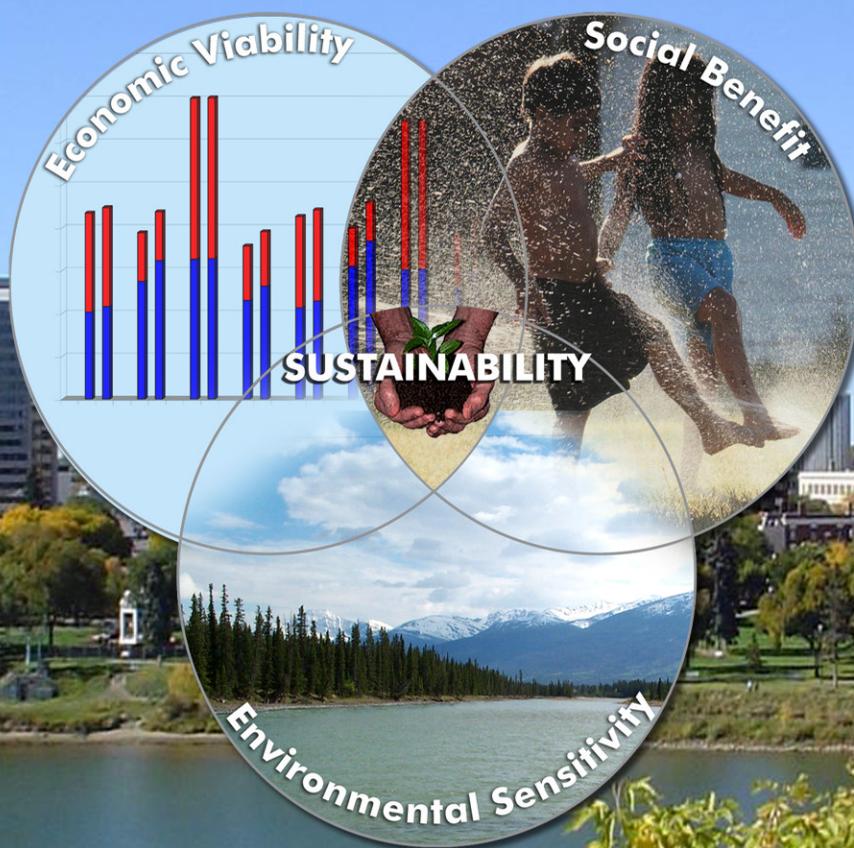


# SASKATON WASTE AND RECYCLING PLAN OCTOBER 2007



October 2007  
95438 (03)

City of Saskatoon  
Environmental Services Branch  
1030 Avenue H South  
Saskatoon, SK S7M 1X5



*City of*  
**Saskatoon**

## **CITY OF SASKATOON**

# **WASTE AND RECYCLING PLAN**

**Prepared for:**

City of Saskatoon  
Environmental Services Branch  
1030 Avenue H South  
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### Public Advisory Group

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## EXECUTIVE SUMMARY

We don't often think of where our garbage goes, yet collecting garbage, providing recycling and yard waste composting facilities and managing the Saskatoon Landfill are one of the largest and most costly services provided by the City of Saskatoon. The City recognized that unharnessed opportunities existed, to reduce the amount of waste being disposed in the landfill, and improve Saskatoon's environment, today and into the future.

The development of a Waste and Recycling Plan for the City of Saskatoon has been an extensive process driven by the City's commitment to a sustainable plan for the future of solid waste management within the City and the desire to engage all relevant stakeholders and the public at large. In order to develop a Waste and Recycling Plan that would provide the direction and tools to successfully manage solid waste for the next 20 years, the City recognized that a careful integration of vision and possibilities would need to be achieved:



The new Saskatoon Waste and Recycling Plan has been developed through a comprehensive examination of the current waste management programs in Saskatoon along with extensive research, consultation and input from the community. Born out of a comprehensive set of guiding principles for the City as an organization and the community as a whole, the Waste and Recycling Plan has a strong focus on waste diversion and increased public awareness. It combines new and existing opportunities for Saskatoon to significantly reduce the amount of waste that is disposed to landfill each year.

The Plan proposes many new opportunities for residents to reduce, reuse and recycle more. A summary of the programs include:

- a new way to pay for garbage collection – the less someone throws away, the less they pay;
- curbside collection of recyclables, and later of yard and food waste;
- new, specialized facilities to process additional recyclable materials, including yard and food waste as well as construction and demolition waste; and

- education and awareness programs to help residents adjust to the changes and improve recycling.

The City recognizes that this “way forward” will evolve as programs are implemented. The City is excited to partner with stakeholders and the public alike to achieve the objectives of the Plan. Through a joint commitment to cooperative effort, the City and its residents will achieve the Plan’s vision.

## TOWARDS A MORE SUSTAINABLE SASKATOON

One of the main reasons the City embarked on the development of the Saskatoon Waste and Recycling Plan was to engage the public and determine what services the residents and businesses of Saskatoon desired to meet their level of environmental commitment. While the City recognized that many residents were interested in enhanced waste reduction and recycling opportunities, it was important that a plan be developed that would be comprehensive, addressing the needs of residents, businesses and industry, and as effective as possible, by supporting other initiatives being undertaken by the City to enhance Saskatoon's sustainability as a community.

Other initiatives being developed by the City include:

- An Environmental Management System – The City is designing and implementing an Environmental Management System (EMS) for all City departments. An EMS is a system to reduce environmental risks that will work to achieve environmental objectives by providing a formal structure to document and improve environmental performance.
- An Energy and Greenhouse Gas Management Plan - The City and Road Map 2020 are working together to engage the community on ways to better manage energy and lower greenhouse gas emissions. Road Map 2020 is a local non-profit organization whose members represent a variety of sectors in the community, all working to make Saskatoon more sustainable.
- The Natural Step is being considered by the Administration. The Natural Step system provides a clear, compelling, science-based definition of sustainability and a practical strategic planning framework to help communities and organizations make smart economic decisions to move them step-by-step towards a successful and sustainable future

The Saskatoon Waste and Recycling Plan is one more component that can support the City's vision to become a more sustainable community.

### PLAN DEVELOPMENT PROCESS

The process of developing the Saskatoon Waste and Recycling Plan began formally in August 2006. The City recognized that while their waste collection and landfill services functioned efficiently, there were few opportunities for waste diversion from landfill available to residents and businesses in the City. The depot system required considerable effort on the part of residents to transport materials to depots for recycling, and the range of materials that could be accepted was limited. Businesses also were challenged to find extensive recycling and waste diversion options.



“The City recognized the need to update our Waste Management Strategy. The process we selected included extensive public consultation to define goals, set waste minimization targets and evaluate waste management options.”

- **Sheri Praski, P. Eng**

**Manager of Environmental  
Services Branch**

The development of a Waste and Recycling Plan for the City of Saskatoon has followed a comprehensive process designed to set new direction for the City of Saskatoon with a focus on leadership in environmental stewardship. This process is founded on the engagement and involvement of key stakeholders and the public, who have been instrumental in the development of the proposed plan. Integral to this process was the establishment of three Advisory Groups:

- Public Advisory Group – made up of 12 members of the public selected from a City-wide recruitment process
- Technical Advisory Group – comprised of key waste management and recycling partners, along with private sector stewardship agencies
- Local Government Group – representing the departments across the City administration, as well as 2 Councilors and a representative from the Rural Municipality of Corman Park

The role of the Advisory Groups was to provide input and representation for the wider community, and to share ideas and knowledge in developing the Waste and Recycling Plan. The groups took part in a number of workshops and meetings, reviewed reports, and made recommendations on how to move forward. Every major decision made by each group involved a democratic process which required a majority consensus. Many of the decisions and recommendations in the Plan were identified independently by each group, despite the varied backgrounds, experience and perspective of the members.

The development of the Plan followed a comprehensive process:

- An evaluation of the current system of handling waste in the City was conducted. This included a look at waste collection, disposal and recycling, and a waste characterization study which assessed the components of the waste being sent to the Saskatoon Landfill.
- A set of guiding principles and goals were developed by the Advisory Groups, to set the tone for how the Plan would be developed.
- A Preliminary Options Inventory was prepared, that provided a range of waste management programs that could be considered for implementation in Saskatoon.
- The Advisory Groups selected a range of financial, environmental, social and technical parameters that were used to screen this Inventory, to determine which programs would best suit Saskatoon.
- The preferred options were selected by the Advisory Groups based on this screening exercise, and the preferred options were evaluated in detail using a “triple bottom line” analysis. This evaluation was detailed in the Proposed Options Report.
- Final adjustments to this Proposed Options Report were made, to produce the Draft Waste and Recycling Plan.

***Triple Bottom Line - more than just dollars***

“Triple bottom line” analysis provides a way of evaluating options that takes into account more than just financial cost or value. Environmental and social benefits were also considered while selecting options in order to provide a more holistic understanding of what should be included in the Plan.

- Extensive public consultation on the Draft Plan was undertaken by the City in May 2007, including 6 open houses, media advertising, production of a newsletter and circulation of a survey, to gather more public input on the Draft.
- Changes to the Draft were made on the basis of the input from the public, and the Advisory Groups were given an opportunity to have a final review of the Plan.
- Plan Adoption by Council

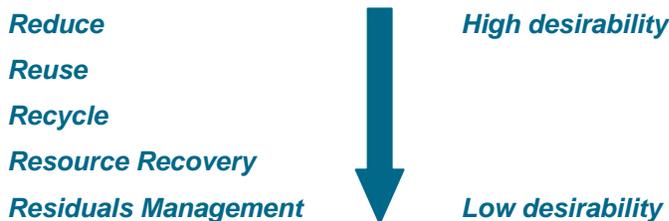
This version of the Plan represents the outcome of the past 10 months of effort on the part of the Advisory Groups, the City Administration, and the input from the public during the public consultation campaign. Adoption by Council will pave the way for implementation, beginning in 2008.

## STRUCTURE OF THE PLAN

The Plan has been organized to first provide an overview of the existing waste management system, in terms of waste disposal and recycling services, facilities and policies. Waste disposal and recycling trends, as well as waste characterization help provide the backdrop against which the Plan was developed. Against this background, the guiding principles and goals that formed the basis of the plan's development are outlined.

The bulk of the Plan is based on the programs and policies that will form the basis of how the City of Saskatoon manages waste over the next 20 years, from 2008 – 2028. First, the public education and outreach activities that will support these programs are outlined. The sections that follow organize programs and policies based on the parts of the community that they will affect. Programs that will influence the community as a whole, e.g. development of new facilities, are described first, followed by programs for residents and programs for the Industrial, Commercial and Institutional (ICI) and Construction & Demolition (C&D) sectors of the population. As these sectors will have different needs, the implications of the Plan are discussed for each group, to help put the changes in context.

Program selection has also been guided by the waste management hierarchy or "5 Rs" principle – Reduce, Reuse, Recycle, Resource Recovery and Residuals Management.



This hierarchy is a guide to the relative environmental benefits of different waste management options. While the options relating to the top of the hierarchy can be very good strategies, it is recognized that no

single element on its own can offer a total solution. The Plan therefore reflects a balance between various waste management options, all aimed at minimizing the impact that waste has on the environment.

For each group, programs are organized in phases to divide the 20-year time frame into more manageable segments. Within this period, there are four implementation phases that have been formally defined.

- Phase 1 – this would represent the first year following adoption of the Plan, and will build on existing programs, as well as be a transitional period as the City works towards more sweeping changes in subsequent phases.
- Phase 2 – covers the next 2 to 5 years following Plan adoption, and involves more significant changes to the waste management system, with a focus on increased recycling
- Phase 3 – covers the period 5 – 10 years after Plan adoption, and targets the organic component of the waste stream for diversion.
- Phase 4 – covers the next 10-20 years after Plan adoption, with a focus on exploring waste-to-energy options, as well as continued improvement of programs established in earlier phases

It should be noted that the inclusion of a particular program or policy in a phase provides an indication of when that program or policy will be **initiated**; however, some programs may begin in one phase with preparatory steps, but not be fully complete until a later phase. In addition, some programs represent more permanent change, and will be expected to continue for the life of the plan and beyond, once they are initiated.

### Getting the Most Out of Reading this Document

While there is a considerable amount of information contained in the entire Plan, the document is organized to help readers with different interests find the information they need as easily as possible:

- If you are interested in how programs will affect you as a homeowner and resident in Saskatoon, focus on the “Programs for Residents” section first, which covers the programs and services for your home.
- As a business owner, you should check out the “Programs for Business, Industry and Institutions” section for issues that may relate to your business.
- Are you an entrepreneur looking for a new business opportunity? – have a look at the “Programs for Everyone” section to see where new facilities and services will be required to support the Plan.

We hope that over time you will read the entire document, and be able to achieve an overall understanding of the dramatic improvements to the environment that implementation of this Plan will make to the city of Saskatoon, today and into the future.

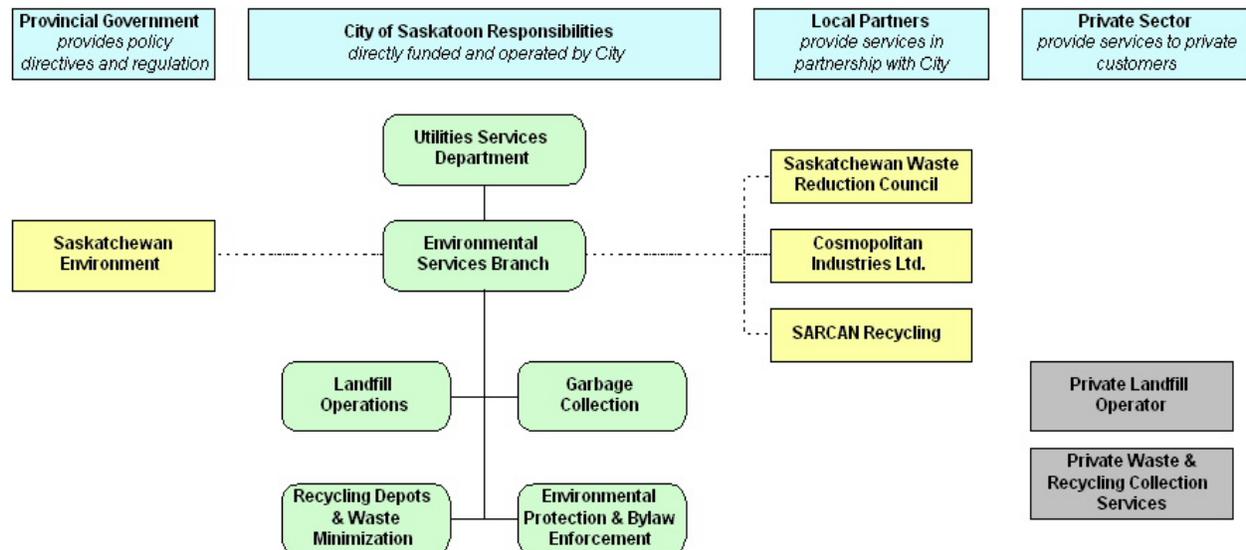
## THE CURRENT WASTE MANAGEMENT SYSTEM

The waste management system refers to the network of facilities, services and policies that together provide waste and recycling collection and waste disposal services to the residents and businesses in the city of Saskatoon.

### ROLES & RESPONSIBILITIES IN WASTE MANAGEMENT

Both the City and the private sector have responsibilities in the waste management system. Other organizations, such as SARCAN Recycling, Saskatchewan Environment and the Saskatchewan Waste Reduction Council also provide support to the waste management system. The figure below outlines how these roles and responsibilities for waste management vary between organizations.

**Figure 1: Waste Management Roles and Responsibilities**



### WASTE MANAGEMENT POLICY

Waste management policy comes from two main sources - the City's Waste Bylaw, and the Province of Saskatchewan, through Saskatchewan Environment.

#### Waste Bylaw No. 8310

This bylaw makes provisions for the storage, collection, handling and disposal of waste within the City limits. Different sections of the bylaw address specific concerns with respect to the different waste generation sectors – Residential; Commercial, Institution and Industrial; and Construction and Demolition (C&D). This bylaw also determines fees and charges for waste disposal, such as tipping fees at the landfill. The

City's bylaw works in conjunction with any applicable provincial or federal legislation pertaining to the management of waste.

### **Saskatchewan Environment**

At the provincial level, the Government of Saskatchewan, through Saskatchewan Environment (SE), has the responsibility for the overall regulation of waste management in the province. SE is responsible for developing overall provincial direction for waste management, and providing guidance to municipalities as they implement waste management initiatives. As part of this responsibility, SE creates legislation to govern particular types of waste, e.g. paint and some hazardous waste, so that these materials are managed with the support of their manufacturers, rather than through public funds.

Saskatchewan Environment also permits and inspects waste disposal facilities. The Saskatoon Landfill site has a permit to operate from SE, which dictates the amount and types of waste which the facility can accept for disposal.

### **WASTE MANAGEMENT SERVICES & FACILITIES**

The City is the primary agency responsible for waste collection in Saskatoon. The City uses a predominantly automated waste collection system for collection from residential and commercial sites. The City currently provides Saskatoon with waste collection services using the following vehicles:

- One rear-loader packer truck
- Three front-fork loader trucks
- Thirteen automated side-loader trucks.

The fleet is used exclusively for waste collection, with the exception of one front-fork loader which is dedicated to the collection of recyclables from depots.

Residential waste is collected weekly in the summer months, and bi-weekly during the winter. Collection service is provided through a combination of service types:

- Back-lane collection of 300-gallon polyethylene containers, which are shared between 3 – 4 households in single-family dwelling unit neighbourhoods
- Front street or back-lane collection of 100-gallon polyethylene roll-out carts, which are assigned to individual single family dwelling units
- Apartment-style building service of privately owned metal bins serviced by the City
- Privately owned metal bins provided and serviced by private waste management contractors

The City of Saskatoon is one of several organizations providing collection service to commercial businesses. These businesses may contract with the City for service of privately-owned or City-rented bins, or enter a contract with private haulers who provide bin rental and collection service. Some private haulers may also provide additional collection to apartment style buildings which require more frequent service than once per week.

Private waste collection service providers may also involve specialized waste collection service, e.g. commercial cooking grease collection. One of the private waste haulers in Saskatoon, Loraas Disposal, also operates a private disposal facility to the north of the City, which it uses to dispose of some of the waste it collects.

### **Saskatoon Waste Management Centre**

The Saskatoon Waste Management Centre, commonly referred to as the landfill, is the primary waste disposal facility for the City of Saskatoon. In 2001, the City took the initial steps towards upgrading the landfill as a regional waste management facility by developing additional public services, such as a residential waste drop-off area and a range of recycling facilities. Figure 2 shows waste being disposed of at the transfer station at the landfill.



**Figure 2: Residential Drop-off Transfer Station at Saskatoon Landfill**

Improvements in the landfill infrastructure have included construction of a groundwater control system and the expansion of the landfill mound to the south. This flat graded area has a liner system and leachate collection system in place below the ground. Figure 3 below shows the new south cell.



**Figure 3: Expanded Landfill Cell “H”**

## **RECYCLING SERVICES & FACILITIES**

The City operates six recycling depots where residents can drop off a range of recyclable materials. The locations are as follows:

- Lawson Heights Mall – 134 Primrose Drive
- University Heights Recycle Centre - Lowe Road
- Lakewood Civic Centre – 1635 McKercher Dr
- City of Saskatoon Landfill – Dundonald Avenue, 1.1 km south of 11th Street
- Meadowgreen Recycle Depot – corner of 22nd Street W and Witney Avenue
- Edmonton Avenue & Avenue P Recycle Depot

These depots accept newsprint, corrugated cardboard, mixed papers, tin cans, milk jugs and cartons, and non-refillable beverage containers. City collection vehicles provide collection and delivery of all paper products to Cosmopolitan Industries for processing as well as the collection of tin cans for recycling. Beverage containers and other recyclables are collected from the depots by the recycling processors directly.

The City also operates two windrow composting areas, in partnership with the Saskatchewan Waste Reduction Council (SWRC). The facility on the Westside is at the intersection of Highway 7 and 11<sup>th</sup> Street, while the Eastside location is at McOrmond Drive, just north of 8th Street East. These sites provide seasonal residential drop-off facilities for yard waste, and are used by the City to compost materials collected from the public through the leaves and grass subscription program.

Together with the SWRC, the City also operates the Compost Demonstration Site, located in City Park Community Garden. The

Compost Demonstration Site provides examples of home composting opportunities, including free seminars for the public.

There are also numerous paper recycling bins at various commercial locations, e.g. malls, supermarkets, where residents can deposit paper and cardboard for recycling. Recycling bins provided for pedestrian traffic are located throughout the Business Improvement Districts (BIDs), the service of which is currently contracted with a private company. A user pay subscription-based seasonal leaves and grass collection service is also provided by the City, whereby residents can sign up for an additional cart to be used for diverting these materials from the landfill.

The Saskatoon Waste Management Centre also provides some recycling opportunities. The site provides collection areas for recyclables including scrap metals, propane tanks, automotive batteries, automotive engine oil, filters and containers, newspaper and cardboard, beverage containers, and leaves and grass. Residents can also drop off white goods and appliances. Those containing refrigerants and mercury switches have these removed before they are recycled.

Cosmopolitan Industries Ltd. holds a contract with the City for the recycling of several grades of paper, as well as corrugated cardboard. The company operates a paper sorting facility in Saskatoon, and is responsible for marketing its recovered paper. Cosmopolitan Industries is affiliated with the non-profit sector, and provides training and employment opportunities for persons with special needs.

SARCAN Recycling also provide drop-off recycling services in the city for a range of materials including food and beverage containers, dairy containers, paints, and electronics.

Saskatoon Curbside Recycling (SCR) offers a privately operated curbside recyclables collection service to residents of Saskatoon. The company works in partnership with SARCAN Recycling and Cosmopolitan Industries Ltd. in the provision of the service. SCR provides four-stream recyclables collection using a combination bin and bag system.

**Figure 4: Recycling bins at a City of Saskatoon recycling depot site**



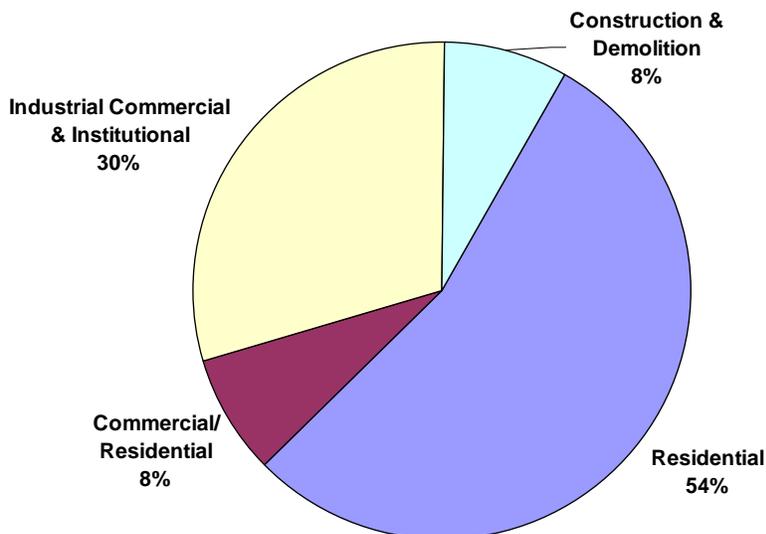
## SASKATOON WASTE CHARACTERISTICS

A critical element in developing new options for reducing the amount of waste that goes to the Saskatoon Landfill is to have an understanding of what is currently disposed at the site. A Waste Characterization Study was undertaken in 2006 to provide a baseline picture of the amounts and types of waste currently going to the landfill, based on two direct sorting events, once in August 2006 and once in November 2006. To augment this, data was also compiled using statistics from the City to provide a historical picture of waste disposal and recycling in the City. Landfill operation records and a direct waste sorting program were used to specifically examine waste being disposed in the landfill.

### Waste Composition & Sources

Waste delivered to the Saskatoon Landfill comes from a variety of sources, as shown in Figure 5 below.

Figure 5: Sources of Waste at Saskatoon Landfill



This is important to note, as different programs will be needed to focus on these various portions of the waste stream. The following sections discuss the characteristics of these different types of waste.

Waste composition was determined by two manual waste sorting events in 2006, one in August and one in November. Samples were collected from a variety of neighbourhoods across the City, based on the garbage collection routes of the City's trucks, as well as from private collection vehicles servicing commercial customers.

Figures 6 and 7 on the following page show the percentage composition by weight for the residential and commercial waste streams, using the August 2006 waste sort data.

Figure 6: Residential Waste Composition (%) in August 2006

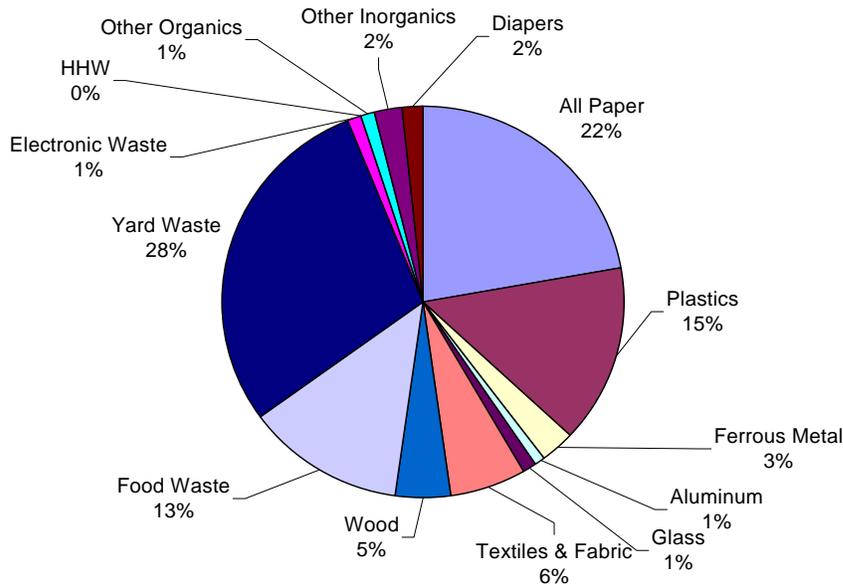
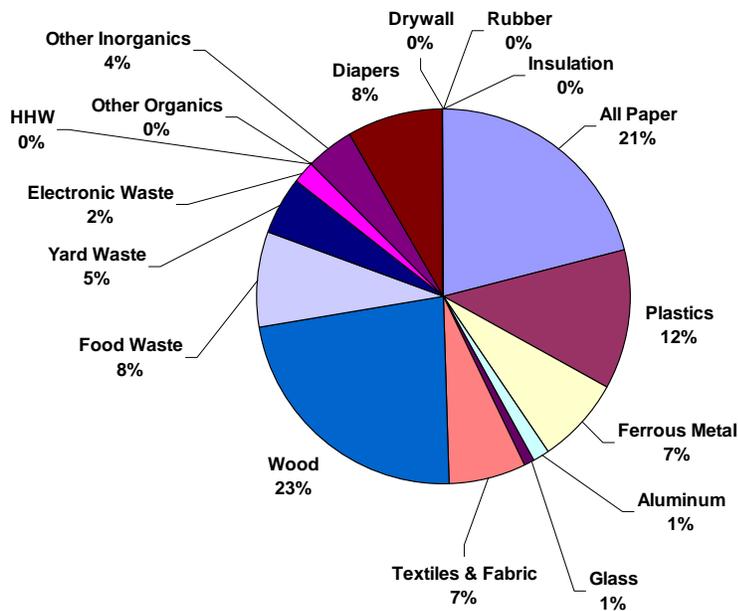


Figure 7: Industrial, Commercial & Institutional Waste Composition (%) in August 2006

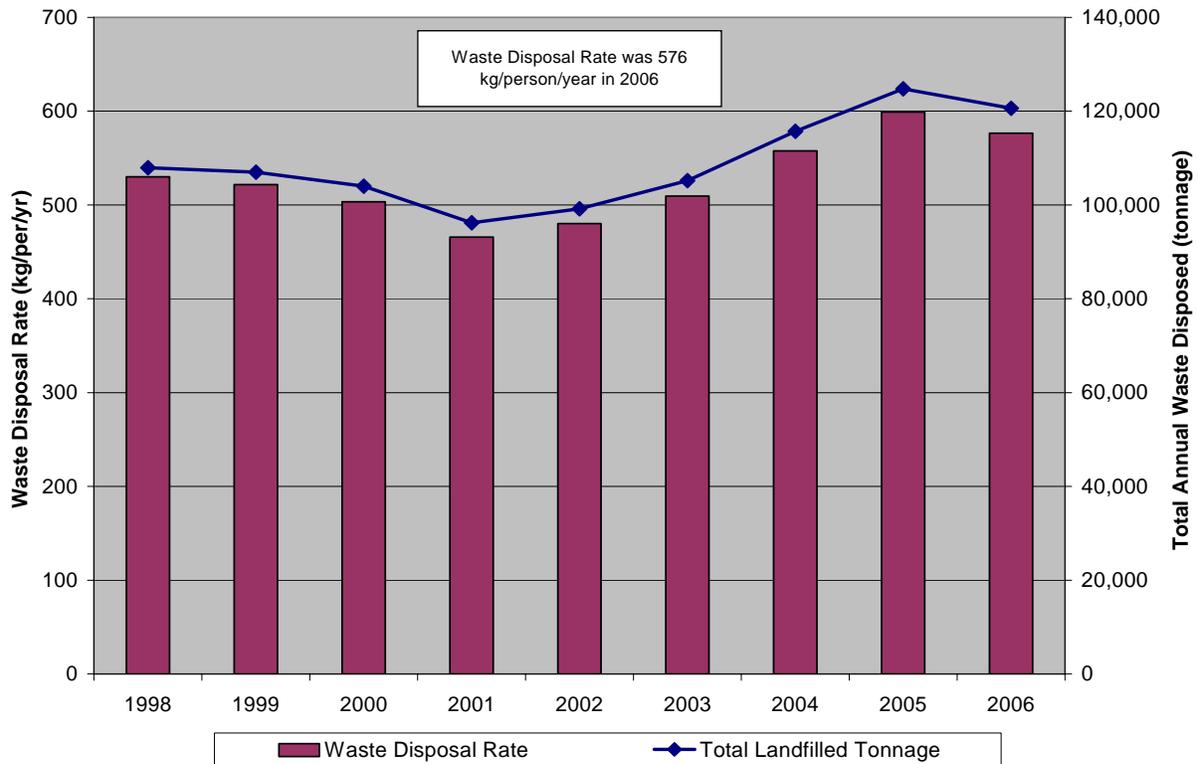


### Waste Disposal Trends

Waste disposal quantities at the Spadina landfill were collated for the period 1998 to 2006, based on the Geoware software and database used in operation of the weigh scales at the site. However, it is recognized that total waste quantities will vary up and down as

population changes, or as particular activities occur within a given year. To provide a better measure of how waste is being disposed, the **waste disposal rate**, which is the rate of disposal per person per year, was also calculated, based on the population and the total waste disposal tonnages for each respective year. Both sets of information are shown in Figure 8 below.

**Figure 8: Waste Disposal Rate and Total Disposed Tonnage for Saskatoon, 1998 – 2006**



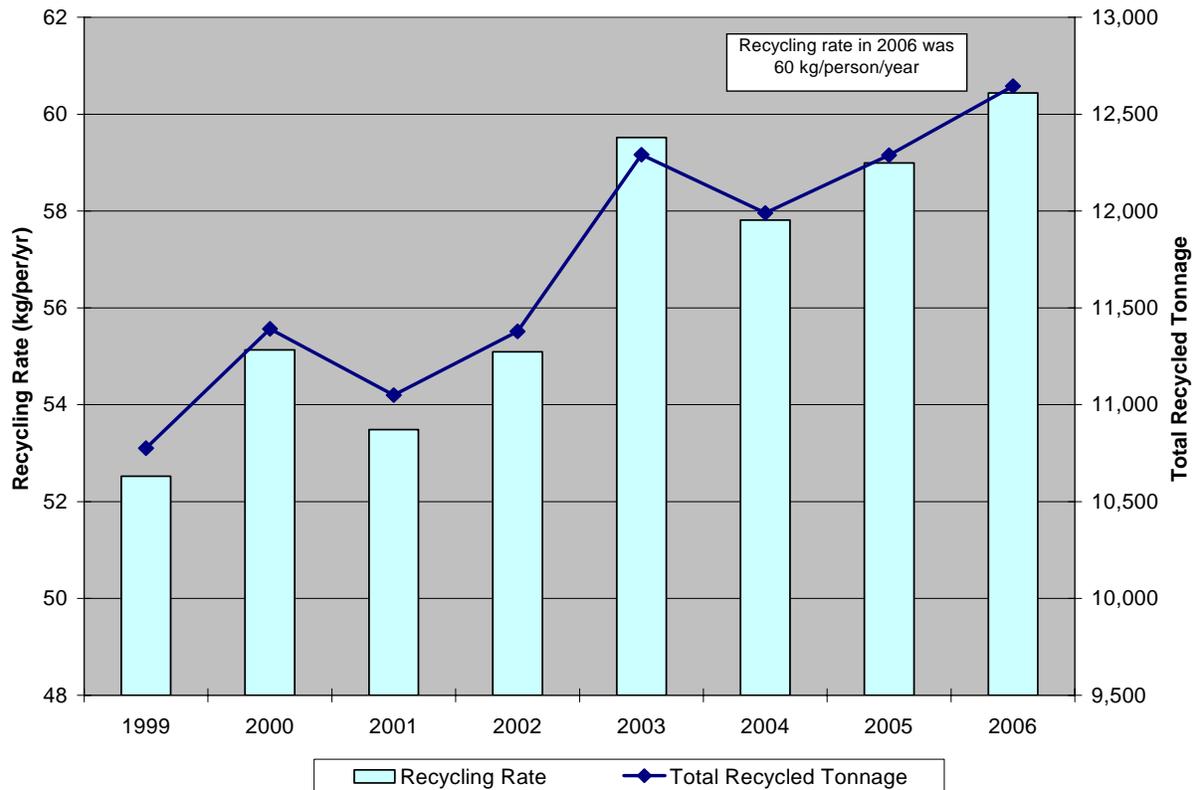
## Recycling Trends

As the Waste and Recycling Plan has been developed with the primary focus of diverting more waste from the landfill, it is also important to consider how much waste is currently being recycled. As with waste disposed, total recycling quantities, as well as the recycling rate per capita were determined for the period 1999-2006, based on the following:

- Recycling activities considered include recycling at the landfill, recycling through the City of Saskatoon Depots and recycling through SARCAN Recycling and Cosmopolitan Industries
- Composting of yard waste is also counted in the recycling rate calculation

The recycling rate trend for the city is shown in Figure 9 on the following page.

Figure 9: Recycling Rate and Total Recycling Tonnage, 1999 – 2006



### Waste Diversion Rate

The waste diversion rate can be thought of as the percentage of the total amount of material that is diverted from landfill disposal, relative to the total amount both diverted and disposed. For 2006, the waste diversion rate was calculated using the following data:

Total Recycled + Total Composted = 12,645 tonnes

Total Disposed = 120,600 tonnes

Waste Diversion Rate =  $12645/120600 = 10\%$

Based on this waste diversion rate, it can be seen that there is significant room for improvement to increase the level of waste diversion in Saskatoon.

## **GUIDING PRINCIPLES, GOALS AND SUPPORTING CONCEPTS**

The Waste and Recycling Plan was developed against the backdrop of the existing waste management system and its performance. One of the first tasks in developing the Plan was the establishment of a set of guiding principles and goals, to provide a foundation for the overall direction of the Plan, and to identify both short and long-term targets.

The following goals, philosophies and ideas were generated through the workshop sessions with the three Advisory Groups.

### **GUIDING PRINCIPLES**

Guiding principles are high-level principles which are intended to influence the entire direction of the Plan, by providing a framework for how decisions are made. They do not relate to specific timelines, and will remain valid throughout the implementation of the Plan. The following Guiding Principles were identified:

#### **Education and Awareness Building**

Education and awareness building are essential elements to influence behavior, and will therefore be of critical importance to the success of the Plan, since many of the programs in the Plan rely on changes in the behaviours of the citizens of Saskatoon – whether at home, at work or both – in order to succeed. The City will support a comprehensive education and awareness building program, based on a community based social marketing approach to waste reduction. Social marketing refers to the use of a range of strategies to encourage new behaviour, specifically the participation in waste management programs and improvements in waste reduction.

Four key steps will be applied:

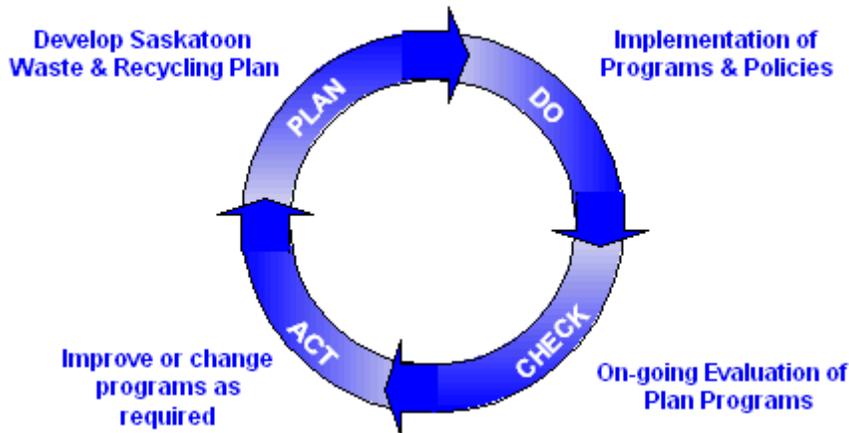
- Identifying barriers and benefits of the proposed changes
- Developing a strategy that utilizes tools that have been shown to be effective in changing behaviour
- Pilot-testing the strategy to refine operations prior to wide-scale implementation
- Evaluating the strategy once it has been fully implemented across the community

Social marketing approaches for waste management may include workshops, demonstrations, outreach activities, awards and competitions. Where appropriate, these strategies will be supported by more traditional educational tools such as public service announcements, brochures and web-based information using the City's website, as well as information provided by other partners such as environmental organizations and community groups around the City.



## Continuous Improvement

Having continuous improvement as a guiding principle of the Plan creates a useful framework for long term implementation of the Plan. Continuous improvement is based on the “Plan, Do, Check, Act” cycle where a cyclic approach is taken for planning, implementation, performance monitoring, and program improvement or change.



In the context of waste management, the “Plan” component of the cycle will begin with the development of the Saskatoon Waste and Recycling Plan. Implementation of the programs and policies outlined in the Plan will represent the “Do” phase. To support the “Check” phase, ongoing evaluation of all Plan programs will be carried out by the City. The effectiveness of programs will be monitored and reported to City Council and the public. Under the “Act” stage, programs that are not operating successfully will be reassessed by City staff and appropriate action recommended to improve or change the programs to produce better results

By making the continuous improvement philosophy a part of the Plan, resource allocations to support Plan implementation and improvement can be better supported. Rather than setting a finite goal, the idea of continuous improvement also provides a constant target or “rallying point” to refocus efforts of the citizens of Saskatoon towards improving the success of programs.

## Enable Waste Management Goals through Partnerships

The City will look for potential opportunities to support their waste management goals through innovative partnerships with private sector stakeholders. The programs recommended for implementation in the Plan will require services to be provided. This represents a number of opportunities for local businesses to become involved in the provision of these services. The City will work with the private sector community to identify services required, and will be open to consider private sector partners that offer practical, financially responsible and viable options for the provision of these services.

The City will also consider the adoption of policies to enable private investment in locating waste management facilities in Saskatoon. Consideration will also be given to how existing City policies might impact or be impacted by policies of other jurisdictions. This will be supported by on-going communications with other municipalities, as well as opportunities to share resources and expertise to support policy alignment.

### **Support for User Pay Philosophy**

Implementation of a user pay system, wherever possible and appropriate, is a critical step in working towards individuals taking greater responsibility for managing the amount of waste they produce. The predominantly taxation-based fee structure that currently funds the City's waste management system does not support waste reduction goals, as costs are fixed and the true costs of waste management are not apparent to most system users. In addition, where program costs to the user are fixed, there is little financial incentive to change behaviours, e.g. to increase levels of recycling.

The City will develop its programs so as to shift funding responsibility from general taxation towards user pay systems. Solid waste management services are often better structured on a user-pay basis where residents and businesses pay on the basis of how much waste they generate for disposal rather than a flat fee. This fee structure also encourages waste reduction, and recycling. In addition, provided that tipping fees are set at realistic levels, other waste diversion services can be offered at lower costs than garbage disposal.

### **Leadership and Innovation**

The City of Saskatoon is already home to a number of innovative companies who are at the leading edge of their respective fields. This culture of innovation can be harnessed in the context of waste management, as a rallying point for the public to become more involved in the new waste management programs. The implementation of the full range of programs within the Plan will provide Saskatoon with an opportunity to show leadership and innovation with respect to waste management.

### **Improvement in Quality of Life for Citizens**

The Plan will work towards an improvement in the quality of life for the citizens of Saskatoon and develop a waste management program of which the citizens of Saskatoon can be proud. Not only will the Plan represent a new era for waste management in the City, it will also provide a basis for considerable improvements in the environment of Saskatoon, protecting it for present and future generations.



## PRIMARY GOALS

The primary goals that have been identified are more focused, and address specific directions that will be supported throughout the implementation of the Plan. Timeframes for achievement of these goals will be established through implementation of the Plan.

### Adoption of a Zero Waste Goal

Zero Waste is an overarching philosophy to help guide the approach to managing waste and designing waste management programs, so as to focus on how to reduce and reuse waste. Zero Waste is akin to “Accident Free” or “Zero Tolerance” policies that set an overall tone for how an organization conducts its business.

Zero Waste goes beyond recycling by taking a “whole system” approach to the flow of resources over their whole lifetimes. This could include redesigning a product to use fewer raw materials, or finding new markets that use waste as an input to a process, so that the waste becomes a resource rather than a problem. On a personal level, it could involve changing purchasing habits to avoid buying items with excess packaging. Zero Waste does not mean that no waste will be landfilled or produced, but that the City will strive to reduce the waste going to landfill by adopting aggressive waste reduction policies.

By considering Zero Waste as an overall philosophy, the City can focus on reducing waste disposal per capita by increasing awareness and participation in waste diversion programs. The City will also be more synchronized with the direction of other large municipalities across Canada, and demonstrate leadership within the province.

### Support Product Stewardship Programs and Extended Producer Responsibility

While locally implemented programs can have significant effects, another effective way to promote reduction and reuse is to encourage provincial and federal policy-based programs for waste management. To this end, the City will:

- Support the continuation and expansion of product stewardship programs implemented at the provincial and federal levels
- Support extended producer responsibility and Design-for-Environment initiatives that encourage or regulate manufacturers to use recyclable and recycled packaging materials and discourage excessive packaging.
- Lobby senior levels of government to implement policy to expand extended producer responsibility programs within Saskatchewan and Canada, particularly those that focus on packaging waste.

Product Stewardship is a policy approach in which the producer’s responsibility for managing the environmental impact of their product is extended across the whole life cycle of the product, from selection of materials and design to its end-of-life. This means that the producers

#### **Zero Waste – A Growing Concept**

Communities that have adopted Zero Waste include Halifax, Toronto and Seattle. In BC, there is strong Zero waste movement; the City of Nelson, as well as the Regional Districts of Nanaimo, Cowichan Valley, Central Okanagan and Kootenay-Boundary, have all adopted a zero waste goal.

#### **Product Stewardship in Action**

A good example of this type of program is the used-oil management program where producers provide a product take-back service so that the public can return used oil, filters and containers for recycling.

and consumers have financial responsibility for the products from production to final disposal, so that the cost of managing this waste is not borne by city government and local taxpayers.

In Saskatchewan, Product Stewardship is regulated by the Provincial Government, which works with producers to develop stewardship programs for various materials. There are already programs for items such as beverage containers, milk containers, used oil, used tires, paint, agricultural scale pesticides, and an electronics stewardship program was recently launched in February 2007. The province is also working on a multi-material stewardship initiative, which would target plastic, glass, tin and paper packaging materials.

Support for and continued lobbying of the Provincial Government to expand the list of products governed by Product Stewardship regulations would mean that even more items could be managed through stewardship programs and diverted from landfill. This in turn will reduce the financial burden for the City associated with managing these items.

#### **Product Stewardship in Action**

Since the scrap tire recycling program began 10 years ago, 8,000,000 scrap tires have been removed from the waste stream.

Since 1996, approximately 127 million litres of used oil, 14 million used oil filters and 1.5 million kilograms of empty plastic used oil containers have been recycled in Saskatchewan.

### **The City of Saskatoon will “Walk the Talk”**

The City will commit to implementing strong waste diversion programs and policies within the organization itself, to publicly demonstrate its own dedication to supporting the zero waste philosophy. A base level of services will be implemented in all municipal departments and facilities, along with department-specific programs where appropriate. Examples could include the use of City-generated compost on public garden beds, parks and sports facilities, or the use of recycled crushed concrete and asphalt as aggregate for road repair activities.

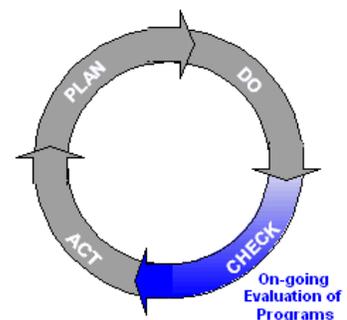
## **SUPPORTING CONCEPTS**

The concepts in this third group relate more specifically to the administration of the Plan, and will influence implementation planning.

### **Performance Measurement**

Ongoing evaluation of all Plan programs will be carried out by the City. The City will commit to adoption of a standard methodology for measuring the performance of its programs and policies implemented under the Plan, and to benchmark performance in the context of the Zero Waste and Continuous Improvement guiding principles. The City will encourage private waste management and recycling operators to adopt the same methods for waste tracking and reporting, so that results can be standardized across the City.

The effectiveness of programs will be monitored and reported to Council and the public. Tools for evaluation will include periodic waste composition studies, to determine whether materials targeted by particular programs are being successfully removed from the disposal stream.



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## **Reporting and Recognition**

The City will embrace an open and transparent process for the planning and implementation of programs under the Plan. In keeping with the supporting concept on Performance Measurement and Reporting, the City will also create a framework to obtain continual feedback from the public. Where appropriate the City will also utilize other tools to measure public satisfaction with programs, or determine ways to improve program delivery.

The City will support and recognize successes in waste management, including good efforts by individuals, businesses and other organizations who demonstrate their support for the waste management programs and philosophies of the Plan.

## **Commitment to Stay the Course**

Recognizing that the time frame for the Plan will be a twenty-year period, the City will commit to maintaining its support of the Saskatoon Waste and Recycling Plan, through a practical and fiscally sound approach to program implementation.

## **PUBLIC EDUCATION & OUTREACH ACTIVITIES**

Since education and awareness building is a guiding principle for the Plan, all of the options to be included in the Plan will include an integral education component. To lead these efforts, the City will hire a Waste Reduction Education Coordinator (or similar title) to be responsible for the planning and delivery of public outreach and engagement strategies focused on waste reduction. As the first of the “5 Rs”, waste reduction will be a key focus of the Waste and Recycling Plan for Saskatoon. Waste reduction most specifically refers to activities that reduce waste at the point of generation, i.e. prevent waste from occurring in the first place. In the context of the Plan, these waste reduction activities relate primarily to education and outreach strategies that focus on different approaches to handling materials and avoiding waste production, as close as possible to the point of generation.

Public engagement and outreach strategies will target the whole city broadly, as well as focus on particular groups or issues that may warrant specific attention. In Phase 1, the focus will be on the continuation of existing programs. In subsequent phases, new initiatives are identified, along with public education and outreach strategies that will be developed and applied to support the other programs and services in the Plan.

### **IN PHASE 1**

The following waste reduction programs are already in place in the City, and will be incorporated in the Plan in Phase 1.

#### **Update & Expand Recycling Directory**

The City of Saskatoon already maintains recycling information on its web site, and produces a “Saskatoon Recycles” brochure. This program would involve the continuation of these efforts, and could be expanded to include the following elements:

- A registration component, so that new companies could register their services electronically and be added to the database
- Printing of the Saskatoon Recycles brochure on 100% post-consumer content recycled paper, and ensuring the brochure is marked as such
- Promotion of the existing Environmental Operations dispatch telephone number could be promoted as the point of contact for those without Internet access, as the person staffing that telephone number would have access to the web-based information

In order to leverage the activities of other organizations, such as the Saskatchewan Waste Reduction Council, the City will also provide links



from its website to other sources of recycling information, to maximize the amount of information available to residents.

### **Expand Waste Reduction Calendar**

The City already provides a waste collection calendar to inform residents about their waste collection days. This publication could be expanded to include information about yard waste composting, as well as any other waste reduction events planned for the year such as hazardous waste round-ups, compost programs or other special events. A two-year publication cycle would reduce the amount of paper used for calendar production, and lower the amount of out-of-date calendars disposed each year. Over time, the option of cost sharing with other departments to spread messages about water conservation, road works, energy conservation or other activities will be considered.

### **Promote and Facilitate Existing Reuse Opportunities**

Reuse supports the overall direction of reducing the amount of waste being disposed in the landfill by providing opportunities for usable items to have a longer useful life. The City is already involved in supporting reuse activity through the promotion of reuse opportunities for items such as furniture and clothing on the City's website. In Phase 1, the City will further support material reuse by more actively promoting reuse opportunities for a wider range of items, including used building materials.

The City would expand the existing reuse promotion section of the web site to facilitate a City-wide materials exchange, and may allow residents to post items available for reuse, in an on-line classified format. Alternatively, the City may promote existing web-based recycling and materials exchanges, rather than duplicating efforts. Posting opportunities will also be made available to both residents and businesses, to maximize the types and quantities of materials that could be exchanged. This program would create increased awareness across the community about reuse options.

In keeping with the concept of the City as an enabler to support the Plan, the City would also be involved in identifying particular organizations working in the material reuse sector, and work with these stakeholders to identify how best to support their operations. Private sector organizations have also developed on-line materials exchange/classified listings, which will also be supported by the City.

## **IN PHASE 2**

### **Develop Public Displays on Waste Reduction**

This would involve hosting of displays at public events such as spring and fall home shows, recreation shows and fall fairs. This program would enhance the visibility of the waste reduction and diversion initiatives being undertaken, and provide the public with opportunities to ask

#### ***Ways to Reuse***

- Swap items with friends, neighbours and colleagues
- Take a reusable coffee mug to work, and use it!
- Participate in a paint exchange program, to use someone's excess paint for small jobs around the house

questions and get additional information. This program would need a set of good quality display units developed on key programs, and staffing resources to attend the events.

### **Develop Illegal Dumping Prevention Program**

Illegal dumping of waste is a concern in the City, particularly in locations just outside the City limits. Educational programs that discourage illegal dumping would be developed, with a focus on highlighting proper disposal options, and environmental problems associated with illegal dumping. This program would need to be supported by enhanced enforcement resources through the Environmental Protection Officers.

The City could consider allocating funds to support clean-up of illegal dump sites in and around the City. Funds would be provided for volunteer groups, e.g. hockey teams, community organizations, etc. to apply for a “Clean Up Grant” as a fund-raising opportunity. The group or the City would identify an area to be cleaned up, and the community group would provide the volunteer labour for the clean-up event. City funds would go towards providing a small amount as a fund-raising grant to the group, as well as supplying equipment, time, refuse bins for the work, transport of waste to the landfill once the area has been cleaned, and waiving tipping fees for the material.

### **Initiate Smart Shopper Consumer Awareness Program**

This program would focus on providing individual consumers with guidelines on how to be “smart shoppers” from a waste reduction perspective. It would focus on ways for consumers to change purchasing habits to reduce waste, by encouraging bulk purchasing, purchasing materials with recycled content, selecting products with recyclable packaging, etc. This program would be aimed at educating the public by making them aware of how their actions can contribute towards solid waste reduction.

### **Promote Grasscycling Program**

Grasscycling is the natural recycling of grass by leaving clippings on the lawn when mowing. Grass clippings will quickly decompose, returning valuable nutrients to the soil. The City would promote grasscycling as a waste reduction strategy to reduce the amount of yard waste requiring composting. The program would be supported by demonstration projects whereby visible grass or lawn areas, e.g. in a municipal park, could be cut with mulching mowers and grasscycling practiced, with appropriate signage to highlight the project. Educational material advising residents how to go about grasscycling would also be developed and provided. To support this program, the City would also offer a rebate program, whereby residents purchasing a mulching mower to allow them to grasscycle would apply for a rebate to offset expenses.

#### **WHAT IS GRASSCYCLING?**

*Grasscycling is the natural recycling of grass by leaving clippings on the lawn when mowing. Grass clippings will quickly decompose, returning valuable nutrients to the soil.*

*Grasscycling saves time and money, as is good for the environment since it reduces the amount of yard waste that goes to landfills.*

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## **Develop Waste Reduction Education Program for Schools**

Many resources already exist to provide waste reduction and recycling education information to teachers and students in a school-based setting. Rather than utilize funds to develop specific materials for this, resources could be directed towards providing School Districts with the sources of this material. Support for waste reduction education in schools could be provided through organizing tours of recycling depots or compost demonstration gardens.

The City may also consider the initiation of a school-based environmentally-themed competition, which would involve schools participating in a quiz-based competition and competing for prizes at the various grade levels – elementary, middle school, high school. This would be a good opportunity for the City to enhance the visibility of the waste reduction programs under the Plan.

### **IN PHASE 3**

The public outreach and education programs identified in the previous phases will continue as appropriate into Phase 3 and beyond. As new services are implemented, supporting educational components will be developed and rolled out to the community, to maintain awareness and interest, and encourage strong participation in new waste diversion programs.

## PROGRAMS FOR EVERYONE

There are several elements of the Plan that will function on a City-wide basis to support the broad goals of the Plan and provide the City with better control over the waste management system. These aspects of the plan include new waste management policies to govern how waste will be handled, and new facilities that will be developed to provide services to the community as a whole. This section provides descriptions of how these programs, policies and services will be provided “For Everyone”. They are organized according to their phase of implementation.

### IN PHASE 1

#### Implement Incentive-Based Tipping Fees for Yard Waste

Tipping fees are the charges applied at the landfill for disposal of waste. An **incentive-based tipping fee** is structured to create a financial incentive to encourage new waste management behaviour. High tipping fee rates are linked to the action being discouraged, so that people are encouraged to do the right thing because of financial savings.

This program would decrease tipping fees for sorted yard waste to encourage greater diversion to the yard waste compost sites, so that the tipping fee for yard waste would be lower than that for mixed waste. This would encourage residents to take advantage of the lower cost option. Landfill tipping fees for garbage will need to be elevated to create a sufficient difference in charges to make the yard waste diversion option more attractive.

These lower tipping fees for yard waste would also be in effect at the City’s yard waste compost facility. An increased level of monitoring and quality control will be required at the composting sites to prevent residents from contaminating yard waste with materials that would attract higher tipping fees. This policy is expected to be implemented with the upgrade to the City’s existing yard waste composting sites.

#### Implement Disposal Ban on Paper and Cardboard

The implementation of a disposal ban means that the banned material is prohibited from being disposed in the landfill. Disposal bans are enforced when an alternative avenue exists for handling the banned material, and would be implemented through changes in the City’s Waste Bylaw.

A disposal ban on paper and cardboard would be relatively straightforward to implement, as Cosmopolitan Industries Ltd. already provides an opportunity for paper and cardboard recycling. The banning of paper and cardboard would be phased in over time, so that processing at Cosmopolitan Industries could be expanded as increased amounts of materials were directed there instead of the landfill. While it is not anticipated that new processing facilities would be required to support

#### QUICK FACTS ON INCENTIVE-BASED TIPPING FEES

**Purpose:** *Decrease tipping fees for sorted yard waste to make them lower than for regular garbage*

**Effect:** *Encourages separation of yard waste from regular garbage, so yard waste can be composted and kept out of landfill*

**Target Sector:** *Residential, as well as some Commercial, e.g. Landscape companies*

**Implementation:** *Phase 1*

#### QUICK FACTS ON DISPOSAL BANS

**Purpose:** *Ban paper and cardboard from landfill disposal*

**Effect:** *Encourages separation of these materials for recycling rather than landfill disposal*

**Target Sector:** *ICI sector initially, may extend to all sectors over time*

**Implementation:** *Phase 1 for ICI sector, Phase 2 or 3 for all other sectors*

the implementation of a disposal ban on paper and cardboard, it is likely that additional storage space for paper would be required to hold materials prior to processing.

The City expects to initially focus this ban on commercially generated paper and cardboard. This is because generators in this sector often produce large quantities that can be readily separated and kept clean for recycling. Once easy opportunities for recycling at the residential level are in place, the ban could be extended to include paper and cardboard from the residential sector. The ban would likely be applied to bags or loads of residential waste with more than some minimum (eg. 10%) paper and cardboard content, rather than targeting individual pieces within a load or bag of garbage.

Implementation of a ban on cardboard and paper will require supporting education and awareness building in advance of imposing the bans. Residents and businesses will require time to become accustomed to utilizing the alternatives, and the City should be prepared to transition to full scale bans over time. Enforcement of the bans once in place will also be required, in terms of increased inspections of incoming loads.

### **Upgrade Yard Waste Composting Facility**

The City currently operates a yard waste composting site on McOrmand Road on the east side of the city and at another site on the west side, near the intersection of Highway 7 and 11th Street. Yard waste – leaves, grass, small brush and trimmings – is deposited there and composted. Material from the City's parks and other locations, as well as yard waste dropped off by residents and businesses at the Saskatoon Landfill, are brought to these sites for composting, using simple turned windrows.

In Saskatoon, the two compost sites would utilize the turned windrow system for composting yard waste. Sufficient land area exists at both sites to support this activity. Additional requirements will include a loader or other material handling equipment to be used for turning the windrows, as well as the staffing resources to be involved in running the operation and receiving materials from the public.

Based on the response from the public in the use of the McOrmand Road site in 2006, the City determined that this program would be accelerated, beginning in 2007 rather than 2008. The 2007 activities have included upgrades to both yard waste composting sites, along with increased levels of promotion about the service available.

An educational component will also be required to inform users on the types of material suitable for handling at this location, as good control of



**Figure 10: Yard Waste Composting at McOrmand Road**

the organics coming into the site will go a long way to reduce odour and leachate issues. Educational activities including tours of the yard waste drop off sites, brochures explaining suitable material types, and other public service announcements could be incorporated to support the program.

## **IN PHASE 2**

### **Develop Building Materials Reuse Facility at Saskatoon Landfill**

In reviewing the quantities and types of C&D waste material coming into the landfill, it is known that significant amounts of this material could be reused, however, very little reuse opportunities exist. As a result, a lot of it becomes garbage, because there is no alternative. To address this, the City will identify and designate an area at the Saskatoon Landfill facility to be used for the free drop-off and reuse of used building materials. This area will be staffed, to prevent persons from dropping off waste that should be designated for disposal, as a means of avoiding tipping fees.

In the spirit of identifying partners to achieve the waste reduction objectives, it has been noted that Habitat for Humanity operating in Saskatoon is already involved in building material reuse. This organization may be the ideal partner for the City to develop the building material reuse opportunity, and could support the activity by providing staffing resources at the site. In addition, the organization would be able to take advantage of building materials in its own housing development projects.

On-going promotion of the reuse facility, through the City's website and other communications tools, would be required to encourage participation.

### **Develop Recyclables Processing Facility**

Once materials have been collected via a curbside recyclables collection program (*described on page 35*), there will be a need for a material recovery facility (MRF) for the sorting and processing of the recyclables. A MRF accepts recyclables collected through a curbside program, and further separates, processes and stores them for later use as raw materials for remanufacturing and reprocessing. This increases the quality of the recyclables processed, allowing the separated materials to generate the highest possible revenues in the market.

In a MRF, the separation, processing and transformation of recyclables uses the physical or chemical characteristics of the recyclable materials to separate each targeted material, e.g. ferrous metal can be removed by passing magnets over the recyclables. Once the targeted material is removed from the stream, it can be further processed depending on its subsequent use. After separation, materials are usually compacted or baled so that they can be stored and transported more efficiently.

The development of the MRF could be undertaken directly by the City; alternatively, the facility could be constructed and operated by a private sector company which would provide the necessary service to the City. Existing processing capacity for different streams, e.g. paper, could also be expanded to accommodate the increased quantities of recyclables that would be recovered through a curbside recyclables collection program.

Regardless of how the facility is developed, consideration will also be given to making the facility available for use by both City and private haulers providing recyclables collection to commercial businesses, so as to maximize the level of recycling achieved in Saskatoon. The City would also support the facility development through assistance with identifying suitable locations for the facility, and support through the zoning and planning process.

## **IN PHASE 3**

### **Develop Organics Management Facility**

This option would be developed in tandem with the provision of a collection service for source-separated organics, and would be the processing facility for this material. The facility would be scaled to handle all of the City's organic waste, allowing both yard waste and food waste to be treated in the facility.

From a technological perspective, there are two main technologies that would be considered as suitable facility options: in-vessel composting and anaerobic digestion. Only one of these two options will be selected for developing the organics facility, as the material streams treated in each would be the same.

In-vessel composting allows a wide range of organic materials, including food waste, to be handled and composted safely, minimizing problems associated with wildlife, odours and large-scale operations. These systems often involve covered piles or large closed vessels. The end product is high-quality compost which can be used for a variety of applications, once it has been stabilized and cured.

Anaerobic digestion is the biological conversion of organic materials in the absence of oxygen. This process is carried out by anaerobic microorganisms that convert carbon-containing compounds to biogas, which is a gas primarily consisting of methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>), with trace amounts of other gases. The end products of the anaerobic digestion process are the biogas, which can be burned to recover energy, and a solid component of the digestion process, which can then be composted for further use.

In both cases, the material coming in to the facility must be pre-treated to remove any large or unsuitable materials, and to make sure that the correct mixture of organic material, moisture and any other additives is correct. Once this step is complete the organic material is ready for

processing. The table below provides some comparative information on the two technologies.

	IN-VESSEL COMPOSTING	ANAEROBIC DIGESTION
DESCRIPTION	Composting is the microbial decomposition of organic matter, in the presence of oxygen, into humus, a soil-like material. Humus can be used in vegetable and flower gardens, hedges, etc	Anaerobic digestion (AD) is the biological conversion of organic materials in the absence of oxygen. The process produces Biogas which can be used for energy generation
PROCESS	Three main phases: - Pre-processing - Primary Composting Phase - Stabilization and Curing	Three main phases: - Pre-treatment - Digestion - Biogas Treatment and Use
FACILITY DEVELOPMENT	This type of facility is typically provided by specialized vendors, who will design and build the facility according to the characteristics of input materials and processing requirements. The technology provider may also operate the facility once constructed.	

The City will explore options for developing the facility directly, as well as through a public-private partnership or entirely through private investment. A common arrangement for many cities working to develop such facilities is to have funding, construction and operation provided by an independent operator, who is willing to accept the City's organic material on a fee-for-service basis. In a partnership arrangement, the City's contribution could include such things as the provision of land for the facility, assistance with zoning, permitting or other policies, and/or a guaranteed amount of material to be supplied. This scenario would considerably reduce the City's financial commitment in developing the facility.

Selection of a preferred option for managing organics will be dependent on a number of factors, including the scope for private investment, the opportunity to effectively utilize the products (compost, biogas, energy or other), and the relative costs of the various options. Lessons learned by other municipalities which have successfully developed organics management facilities will also be considered, so as to choose the best option for Saskatoon.

## Develop Construction and Demolition Materials Handling Facility

This program will involve the development of a facility to sort and process construction and demolition materials for reuse and recycling. The facility would make use of mechanical and manual sorting to separate mixed C & D waste. This program would augment existing City programs such as the grinding and reuse of asphalt and concrete for reuse as aggregate in municipal operations, and the operation of a number of clean fill sites around the City.

In typical operations, incoming loads travel over a scale and into the receiving area where loads can be untarped, and tipped to facilitate inspection. Items are sorted according to type, and conveyors or other equipment used to transfer materials to processing locations. Once the

### DID YOU KNOW?

*The Saskatoon Landfill accepts clean fill loads and pure rubble loads at no charge. These materials are used for landfill cover material and road base construction within the landfill site, respectively.*

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material streams have been separated, the individual streams can be reused or recycled accordingly.

The facility may also incorporate a reuse area, either before or after the scale, where sorted reusable materials could be deposited, and where customers could come to access material to be reused. Location of this facility in advance of the scale would encourage more reuse of the material, as a means of reducing costs as compared with unsorted materials being delivered for processing.

The development of this facility will be supported by targeted outreach to both the residential and commercial sectors, to inform these groups of the opportunities for recycling and reuse at the facility. The construction sector, and the residential population involved in small-scale renovations would be specific targets for these educational efforts, and may also be involved in pilot programs if required.

The City will also encourage the use of this facility by the C & D sector through regulatory instruments, such as charging higher tipping fees on C & D waste brought to the Saskatoon Landfill for disposal, and linking waste management during the construction/demolition activities to the planning permit process.

## PROGRAMS FOR RESIDENTS

The residential sector generates the largest portion of the waste going to the Saskatoon Landfill; this sector contributed just over half (about 54%) of the waste going to the landfill site in 2006. Based on this, it makes sense that many of the programs in the Plan focus on the residential sector, as reductions in the amount of waste this sector produces could have significant results in reducing the amount of waste sent to the landfill. Through the development of the Plan, the City received many comments from residents, who were all very interested in seeing increased recycling opportunities for their households, and recognized the importance of this Plan to achieving greater sustainability for Saskatoon.

In the context of the Plan, the residential sector is discussed in two groups:

- Single family residential units (SFU) – refers to single detached homes, semi-detached homes, row houses and duplexes. Generally, these units receive their waste collection service directly from the City.
- Multi-family units (MFU) – this group includes multi-unit dwellings such as high- and low-rise apartment buildings, as well as seniors' complexes, townhouse complexes and condominiums. These units typically receive their waste collection from a private contractor, and often have centrally located communal bins which are shared by everyone in the complex. Some of these buildings may receive City-provided collection.

In some cases, programs for the SFU and MFU groups are described separately, while others programs will apply to both. Within each phase, public education and awareness building activities will represent a foundation element, to support each of the programs, and to provide additional opportunities for residents to reduce the amount of waste they produce.

### IN PHASE 1

Phase 1 will represent the first year following the adoption of the Saskatoon Waste and Recycling Plan. The Proposed programs included in this phase build on existing programs and activities already being undertaken by the City, and provide a transition period during which implementation of other, more extensive programs will be finalized.

### Continue Collection Events for Household Hazardous Waste

Household hazardous waste (HHW) includes chemicals and materials commonly used in the household that contain potentially hazardous or toxic elements, and therefore require special disposal. HHW includes items such as fuels, solvents, used oil, pesticides and fertilizers, as well as things like mercury thermostat switches, propane cylinders and

#### DID YOU KNOW?

There are about 60,000 single family housing units and 24,000 multi-family units in Saskatoon. Providing equitable service to all residents is a key element on the Plan.

fluorescent light tubes. The City currently provides “round up days” periodically throughout the year to allow residents to dispose of these items safely.

To support this option, the City would continue its existing program for recycling of household hazardous waste, through the provision of monthly “round-up days” where residents can bring their HHW in for recycling and proper disposal. The current system for providing the service would be maintained, so that the City would partner with a local private contractor (currently Envirotec) to provide the service.

The City would need to continue to promote the monthly events through their web site, with possible supplemental promotion in the newspapers immediately before an event. The City could also explore partnerships with retailers of household chemicals, such as hardware and garden stores, to distribute information about the HHW collection events when targeted products are purchased.

The collection of other HHW would be considered as a temporary program that is maintained only until a provincial stewardship program to cover these additional materials is in place.

### **Subsidize Home Composters for Residential Use**

Composting at home using either a backyard composter or vermicomposter is a simple and cost effective way to remove residential food and garden waste from the waste stream. Backyard composters, as the name suggests, are typically used in homes with yards or outdoor space available for their storage. Vermi-composters or worm composters use a more compact design and special worms to facilitate composting in a small space, and are often used in apartment settings with limited or no access to yard space.

In addition to waste reduction, benefits include household production of compost for use on gardens and an increased awareness of waste management issues at a household level.

The City has been involved in the subsidization of backyard composters in the past, through the provision of a \$10 rebate to any resident of Saskatoon who purchases a backyard composter. The resident applies for the rebate with proof of purchase; rebates are limited to one per year per household.

To support this option, the composter rebate program would continue in Phase One, targeting the residential sector. The City could consider extending the rebate to include vermicomposters, which may be of interest to residents in multi-family dwellings who are unable to use a backyard composter unit.

Promotion of backyard composting will be a key focus of education programs in Phase 1, to encourage as many people as possible to deal with their yard waste individually at home. This outreach could build on the existing Compost Demonstration sessions held at the Compost Demonstration Garden in City Park, as well as through participation in

#### **DID YOU KNOW?**

The City's household hazardous waste collection days provide collection service for a wide range of materials including adhesives, aerosols, automotive fluids, batteries, cleaners, old pharmaceuticals, pesticides, mercury thermostats, fluorescent tubes, propane tanks and solvents.

#### **DID YOU KNOW?**

The Federation of Canadian Municipalities (FCM) has done research which estimates that annual waste diversion is in the order of 120 kg/household/year for a consistently used home composting unit.



home and garden shows, displays at garden centres, parks and community centres. Outreach programs to support the use of composters in schools will also be incorporated into the education efforts for this program.

### Develop Additional Compost Demonstration Gardens

The existing compost demonstration program operated at the City Park Compost Site will be augmented to provide additional compost workshops. Additional compost demonstration gardens at other parks around the City will also be considered. The City has already partnered with the Saskatchewan Waste Reduction Council on this, and would seek to continue this partnership. Other non-profit organizations, youth groups and community based organizations could be identified as partners in the maintenance of the compost demonstration gardens. This initiative could be tied into the subsidized composter program, where volunteers provide advice on the start-up and use of backyard composters.

### Implement User Pay System for Waste Management

User pay systems are a funding mechanism commonly utilized for solid waste management programs, whereby residents pay to cover the costs of waste disposal, based on their level of usage of disposal services. Currently in Saskatoon, residents pay for waste management services through their property taxes, on an assessment basis. The portion of the property taxes used to pay for solid waste is the same for every household, regardless of the amount of waste being generated. In communities with user-pay programs, residents are charged for the collection of waste, *based on the amount they throw away*. This creates a direct economic incentive to recycle more and to generate less waste, since “the less you throw away, the less you pay”. This change in the way waste management services are paid for is considered to be critical to the overall success of the programs recommended in the Plan, as it provides strong encouragement for residents to take advantage of the new waste diversion programs.

User pay systems offer a range of advantages. One main advantage is that the householder has a considerable level of control over waste management costs, as they are able to directly control how much they pay by the amount of waste they set out for collection. From an environmental perspective, user pay systems also work well. Since increases in costs are directly linked to increased waste generation, user pay systems have been observed to increase waste diversion from landfill, as residents are financially motivated to utilize recycling and composting alternatives as a means of reducing their costs. User pay systems can also be self-financing, making them less vulnerable to budget cuts when municipal tax revenue allocations must be adjusted, and reducing the competition for funds with other civic services.

#### QUICK FACTS ON USER PAY SYSTEM

**Purpose:** *Charge for waste management services based on level of use, rather than flat rate*

**Effect:** *“The less you throw away, the less you pay”. This creates a link between increased waste diversion and reduced costs.*

**Target Sector:** *Residential, beginning with single family units*

**Implementation:** *Preparation beginning in Phase 1, full implementation in Phase 2*

#### DID YOU KNOW?

In Tacoma, WA the recycling rate tripled following the introduction of user pay and recycling programs. Many communities have experienced 10 – 40% increases in waste diversion following the introduction of similar programs.

In order to make the program as easy and fair as possible for residents, the City will address the following issues at the time of program implementation:

- Launch of a targeted public outreach and awareness campaign to promote the changes, develop educational materials, and to work with neighbourhoods to increase awareness of the benefits and changes associated with the program.
- Identify how tax bills will be adjusted and solid waste utility charges initiated, so that residents can see where their money goes.
- Structure the system in such a way that those with limited ability to pay are not penalized, by considering specifically how the program will affect residents living in neighbourhoods with lower assessment values or with large families. The City will keep the possibility of dealing with case-by-case fee waivers or adjustments where economic hardship can be effectively demonstrated. Typically, the provision of waste diversion alternatives is sufficient to reduce waste generation to levels where costs are manageable.
- Accelerate the conversion of all remaining neighbourhoods to individual front-street waste collection, so that the user pay system can be fairly enforced
- Ensure flexibility of choice for residents by offering a range of cart sizes for waste collection, and/or offering less frequent collection for those residents who can reduce their waste enough that weekly garbage collection is not required.

As it is recognized that a complete transition to a user pay system will take time, the City will begin preparation activities early in the Plan, to be followed by enforcement only when all other aspects are in place.

The first aspect of this preparation will be the city-wide conversion to individual cart collection for all single-family households in the city. As discussed above, the user pay system will be based on the ability to directly link an individual household's waste generation to that household, so that those residents who are doing their part to reduce waste can reap the benefits of the user pay system.

Previously, conversions to individual cart collection were driven by interested community associations who approached the City requesting conversion. To facilitate the implementation of the user pay program, and the other waste diversion initiatives under the Plan, this process of voluntary conversions has been changed so that conversions are driven by the City, in partnership with neighbourhoods. It is expected that this will eventually lead to the complete elimination of the communal back-lane bins, so that every single-family household has an individual waste collection cart.

**WHAT WE'VE HEARD ...**

"I am pleased to see that the City is planning on improving the current waste & recycling process, and as a newly returned resident I would like to say that I am all for a user pay system."

**- Hali, June 2007**

**WHAT WE'VE HEARD ...**

"I also like the idea of every household being charged for the amount of garbage they produce, as long as we each have our own containers."

**-Lorna, June 2007**

## IN PHASE 2

Phase 2 will cover the period of 2 – 5 years following plan adoption. The main features of this phase involve the expansion of recycling services.

### Provide Recyclables Collection Service to Single Family Residential Units

Currently, recyclables are collected around the City at a number of depots, along with additional paper recycling bins at multiple locations. A small number of single family homes have opted to pay for a privately operated curbside collection service for recyclables. Under the Plan, it is proposed that curbside collection of recyclables would be provided City-wide to all single-family housing units, beginning in Phase 2. A similar program for multi-family housing units would be phased in gradually, starting late in Phase 2 with pilot programs, for implementation in Phase 3. This option would also involve the development of a facility within the City to handle the processing of the collected materials.

There are two main options for providing the collection service for recycling – source-separated collection or commingled collection. Source-separated collection involves the separation of recyclables into different categories at the point of generation, most commonly at the individual household level. Under this option, a mix of containers or bags would be used to separate different materials prior to collection. This is the type of collection commonly known as the “blue box system”. With commingled collection, all the recyclables to be included in the program are “commingled” or mixed together, often in a single container or bag for collection, with little or no sorting at the household level. The table below provides a comparison of these two options.

#### WHAT WE'VE HEARD ...

“I like the idea of having curbside collection of recyclables. I feel it will make it easier for residents to recycle their materials. I am looking forward to that day.”

- Yvette, May 2007

	SOURCE SEPARATED COLLECTION	COMMINGLED COLLECTION
Description	Materials collected in different groups, separated by the householder.	All materials collected in a single container/bag, with no separation.
Equipment	Many cities use <b>blue box system</b> - a combination of small open-topped containers and reusable plastic bags to facilitate the setting out of sorted recyclable materials for collection in separate streams.	Collection may be achieved using a single cart similar to that used for garbage collection in Saskatoon. Some programs use a blue or clear garbage bag for collection.
Materials Collected	Programs often require newsprint and cardboard to be separated from other kinds of paper Glass, tin, and aluminum often grouped together in blue box Plastic may need to be collected as a separate stream	Plastics, tin, aluminum and paper are mixed together Glass is often excluded from commingled collection due to problems with breakage (would still be collected at depots) Cardboard may also be included if container is large enough
Advantages	Materials sorted at curb – less risk of contamination between streams Range of collection vehicles could be used, as long as separation of streams is maintained	No sorting of material required, easier to use Automated collection is less labour intensive; could result in fewer workplace injuries Closed containers resist weather impacts; less containers to store
Disadvantages	Increased effort from residents required to do sorting Multiple containers to store between collection	Material quality may be reduced since all items mixed together Collection carts more expensive to replace

The City recognizes that this program would be a major change for residents, and as such the implementation of this program would be supported by a considerable public engagement and outreach program. This will encompass:

- Strategies to encourage residents to change their recycling practices to take full advantage of the program.
- Pilot programs in different neighbourhoods to test which collection method would work best.
- Extensive information resources on how to use the program – what to sort, how to prepare materials, guides for what can and cannot be recycled, etc.
- On-going messaging about the program, including feedback on the new levels of recycling achieved to demonstrate successes.

Once the program was fully established, the City could consider policy changes to enable enforcement of program requirements. Currently, the Saskatoon Landfill uses a surcharge model to discourage the disposal of recyclables in the landfill. Surcharges, or extra charges, are applied for loads that contain more than 10% of easily recyclable materials, e.g. cardboard. This practice would be maintained, but consideration could be given to increasing the surcharge level, to further discourage the practice of disposing of recyclables, once the corresponding recyclables diversion program was in place. Recyclables collected under this program would be processed at a material recovery facility (*discussed on page 27*) and sold to make new products.

### **Provide Recyclables Collection Service for Multi-Family Residential Units**

This program would be an expansion of the single-family residential program, to provide recycling collection service to multi-family housing units (MFU). It would provide equitable service for both single family and multi-family residents, and would allow the City to have control over a greater portion of the total waste stream. Under this program, the range of materials to be collected would match that of the single family unit program.

The location and sizes of containers would need to be determined in conjunction with the residents or building management service providers. The City could provide this service directly, or contract out the collection of the materials. The materials collected under this program would be processed in the same way as those materials collected under the SFU program.

As with the single-family residential recycling program described above, a critical element of program success will be a targeted education program to encourage participation. Because the program will function differently than for single-family programs, there will be a need for educational tools on two fronts. Firstly, there will need to be specific information provided to property managers/owners with regard to location and servicing requirements for recycling bins. Educational tools

#### **WHAT WE'VE HEARD ...**

"I'm eager to be part of a well thought out recycling plan. Please don't forget people living in condos and apartments. We want to participate too."

**- Judith, May 2007**

to inform residents of the types of materials they could recycle under the new system will also be required.

### **IN PHASE 3**

Phase Three of the Plan covers the period 6 to 10 years following adoption of the Plan. This phase of the plan focuses on increasing waste diversion by expanding the organics management options. Public outreach programs and other activities to support programs implemented in previous phases would remain in place as appropriate.

### **Provide Curbside Collection of Organics to Single-Family Residential Units**

The residential waste composition information presented earlier identifies almost 40% of residential waste as being organic materials. Diversion of this material from the landfill would result in a significant reduction in the amount of landfill space required annually. Since organic material in the landfill is the main source of methane, a known greenhouse gas, this diversion would also reduce the environmental impacts of the landfill significantly.

This option would involve the collection of organics from single-family residences within the City. Under this program, residents would separate their organic materials – food scraps, vegetable peels, food-contaminated paper, e.g. pizza boxes, and yard waste – from their recyclables and other waste, for separate collection. This type of program is called a source-separated organics (SSO) collection program, since the organic component is separated at the source of generation, the individual household.

To facilitate collection of this material as a separate stream, a second collection cart would likely need to be allocated to each house receiving collection. Collection frequency would also need to be considered if a separate SSO stream were to be collected. Currently, this component of the waste stream is the portion primarily responsible for odours and problems with animals and birds, which are attracted to garbage as it decays. If this stream were to be separated from other waste, collection frequency would likely need to be weekly, with the possibility that the remaining garbage and recyclables could be collected bi-weekly on alternate weeks.

The establishment of a collection service for SSO for Saskatoon will need to be carefully planned. While several cities across Canada have fully implemented programs in place today, all of these programs were launched initially as pilot projects, many lasting at least 12 months, to establish how the program would work through all seasons. Not only were collection service models tested, cart sizes and container configurations were also explored in some cases, to determine the optimal size and type of container for organics collection. The City would implement such a program in a similar manner, making use of pilot programs in a range of neighbourhoods across the City, to determine the



#### **DID YOU KNOW?**

About 30-40 % of Saskatoon's landfilled waste could be composted into soil for our gardens if all organics were removed from the waste stream.

particular challenges and issues specific to Saskatoon. The program could then be rolled out city-wide once the details had been established.

Public outreach and engagement strategies that focus on the changes associated with the launch of a collection service for SSO will be a vital element for the program's success. Many municipalities that have implemented such programs launched public awareness campaigns and solicited feedback from numerous stakeholders on this single issue, prior to full-scale implementation. Once the initial efforts to make the public aware of the need for the change have been made, there will also be a need for on-going awareness-building, to remind residents of the materials that are eligible for disposal in the organics stream vs. the garbage stream.

As the quantities of organics that can be set out will be limited by the size of the collection cart, supplemental education efforts may also need to focus on opportunities to reduce the yard waste component, through grass-cycling, back-yard composting and mulching of leaves.

### **Provide Source-Separated Organics Collection to Multi-Family Residential Units**

This program would be an expansion of the single-family residential program, and would provide organics collection service to multi-family housing units (MFU), so as to provide equitable service for both single family and multi-family residents. Expansion to include this sector would allow the City to have control over a greater portion of the waste stream, and be more directly able to influence achievement of waste diversion goals. Under this program, the range of materials to be collected would match that of the single family unit program.

The location and sizes of containers would need to be determined in conjunction with the residents or building management service providers. As the volumes of organics from a multi-family residential building are likely to be substantial, weekly collection would be the minimum level of service, with buildings possibly being given the option of more frequent collection service to reduce concerns about odours, or animals being attracted to the materials. The City could provide this service directly, or contract out the collection of the materials. The materials collected under this program would be processed in the same way as those materials collected under the SFU program.

As with the single family residential program for organics, a targeted education program will be launched to encourage participation in the organics program for multi-family units. This program will provide specific information to property managers/owners with regard to location and servicing requirements for organics bins, along with educational tools to inform residents of the types of materials that should be placed in the organics bins.

It is likely that there will need to be some amendments to the Waste Bylaw to govern the disposal of organics from multi-family dwellings, and to identify suitable cost recovery mechanisms for the provision of this service. At the present time, not many Canadian municipalities are

#### **DID YOU KNOW?**

Many communities have realized that as the number of multi-family residences increases, more waste diversion options for these residents will be required. Saskatoon will show leadership in creating opportunities for multi-family residents to be full participants in new waste diversion programs.

providing SSO collection from multi-family dwellings, with the exception of condominium complexes where individual unit access is possible. One notable exception is the Halifax Regional Municipality, where SSO collection is in place for apartments and condominium complexes, using large carts or toters for collection of this material.

### **Implement Disposal Ban on Recyclables**

Provided that suitable markets are available for recyclables other than paper and cardboard, a disposal ban for all other recyclables to be included in the curbside collection program could also be imposed. The effect of the ban would depend on the level of enforcement that is applied. A strictly enforced ban could have the effect of diverting significant quantities of waste from landfill.

A change to the Waste Bylaw would be required to implement the ban on the disposal of recyclables. This program would also need to be supported by a strong educational campaign, to encourage residents and businesses to comply with the ban. Additional enforcement at the landfill would also be required, to include regular checking of loads delivered for disposal and enforcement of penalties where necessary.

If the facility was operated by the City, amendments to the Waste Bylaw would also need to be made to establish tipping fees at the MRF. In the event that a private operator ran the facility, the City would likely need to elevate landfill tipping fees (significantly above landfill operating costs) to create a sufficient difference in charges to make the use of the facility for recycling a more attractive option than landfill disposal.

### **Implement Disposal Ban on Residential Organics**

The implementation of disposal bans on materials targeted for diversion has been found to be an effective means of increasing participation in waste diversion programs. A disposal ban on organics would only be introduced when an alternative avenue exists for handling that material, either through composting or anaerobic digestion. In addition, it is recommended that a disposal ban only be considered when a collection service for source-separated organics is in place, so that residents have reasonable access to an alternative to disposal.

Additional enforcement at the landfill would also be required, to include regular checking of loads delivered for disposal and enforcement of penalties where necessary.

## **RESIDENTIAL WASTE COLLECTION OPTIONS**

In the preceding sections, collection programs have been described as “stand alone” with respect to equipment requirements and program design, as it is yet to be determined how the various collection service options will be provided. However, it is important to recognize the potential for overlap in the collection services contemplated, which could have implications for efficiency of collection, program costs and the method of service delivery. The City will also need to explore whether

#### **DID YOU KNOW?**

The Province of Nova Scotia banned all compostable organic material from their landfills in 1998.

these services are best provided directly by the City, or whether having the private sector provide these services would be more efficient and effective.

In Phase 2, the collection service levels would include both garbage and recycling, while in Phase 3 this would be expanded to include organics collection. Although the specific process designs for recyclables processing and organic management are yet to be determined, it is likely that this will also impact the type and structure of collection services for the targeted materials. Other factors that will influence the collection service models include:

- The desire to utilize collection containers and/or vehicles in multiple settings, e.g. for collection from single-family as well as multi-family dwellings.
- The need to minimize the amount of truck traffic in congested commercial or residential areas.
- The ability to collect different types of material on the same truck at the same time.
- Street and lane access limitations.

While specifics of collection models are still to be determined, it is clear that they will change from the current waste collection structure. Based on the programs that are included in the Plan, the City has examined how other municipalities with similar programs have selected collection models. Examples of different collection system options are shown in Appendix B.

#### DID YOU KNOW?

Multi-compartment collection vehicles like the one pictured below, allow different materials to be collected with the same truck, at the same time.

(Photo compliments [www.heil.com](http://www.heil.com) )



## PROGRAMS FOR BUSINESS, INDUSTRY AND INSTITUTIONS

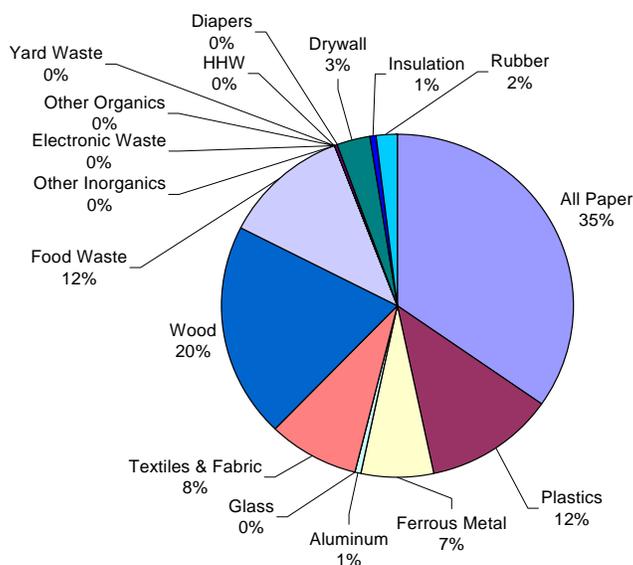
The Industrial, Commercial and Institutional (ICI) sector is comprised of the businesses and industries operating within the city of Saskatoon, as well as institutions such as schools, hospitals, government buildings and the University of Saskatchewan.

### Commercial & Institutional Waste

The waste disposal information at the Saskatoon Landfill indicates that in 2006, about 40,000 tonnes or 38% of the waste coming to the landfill was produced by the ICI sector.

Wood waste, paper and cardboard, and plastics make up the majority of this waste, as shown in the composition analysis below for November 2006.

**Figure 11: Composition of ICI Waste in Saskatoon (2006)**



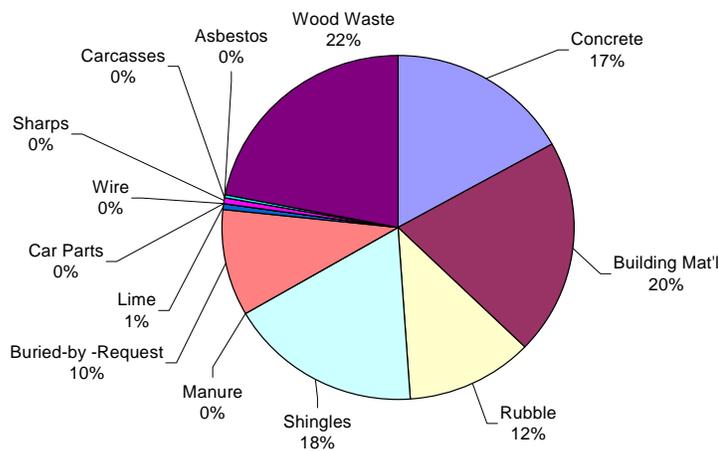
Unlike the residential sector, the ICI sector is directly responsible for the management of its waste, and the City recognizes and appreciates the steps many businesses have already taken to reduce their waste. Most businesses contract with private companies to provide waste and recycling collection services. A small portion of businesses receive City-provided waste collection; these are primarily small commercial operations that may be co-located with residential businesses, e.g. a small strip mall in a residential area. Some may also be involved in very specific waste management activities at their locations, e.g. the proper handling and disposal of industrial chemicals.

## Construction and Demolition Waste

Although the construction and demolition (C&D) industry is a part of the overall ICI sector, this Plan makes special mention of these activities. This is because waste produced by the C&D sector is typically very different from general waste from a business, and often occurs with seasonal variations in large quantities.

In Saskatoon, about 10,000 tonnes or 8% of the waste coming to the Saskatoon Landfill is from the C&D sector. Figure 15 below shows the typical breakdown of C&D waste received at the Saskatoon Landfill in 2006.

**Figure 12: Composition of Construction & Demolition Waste in Saskatoon (2006)**



It's important to note that although the amount of C&D waste entering the Saskatoon Landfill is rather low, in fact it only represents a portion of the C&D waste being generated in the City. It is recognized that the majority of the C&D waste generated likely goes to the privately operated landfill located just north of the city. While this Plan will not apply directly to this privately operated facility, it is expected that many of the policies and programs adopted by the City for the C&D sector will influence the operation of the Northern Landfill, as that landfill operator is also interested in promoting recycling and reuse of C&D waste.

In the context of the Plan, it was recognized early on that the programs and needs of the ICI sector could be quite different from those of residents. As part of the development of the Plan, the City hosted a specific open house workshop session for the ICI sector, to gain a first-hand insight into the types of ICI waste management issues that the Plan could best support. The programs documented here incorporate the feedback from that session, as well as other programs that focus on creating a policy environment to encourage the ICI sector to further reduce their waste going to landfill.



## IN PHASE 1

### Provide Waste Reduction Education Resources to ICI Sector

The City recognizes that supporting the ICI sector will be critical to securing the sector's support for the waste reduction objectives of the Plan. The results of initial discussions with commercial business and industry indicated that they are already shouldering the responsibility for managing waste, and are interested in learning more about how they can reduce the amount of waste they dispose. The City will work with Saskatoon businesses and industrial operations, and assist them in improving their waste management practices through activities such as the following:

- Develop educational materials and resources to support waste reduction in a business/industrial setting, e.g. Waste Reduction Tool Kit for businesses, which would include guidelines on how to conduct a waste audit, identify recycling opportunities and offer other waste reduction strategies such as green procurement. Different sections of the tool kit could address various types of business and industrial activities.
- Provide training and workshop sessions on ideas and strategies for waste reduction
- Act as a central contact for information on how the ICI sector can participate in City-managed waste reduction programs, such as yard waste composting and recycling.
- Identify "best practices" and success stories on waste reduction in the business setting that will allow businesses in Saskatoon who have succeeded in significant waste reduction to be recognized, and to share their ideas with other organizations.
- Liaise with business associations and other industry groups to identify particular sub-groups that can benefit from specialized waste reduction services, e.g. hotels, schools, condominiums, etc.

To deliver these services, the City will explore options for partnerships with other organizations, such as the Saskatchewan Waste Reduction Council, the Saskatoon Chamber of Commerce and the various Business Associations.

## IN PHASE 2

### Initiate Business Environmental Awards Program

This program would focus on businesses in Saskatoon which have been successful in implementing the waste reduction strategies presented in Phase 1 as part of the waste reduction education program. Awards could be based on monthly or quarterly recognition feature, where businesses successfully implementing the program could be featured in local newspapers and publicly recognized for their success. This

#### DID YOU KNOW?

##### ***Zero Waste at Work***

In 2007, the Hudson's Bay Company (Hbc) corporate head office located in downtown Toronto became the first office tower in Canada to achieve the 'zero waste' designation. Hbc's head office achieved a 96.5% diversion rate, which includes organics from landfill.

program could be executed in partnership with the business associations, Chamber of Commerce and other business organizations.

### **Promote Adoption of Environmental Purchasing Policy**

The large purchasing capacity of the ICI sector as a whole has the potential to have significant impacts on waste generation, through the adjustment of the types of goods that businesses and institutions purchase. Under this program, the City encourage this sector to adopt “green practices” for making purchasing decisions, such as favouring products made from recycled content such as paper products, motor oil and tires.

In keeping with the City’s commitment to “walk the talk”, the City would lead this initiative through the adoption of a City-wide environmental purchasing policy. In-house waste reduction would be enhanced by encouraging the purchase and use of reusable products. Over time, the program could extend to apply the preferential purchasing policy to include products that have minimal environmental impacts during production, products that are easily reused and recycled, or cause minimal environmental impacts in operation and upon disposal. This would be a strategic opportunity for the City to demonstrate its commitment to leading by example and “walking the talk” with respect to waste reduction.

As part of this initiative, the City will document and share its experiences in the adoption of such a policy, and provide support and information resources to other companies or institutions that want to adopt similar policies. Other education and awareness programs may be identified as required. All programs will be supported by appropriate media advertising and editorial coverage.

### **Implement Disposal Ban on ICI Yard Waste**

This program would work with the ICI sector to divert ICI yard waste from the landfill. Outreach to high yard waste generators, e.g. landscaping contractors, or organizations with large amounts of landscaped area, such as schools with playing fields, would be the focus for this program.

The City recognizes that businesses and industry will require time to become accustomed to utilizing the alternatives, and the City should be prepared to transition to a full scale ban over time. Enforcement of the ban once in place will also be required, in terms of increased inspections of incoming loads.

## **IN PHASE 3**

### **Implement Disposal Ban on All ICI Organics**

This disposal ban would be rolled out in stages, and would only be implemented when suitable alternatives were available for the ICI sector. ICI sector organics are typically generated at a pre-consumer point, e.g. unsaleable perishables from grocery stores, and therefore is likely to be



#### **DID YOU KNOW?**

EcoLogo (pictured above) is North America’s most widely recognized and respected multi-attribute environmental certification mark. By certifying the environmental leaders in over 300 categories of products, EcoLogo helps environmental marketers win customers, and helps buyers - both consumer and corporate - find and trust the world’s most sustainable products.

less contaminated by plastics and other materials, in comparison with food waste from residences.

The City will work with the ICI sector to test methods for the separation and collection of ICI organics, and provide support to this sector to facilitate the transition.

### **Implement Incentive-Based Tipping Fees for Construction & Demolition Waste**

This policy option would be implemented to discourage the disposal of C & D waste, once the recycling and processing facility for this material stream was in place. Tipping fees for mixed construction and demolition materials would need to be set significantly higher, e.g. at least 3 – 4 times the tipping fees charged at the processing facility, to create sufficient incentive to direct material to the processing operation. Depending on the relative location of the processing facility to the Saskatoon Landfill, the landfill could also implement lower tipping fees to accept sorted materials, which would then be transferred to the processing facility.

### **Implement Disposal Ban on Construction & Demolition Waste**

As a more aggressive incentive, complete disposal bans on C & D materials will be implemented over time at the Saskatoon Landfill, when the level of awareness about diversion options through the processing facility is gauged to be sufficiently widespread within the City. It is recommended that the transition from differential tipping fees to a disposal ban be achieved over a period of 6 to 12 months, to provide enough time for concentrated awareness building and education initiatives to be delivered prior to implementation of the ban. The City will work with this sector to optimize the timing of this transition period toward the end of the construction season, e.g. September/October in one year, with a view to implementing the ban at the start of the following construction season, e.g. March/April.



### **Require Waste Management Plans in Building Permits**

The City will incorporate the requirement for a waste management plan to be filed, as part of the planning and building permit process. Those applying for a building or demolition permit would be required to submit a plan documenting how recyclable/reusable materials generated during the construction or demolition will be handled. Other options that could be considered include:

- The requirement for the applicant to make a recycling deposit at the time of permit application, which is refundable once the applicant can demonstrate that the specified materials have been recycled, e.g. weigh ticket or tipping fee receipt from recycling facility
- The requirement for the applicant to present receipts or evidence of proper disposal and/or recycling as a condition of receipt of occupancy permits (only suitable for construction/renovation)

The City recognizes that the programs outlined in Phases 1 to 3 for the ICI sector will need to be implemented in partnership with this group of stakeholders. In addition, the City will work in cooperation with this group to identify other needs to support waste diversion from the ICI sector.

## PROGRAMS FOR PHASE 4

No formal program options have been identified for the period beyond Phase Three. The issue of energy recovery is however, expected to be addressed in the later phases, and is therefore discussed below.

### Investigate Waste-to-Energy Technologies

There are several systems for solid waste management involving proprietary technologies which have been developed to thermally treat waste to recover energy. Some of these processes have been in successful operation for several years, while others are newer and beginning to grow in the number of successful systems for waste treatment. Several thermal treatment and energy recovery technology options now exist, including mass burn incineration, fluidized bed incineration, two-stage starved air combustion, gasification, pyrolysis and bio-oil production. Supported by improvements in energy recovery components such as boilers and turbines, thermal treatment of waste, primarily by mass burn incineration, currently represents the second most common method of treating waste, after landfilling.

The City of Saskatoon has an interest understanding the various waste-to-energy technologies that are currently available, and that may develop over time. The City will continue to monitor the state of technology options for waste-to-energy, which may in the future, lead to a more formal consideration of the development of a waste-to-energy facility in the City. This option would represent the fourth “R” – resource recovery – in the 5Rs hierarchy, and would therefore be implemented only after other waste diversion strategies focus on the first 3Rs – reduction, reuse and recycling – have been maximized.

## FUTURE PHASES

As programs are implemented in Phases 1 to 3, it is expected that they will continue, and be evaluated on an on-going basis to determine their levels of success. Subsequent phases beyond the first 10 years have, therefore, not been specifically defined as it is anticipated that adjustments to specific programs will be a large part of the activities for the latter 10 years of the Plan. In addition, depending on the implementation dates of various programs, phases may actually end up being longer than the defined periods outlined here.

#### DID YOU KNOW?

The City of Saskatoon has its own electrical utility. As waste-to-energy technologies emerge, the City may benefit twofold from these in the extension of the life of the landfill and production of electricity.

## TRIPLE BOTTOM LINE COST-BENEFIT ANALYSIS

The Advisory Groups and the City recognized that more than “just dollars” should be considered when assessing the cost-benefit profile of various options. Programs which might cost more than the current system would yield significant environmental and social benefits, which should be quantified and balanced against monetary expenditures. To accommodate this, the Advisory Groups and the City employed a “triple bottom line” analysis in evaluating options. This approach provides a way of evaluating options that takes into account more than just financial cost or value by incorporating indicators of social and environmental benefits.

Even though there is a clear understanding that environmental and social values exist, measuring these values is more challenging. While there is considerable work being done on environmental and social economics, the City understood that detailed analysis for Saskatoon was well beyond the scope of the Plan. To represent the triple bottom line, key indicators were used to provide a representative picture of environmental and social costs and benefits, along with a range of financial parameters.

The full range of possible parameters is shown in the table below, although available information varied from program to program.

PARAMETER TYPE	CRITERIA
Financial	Annualized Capital Cost in 2007 dollars (\$)
	Annual Operating Cost (\$)
	Operating Cost per tonne (\$/tonne)
	Landfill lifecycle capacity savings (\$/tonne)
Environmental	Net Diversion Potential (tonnes)
	Greenhouse Gas Reduction Potential in tonnes of CO <sub>2</sub> /tonne of waste
	Greenhouse Gas Reduction in terms of # of Honda Civics taken off the road for 1 year
	Landfill space savings in cubic meters
	Landfill space savings in terms of equivalent # of school buses
Social	Accessibility, Convenience and Acceptance

### DID YOU KNOW?

The cost of reducing and recycling today will reduce future demands and their associated costs. Almost 98% of respondents to the survey about the Plan agreed that reducing the amount of waste that goes to the landfill in order to extend its life should be a top priority, to save money in the long run.

## DETERMINATION OF VALUES FOR OPTIONS

Since this is a high-level plan, exact costs, sizes and configurations of programs and services are still to be determined. However, there was also a need to provide information about potential costs and benefits of implementing the various programs. Careful assumptions about the program design and costs were made in order to provide the triple bottom line analysis for the programs, policies and new facilities identified in the Plan. These assumptions are documented in Appendix C. The following sections outline how the values for each option were determined.

### Annualized Capital Costs

Capital costs were determined as the costs of upfront activities, e.g. equipment purchases or facility construction. They include soft costs such as financing, engineering and project management. Capital costs exclude cost of land, business licensing, rezoning, permitting and any requirements to construct bench or pilot scale facilities as precursors to full scale plant development. Existing facilities were used where possible to estimate costs for components, or scaled based on the total facility cost to the appropriate size for Saskatoon. Annualized costs were derived by amortizing total capital costs over a period reflective of the life of the asset, at a 6% interest rate.

### Annual Operating Costs

Operating costs are those costs associated with day-to-day operations and maintenance of a facility or program. This includes staffing, energy, supplies and equipment, and insurance. These costs were based on estimates for existing facilities or programs and the building of operating cost profiles.



### Operating Cost per Tonne

This was derived from the total operating cost, divided by the expected annual net tonnage that could be diverted by implementing the program.

### Landfill Lifecycle Capacity Savings

In order to understand the full implications of diverting waste from the landfill, it was necessary to look at the potential cost savings over the entire life of the landfill. To do this, the following were considered:

- Landfill construction costs relating to the life of a landfill
- Landfill operating costs over the life of a landfill
- Environmental Monitoring costs per year, for the operating life of the landfill
- Closure costs at the end of the landfill's life
- Post-closure environmental monitoring costs, for a 25-year period following the closure of the landfill
- The total capacity of the landfill for waste, as a volume in cubic metres

The construction of Cell 'H' at the Saskatoon Landfill, built in 2005, was used as a template for developing these costs. Cell 'H' provides the most recent construction information available that includes landfill life and capacity information for this site. The total life cycle cost of the landfill was computed, and divided by the total capacity in cubic metres to determine a cost per cubic metre and a cost per tonne using the compaction density. The following were the results:

- Lifecycle Cost per cubic metre = \$30/m<sup>3</sup>



- Lifecycle Cost per tonne = \$47/tonne

The lifecycle cost per tonne was used to calculate the lifecycle savings achieved by diverting waste from the landfill.

### Net Diversion Potential

Net Diversion Potential was defined as the net additional diversion from landfill that is achievable through implementing the specific program or service. The diversion potential was determined to be the portion of the incoming waste stream that the program could potentially handle or divert, based on the composition of the total MSW waste stream and the type of materials that the program or service is targeting. Residuals from the program or service, as well as any uncaptured material, were subtracted from this total to provide the net diversion potential.

### Greenhouse Gas Reduction Potential

It is recognized that the implementation of waste diversion programs can have a positive impact to reduce the amount of greenhouse gas emissions that would otherwise arise if the material was landfilled. The amount of greenhouse gas reductions is linked to the type of program or process, as well as the types and quantities of material targeted. A model was used to relate the amounts of material recycled, composted or otherwise diverted from landfill, to greenhouse gas emissions reductions. Since there are many different types of greenhouse gases including carbon dioxide or CO<sub>2</sub>, the industry standard is to express the amounts of the various different gases in equivalent amounts of CO<sub>2</sub>, which results in the units of “tonnes of CO<sub>2</sub> equivalents”.

In order to make this simple to visualize, the greenhouse gas emissions reductions were presented in terms of “number of Honda Civics taken off the road for 1 year”. This is because the savings or reductions are annual, and would occur each year the program was in place.

### Landfill Space Savings

This is the amount of space that materials to be diverted would take up in the landfill. It is based on the net diversion potential tonnage and the space taken up per tonne of material.

To assist in visualization, the landfill space savings were converted to an equivalent number of school buses. The typical “big yellow school bus” has a volume of about 60 m<sup>3</sup>.

### Accessibility, Convenience, and Acceptance

All programs or services were rated with these social parameters, as indicators of how easy it would be for citizens of Saskatoon to access and use the programs. Programs and services that were offered directly to residents, e.g. collection of materials at the residence, were ranked as “High” in these terms, while programs that required more effort on the part of participants were scored lower.



Greenhouse gas emissions for the Honda Civic were based on standard annual fuel consumption estimates for an annual distance traveled of 25,000 km, with 55 percent city and 45 percent highway driving. Under these parameters, a 2007 automatic Honda Civic produces about 5.7 tonnes of CO<sub>2</sub> equivalent per year.



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## **TRIPLE BOTTOM LINE ANALYSIS SUMMARIES**

The summary tables on the following pages provide an annual basis for comparison of the various programs and policies in the Plan. They have been organized by Phase as follows:

- Capital Cost Tables – show both total and annualized capital costs. There is a single table combining all three Phases.
- Triple Bottom Line Tables – shows annualized values for all parameters. There is a table for each Phase.

**Table 1: Capital Cost Summary for All Phases**

	CAPITAL COSTS (\$)	AMORTIZATION PERIOD (YEARS)	ANNUALIZED CAPITAL COST (\$/YEAR)
<b>PHASE 1 PROGRAMS</b>			
Phase 1 Public Education & Outreach Activities	0	0	0
Implement Incentive-Based Tipping Fees for Yard Waste	0	0	0
Implement Disposal Ban on Paper & Cardboard	0	0	0
Upgrade Yard Waste Compost Facilities	75,000	0	75,000
Continue Household Hazardous Waste Days	0	0	0
Composter Subsidy Program	0	0	0
Develop Additional Compost Demonstration Gardens	20,000	0	20,000
Implementation of User Pay System	0	0	50,000
<b>PHASE 2 PROGRAMS</b>			
Phase 2 Public Education & Outreach Activities	0	0	0
Develop Building Materials Reuse Facility at Landfill	65,000	5	15,431
Develop Recyclables Processing Facility	5,005,000	20	436,359
Provide Recyclables Collection to Single Family Residential Units	Blue box option	15	543,643
	Commingled options	15	821,643
Provide Recyclables Collection to Multi-Family Residential Units	700,000	15	72,074
Initiate Business Environmental Awards Program	0	0	0
Promote Adoption of Environmental Purchasing Policy	0	0	0
Implement Disposal Ban on ICI Yard Waste	0	0	0
<b>PHASE 3 PROGRAMS</b>			
Phase 3 Public Education & Outreach Activities	0	0	0
Develop Organics Management Facility	In-vessel composting	20	1,064,523
	Anaerobic Digestion	20	1,438,545
Provide Curbside Collection of Organics to Single-Family Residential Units	7,980,000	15	821,643
Provide Source-Separated Organics Collection to Multi-Family Residential Units	700,000	15	72,074
Develop Construction & Demolition Materials Handling Facility	3,500,000	15	360,370
Implement Disposal Ban on Recyclables	0	0	0
Implement Disposal Ban on Residential Organics	0	0	0
Implement Disposal Ban on All ICI Organics	0	0	0
Implement Incentive-Based Tipping Fees for Construction and Demolition Waste	0	0	0
Require Waste Management Plans in Building Permits	0	0	0

**Table 2: Triple Bottom Line Summary for Phase 1 Programs & Services**

PROGRAM NAME	FINANCIAL				ENVIRONMENTAL			SOCIAL
	Annualized Capital Cost (\$)	Annual Operating Cost (\$)	Operating Cost per tonne (\$/tonne)	Landfill Capacity Savings (\$)	Net Diversion Potential (tonnes)	Greenhouse Gas Reduction Potential (tonnes CO <sub>2</sub> eq and equivalent # of Honda Civics taken off the road for 1 year)	Landfill space savings (m <sup>3</sup> and equivalent # of school buses)	Accessibility, Convenience, & Acceptance
Phase 1 Public Education & Outreach Activities (including Waste Reduction Coordinator salary)	\$0	\$85,000	Not applicable	Significant	Significant	Significant	Significant	High
Implement Incentive-Based Tipping Fees for Yard Waste	\$0	\$0	Not applicable	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Medium
Implement Disposal Ban on Paper & Cardboard	\$0	\$0	Not applicable	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Medium
Upgrade Yard Waste Composting Facility	\$75,000	\$40,000	\$4	\$500,859	10,544	2,531 tonnes CO <sub>2</sub> eq or 444 	15,628 m <sup>3</sup> or 261 	Medium
Continue Household Hazardous Waste Collection Days	\$0	\$70,000	\$944	\$3,521	74	Insufficient data to determine	165 m <sup>3</sup> or <1 	Medium
Subsidize Home Composters for Residential Use	\$0	\$7,000	\$2	\$218,998	4,611	1,107 tonnes CO <sub>2</sub> eq or 195 	7,193 m <sup>3</sup> or 120 	High
Develop Additional Compost Demonstration Gardens	\$20,000	\$1,000	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	High
Implement User Pay System for Waste Management Services	\$50,000	\$290,000	Not applicable	Not applicable	Counted under diversion programs	Counted under diversion programs	Counted under diversion programs	High

**Table 3: Cost Summary for Phase 2 Programs & Services**

PROGRAM NAME		FINANCIAL			ENVIRONMENTAL			SOCIAL	
		Annualized Capital Cost (\$)	Annual Operating Cost (\$)	Operating Cost per tonne (\$/tonne)	Landfill Capacity Savings (\$)	Net Diversion Potential (tonnes)	Greenhouse Gas Reduction Potential (tonnes CO <sub>2</sub> eq and equivalent # of cars)	Landfill space savings (m <sup>3</sup> and equivalent # of school buses)	Accessibility, Convenience, & Acceptance
Phase 2 Public Education & Outreach Activities (including Waste Reduction Coordinator salary)		\$0	\$155,000	Not applicable	Significant	Significant	Significant	Significant	High
Develop Building Material Reuse Facility		\$15,431	\$30,000	\$33	\$43,444	915	526 tonnes CO <sub>2</sub> eq or 93 	1,427 m <sup>3</sup> or 28 	High
Develop Recyclables Processing Facility		\$436,359	\$4,625,000	\$145	\$1,515,000	31,886*	99,741 tonnes CO <sub>2</sub> eq or 17,499 	49,744 m <sup>3</sup> or 829 	High
Provide Recyclables Collection Service to Single Family Residential Units	Blue box option	\$543,643	\$3,540,000	\$182	\$924,325 (already counted as part of recyclables processing)	19,460 (already counted as part of recyclables processing)	52,420 tonnes CO <sub>2</sub> eq or 9,197 	30,359 m <sup>3</sup> or 506 	High
	Commingled option	\$821,643	\$3,217,500	\$170	\$897,200 (already counted as part of recyclables processing)	18,889** (already counted as part of recyclables processing)	52,363 tonnes CO <sub>2</sub> eq or 9,187 	29,468 m <sup>3</sup> or 491 	High
Provide Recyclables Collection Service to Multi-Family Residential Units		\$72,024	\$318,233	\$170	\$88,739 (already counted as part of recyclables processing)	1,868 (already counted as part of recyclables processing)	5,226 tonnes CO <sub>2</sub> eq or 917 	2,915 m <sup>3</sup> or 49 	High
Initiate Business Environmental Awareness Program		Included in public education and outreach activities budget above		Not applicable		Not applicable	Not applicable	Not applicable	Medium
Adopt a City-wide Environmental Purchasing Policy		Included in public education and outreach activities budget above		Not applicable		Not applicable	Not applicable	Not applicable	Medium
Implement Disposal Ban on ICI Yard Waste		\$0	\$0	Not applicable	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Medium

\* includes residential diversion from curbside collection program

\*\* excludes glass

**Table 4: Cost Summary for Phase 3 Programs and Services**

PROGRAM NAME		FINANCIAL				ENVIRONMENTAL			SOCIAL
		Annualized Capital Cost (\$)	Annual Operating Cost (\$)	Operating Cost per tonne (\$/tonne)	Landfill Capacity Savings (\$)	Net Diversion Potential (tonnes)	Greenhouse Gas Reduction Potential (tonnes CO <sub>2</sub> eq and equivalent # of Honda Civics)	Landfill space savings (m <sup>3</sup> and equivalent # of school buses)	Accessibility, Convenience, & Acceptance
Phase 3 Public Education & Outreach Activities (including Waste Reduction Coordinator salary)		\$0	\$155,000	Not applicable	Significant	Significant	Significant	Significant	High
Develop Organics Management Facility	In-vessel Composting	\$1,064,235	\$400,500	\$13	\$1,413,000	29,750 <sup>+</sup>	6,699 tonnes CO <sub>2</sub> eq or 1,176 	41,239 m <sup>3</sup> or 687 	High
	Anaerobic digestion	\$1,438,545	\$2,971,000	\$120	\$1,176,000	24,760 <sup>+</sup>	6,339 tonnes CO <sub>2</sub> eq or 1,113 	32,837 m <sup>3</sup> or 547 	High
Develop Construction & Demolition Materials Handling Facility		\$360,370	\$750,054	85	\$419,131	8,824	4,448 tonnes CO <sub>2</sub> eq or 781 	13,766 m <sup>3</sup> or 229 	High
Provide Curbside Collection of Source-Separated Organics to Single Family Housing Units		\$821,643	\$3,217,500	\$142	\$1,072,670 (already counted as part of organics processing)	22,583 (already counted as part of organics processing)	4,113 tonnes CO <sub>2</sub> eq or 722 	35,232 m <sup>3</sup> or 587 	High
Provide Collection of Source-Separated Organics to Multi-Family Housing Units		\$72,024	\$381,951	\$142	\$127,337 (already counted as part of organics processing)	2,681 (already counted as part of organics processing)	542 tonnes CO <sub>2</sub> eq or 96 	4,182 m <sup>3</sup> or 70 	High
Implement Disposal Ban on Recyclables		\$0	\$0	Not applicable	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Medium
Implement Disposal Ban on Residential Organics		\$0	\$0	Not applicable	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Medium
Implement Disposal Ban on ICI Organics		\$0	\$0	Not applicable	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Medium
Implement Incentive-Based Tipping Fees for Construction & Demolition Waste		\$0	\$0	Not applicable	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Counted under associated diversion programs	Medium
Require Waste Management Plans in Building Permits		\$0	\$0	Not applicable	Limited	Limited	Limited	Significant	Medium

\* In-vessel system can accept woodwaste and drywall for composting, whereas anaerobic digestion system less flexible

<sup>+</sup> includes residential diversion from curbside organics collection program

## FINANCIAL IMPLICATIONS OF PLAN IMPLEMENTATION

The preceding summary tables demonstrate that the implementation of the Plan will require significant resources in order to succeed. It is important to recognize that while cash outlays to support these activities will increase as a result of implementing new service, there are considerable benefits that should be equally weighed. These costs and benefits are discussed in the following sections.

### COST SHARING OPPORTUNITIES

It was recognized that the City could leverage partnerships with stakeholders such as non-profit organizations and private waste management service providers to deliver the programs outlined in the Plan and reduce the burden on taxpayers.

Table 5 below summarizes the **projected maximum level of investment** and the associated benefits at the end of each Phase of the Plan. This maximum level of investment represents the value of required financial resources to achieve the programs. However, it cannot be said that implementation of the Plan will “cost the City” this much, as many programs, particularly the development of new facilities, lend themselves to private development funding.

**Table 5: Projected Maximum Investment and Benefits Summary**

TRIPLE BOTTOM LINE PARAMETERS	PHASE 1	PHASE 2	PHASE 3
Maximum Annualized Capital Cost (\$)	\$145,000	\$1,345,457	\$2,692,582
Maximum Annual Operating Cost (\$)	\$493,000	\$8,668,233	\$7,475,505
Total Annual Landfill Capacity Savings (\$)	\$723,378	\$1,647,183	\$1,832,131
Annual Net Diversion (tonnes)	15,229	34,669	38,574
Annual Greenhouse Gas Reduction (tonnes CO <sub>2eq</sub> )	3,638	105,493	6,881
Annual Landfill Space Savings (m <sup>3</sup> )	22,986	54,086	55,055
Cumulative Diversion Rate relative to 2006 Performance	13%	42%	73%

### DEFERRED LANDFILL REPLACEMENT

The current Saskatoon Landfill has less than 20 years of capacity at current waste disposal rates. This estimate includes the recently constructed Cell ‘H’ and future planned expansions. If no efforts are made to reduce the amount of waste that is currently disposed, there will be a need for a replacement landfill to be designed, developed and constructed in the next 15 – 20 years,

As Table 5 shows, the implementation of the programs and policies in the Plan can have a dramatic impact on the amount of waste being disposed. The added advantage is that plan implementation would also defer the replacement of the landfill considerably, making existing landfill capacity last much longer than current estimates.

Preliminary estimates indicate that development of a new replacement landfill with a minimum 30 year life would cost in the order of \$75 million. This estimate assumes completion of a facility within 20 years and accounts for increases in the cost of construction, land acquisition, and regulatory requirements for monitoring. It was assumed that only a portion of that total would be required to initiate the replacement landfill's development, and so an estimate of \$24 million was used. It was also assumed that the landfill life would be extended at the same rate as the cumulative diversion rate increased, i.e. a 5% diversion rate would result in a 5% extension of the landfill's life.

Table 6 below shows how increasing the existing landfill's life could reduce the amount of reserve funding per year needed for a replacement landfill, and also allow the City more time to accumulate these funds.

**Table 6: Replacement Landfill Cost Scenarios**

	"DO NOTHING"	AT END OF PHASE 1	AT END OF PHASE 2	AT END OF PHASE 3
<b>CUMULATIVE DIVERSION BASED ON 2006 PERFORMANCE</b>	0%	13%	42%	73%
<b>CAPITAL COST DEFERRAL PERIOD (YEARS)</b>	0	3	8	15
<b>REPLACEMENT LANDFILL FUNDING PERIOD</b>	20	23	28	35
<b>NEW ANNUAL CONTRIBUTION</b>	\$1,240,955	\$1,098,190	\$873,912	\$717,315
<b>DIFFERENCE TO STATUS QUO</b>	\$0	-\$142,765	-\$367,043	-\$523,640

As can be seen in Table 6, extending the life of the existing landfill by implementing the Plan allows the cost for a replacement landfill to be deferred. This will reduce the annual reserve amounts and give the City a longer funding period in which to accumulate the required funds.

## **PLAN ADMINISTRATION**

The City's Environmental Services Branch will be responsible for managing implementation, with support from the other areas of the City's organization as required.

Implementation Plans will be developed to support the execution of the programs in the Plan. The nature of many of the programs is such that multiple sectors of the City and external stakeholders will be affected or involved in the roll-out of programs. The City may consider the formation of a Plan Implementation Working Group, which would involve key stakeholders both within and external to the City. This Group would provide stakeholder input and technical support throughout the implementation of the programs and policies in the Plan.

## **PLAN REVIEW AND AMENDMENT**

This Plan represents the current understanding and approach to the solid waste management challenges being faced by the City. The version of the Plan that is formally adopted will be considered a "living document" that may be amended to reflect new considerations, technologies, and issues.

It is anticipated that the Plan will be reviewed periodically and as programs are implemented; this will happen at least once every 5 years. Subsequent phases (beyond the four currently defined) may be identified as the need arises.



## GLOSSARY

TERM	DESCRIPTION
Anaerobic Digestion (AD)	A biological process using microbes to break down organic material in the absence of oxygen. Digestion takes place in an enclosed chamber, where critical environmental conditions (e.g. moisture content, temperature and pH levels) can be controlled to maximize microbe generation, gas generation and waste decomposition rates.
Bulky Waste	Large items of waste materials, such as appliances, furniture and large auto parts.
Construction and Demolition (C&D) waste	The portion of MSW originating in the demolition, land clearing and construction sectors. Also may be referred to as DLC waste
“Clean” materials recovery facility	Material is collected in a source-separated program, where contamination is minimal.
Combined Heat and Power (CHP)	The combined generation of heat and electric power from a thermal treatment process for waste. Also known as co-generation.
Commingled	Recycling programs where a number of different materials are mixed together rather than collected separately.
Composting	A biological process whereby organic matter is decomposed through microbial activity, in the presence of oxygen, to produce a peat like humus.
Contamination	Material that is inadvertently collected as part of a recycling or organics program and that must be removed before processing or marketing.
Co-collection	The collection of recyclables and organics together with municipal garbage in one truck; separated later for recycling and composting/digestion or disposal.
Collection	The process of picking up waste, recyclables, or compostable materials from a household or business.
Demand Side Management (DSM)	A utility program aimed at reducing consumer use of a service, such as waste services or electricity, through reduction, conservation or efficiency measures.

TERM	DESCRIPTION
Disposal bans	Regulation prohibiting disposal of materials or products (e.g. yard waste, or lead-acid batteries) in landfills and/or incinerators; typically targeted at items that contribute substantial volume or toxicity to the solid waste stream
Diversion (of waste)	The redirection of generated wastes away from disposal through reuse, recycling, or recovery. It does not include source reduction.
Demolition, Land clearing & Construction (DLC)	The portion of MSW originating in the demolition, land clearing and construction sectors. Also referred to as C&D waste.
Drop-off/Depot	Facilities (staffed or unstaffed) where the public brings recyclables materials, organics or garbage for management by the municipality.
Fibre	Paper materials, such as cardboard, newsprint, and mixed papers.
Gasification	The thermal break-down of solid materials, in the partial absence of oxygen, into a gaseous constituent (syngas), and a solid char residue.
Green Energy	Energy generated from renewable resources through licensable and environmentally and socially responsible projects—to contribute to meeting future demand for electricity
Hierarchy (for waste)	A hierarchy method for solid waste management. The following practices are ranked in order of preference: source reduction; reuse; recycling; energy and materials recovery; and landfill disposal.
Industrial, Commercial & Institutional (ICI)	The portion of MSW originating in the light industrial, commercial and institutional sectors.
In-vessel composting	Composting involving a closed tank or unit with physical controls
Mechanical Biological Treatment (MBT)	Generic term used to describe a range of solid waste treatment options which combine some form of mechanical processing or sorting of waste with some type of biological treatment (aerobic or anaerobic) to stabilize the waste.
Multi Family unit (MFU)	Multi family residences including apartments, condos, duplexes and townhouses.
Mixed Paper Products (MPP)	The mixed paper portion of the paper products. Includes office paper and boxboard. Does not usually include newspapers, magazines and corrugated cardboard.

TERM	DESCRIPTION
Materials Recovery Facility (MRF)	A facility where recyclable materials (such as glass, metals, plastics or paper) are separated and processed into marketable materials.
Municipal Solid Waste (MSW)	The solid waste stream from residential, ICI and DLC sources.
Old Corrugated Cardboard (OCC)	Corrugated cardboard that has been separated for recycling. Corrugated boxes have a fluted, corrugated medium layer (rippled layer), sandwiched between layers of linerboard.
Organics	The organic fraction of the waste stream, consisting of material that is biodegradable, typically food, yard waste, and sometimes paper.
Old News Paper (ONP)	Used newspapers that have been separated for recycling.
Old Magazines (OMG)	Used magazines that have been separated for recycling.
Processing	Preparation of solid waste for sale to markets through such activities as hand-sorting, magnetic and/or mechanical separation or shredding, composting or digestion.
Pyrolysis	The thermal break-down of solid materials into gaseous, liquid and solid materials that may be used for a variety of purposes, such as fuel and chemical feedstock. The process is endothermic (i.e. requires external energy) and takes place in the total absence of oxygen.
Refuse Derived Fuel RDF	The mechanical processing of household waste using screens, shredders and separators to recover recyclable materials and produce a combustible product from the remaining waste stream.
Reuse	The use of product, such as refillable beverage bottle, more than once, possible with slight modification.
Source separation	The separation of materials suitable for recycling or composting from solid waste at the source of generation (e.g. households, businesses).
Source Separated Organics (SSO)	A system whereby the waste stream contains food yard waste and some papers. Organics are separated by householders according to municipal guidelines, and are processed at composting facilities
Syngas	A gaseous constituent resulting from the thermal breakdown of solid materials

TERM	DESCRIPTION
Thermal treatment	Technologies that process waste using high temperatures to reduce the quantity of material requiring disposal, stabilize the material requiring disposal, and recover energy and potentially material resources.
Tipping Fee	The fee charged at a landfill, waste-to-energy plant or other waste handling facility for the service of handling MSW.
Waste stream	The waste output of a community, region or facility. Total MSW is categorized into different waste stream components (e.g. organic waste, construction waste, paper products etc.)
Waste-to-Energy (WTE)	A general description for the process by which MSW is converted to a usable form of energy, generally through incineration or other thermal treatment process
Wet/dry waste	Wet waste is the organic or compostable portion of waste and dry wastes are wastes that can be collected for recycling.
Windrow Composting	Composting process whereby piled organic material is placed in a series of rows, usually two meters deep. The rows are turned periodically for natural aeration.
Yard Waste	Yard and garden wastes from the residential or ICI sectors including leaves, grass clippings, cuttings etc.

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## **LIST OF ACRONYMS**

AD	Anaerobic Digestion
C&D	Construction and Demolition
CHP	Combined Heat and Power
CO <sub>2</sub> eq	Equivalent tonnes of carbon dioxide
DSM	Demand Side Management
FCM	Federation of Canadian Municipalities
GHG	Greenhouse gases
ICI	Industrial, Commercial and Institutional
IVC	In-vessel composting
LFG	Landfill Gas
LHR	Long Haul Rate
MBT	Mechanical Biological Treatment
MFU	Multi Family Unit
MPP	Mixed Paper Products
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
OCC	Old corrugated cardboard
ODS	Ozone depleting substance
ONP	Old newspaper
OMG	Old Magazines
RDF	Refuse Derived Fuel
RFP	Request for Proposals
SWRC	Saskatchewan Waste Reduction Council
SWRP	Saskatoon Waste and Recycling Plan
tpa	Tonnes per Annum
tpd	Tonnes per Day
VOC	Volatile Organic Compounds



## RESIDENTIAL WASTE COLLECTION SCENARIOS

While specifics of collection models are still to be determined, it is clear that they will change from the current waste collection structure. Based on the programs that are included in the Plan, the City has examined how other municipalities with similar programs have selected collection models. Examples of different collection system options are shown in Appendix B.

### PHASE 2 COLLECTION OPTIONS

The examples below outline possible collection scenarios for Saskatoon, and are shown for winter and summer, at the end of Phase 2, when recyclables collection is expected to be in place.

Figure 1: Collection Option for Phase 2

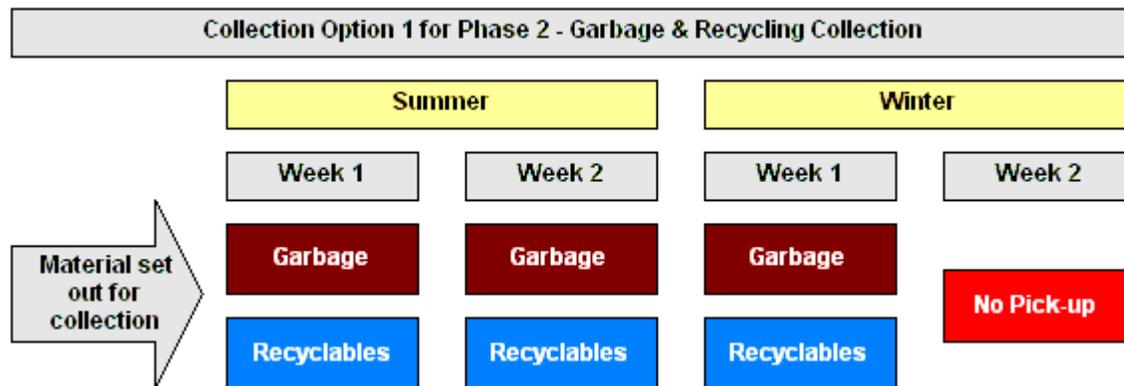
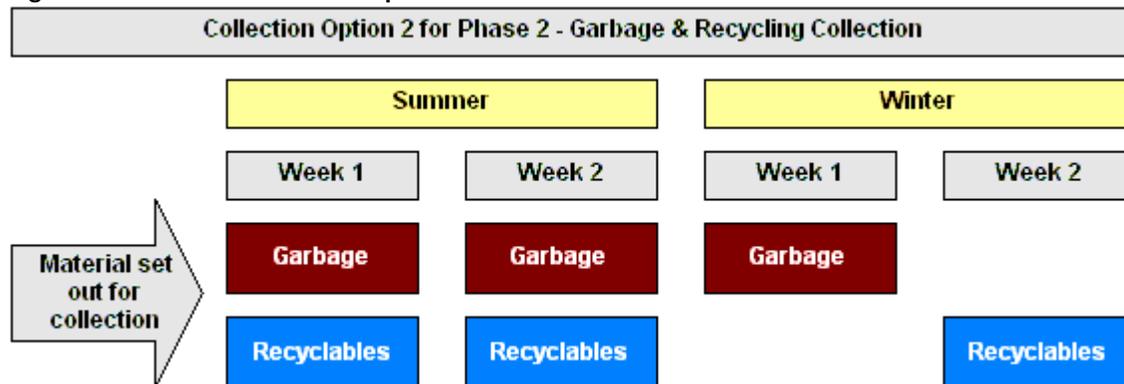


Figure 2: Alternative Collection Options for Phase 2



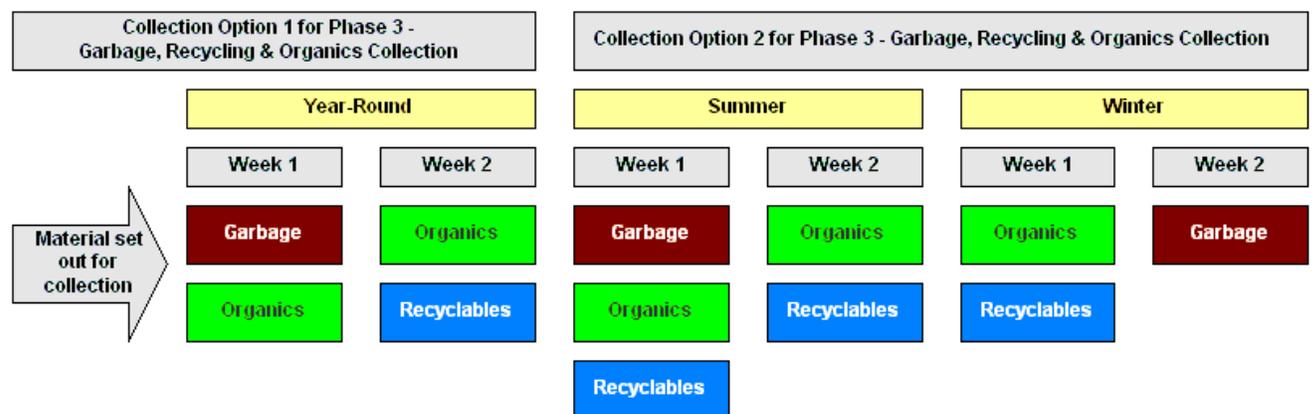
The two options presented above for Phase 2 collection differ only in how collection in winter would be achieved. It should be noted that winter garbage collection in

Saskatoon currently occurs every two weeks, so that this would not represent a reduced level of collection frequency for residents, although it would incorporate recyclables collection.

### PHASE 3 COLLECTION OPTIONS

In Phase 3, when organics collection will be incorporated into the collection schedule, the City may consider using trucks with multiple compartments, so that 2 different types of material could be collected simultaneously with the same truck, reducing the number of separate trips that would need to be made.

**Figure 3: Collection Options for Phase 3**





## **DEVELOPING PROGRAM DESIGNS**

As was noted throughout the Plan, implementation of the programs and policies will be undertaken by the City over time, and will reflect what is appropriate, cost-effective and most efficient for each program. However, it was necessary to develop the basic components of program, as a means of evaluating potential program costs and performance. This appendix documents the assumptions made about each of the programs, policies and new facilities identified in the Plan.

## **PUBLIC EDUCATION & OUTREACH ACTIVITIES**

Public engagement and outreach strategies will target the whole city broadly, as well as focus on particular groups or issues that may warrant specific attention. To lead these activities it was identified that the City will hire a Waste Reduction Education Coordinator (or similar title) to be responsible for the planning and delivery of public outreach and engagement strategies focused on waste reduction. The main operating requirements for these programs would be the salary for the position, and a budget for the activities

A cost profile for the hiring of the waste reduction coordinator based on the following assumptions:

- Staffing resources would be 1 full-time equivalent
- Annual salary and benefit costs would be \$65,000
- Existing office space and vehicles would be able to be utilized by the person in the position, so no new capital investment would be required for these aspects

In terms of costs associated with the promotion of various programs, it is expected that an annual budget allocation will be made for those programs that are to be implemented or supported. For the purposes of cost estimation, it has been assumed that:

- An allocation of \$20,000 would be provided in Phase 1 to support Phase 1 activities
- From the start of Phase 2 onwards, an allocation of \$90,000 per year would be budgeted for specific program development and associated advertising, or other outreach activities
- Not all programs will be implemented at once; programs with the potential to deliver greatest waste reduction/diversion results would be targeted as a priority, and this used to determine allocations to specific programs, based on the above.

The public outreach and education activities identified in the Plan were as follows:

#### Phase 1

- Update & Expand Recycling Directory
- Expand Waste Reduction Calendar
- Promote and Facilitate Existing Reuse Opportunities

#### Phase 2

- Develop Public Displays on Waste Reduction
- Develop Illegal Dumping Prevention Program
- Initiate Smart Shopper Consumer Awareness Program
- Promote Grasscycling Program
- Develop Waste Reduction Education Program for Schools

It was also assumed that once started, programs would continue as appropriate into subsequent phases.

## **PHASE 1 PROGRAMS**

There are several elements of the Plan that will function on a City-wide basis to support the broad goals of the Plan and provide the City with better control over the waste management system.

The following assumptions were made about the programs planned for Phase 1:

### **Implement Incentive-Based Tipping Fees for Yard Waste**

While there are incremental charges to implementing such a program with regards to enforcement and bylaw changes, there has not been a specific capital cost identified. Expected operational costs with respect to the promotion and information sharing regarding the new policy have been incorporated in the cost of the public education and outreach allocations in the preceding section.

### **Implement Disposal Ban on Paper & Cardboard**

In order to develop a program scope and cost profile for this program option, the following were assumed:

- No new facility for processing paper and cardboard would be required to be constructed
- No new collection vehicles would need to be purchased by the City, as the program would initially target the ICI sector, which already covers its own recycling costs.
- Existing staffing levels at the Saskatoon Landfill would be sufficient to provide the increased levels of enforcement to support the ban
- Educational activities relating to the implementation of this policy have been assumed to be covered under the Public Education and Outreach section.

### **Upgrade Yard Waste Compost Facilities**

For the purposes of this report, it was assumed that the existing compost facilities would operate at the existing McOrmand Road location, utilize a turned windrow system for composting, and be sized to handle all yard waste generated within the City. It was also assumed that the east side location would be developed once the McOrmand Road location was in place.

The following costs were assumed:

- Capital costs consist of \$75,000 for upgrades at both sites in Phase 1
- Annual operating costs of \$40,000/yr for site operations and maintenance, including staffing, based on existing arrangement with SWRC in partnership with the City

### **Continue HHW Days**

The collection events would be supported through general tax revenue, although the City could consider the implementation of a nominal fee for using the service. If implemented, this fee would be set very low, so as not to discourage residents from making use of the service. Once a provincial stewardship program was established, the manufacturers and retailers for the product would take over responsibility for its handling and disposal, and should be responsible for long-term funding requirements.

To develop costs for this program it was assumed that:

- Frequency of these events would be once per month throughout the year
- Envirotec facility would continue to be used for collection and processing of materials collected in the program

- The City would be involved in increased promotion of this service, to increase the level of participation
- Annual operating budget allocation of \$70,000 would be provided for this program, including promotion of events

### **Composter Subsidy Program**

The following assumptions were made with respect to the design of this program:

- The rebate-based program structure would be maintained at \$10/unit
- An annual budget of \$7,000 would be allocated to rebates (500 composter units, plus \$2,000/year administrative costs).
- Education and awareness program costs were assumed to be incorporated into the annual allowance for that program

### **Develop Additional Compost Demonstration Gardens**

The following were assumed to develop costs for this program:

- City would incur start-up costs to develop sites, including plant purchases and site works to prepare sites
- 2 new sites would be developed in Phase 2 at a cost of \$10,000 per site
- On-going garden maintenance allocation of \$1,000 per year would be provided, to include site works and City-provided services, e.g. transportation
- Labour for garden maintenance would be volunteer only

### **Implementation of User Pay System**

The main start-up costs directly associated with the implementation of this policy would relate to the following:

- The purchase of the necessary additional individual collection carts – this will be critical to allow conversion of all neighbourhoods. Lease and rental options could be investigated to reduce the extent of capital outlay that would be associated with the City purchasing a large number of carts in a short space of time. The existing conversion program to transition neighbourhoods to individual cart collection could be accelerated, utilizing funds already allocated for cart purchases to support this program

- Resources to deal with logistical and outreach activities associated with converting neighbourhoods where street configurations represent challenges to the proposed individualized collection service.
- Some upgrades to the City's utility billing system to move to the new method of billing
- Resources for enforcement during the transition period, to provide additional support to the education program

The following assumptions were made with respect to the design of this program, and used as a basis for estimating program costs:

- The cost of implementation of city-wide disposal limits through bylaw amendment were assumed to be incorporated into the City's fixed administrative costs
- The current estimate is that 25,000 households would require individual 100-gallon carts for complete conversion of the City to this collection system
- Assume that implementation of this policy would be phased over time, to mitigate financial burden associated with changeover to new carts, as well as needed outreach to neighbourhoods undergoing conversion to individual cart collection
- As neighbourhoods were converted, the incremental cost of collection from increased numbers of carts would be reflected as part of this program, amounting to \$275,000 additional cost in 2008 (Phase 1), and \$315,000 in 2009 and thereafter (Phase 2 and beyond).
- Capital costs associated with converting the remaining households have been calculated by the City at \$2.13 million. This translates to an incremental increase of \$50,000 per year for the accelerated purchase of new carts, over and above the \$300,000 that is already budgeted for this expense. This incremental capital cost would begin 2008 (Phase 1) and continue into Phase 2.
- Outreach to neighbourhoods will be undertaken using resources allocated specifically to this program, and supported by the overall public outreach program budget. An allocation of \$15,000 per year was assumed.
- Annual administration and billing costs were assumed to be incorporated into City overhead costs.

### **Provide Waste Reduction Education to ICI Sector**

The following assumptions were made with respect to this program:

- Waste Reduction Coordinator would lead this initiative, therefore no additional staff time would be required
- In Phase 1, budget allocations would be provided through the already-outlined Public Education and Outreach budget allocation

## **PHASE 2 PROGRAMS**

The assumptions made to develop costs for Phase 2 programs are outlined under the respective programs.

### **Develop Building Materials Reuse Facility at Landfill**

The following assumptions were made to develop costs for the program:

- 1 full-time equivalent required to attend materials reuse area at cost of \$50,000 per year
- Occasional materials handling needs will be met using existing equipment at Spadina Landfill
- Support from Habitat for Humanity if supplied, will be on volunteer basis
- Estimated cost of cover-all building constructed for material storage at \$65,000

### **Develop Recyclables Processing Facility**

The following assumptions were made with respect to the development of a recyclables processing facility:

- The facility could be operated by the City or the private sector, no determination on this has yet been made. Costs associated with the facility are considered equivalent, whether operated by City or private company
- No long-haul transportation costs to markets have been included in operating costs
- No revenue from marketing of materials has been considered in cost profile

Costs for the facilities were estimated based on the following assumptions:

- The capital costs for the MRF would include a 25,000 square foot building at \$150/sq ft; \$55,000 for a scale; \$500,000 for a processing line, \$200,000 for a loader, and 2 cabs and trailers for \$150,000 each. MRF capital costs are high-level and assumed equal for either collection method.

- Operating costs per tonne were estimated at \$145/tonne, based on City of Abbotsford processing facility for commingled recyclables at 2007 costs. City of Abbotsford facility processes about half the expected quantities for Saskatoon, which could result in lower costs for Saskatoon, based on economies of scale.
- In the event that the City elects to outsource the processing of recyclables, it is anticipated that the service provider would be responsible for facility development capital and operating costs

### **Provide Recyclables Collection to Single Family Residential Units**

In order to develop the scope for this option, the following assumptions were made:

- This program would cover a collection service only to single-family households
- Costs associated with this program reflect collection-related costs only, and Costs associated with the program will encompass the purchase and operation of collection vehicles, collection containers, and the operation of a transfer and processing facility
- Source-separated recyclables collection costs would be based on a manually collected blue box system
- Commingled recyclables collection costs would be based on an automated cart collection system
- Both systems would require the purchase of 12 new trucks to provide collection service, at a cost of \$350,000 each
- Capital costs for the source-separated collection would also encompass the purchase of blue boxes & bags for each household
- Capital costs for the commingled collection service would also encompass the purchase of an additional cart for automated collection for each household.
- Operating costs for automated collection vehicles have been indexed based on the City's 2007 actual waste collection costs of \$3.7 million, and incorporates the expected increase in collection costs of \$590,000 per year that will result from transitioning to individual cart collection city-wide. It was assumed that an amount equal to 75% of these costs would cover the additional expense to provide recyclables collection. The bi-weekly collection of garbage during the winter is currently equivalent to 75% of the City's full collection capacity, and therefore would be the same level of service as used for bi-weekly recyclables collection which has been assumed.

- Operating costs for manual blue box collection have been indexed based on existing private blue box service in Saskatoon, discounted based on assumed economies of scale, and have considered collection cost components only, for a rate of \$5/household/month.
- Processing capacity and associated costs would not be included in the cost of providing the collection service

### **Provide Recyclables Collection to MFU**

In order to develop the program design and cost profiles for this program, the following were assumed:

- Costs for collection only will be considered in this program component
- It is assumed that automated collection of large containers suitable for multi-family building use will be utilized; this has been assumed as equal to that for automated collection for single-family units, although equipment may differ.
- Two additional dedicated trucks to be purchased for MFU collection, at cost of \$350,000 each
- Costs for purchase of new bins for MFU not included, as may be able to utilize existing bins for recyclables collection
- Processing would occur at the same facility developed to process recyclables from single-family collection program; processing capacity costs have not been included in the cost of providing the collection service

### **Initiate Business Environmental Awards Program**

Incremental costs for this program have not been considered, it is assumed that this falls within the cost allocation for public education and outreach activities already outlined.

### **Promote Adoption of Environmental Purchasing Policy**

Incremental costs for this program have not been considered, it is assumed that this falls within the cost allocation for public education and outreach activities already outlined.

### **Implement Disposal Ban on ICI Yard Waste**

In order to develop a program scope and cost profile for this program option, the following were assumed:

- Facilities for processing ICI yard waste would be suitably sized to provide adequate processing capacity for expected quantities of all materials banned

- Existing staffing levels at the Saskatoon Landfill would be sufficient to provide the increased levels of enforcement to support the ban
- Educational activities relating to the implementation of this policy have been assumed to be covered under the Public Education and Outreach section.

## **PHASE 3 PROGRAMS**

Phase 3 program assumptions are discussed in the following sections.

### **Develop Organics Management Facility**

The broad range of proprietary technologies available for both in-vessel composting and anaerobic digestion makes the estimation of costs challenging, as there is significant variation from one to another. For the purpose of this report, a covered aerated static pile system was considered as the option. This system was selected because it is relatively low cost as compared to the other options, and is readily scalable to handle changes in the amount of organics to be managed. In addition, this technology option could be achieved through a relatively straightforward upgrade of the yard waste compost facilities developed in Phase Two. For the anaerobic digestion facility, the costs were estimated based on a comparison of a range of costs for different technologies, with adjustments made for the estimated size of a facility for Saskatoon.

In order to develop a program design and cost profile for this option, the following were assumed:

- The composting facility will be sized to process all organic waste generated in Saskatoon from all sectors, for a total facility capacity of 25,000 tonnes/year. This includes some additional materials such as dry wall that would be accepted for composting.
- The anaerobic digestion facility will be sized to process all acceptable organic waste generated in Saskatoon from all sectors for a total facility capacity of 22,000 tonnes/year. The anaerobic digestion facility will be slightly smaller than the composting facility because of the inability to accept certain materials, e.g. drywall and some wood waste that can be accepted for composting.
- In either case, cost estimates include development of facility infrastructure and auxiliary equipment, but do not include the cost of land acquisition and permitting
- For the composting system, capital costs for a facility of this size were estimated at \$12.5 million, based on experience with facilities developed at similar capacities in 2005-2006.

- Additional capital expenses for the composting facility included material handling equipment and a scale
- Operating costs for a composting facility of this size were assumed to be \$15/tonne based on 4 staff at \$65,000 each, \$10,000 utilities, \$85,000 for 1 replacement cover per year, \$60,000 for loader maintenance, and \$25,000 in site servicing and other expenses
- Capital costs for an anaerobic digestion facility of this size were estimated at \$20 million, based on a number of indicator facilities reviewed in 2005, and would include the anaerobic digestion facility, energy generation infrastructure and composting required for stabilization of the solids from the process.
- Operating costs for a facility of this size were assumed to be \$120/tonne based on indicator facilities above, and 1 facility in partial operation in 2007 in the UK. Operating costs do not include any offsets from energy sales
- Costs for either option are exclusive of the cost of land acquisition and permitting

### **Triple Bottom Line Assessment**

There was limited information available to conduct a full triple bottom line assessment. From an environmental standpoint, the following high-level statements can be made about the AD technology:

- Air emissions – the AD process is typically associated with significant odours that must be controlled. GHG emissions from the process are likely to be less than landfilling because the methane-rich biogas is the main product of the process, and is therefore captured and used rather than being allowed to vent to atmosphere.
- Energy savings - The biogas produced during the digestion phase can be used to generate energy. However, since biogas markets are less well developed, the ability to effectively use the biogas may be limited. In terms of energy generation efficiency, estimates of power generation are in the order of 100 – 200 kWh per tonne processed, or about 20% of that for gasification.
- Impact of Digestate – The solid fraction (digestate) is likely to require further treatment, such as via composting, before it can be beneficially used for soil amendment or land application. Heavy metals accumulations in the solid fraction may occur if mixed MSW is the feedstock, and could in turn affect the usability of the compost product. Utilizing a source-separated organics input would limit the heavy metals risk, and improve the quality of the compost material.

### **Provide Curbside Collection of Organics to Single-Family Residential Units**

To develop a program design and cost profile for this option, the following were assumed:

- The program scope would cover the provision of a collection service for source-separated organics only, using a cart to facilitate collection
- Collection would be provided to single family residential units using this program structure
- Costs associated with the program will encompass the purchase and operation of collection vehicles, but not operation of an organics processing facility (to be addressed in later section)
- Twelve additional trucks would be required to provide collection service to all single family houses in the City; these have been assumed to cost \$350,000 each
- Operating costs for automated collection vehicles have been indexed based on the City's 2007 actual waste collection costs of \$3.7 million, and incorporates the expected increase in collection costs of \$590,000 per year that will result from transitioning to individual cart collection city-wide. It was assumed that an amount equal to 75% of these costs would cover the additional expense to provide recyclables collection, as only a portion of the costs of a single garbage collection route would be required to provide an additional route.
- No determination has yet been of whether the City or the private sector would provide the collection service, nor have any specific efficiencies associated with a service provider been included
- No revenue from marketing of compost, energy or other products has been considered in the cost profile

### **Provide Source-Separated Organics Collection to Multi-Family Residential Units**

In order to develop the program design and cost profiles for this program, the following were assumed:

- Costs for collection only will be considered in this program component, i.e. no processing costs
- Assume collection cost per tonne will be the same as for single-family SSO collection

- Processing would occur at the same facility developed to process recyclables from single-family collection program
- No determination has yet been of whether the City or the private sector would provide the collection service, nor have any specific efficiencies associated with a service provider been included
- No revenue from marketing of compost, energy or other products has been considered in the cost profile

### **Develop Construction & Demolition Materials Handling Facility**

The variation in equipment and facility design for C&D material processing makes the development of cost profiles for facilities very challenging. Some facilities are highly automated, while others focus on management and storage of source-separated streams. For the purposes of developing a cost profile for this option, the following were assumed:

- The facility would incorporate both mechanical and manual separation
- The facility would be sized to handle 20,000 tonnes of C&D waste per year, based on the current disposal rate of 9,000 tonnes/year going to the Spadina Landfill, and the likelihood that if a facility were available and regulatory support given to the program, the amount of material available for treatment would increase dramatically. The projected processing rate would be 60 tonnes/day
- Capital costs of facility development are assumed to be \$3.5 million for a 10,000 sq.ft. facility with some mechanical processing, based on estimates for two other US facilities as follows:
  - 25,000 sq.ft. building with full mechanical processing line, capacity of 680 tonnes/day cost \$12 million in 2005/6
  - 21,000 sq.ft. building with partial mechanical line, capacity of 500 tonnes/day cost \$5 million in 2005/6
- Operating costs are assumed to be \$80 - \$85/tonne, based on published tipping fees of \$95-\$100/tonne associated with the indicator facilities above, and making some allowance for profit as facilities are operated by private sector.

### **Implement Disposal Ban on Recyclables**

In order to develop a program scope and cost profile for this program option, the following were assumed:

- Facilities for processing recyclables would be suitably sized to provide adequate processing capacity for expected quantities of all materials banned
- Existing staffing levels at the Saskatoon Landfill would be sufficient to provide the increased levels of enforcement to support the ban
- Educational activities relating to the implementation of this policy have been assumed to be covered under the Public Education and Outreach section.

### **Implement Disposal Ban on Residential Organics**

In order to develop a program scope and cost profile for this program option, the following were assumed:

- Facilities for processing residential organics would be suitably sized to provide adequate processing capacity for expected quantities of all materials banned
- Existing staffing levels at the Saskatoon Landfill would be sufficient to provide the increased levels of enforcement to support the ban
- Educational activities relating to the implementation of this policy have been assumed to be covered under the Public Education and Outreach section.

### **Implement Disposal Ban on All ICI Organics**

In order to develop a program scope and cost profile for this program option, the following were assumed:

- Facilities for processing ICI organics would be suitably sized to provide adequate processing capacity for expected quantities of all materials banned
- Existing staffing levels at the Saskatoon Landfill would be sufficient to provide the increased levels of enforcement to support the ban
- Educational activities relating to the implementation of this policy have been assumed to be covered under the Public Education and Outreach section.

### **Implement Incentive-Based Tipping Fees for Construction and Demolition Waste**

In order to develop a program scope and cost profile for this program option, the following were assumed:

- Facilities for processing construction and demolition materials would be suitably sized to provide adequate processing capacity for expected quantities of all materials banned

- Existing staffing levels at the Saskatoon Landfill would be sufficient to provide the increased levels of enforcement to support the ban
- Educational activities relating to the implementation of this policy have been assumed to be covered under the Public Education and Outreach section.

### **Require Waste Management Plans in Building Permits**

Incremental costs for this program have not been considered, as it is assumed that the costs to implement this policy change are already covered as part of the City's overhead costs. Education and awareness-building activities specific to this program have been assumed to fall within the cost allocation for public education and outreach activities already outlined.

## **PROGRAMS FOR PHASE 4 & FUTURE PHASES**

### **Activities from Previous Phases**

It has been assumed that the costs associated with programs initiated in previous Phases would continue as appropriate in Phase 4 and beyond.

### **Investigate Waste-to-Energy Technologies**

The following assumptions were made with respect to this program:

- No specific cost allocation to be provided
- Staff time to consider options incorporated into overhead
- Any pilot projects or other start-up exploration would be covered by specific cost allocations identified at that time.