Report

Assessment of Residential Source Separated Organics Collection Options

A Study for the City of Minneapolis

Project I.D.: 13M030

Minneapolis, Minnesota

October 2013

Minneapolis
City of Lakes

Foth

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October 1, 2013

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Dear Mr. Herberholz:

RE: Final Report – Assessment of Residential Source Separated Organics Collection Options

This letter transmits the final report of the Assessment of Residential Source-Separated Organics Collection Options. It has been a pleasure serving you and the City of Minneapolis on this project.

Sincerely,

Foth Infrastructure & Environment, LLC

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Cc: Jeff Jenks and Kellie Kish

Assessment of Residential Source Separated Organics Collection Options

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Project ID: 13M030

Prepared for

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October 2013

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Assessment of
Residential Source Separated Organics Collection Options

Executive Summary

The City of Minneapolis is a leader in solid waste management and recycling. The City's organized system of garbage, recycling and yard waste collection has been a model for other communities for decades. The City just recently made a large investment in the next generation of improvements in recyclables collection by implementing one-sort recycling. This study examines the feasibility for the City to collect source-separated organics on a City-wide basis.

The City of Minneapolis Solid Waste & Recycling Program has been testing and evaluating the feasibility of separate collection of residential organic waste (such as food scraps and non-recyclable paper items) for over four years with the start of its first pilot collection route in September 2008. This source-separated organics (SSO) study was commissioned by the City to independently analyze the feasibility and preliminary costs of current and alternative methods of collecting SSO.

Over the past few years, there have been several innovations and plans in the private marketplace for SSO collection, processing and composting facilities. Also, government regulations are changing that will affect the City's future SSO operations. This study addresses these changes, plans and regulations as part of the overall assessment of options and feasibility analysis.

Today, the City's pilot SSO program operates on a "voluntary" (also known as "opt-in") basis whereby willing residents subscribe to the additional service and then receive a new, green SSO cart and program instructions. A dedicated City crew and truck serves five routes within parts of eight south Minneapolis neighborhoods. The pilot program is open to a total of 5,370 dwelling units (DUs), including those households that do not subscribe or set-out any SSO. This is about five percent of all households in the City (105,500 DUs).

About 476 tons of SSO were collected in 2012 which equates to a weighted average of 177 pounds of SSO per household serviced (including non-subscribers) per year. The City's selected pilot route data indicates an average SSO diversion rate of about 8.7 percent as a fraction of the total amount of mixed municipal solid waste (mixed MSW). On average, the City crew serves 113 route households (including non-subscribers) per hour. The current pilot program costs about $125,000 per year.

The pilot program collects from within five routes that serve at least parts of eight south Minneapolis neighborhoods. The subscription rate (number of households that opt-in and receive a green SSO cart over total number of households in that neighborhood) ranges from a low of 30 percent to a high of 52 percent with a total average of about 46 percent. The cost of the pilot program is spread city-wide such that subscribers are not charged any extra for the SSO cart or collection service. A variety of outreach and public education tools have been used in the pilot neighborhoods to encourage residents to participate. The City may wish to consider

conducting a controlled opinion survey to determine residents' willingness to participate in and/or pay for this additional SSO collection service.

The Minneapolis SSO pilot program was compared to several other northern cities that have had ongoing SSO collection programs for many years. Most of the same organic materials are included, but the overall solid waste, recyclables and SSO collection systems are sometimes very different. For example, many of the other Canadian cities around Toronto use an "opt-out" approach whereby all residents receive the *Green Bin* (cart) for SSO and then must actively contact the municipality to decline to participate in the service and request the *Green Bin* be removed. Some cities have even gone so far as to require SSO participation by making it mandatory that residents separate their organics from their mixed MSW and other recyclables (e.g., Seattle, San Francisco).

This study indicates that the Minneapolis pilot programs have been very successful. However, there are ample opportunities for improvements in subscription rates, recovery rates and collection efficiencies. The Minneapolis pilot program recovery rate of 177 pounds per total household serviced per year is on the low end of the range. Other cities have achieved in the range of 300 to 700 pounds per total household serviced per year. The City's pilot routes reflect a diversity of neighborhoods, resident demographics and program promotions. The level of effort to educate pilot route residents and encourage SSO subscriptions varies between neighborhoods. Additional promotions and incentives could be considered to help increase subscriptions and participation in the SSO program.

All Minneapolis pilot routes continue to use the same collection system operational design. Subscribing residents receive additional weekly SSO collection service using special green carts. The SSO is collected separately by a City crew without co-collection or commingling with other waste streams. Once collected, the SSO is delivered directly to Hennepin County's Brooklyn Park Transfer Station (BPTS) where the City pays the County a $15 per ton tipping fee. This tipping fee is a subsidized rate by County Board policy. According to County staff, the actual costs of operations, including transfer and composting tipping fees, is approximately $65 per ton.

Five collections option categories were analyzed for this study:

- No SSO sorting or separate collections such that the organics would be disposed within mixed MSW (option #1).
- Separate collection of SSO alone similar to the current pilot operations (option #2). This option was further split into two: #2.a with continued County tipping fee subsidy and #2.b without continued County tipping fee subsidy.
- Collection of SSO with yard waste (option #3.a - commingled with yard waste and option #3.b – co-collected with yard waste with SSO contained within *Blue Bags*™).
- Co-collection of SSO within the mixed MSW, but the SSO is contained within *Blue Bags*™ (option #4).

This analysis estimated the collection and disposal costs of each of these options. This study indicates that the SSO alone collection option (#2), may be the least costly SSO collection option. (See Table ES-1 for the bottom-line cost comparison of the five options.) This rank as the least cost option is due in large part to the ongoing County SSO tipping fee subsidy at the BPTS. Collection of SSO commingled with yard waste (option #3.a) may be slightly more cost-effective if the County were to ever eliminate its SSO (alone) tip fee subsidy at the Brooklyn Park Transfer Station (BPTS).

Table ES-1
Summary of SSO Collection Options
Cost per Total Dwelling Unit (DU)* Per Month

$ per Total DU Serviced* City-Wide Per Month
(Including households that do not subscribe to the SSO service or set-out SSO)*

SSO Collection Option	Current Seasonal Yard Waste Progam Costs	Incremental SSO Costs	Total Collection Costs
SSO Alone - with continued County tip fee subsidy (Option #2.a)	$2.95	$2.23	$5.18
SSO Alone - without any County tip fee subsidy (Option #2.b)	$2.95	$2.54	5.49
SSO +Yard Waste - no Blue Bag (Option #3.a)	$2.95	$2.42	$5.37
SSO +Yard Waste - with Blue Bag (Option #3.b)	$2.95	$5.02	$7.97
SSO +mixed MSW – with Blue Bag (Option #4)	$2.95	$7.76	$10.71

Table ES-1 displays the total costs for the existing yard waste collection program at $2.95 per DU per month ($3,740,397 per year 2013 yard waste program budget ÷ 105,500 dwelling units ÷ 12 months per year). These are "base" costs to provide seasonal yard waste collection services during approximately eight months per year (April through November). Each option listed then shows the incremental costs for collecting SSO added on to this base, yard waste collection costs. This analysis factored in collection efficiencies for options #3.a and #3.b in combining yard waste and SSO during the eight-month yard waste collection season, but also assumed new trucks would be required for these combined operations.

The City may find that there may be additional collection efficiencies by collecting SSO with yard waste (option #3.a) during the 8-month yard waste season (April through November). Instead of creating entirely new SSO routes with separate trucks throughout the year (option #2), collection with yard waste (options #3.a and #3.b) only requires separate SSO routes during the 4-winter months (November through March).

Every other week (EOW) trash collection was intentionally not included in the in-depth cost analysis for this study. EOW is too complicated at this stage of development of SSO collection because of the voluntary, "opt-in" system design. There would be less cost savings if the mixed MSW trucks needed to serve an entire route on weekly basis, but omit SSO / EOW subscribers on their off week.

The calculated total amount of SSO per year is calculated at 7,913 tons per year city-wide based directly on pilot performance data and a projected recovery rate of 150 pounds of SSO per household per year. This recovery rate is for all dwelling units serviced, including households that do not subscribe or participate.

The City's North Transfer Station is currently not actively receiving and transferring yard waste or MSW. With minor modifications, the North Transfer Station could handle bulk transfer of SSO under any of the collection options identified in this study. However, processing of SSO (e.g., sorting or grinding) is not feasible given current building configuration and space constraints.

A private transfer station (SKB) owner/operator and their yard waste operating partner (SET) were interviewed for this study. SET and SKB representatives indicated that they could handle any form of the SSO that Minneapolis collects at their SKB – Malcolm transfer station, even on a city-wide basis. Modifications to the current facility layout and operations would be required to handle volumes projected that might be collected on a city-wide basis. The City is currently contracting with SET for yard waste processing / transfer services at the SKB – Malcolm transfer station. Other private contractors may be interested as well if the City were to release a request for proposals for transfer / composting services.

As part of this study, Foth conducted a preliminary analysis of environmental impacts for each SSO collection option. Option #2 has the highest GHG net impact at an estimated 288 metric tonnes of carbon dioxide equivalents ($MTCO_{2e)}$ per year. Options #3.a. and #3.b have the lowest GHG net impacts at an estimated 15 $MTCO_{2e}$ per year. Option #4 has the next lowest net impact at 33 $MTCO_{2e}$ per year. The additional impacts of Option #4 are due in part to the need to retransfer all mixed MSW back to HERC after sorting out the *BlueBags*™ of SSO at the SKB Malcolm Transfer Station. This is a preliminary analysis to compare environmental impacts of each SSO collection option using the incremental increases in fuel use and emissions compared to the benefits of composting.

The longer term vision of the overall solid waste, recycling and SSO system could include standardized, mandatory ("opt-out") SSO service and EOW garbage collection. This more aggressive form of SSO service requirements may not be appropriate for the next stage of SSO development in the City, but should be discussed as an option for longer range planning. The current voluntary ("opt-in") SSO service approach may be the best operating policy for the near term because this approach is lower cost and likely produces a higher quality compost product due to less contamination of the organic materials collected.

Assessment of
Residential Source Separated Organics Collection Options

List of Abbreviations, Acronyms, and Symbols

AD	Anaerobic digestion
BPTS	Brooklyn Park Transfer Station
CEAC	Citizen Environmental Advisory Committee
CO_2	Carbon dioxide
DU	Dwelling unit
EAB	Emerald Ash Borer
ECCO	East Calhoun Community Organization neighborhood
EOW	Every Other Week trash collection frequency
EPA	U.S. Environmental Protection Agency
Foth	Foth Infrastructure & Environment, LLC
FTEs	Full time equivalents
GHG	Greenhouse Gas
GTA	Greater Toronto Area
HERC	Hennepin County Energy Recovery Center
HH	Household
kg	Kilogram
lbs	Pounds
M.S.	Minnesota Statutes
MDA	Minnesota Department of Agriculture
MPCA	Minnesota Pollution Control Agency
MRF	Material recovery facility
MRI	Minneapolis Refuse, Inc.
MSW	Municipal solid waste as defined by Minnesota Statutes and City trash program instructions.
$MTCO_{2e}$	Metric tonnes of carbon dioxide equivalents
ORF	Organics recycling facility
OTI	Organics Technologies, Inc.
SET	Specialized Environmental Technologies (dba The Mulch Store)
SMSC	Shakopee Mdewakanton Sioux Community
SSO	Source-separated organics
SSO + yard waste	Source-separated organics commingled (or co-collected) with yard waste
SSOM	Source-separated organic materials
SW&R	Solid Waste and Recycling Division
SWANA	Solid Waste Association of North America
SWMCB	Solid waste Management Coordinating Board
TPY	Tons per year
U.S.	United States

Assessment of
Residential Source Separated Organics Collection Options

Definitions

Blue Bag™ Organics	A trademarked program of SSO collection whereby SSO is separated into and stored in special, compostable "blue bags" and then placed inside of traditional mixed MSW or yard waste carts for co-collection. The blue bags of SSO are then removed via manual sorting whereby the materials are conveyed over an elevated sort line. The blue bags of SSO are then transferred to a SSO composting facility for further processing. (For more details, see www.BlueBagOrganics.com.)
Brush	As defined and collected by the City of Minneapolis yard waste collection program and includes pieces of brush and small branches that are less than 3 inches in diameter and less than 3 feet long. (For more details on how residents are instructed to prepare and set out brush, see http://www.minneapolismn.gov/solid-waste/yardwaste/solid-waste_yardwaste-preparation.)
City	City of Minneapolis
Diversion rate	The amount of SSO recovered over the total amount of mixed MSW + SSO collected for a specific route or area.
Dwelling unit	A single household dwelling unit in the City that receives City-managed solid waste and recyclables collection services.
Full time equivalent	A unit of measuring staff complements. E.g., one FTE equals one full time staff position.
Household	Same as a dwelling unit. There may be multiple households within one building (e.g., a duplex has two households).
Mixed MSW	Includes solid waste materials set out for disposal as per the City's trash collection instructions and the City's ordinance.
Organics	The list of compostable organic materials as defined by the City of Minneapolis pilot SSO program. Does not include yard waste. (See Appendix A.4 – Cart Brochure, part of the City's SSO pilot program public educational literature.)

Participant	A subscriber to the City's SSO collection program that receives a cart and actually participates by sorting their household organic materials and setting them out for collection as per the program instructions.
Participation rate	The number of households that set out SSO materials over a period of time (e.g., four to six weeks) over the total route households serviced. Similar to subscriber rate.
Recyclables	The list of recyclables materials as defined by the City of Minneapolis recycling program. Does not include yard waste or SSO. (For more details see http://www.minneapolismn.gov/solid-waste/recycling/solid-waste_recycling-separating.)
Recovery rate	The pounds of SSO collected per total route household serviced (including households that do not subscribe).
Set-out	An individual SSO cart containing SSO as set out by a participating resident. One cart per set out. Multiple cart set-outs may be collected at one stop.
Set out rate	The number of set outs on any one given collection day over the total route households serviced.
Source-separated organics	Organic materials once separated by the resident in preparation for collection as per the City's SSO program instructions.
Stop	A specific station where SSO carts are stationed (e.g., at the curb line) where the truck stops to tip the SSO cart(s) into the truck. A stop may include multiple carts.
Subscriber	A household in the City SSO program that proactively "opts-in" to voluntarily receive a SSO cart and participate as per the program instructions. The number of SSO program subscribers equals the number of SSO carts delivered by the City.
Twin Cities Metropolitan Area	Seven – County metropolitan area including the Counties of Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington.

Assessment of
Residential Source Separated Organics Collection Options

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Toronto staff, including other communities in the Greater Toronto Area

1 Introduction

1.1 Purpose

The City of Minneapolis Solid Waste & Recycling Program has been testing and evaluating the feasibility of separate collection of residential organic waste such as food scraps for over four years with the start of its first pilot collection route in September 2008 in the Linden Hills neighborhood. Today, parts of eight Minneapolis neighborhoods have separate organic collection available to residents and a wealth of data has been obtained from these pilot routes. In the past, there have been preliminary analyses of the information and results of the pilots, but there has not yet been a thorough, independent study to help City officials review the ongoing organic waste demonstration program, including a cost analysis and discussion of alternative collection options.

In August 2012, the Minneapolis Citizen Environmental Advisory Committee (CEAC) recommended that the City commission a more formal study by an independent consultant who specializes in municipal organics collection to conduct the necessary research. This source-separated organics (SSO) study was authorized by the City Council to analyze the feasibility and preliminary costs of alternative methods of collecting SSO.

1.2 Scope of Work

This study describes the existing SSO collection pilot operations in the City, including a summary of readily available performance information on amounts, participation and costs. Other case study information on residential organic waste collection programs is summarized. Alternative collection methods are described with specific assumptions so that each collection scenario can be objectively compared. When available, projected city-wide service costs are evaluated and compared between each scenario. Observations from this cost-benefit analysis are developed as part of the conclusions of the overall study.

This study addresses the following questions:

- Is there sufficient processing capacity in or near Minneapolis to handle volumes from city-wide SSO collection?
- Is collection of commingled SSO and yard waste preferable to separate collection?
- How does the Emerald Ash Borer (EAB) quarantine bear on this issue?
- What will be the impact of the MPCA composting rules that are currently under revision?

1.3 Data Limitations

This study used the best information and data available at the time. Many of the market conditions may change, especially given the rapidly developing technology of SSO collection and composting. Much of the data comes from unpublished information sources (e.g., personal communications) from City staff and others.

This study is a preliminary cost analysis based on specific City operational and other program conditions. This study is not a detailed collection system design plan. The cost data, therefore, is deemed adequate for purposes of comparing collection method options and broader policy

discussions, but is not sufficient for purposes of program implementation planning (e.g., budgeting for equipment purchases or precise labor costs). Key operation variables and additional, incremental costs are analyzed. Program management and other City administrative costs are not included in the cost analyses. Selected procurement steps are identified (e.g., contracting for SSO transfer/composting services, purchase of additional new trucks), but are not analyzed for City program management staff costs. Actual capital cost of building and facility improvements are not yet known. For example, this analysis is based on preliminary estimates only to upgrade and expand a generic transfer station to accommodate handling of SSO in addition to other traditional materials already being received (e.g., yard waste, mixed MSW, construction & demolition debris, etc.). Additional feasibility, design and permitting work will be needed to refine these preliminary cost estimates into more accurate budgets and work plans.

The separate collection of SSO without any other material is the most common collection method in Minnesota. Given that this is the method used for the City's pilot routes for over four years, there is ample data that is reviewed and analyzed as part of this study. The other methods of SSO collection are not as common (e.g., commingled with yard waste) or have just recently been introduced into the marketplace (e.g., the *Blue Bag™ Organics* program to co-collect SSO within mixed solid waste or yard waste). Also, some of the concepts have not yet been tested on a full-scale basis in this marketplace. Therefore, the level of certainty and detailed performance data from these other methods of collection is less than the City's pilot method of separate collection of SSO.

Most other cities and haulers often do not report their SSO program performance in a consistent / standardized format. The metrics need to compare "apples to apples" for an objective analysis, yet the comparable data is not always available. For example, it is difficult to compare pounds of SSO per "household" without defining whether these program results are for total counts including all households serviced (including non-participants or households without set-outs) versus set-outs from participating households only.

The cost analysis in this study is based on a number of assumptions including the future of various government regulations and policies. For example, this study assumes that:

- MPCA will eventually adopt its proposed composting rule regulating source-separated organics composting facilities. This study assumes that the new rule may be adopted such that it may go into effect by the end of 2015. This study further assumes the content of the new rule as adopted will closely resemble the current draft rule. Other uncertainties include how MPCA will implement the rule for specific, individual facility permits and how MPCA will otherwise actually implement and enforce the rule provisions.
- MDA will maintain the current Emerald Ash Borer (EAB) quarantine zones for the near future. This study does not assume that MDA will extend the list of Minnesota counties in the quarantine to Dakota, Scott or Carver Counties where the current list of available SSO composting facilities are located.

There are varying levels of uncertainty about each of the above assumptions pertaining to government regulations and policies. The comparative cost analysis in this study may need to be refined if the assumptions turn out to be incorrect due to additional governmental decisions.

2 Background

It is important to understand the background, history and current status of organics, yard waste, recycling, and mixed solid waste collection systems as managed by the City of Minneapolis. The subsequent sections of this study build on this background and base level of understanding.

2.1 History

The City of Minneapolis has conducted pilot programs to test the collection and composting of residential SSO. SSO materials include food scraps (both vegetable and animal), non-recyclable paper products (pizza boxes, paper towels, boxes such as frozen food containers), vacuum cleaner bags and their contents, and other selected organic wastes as separated by City residents. Based on a waste composition study conducted jointly by the City and Hennepin County[1], it was determined that approximately 34 percent of the residential solid waste stream is comprised of such organic wastes and therefore represents a very significant fraction of potentially recoverable materials.

The first SSO pilot program began in September of 2008 serving about 300 households in the Linden Hills neighborhood after extensive planning efforts between the City, Hennepin County and Linden Hills Power and Light. The goals and metrics of the original pilots are spelled out in the City's *Interim SSO Report* released in 2009.[2] The pilot program was designed to test the collection of only SSO, without the inclusion of any yard wastes, brush, garden wastes, or other compostable materials. Specialized "organics carts" (aka "SSO cart") were provided to pilot neighborhood residents that subscribed to the service at no cost to residents. The SSO carts were collected by separate "organics trucks" with dedicated routes to serve the pilot neighborhoods. This method of collecting only SSO in separated loads allowed the material to be received at Hennepin County's Brooklyn Park Transfer Station (BPTS) for transfer to a centralized SSO composting facility, SET - Empire. Hennepin County helped fund the original pilot program in the Linden Hills and East Calhoun (ECCO) neighborhoods.

Since then, the pilot SSO collection operations have been expanded to include the entire Linden Hills neighborhood, the entire East Calhoun (ECCO) neighborhood and parts of the Cooper, Hiawatha, Howe, Longfellow, Phillips, and Seward neighborhoods. The Linden Hills neighborhood is served with weekly collections, with part of the neighborhood collected on Mondays and the other part collected on Tuesdays. The ECCO neighborhood is served weekly on Tuesdays. The other, new neighborhoods were added in 2010 and are served weekly on Wednesdays (City route #10), Thursdays (City route #11), and Fridays (City route #13). The last three pilot routes #10, #11 and #13 were designed to correspond directly to regular trash routes and complement the original Linden Hills and ECCO routes to develop a full week's worth of pilot collections for one truck and crew.

2.1.1 Linden Hills Anaerobic Digestion Study

A report titled, *Linden Hills Power & Light - Anaerobic Digester Feasibility Study* (Linden Hills study) developed in June, 2008[3], included a section focused on securing a feedstock and collection possibilities to support a neighborhood-scale anaerobic (AD) facility. For this Linden Hills 2008 study, the feedstock sources were assumed to include source-separated organics and

grease trap waste. Source-separated organics for the purposes of the Linden Hills 2008 study included: yard waste, food waste, paper towels, tissue paper, paper packaging, other non-recyclable paper, disposable diapers, kitty litter, and pet feces.

The Linden Hills 2008 study highlighted several collection options and determined that it would need to work with the City of Minneapolis to create a residential organics collection program that will maximize recovery rates and also minimize costs. The study recommended targeting the recovery of organic waste produced from commercial businesses such as restaurants, grocery stores and food processing facilities. Also, the study recommended targeting institutions such as schools, nursing homes and other large establishments that provide hot lunches.

It is important to note that the City's pilot routes do not include all the materials that could be used as feedstock for an AD facility. Candidate AD organic materials that are NOT collected as part of the pilot routes include:

- Diapers, kitty litter and pet feces
- Yard Waste (leaves and grass clippings)

The Linden Hills 2008 study reported that neighborhood residents could collect about 800 tons of food waste, paper packaging and yard waste from residents annually. The study acknowledged the extreme variability of volume based on the seasonality of yard waste. The study also acknowledged the potential source of organic materials from commercial business and institutions. The Linden Hills 2008 study estimated that another 122 tons per year of organic material could potentially be collected from commercial and institutional establishments within the neighborhood. The feasibility of a small-scale, neighborhood-based AD facility has not been developed further.

2.2 Current Pilot Operations and Performance

All SSO pilot routes are operated today in the same general manner as the original pilots in Linden Hills and ECCO neighborhoods. The current method of SSO collection in the City's pilot routes continues to provide a separate SSO cart to residents within the selected pilot neighborhoods that "opt-in" to the program. Residents must subscribe to the service to receive the cart, additional public education literature, and weekly separate SSO collection service.

After responses from residents requesting SSO carts are received, containers are delivered to residents with information on proper use of the container, materials to put in the SSO cart and materials not to include for SSO collection (See Appendix A – Selected Examples of City Public Education Tools). The City's pilot program remains an "opt-in" program without any extra charge to subscribing residents. "Opt-in" refers to the method of sign up for the program: residents could opt-in to have a cart and participate, or not. This is contrasted with an "all-in" or and "opt-out" program, where SSO carts would be delivered to all residents of a selected neighborhood that have City residential solid waste and recycling services and then could call to have the carts removed if they did not wish to participate.

In the Linden Hills and ECCO neighborhoods, the new service has been extensively promoted that participation in the SSO program could result in the need for a smaller garbage cart with

associated reduced costs to the customer. Inclusion of the SSO program into the "base" solid waste fee as charged by the City is being used throughout all of the pilot routes. There is no extra charge or rebate / credit to participating residents.

Table 2-1
Minneapolis SSO Pilot Routes
Type of Organic Waste Accepted and Not Accepted

General Types of Organic Waste Accepted	Detailed List of Acceptable Materials	Unacceptable Materials
♦ Food scraps ♦ Non-recyclable paper products ♦ Odds and ends ♦ Plant waste	♦ All food scraps, including: ▸ Meat, bones, fruits and vegetable trimmings, bread, baked goods, pasta. ♦ Non-recyclable paper products, including: ▸ Pizza boxes, milk/juice cartons, beer and soda boxes, paper egg cartons, refrigerator and freezer food boxes, ice cream packages, frozen juice tubes (without metal ends or plastic liners), gift warp (without metal foil), tissue paper, and packaging paper. ♦ Compostable food service items, paper take-out food containers, paper soda or coffee cups, Paper scrap including: paper towels, napkins, tissue (no diapers or hygiene products). ♦ Odds and ends, including: ▸ Vacuum cleaner bags (including contents), drier lint, houseplant trimmings, wooden Popsicle sticks, chop sticks, and cotton balls and swabs (without plastic).	♦ Plastic, such as: Styrofoam™, plastic wrap or bags and food and beverage containers ♦ Glass and cans ♦ Recyclable paper ♦ Yard waste ♦ Pet droppings or animal bedding or litter ♦ Diapers, wipes, or hygiene products ♦ Rocks or bricks ♦ Construction materials ♦ All other trash

Sources:
Generic Minneapolis invite letter with pilot program fact sheet. (See Appendix A.5).
Linden Hills cart hang tag (Appendix A.6)

The SSO pilot routes have provided important information on program introduction, education materials provided to residents and expected participation levels. For planning and cost comparison purposes, a city-wide average of 40 percent of total households can be assumed to participate in a SSO program if the operations and funding (i.e., no additional charge to subscribing residents) of the new SSO service is similar to the current pilot program. Neighborhoods with frequent turnover or high rental percentages, such as the University area, would be expected to have significantly lower participation than this city-wide average. Very stable neighborhoods with fewer turnovers or rental property will likely be above 40 percent.

See Table 2-2 for a listing of all current pilot routes. Residential SSO is collected separately from yard waste or other organic materials and delivered directly from the route to the BPTS. The original pilot in 2008 started with two trucks serving the pilot neighborhoods. The City consolidated operations to one truck in 2009 so that one truck and crew of two collected all SSO from Linden Hills and ECCO neighborhoods on Mondays and Tuesdays. This is the same operation today after adding the adding the Wednesday, Thursday and Friday routes (#10, #11 and #13, respectively).

Table 2-2 summarizes the performance data assembled to date. This table shows the neighborhood or route number, collection day, SSO pilot collection start date, total dwelling unit (DU) count, number of residents that have signed up, the calculated subscription rate as a percentage of total dwelling units within each route, total tonnages for all routes in 2011 and 2012, and pounds per household serviced (including households that did not participate).

Additional historical data is available for the Linden Hills and ECCO neighborhoods for the earlier years of the pilot program (e.g., 2009 – 2010). The Linden Hills (Monday + Tuesday) and ECCO (Tuesday) routes were combined in 2010 into one route for purposes of operational efficiencies and data reporting. Therefore, the Linden Hills + ECCO subtotal of SSO collection performance is shown on Table 2-2 so that it can be more easily compared to the other routes (Wednesday, Thursday and Friday) that were added in late 2010.

One indicator of the City's progress in delivering SSO collection services is the number of households (aka "dwelling units") served. Table 2-2 indicates that 5,370 pilot route households currently have SSO collection service available on a voluntary "opt-in" subscription basis. This is about five (5) percent of the total households (about 105,500 residential dwelling units) served with municipal solid waste and recycling services from SW&R.

Within the pilot routes, a total of 2,453 residents have elected to "opt-in" to the program and requested a SSO cart and collection service. This is an average subscription rate of 46 percent of all households eligible for the service.

Of these that subscribe in the Linden Hills and ECCO neighborhoods, an average of 60 percent and 54 percent, respectively, set out SSO carts in the first two years of the program (approximately September 2008 through September 2010). This is the weekly set-out rate and the actual participation rate over time is much greater because not every household sets out SSO every week.

Table 2-2
Minneapolis SSO Pilot Routes
Listing and Summary of Performance Data

Neighborhood or Route Number	Collection Day	Collections Start Date	Total Dwelling Units (DUs) [b]	Number of SSO Subscribers [c]	Subscription Rate (% of Total HH)	Tonnage 2011	Tonnage 2012	Recovery Rate (Pounds / Total DUs / Year) [d]	
								2011	2012
Linden Hills + ECCO	Mon + Tue	9/15/2008 [a]	3,090	1,616	52.3%	329.43	334.86	213	217
Route 10	Wed	9/29/2010	814	349	42.9%	52.93	55.25	130	136
Route 11	Thur	9/30/2010	738	222	30.1%	31.12	28.33	84	77
Route 13	Fri	10/1/2010	728	266	36.5%	44.85	57.6	123	158
	TOTAL		**5,370**	**2,453**	**45.7%**	**458.33**	**476.04**		
	Average pounds per total DUs serviced on the route					**171**	**177**	**138**	**147**

Source: Minneapolis staff, personal communications

Notes:
(a) Start date for Linden Hills = 9/15/2008. Start date for ECCO = 7/22/2009.
(b) Total Dwelling Units (DUs) Serviced = All eligible, residential households on the route that receive City trash & recycling collection services.
(c) SSO subscribers = households that signed up for SSO service and received a SSO cart. [Note that one subscriber = one DU (e.g., duplex = 2 DUs and maybe 2 SSO subscribers)
(d) Pounds per **Total** DUs serviced per year = Total pounds of SSO collected on the route / All households serviced (including subscribers **and** non-subscribers)

The most basic metric for comparing collection program performance is the recovery rate in pounds per household served (or "total" households on the route) regardless of whether they have signed up for SSO service or set out any SSO materials. The other metrics such as subscription rates, set-out rates, and pounds per set-out can be used to do more detailed operational analysis. Given the preliminary results of all pilots to date, an average recovery rate of 150 pounds of SSO per household served per year may be a reasonable assumption for projecting city-wide SSO tonnages.

City and neighborhood volunteers have developed an extensive public education and outreach campaign as part of the SSO pilot program. A number of public education tools have been developed for the program including letters, flyers, cart hanger, web pages, and news and media articles. Appendix A itemizes the various public education tools used and displays selected examples.

Table 2-2 indicates that the 2012 recovery rate by pilot route can vary from a low of 77 pounds per household served for Route 10 ("Thursday") to a high of 217 pounds per household served for the Linden Hills + ECCO routes. The total average recovery rate for all five routes was 138 pounds per household served in 2011 and 147 pounds per household served in 2012.

Table 2-2 and other historical data indicate a general trend for increasing recovery rates over time. After September 2010, The Linden Hills "Tuesday" and ECCO "Tuesday" routes were no longer weighed separately. Therefore, Table 2-2 displays the Linden Hills and ECCO route SSO subtotal weights in 2011 and 2012. This Linden Hills +ECCO subtotal averaged 193 pounds per household served in 2009 and then increased over the four years to 217 pounds per household served in 2012. This increase was likely due to a combination of changing variables, including (but not limited to) an increase in:

- Subscribers with additional SSO carts delivered to residents that subscribed, sign-up for the additional service;
- Participation for those that signed-up (i.e., more set-outs by residents with SSO carts); and,
- Recovery of SSO by participating households (i.e., capturing more of the food waste and other organic waste that is generated within their homes as they gain experience with the program)

These improved recovery rates per household served over time may indicate the results of continued and improved public education and outreach efforts. Also, similar to other residential recycling programs, there is a strong peer-to-peer influence of residents communicating among themselves and observing their neighbors participating in the SSO pilot as evidenced by the green SSO carts set out near the curb or alley each week.

There is one downward trend shown on Table 2-2. The #10 - "Thursday" route decreased from 84 pounds per household served in 2011 to 77 pounds per household in 2012. This is also the lowest performing route.

This decrease over two years may be due to the following factors:

- Reduced participation by subscribing households, and
- A lower level of neighborhood volunteers serving as leaders (e.g., recycling block captains) promoting SSO participation.

Additional information about the background demographics and relative efforts by neighborhood volunteer leaders may help further explain these differences by pilot route.

The Minneapolis SSO program has been underway for over four years. This performance data displayed in Table 2-2 is based on actual house counts and actual scale weights from the SSO pilot route collections. The data is very reliable and quite rare to have this level of detailed operational performance information. It may be reasonable to assume from this analysis shown in Table 2-2 that a city-wide SSO program could attain a SSO recovery rate of 150 pounds per household served per year.

The pilot program collects from within five routes that serve at least parts of eight south Minneapolis neighborhoods. As displayed on Table 2-2, the subscription rate (number of households that opt-in and receive a green SSO cart over total number of households in that neighborhood) ranges from a low of 30 percent to a high of 52 percent with a total average of about 46 percent. The cost of the pilot program is spread city-wide such that subscribers are not charged any extra for the SSO cart or collection service. A variety of outreach and public education tools have been used in the pilot neighborhoods to encourage residents to participate.

As part of the early stages of the pilot program, a participant survey was conducted by Karen Ba of StrataVerve, Inc.[4] This professional marketing study looked at audience stratification, message content, barriers to participation, and strategic advertising ideas. The three resident "market segments" were identified as the:

- "Environmentalist choir" (e.g., early adopters, lead users);
- "Mainstream environmental helpers" (e.g., will do the right thing if not a big burden); and
- "Mainstream resistant" (e.g., see not benefit or don't want to think about it)

The StrataVerve study found the following barriers to increased participation:

- Space constraints for the extra green cart and/or the kitchen bucket.
- Nuisance and inconvenience (e.g., smell, need to rinse kitchen bucket and green SSO cart, learning the what items are compostable and what are not)
- Cost of compostable bags used as liners for kitchen buckets or to hold food waste in green carts.
- Not enough SSO. Some survey respondents (12 percent) mentioned the idea of including yard waste in the green cart.
- Environmental impacts (e.g., having to buy compostable bags)

Some of the strategies suggested by the StrataVerve study to increase participation included:

- Consider using a smaller green bin.
- Locate lowest cost compostable bags. (E.g., offer reduced cost bulk bag purchasing.)
- Consider neighbor referral incentives.
- Increase the rebate for reduced trash (i.e., increase the difference in rates for smaller trash can sizes).
- Enhance the block captain method by learning about successful case studies.

The City may need to conduct an updated opinion survey (of other residents not yet in the pilot neighborhoods) to inquire further about stated willingness to participate in such a SSO collection program. This updated survey could also ask about residents' opinions of increasing the cost of solid waste and recycling services throughout the city for everyone so that the new SSO collection service could be provided to those that voluntarily subscribe. Even though residents may not be willing to subscribe and participate, they may be willing to pay a little more so that the option is available.

2.3 Diversion Rates

Another measure of the overall impact of the City's SSO program is the diversion rate, defined for this study as the percent amount of SSO by weight over the total mixed MSW + SSO collected from a route. Table 2-3 displays the diversion rates by route.

Table 2-3
Diversion Rates in Three of the Minneapolis SSO Pilot Routes
(SSO / (SSO + mixed MSW) by weight)

Route Number	Collection Day	Year	
		2011	2012
10	Wed	8.0%	8.8%
11	Thur	5.2%	5.1%
13	Fri	8.6%	11.8%
	Average	**7.3%**	**8.5%**

Only pilot routes #10 (Wednesday), #11 (Thursday), and #13 (Friday) have contiguous SSO and mixed MSW collection boundaries. Therefore, the diversion rate for the Linden Hills / ECCO (Monday/Tuesday) pilot routes cannot be directly measured and calculated.

Table 2-3 indicates that there has been a general increase in the amount of SSO collected in relative to mixed MSW except for route #11 (Thursday). This is similar to the trends in recovery

rates for these three routes shown in Table 2-2. The most recent average diversion rate in 2012 for all three routes is 8.5 percent.

2.4 Current Pilot Costs

Costs are very well established for the SSO pilot program. The following variables summarize the collection operations cost items:

- Truck equipment, operating and maintenance cost = $21 per hour
- Staff labors costs (fully loaded with benefits, etc.) = $32.28 per hour per staff person (Note: Future costs of staff labor are estimated at $33.59 per hour)
- Route hours per week = 28 hours per week
- Average total SSO route households service per hour = 113 households per hour
- Average total SSO route households serviced per day = 735 total households per day

Using these itemized costs, the total collection operations cost is $124,575 per year. (Note: This estimate goes up to $128,390 when future labor costs are used.) The disposal cost variables are:

- Total SSO collected tonnage in 2012 = 476.04 tons from the pilot routes
- Hennepin County's current SSO tipping fee = $15 per ton (See more details about this tipping fee below)

The total disposal cost for SSO collected from the pilot routes in 2012 is $7,141. The total cost of collection plus disposal is currently $131,716 per year or an equivalent of $277 per ton.

This City's total gross cost compares to the savings due to avoided mixed MSW disposal cost of $47 per ton, the current tipping fee at the Hennepin County HERC facility in downtown Minneapolis. The net cost, after mixed MSW disposal savings, is $230 per ton ($277 per ton total cost less avoided –disposal costs of $47 per ton for mixed MSW tipping fee).

The BPTS tipping fee of $15 per ton is a subsidized rate as established by County policy. According to County staff[5], the actual costs are about $65 per ton derived from the following itemized costs:

Transfer station operation and trucking to the composting facility =	$20 per ton
Tipping fee at the composting facility (for costs of processing and marketing the finished compost) =	$42 per ton
Administration =	$3 per ton
Total Cost to the County =	**$65 per ton**

Thus, the County subsidizes the SSO tipping fee at the BPTS by about $50 per ton.

2.5 Other Solid Waste and Recycling Collections & Sustainability Planning Target Goals

The Minneapolis Solid Waste & Recycling website "Statistics" displays tonnage data for all recycling and solid waste streams from 1993 up through 2012[6]. Table 2-4 displays the most recent years of 2007 through 2012 showing that the SSO tonnages have grown from 60 tons in 2008 (0.04 percent of total solid waste) to 476 tons last year in 2012 (0.35 percent of total solid waste).

Table 2-4
Tonnages from All City Solid Waste and Recycling Streams

Year	Recycling	Mixed MSW	SSO	Yard Waste	Other	TOTAL
2007	24,010	105,711	0	15,696	8,324	153,741
2008	22,848	101,722	60	19,523	6,977	151,130
2009	21,759	99,862	272	19,076	7,493	148,462
2010	20,592	99,885	346	15,875	7,546	144,244
2011	19,683	99,434	459	16,116	7,091	142,783
2012	19,927	93,871	476	16,967	6,492	137,733

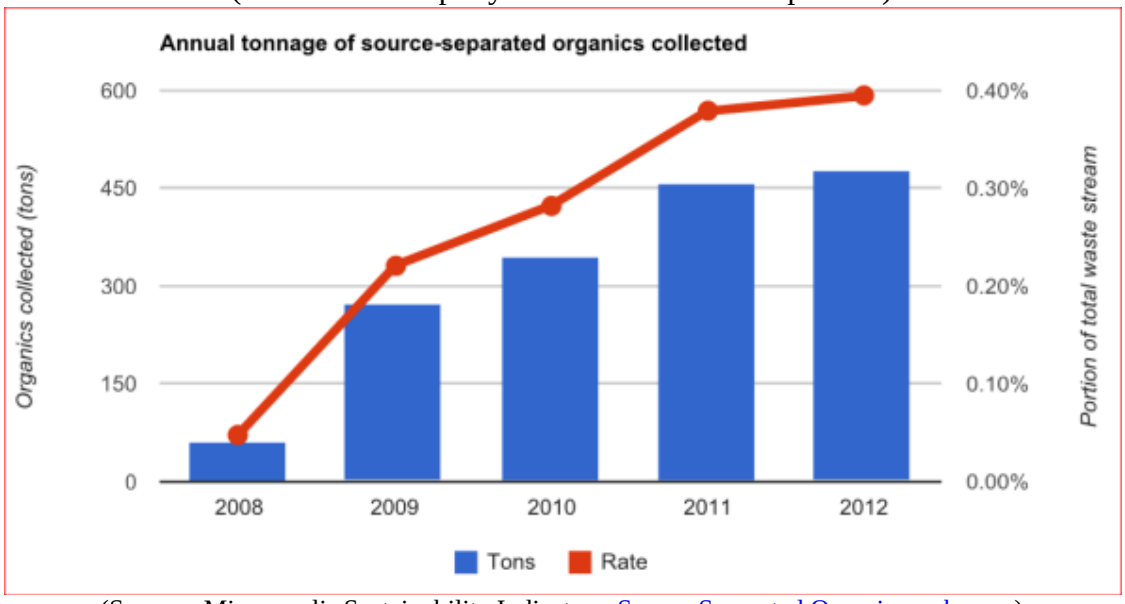
(Source: Minneapolis Solid Waste Statistics Web Page)

According to the *2012 City of Minneapolis Sustainability Report*[7], the City of Minneapolis is committed to city-wide economic opportunity, social equality, and environmental sustainability. The City tracks progress on 26 sustainability indicators to see how far the community has come and what work remains. As one of these sustainability indicators, Minneapolis has set a planning target goal of increasing recovery of residential source-separated organics (SSO) from 0.3 percent of municipal solid waste (excluding yard waste) in 2010 to 7 percent annually by 2015[8].

Figure 2-1 displays both the tonnages and the diversion rate (SSO as a percentage of total mixed solid waste) of SSO collections in Minneapolis from 2008 through 2012 from the City's Sustainability Indicators SSO web page.

Figure 2-1
Source Separated Organics Collected
From Minneapolis Pilot Neighborhoods: 2008 – 2011

(In tons of SSO per year and diversion rate percent)



(Source: Minneapolis Sustainability Indicators: Source Separated Organics web page)

2.6 Regular Yard Waste Collections

The City of Minneapolis, Department of Public Works Solid Waste & Recycling (SW&R) Division currently manages the collection and processing of yard wastes in the City. SW&R residential route vehicles provide collection in one half of the City, and the other half is currently done by a contract hauler, Minneapolis Refuse Inc. (MRI), under contract through January 31, 2014.

As shown on Figure 2-2, about 17,000 tons of residential yard waste is collected by City and MRI crews each year. There has been some decline in the past three years (2010 – 2012) from the peak yard waste tonnage in 2008. The five year average (2008 – 2012) is about 17,500 tons of yard waste collected each year.

State law currently requires residents in the Twin Cities metro area to use certified compostable bags, either plastic or paper. The City and contract collection crews also will pick up yard waste in an appropriate reusable container. City and contract collection crews check for proper bags or cans during the collection process and reject improper yard waste set-outs. Instructions for residents on how to sort, prepare, and set out eligible yard waste for separate collection can be found at the City's Yard Waste general web page and specific instructions web page. It is important to note that the City does not provide yard waste carts. Any SSO + yard waste collection option would need to include the costs of carts due to the need to adequately contain and store the additional SSO materials.

Residents are also allowed to set out brush for collection. Instructions for bundling of brush include:

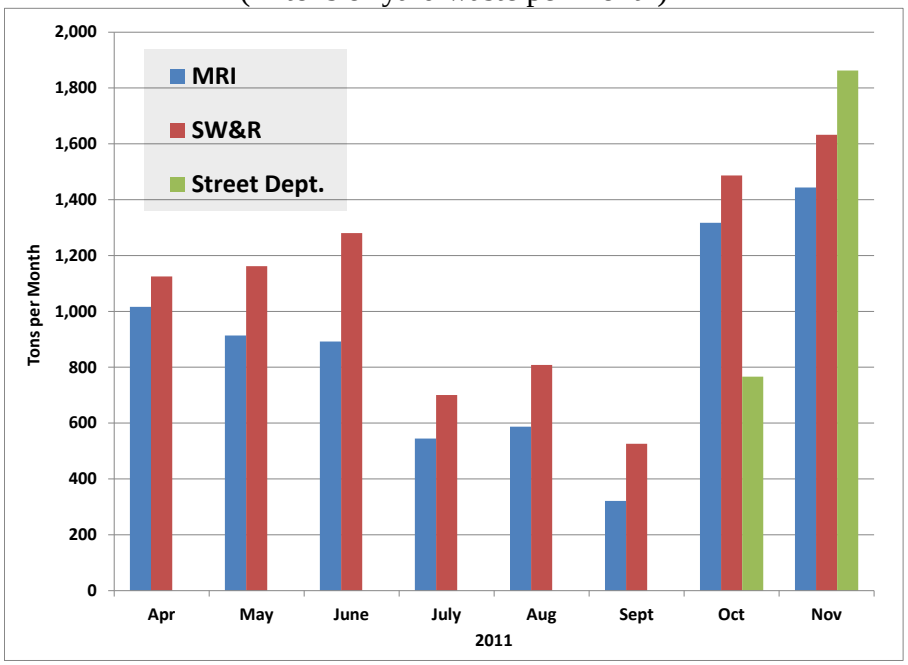
- Pieces of brush and small branches shall be less than 3 inches in diameter.
- Bundle them securely with twine or rope. Do not use wire.
- Each bundle shall be less than 3 feet long and weigh less than 40 pounds.
- Place in reusable container approximately 33 gallons in size, no less than 26 inches in height that has sturdy handles.

Grass, leaves, brush, and other yard wastes are all co-collected and mixed in the collection vehicles on weekdays from Monday through Friday (plus Saturdays following holidays), from April through November. The residential collection trucks are typically rear-load packer trucks. Residential route trucks are weighed at the City's Pacific Street North Transfer Station location or at the SKB – Malcolm Street transfer station. Loads are then delivered to the existing yard waste processing contractors' delivery locations at OTI's facility (Dowling and 2nd Street N.) and SKB (630 Malcolm Avenue SE).

Yard waste is collected from residents by City SW&R or MRI crews. The residential collections fluctuate in a regular, seasonal pattern, each with peaks in the spring and fall. Other incidental yard wastes and street sweepings are collected each fall by the City's Street Division crews during the fall "leaf season" (October/November) each year.

Figure 2-2
Yard Waste Collection in 2011 by Month, by Organization

(In tons of yard waste per month)



(Source: City of Minneapolis Request for Proposals for Yard Waste Processing and Disposal Services, January 2012)[9]

Figure 2-2 displays the yard waste collected by month, by collection organization. About 51 percent of the residential tons and about 50 percent of the residential loads (without including the Street Division fall leaves) for the year come during the months of April, October and November. This fact will be discussed again later under Section 7.4 in relation to the Emerald Ash Borer flight season (May through September).

The total yard waste program budget for 2013 is $3,740,397 (see Section 2.8 below). With 105,500 residential dwelling units served in the City, this equates to a yard waste program cost of $2.95 per dwelling per month.

2.7 Residential Mixed Solid Waste Collections

The City provides solid waste and recycling service to residents in about 105,500 dwelling units. This includes all single family up through four-plex residential buildings, plus any buildings with five or more units that contract with the City for solid waste services and all townhomes. Solid waste and recyclables collection services are provided by City crews, and a consortium of private garbage haulers, Minneapolis Refuse Incorporated (MRI). The City and MRI each collect from approximately half of the city within an organized, prescribed route plan.

City crews use low-entry, Crane Carrier chassis with 20-cubic yard Leach 2RII compactors and Zoeller semi-automated lifters to dump the garbage carts into the rear truck hoppers. The City deploys 14 garbage trucks; each servicing an average of 750 dwellings per day. There are two City crew members per truck. The City crews serve about one half of the City. The City's contractor, MRI, serves the other half of the City. For planning purposes, this analysis estimates that the city-wide garbage collection effort is approximately double the City crews (i.e., about 28 garbage trucks, etc.). Residents are asked to bag or wrap garbage and then place it in the cart. The maximum weight for a large (94 – 96 gallon) cart and its contents is 200 pounds.

2.8 Summary of City Budget Allocations for Solid Waste and Recycling Programs

The Solid Waste & Recycling (SW&R) Division is one of three utility divisions in the Department of Public Works. The following line item budget allocations, as stated in the City's 2013 Council adopted budget[10] and Department of Public Works budget statements[11,12], help provide a relative sense of the current SSO budget compared to the other, various SW&R Division services (from other funds):

- **Source-Separated Organics Collections and Composting $464,134**

  Budget allocation to collect source-separated organics from designated customers. The budget allocation reflects that the current program is being done on a pilot basis in selected test neighborhoods.

- **Garbage Collection $13,154,736**

  Budget allocation to perform collection services to all residential properties of 4 or less dwelling units, all townhouse properties as described in Minneapolis Ordinance and all commercial properties requesting this service.

- **Recyclables Collection** **$9,516,665**

  Budget allocation to perform recycling collection services to all residential properties of 4 or less dwelling units, all townhouse properties as described in Minneapolis Ordinance and all commercial properties requesting this service. Ensure that all collected recyclables are properly processed and marketed for beneficial reuse.

- **Yard Waste Program** **$3,740,397**

  Budget allocation to perform yard waste collection services to all residential properties of 4 or less dwelling units, and all other SW&R customers requesting this service. Ensure that yard wastes are properly processed and composted in accordance with federal, state and county rules.

- **Problem Materials Collection** **$2,351,226**

  Budget allocation to perform collection, processing and marketing of recyclable mattresses, metal items, white goods, and electronic items from SW&R customers.

- **Equipment Operations, Solid Waste & Recycling** **$3,546,066**

  Budget allocation to provide rolling equipment and various goods and services required to operate the various collection programs in the Solid Waste & Recycling Division.

- **Operate City Transfer Stations and Voucher Facility** **$1,480,080**

  Budget allocation to operate the City Transfer Stations (North and South) for Customer Voucher program, emergency waste services, emergency neighborhood waste relief, and other permitted functions.

- **"Clean City" Program (Non-graffiti activities)** **$1,400,171**

  Budget allocation to perform activities that relate to a Clean City Minneapolis. These include: cleaning Dirty Collection areas, including those that present a danger to public health and safety; servicing and maintaining City litter containers; conducting, in partnership with neighborhoods, CleanSweeps; and accelerated cleanup programs. Also includes opportunities for volunteer participation in the prevention of litter through the "Adopt-A-Litter Container" program and prevention of cigarette litter through the "Adopt-An-Ash Receptacle" program. Also includes overall improvement of neighborhood livability through the "Adopt–A-Street", "Adopt-A-Block" and "Graffiti Paint Over" programs.

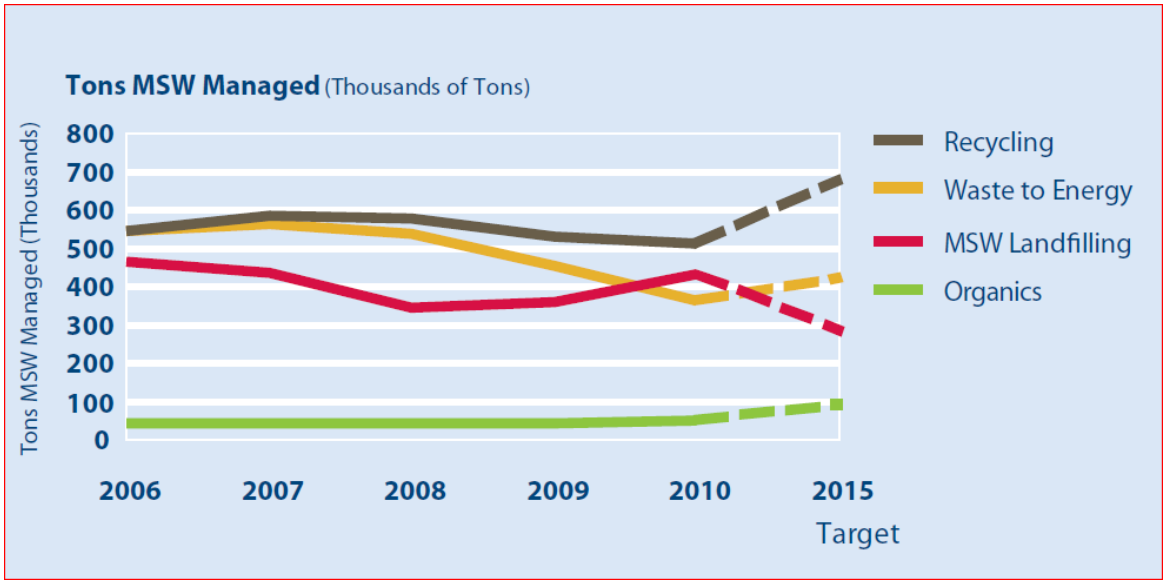
The total SW&R Division 2013 budget allocation is $32 million (including administration and customer services costs not listed above). Therefore, the current SSO budget represents about 1.5 percent of the total 2013 SW&R Division budget.

3 Summary of Other Residential Organic Waste Recovery Systems

3.1 Hennepin County Data

Hennepin County's Solid Waste Management Master Plan (April 2012)[13] has a separate organics recycling component. The County's organics recycling programs and policies have helped the City develop SSO recovery throughout the County, including the Minneapolis pilot program over the past five years. The County Master Plan has goals and objectives for organics recycling within the context of overall solid waste management and recycling programs. Figure 3-1 is from the County Master Plan and shows the relative historical trends of various waste streams and projected, future forecasts.

Figure 3-1
Hennepin County History and Projection of Solid Waste Managed



Source: Hennepin County Solid Waste Management Master Plan (April 2012)[14]

Hennepin County, in partnership with Rational Energies, commissioned a waste composition study conducted in 2011 at its BPTS[15]. Organic waste made up the largest percentage of the residential waste stream at about 33 percent. Table 3-1 displays the excerpted results from this composition study for the residential waste portion and "organic waste" fraction of residential waste. It should be noted that the transfer station receives dedicated loads of SSO. However those loads were excluded from the vehicle sample selection process for the Hennepin County / Rational Energies 2011 composition study.

Food waste made up the largest residential portion at 14 percent. Food-soiled paper together with non-recyclable paper made up about 8 percent. The percentage of yard waste in the residential waste stream was high at about 9 percent. Yard waste material has been banned from disposal in Minnesota since 1992. The amount of yard waste remaining in residential mixed

solid waste has been decreasing as compared to earlier composition studies. (See Appendix B for definitions of waste sort categories from the Hennepin County / Rational Energies study.)

Table 3-1
Rational Energies – Hennepin County Waste Composition Study 2011
Statistical Composition – Residential

Material Group	Material	Mean (%)
Organic Waste		**33.1%**
20	Food Waste	14.0%
21	Liquid Waste	1.5%
22	Food – Soiled and Non-Recyclable Paper	7.8%
23	Compostable Food Service Ware & Other Compostable Items	1.1%
24	Yard Waste	8.7%

Source: Hennepin County Solid Waste Management Master Plan (April 2012)[16]

Hennepin County has continued many other SSO programs to promote additional organics recycling. According to the County's recent *Solid Waste Master Plan*, the County has implemented and supported organics recycling programs in nearly 120 schools, numerous businesses and more than 5,000 households in nine cities. If a curbside organics collection program is not available, residents are encouraged to reduce waste by participating in backyard composting. The County has distributed over 22,000 compost bins to residents to encourage the recycling of food waste into compost at their homes.

Hennepin County also offers a reduced tipping fee of $15 per ton for organics delivered to the County's BPTS. Because the tipping fee for regular garbage is $47 per ton at BPTS and at the Hennepin County HERC facility, there is an incentive to save money by managing organics separately from garbage. The BPTS now also accepts organics for free from residents and small businesses.[17] The $15 per ton is a subsidized rate as approved by the County Board of Commissioners. The County's SSO program and this $15 per ton tipping fee is subject to change.

Hennepin County staff continues to support and monitor their cities' efforts to expand residential SSO services. County staff developed a summary memo for the County Board[18], in part to respond to the City of Orono's request for County assistance.

Organics programs can be divided into those that are subscription-based and those that provide the service to all residents because organics is packaged with garbage and recycling. Table 3-2 shows the percent of households subscribing to the organics service, the weekly set-percent of subscribers setting out SSO on any given collection and the pounds per household per year collected at those participating households. The percent of subscribers (households with SSO carts) setting out SSO on any given collection day is higher than the "subscription rates" (percent of total route households serviced that "opt

in" and receive a SSO cart). Not every household subscribes to the voluntary SSO programs. And of those that do subscribe, not every subscriber sets out SSO each week.

Organics programs have a positive effect on recycling performance, increasing total recycling anywhere from 4 percent to 30 percent. Cities with organics provided as a part of the basic service level experience greater benefits.

Table 3-2
Summary of Residential SSO Programs in Hennepin County

City	Subscription Rate	Percent of Subscribers Setting Out	Organics Performance (lbs/HH/year)	Recycling Performance (lbs/HH/year)	Recycling Increase from Organics	Recycling Rank (of 45 cities)
Medicine Lake	14%	72%	700	593	10%	15
Medina	8%	78%	602	617	6%	14
Mpls - Linden Hills	50%	72%	513	412	NA	36
Mpls-ECCO	38%	73%	475	412	NA	36
Minnetonka	3%	86%	799	588	4%	17
Orono	5%	84%	805	577	6%	20
Loretto	Provided to all	40%	514	568	30%	21
Maple Plain	Provided to all	40%	602	628	29%	10
Wayzata	Provided to all	29%	552	743	19%	3

(Source: Hennepin County staff memo, May 14, 2011)

The price of the additional SSO collection service depends on the hauler and the city. The average of Hennepin County cities that have extra charges for SSO is about $4 per household per month for subscription programs. In some programs, if people are willing to switch to a smaller garbage cart or every other week garbage collection, organics can be added for no additional cost.

Table 3-3 displays the curbside SSO collection programs in Minnesota that were reported by Foth to the Ramsey / Washington Resource Recovery Project (June 2009). This 2009 data was originally organized by Hennepin County staff. This information was summarized from a variety of sources and reflects readily available data from published reports such as those summarized earlier in this section and personal communications with County staff.

Table 3-3 identifies 16 cities in and around the Twin Cities metro area that are conducting pilot SSO curbside collection studies and/or have implemented the service city-wide. The table also indicates whether the service was provided to all residents under contract in the service area or under a "subscription" basis. Only four cities provide city-wide were providing citywide, curbside SSO collection services in 2009 on an ongoing basis under contract (Loretto, St. Bonafacious, Wayzata, and Hutchinson).

Four other cities are "city-wide" but structured to collect SSO curbside on a "subscription" basis (Medina, Minnetonka, Orono, and Medicine Lake). These are "open" MSW hauling communities whereby residents contract directly with their trash hauler for all collection services. In general, subscription SSO collection service is an option provided by a private hauler for an additional average fee. Most often, the subscription services piggyback on the separate yard waste collection services and the two materials are commingled into the same cart and same compartment of the hauler's truck.

On a national basis, there are a number of other relevant case studies that address feasible means of supplying residential SSO via curbside collection programs. However, none of these national and metro area programs report actual program performance in any form of standardized manner.

Table 3-3
Twin Cities Area Curbside SSO Collection Programs

City	Neighborhood	County	Pilot vs. City-Wide	Timeframe	MSW Service: Contract vs. Open
Chanhassen, Chaska, Waconia, Watertown	Parts	Carver	Pilot	2007	Subscription
Burnsville ["phase one"]	N. River Hills	Dakota	Pilot	2002 - 2007	Subscription
Burnsville ["phase two"]	N. River Hills	Dakota	Pilot	2007 - 2008	Subscription
Loretto	City-Wide	Hennepin	City-Wide	Current service	Contract
St. Bonafacious	City-Wide	Hennepin	City-Wide	Current service	Contract
Edina	Morningside	Hennepin	Pilot	Current service	Subscription
Minneapolis	Linden Hills	Hennepin	Pilot	Current service	Contract
Medina	City-Wide	Hennepin	City-Wide	Current service	Subscription
Minnetonka	City-Wide	Hennepin	City-Wide	Current service	Subscription
Orono	City-Wide	Hennepin	City-Wide	Current service	Subscription
Medicine Lake	City-Wide	Hennepin	City-Wide	Current service	Subscription
Wayzata	City-Wide	Hennepin	City-Wide	Current service	Contract
Hutchinson	City-Wide	McLoed	City-Wide	Current service	Contract
Saint Paul	Highland	Ramsey	Pilot	2001	Contract

Sources:
- Madole, John C. Linden Hills Power & Light Anaerobic Digester Feasibility Study, June 2008.
- Eureka pilot study report: A Comparative Analysis of Applied Recycling Collection Methods in Saint Paul. May 2002.
- Personal communications with County staff.
- SWMCB Food Waste and Organics Report, Oct. 2007.

3.1.1 Hennepin County Web Page Info

Hennepin County continues to provide technical assistance and other support for the research and development of residential organics collection programs throughout the County. For example, the Hennepin County web page on "Organic Recycling for Residents"[19] states:

"Organics recycling programs are offered by haulers in the following cities. If you live in an area where organics collection is an option, contact your city recycling coordinator or waste hauler for more information. ….

- *Edina (Morningside [neighborhood])*
- *Maple Plain*
- *Medina*
- *Minnetonka*
- *St. Bonifacius*
- *Loretto*
- *Medicine Lake*
- *Minneapolis*
- *Orono*
- *Wayzata"*

"…… See a list of haulers that collect organics for composting."

3.1.2 Wayzata

The City of Wayzata conducted a pilot project for a curbside collection program among City residents for SSO. The pilot project ran from April 2003 – June 2005.

During the pilot study, the organics material collected from residents included food scraps and non-recyclable paper. Residents separated the acceptable organics materials from the rest of their garbage. Each resident was provided with a special sealable food container to keep in their kitchen to collect food scraps on a daily basis. Residents were also provided with a dedicated organics cart to keep and set out next to their regular garbage cart.

Residents set out their organics cart next to their garbage cart for collection on a weekly basis. After separate collection of the SSO, the material was taken to the Hennepin County BPTS. SSO was tipped and inspected to ensure that non-compostable contaminants were below threshold levels. After the material was inspected, it was transported by Hennepin County to the SET composting facility in Empire Township in Dakota County. The organics that Wayzata residents placed out on the curb was turned into compost, returned to the City and used in its community gardens.

During the pilot program, 70 percent of the households (1,200 total households) in the City participated at least once and a total of 189 tons of organic material were collected and composted. The amount of material collected weekly was typically between 1.5 to 2 tons. Weekly set-out rates were between 42 percent and 48 percent. About 525 to 600 households set out each week. Households participating in the SSO pilot program set out between 260 and 396 pounds per year. This is equivalent to 87 to 173 pounds of SSO per total route households serviced per year (including households serviced but not participating).

When the pilot project ended in 2005, the City of Wayzata added organics collection to the City's residential curbside collection program. Wayzata was the first city in the Twin Cities metro area to offer curbside collection of organics to all its residents.

To cover the additional cost associated with the organics collection program, i.e. adding curbside collection, transportation and disposal of organics; the City increased garbage and recycling fees.

As one means to help residents offset this additional cost, the City offered the option of every-other-week (EOW) garbage collection. A more detailed summary of the Wayzata pilot project is provided in Appendix C.

3.1.3 Wayzata / Randy's New *Blue Bag™ Organics* Program

Randy's Environmental Services has been a leader in developing residential and commercial organics collection services in the west Twin Cities metro area for many years. As described above, one of the first residential SSO pilot curbside collection programs in the region for the City of Wayzata was designed and operated by Randy's. Randy's has also been collecting SSO from restaurants and grocery stores for several years. (For more information about their commercial organics services, see their web page: Randy's Environmental Services and Commercial organics web page).

Randy's announced their *Blue Bag™* Organics program in 2011, constructed their new single-stream and mixed MSW Material Recovery Facility (MRF) in 2012, and began operations at the new facility in early October 2012.

The *Blue Bag™* Organics program allows the generator to collect SSO in a proprietary biodegradable and compostable *Blue Bag™* Organics liner. The *Blue Bag™* is placed in a 30-gallon ("Rehrig Pacific" – type) standard plastic garbage can sized for the *Blue Bag™*. This *Blue Bag™*, when full, is tied off (no twist ties or other bag closure devices allowed) and then placed into the regular trash cart and "co-collected" together with the mixed MSW. The *Blue Bags™* are then hand separated from the mixed MSW and transferred to a composting facility at another location (e.g., Randy's MRF in Orono, MN). This concept eliminates the need for a separate collection truck to collect SSO on a separate truck / separate route. (See the Randy's *Blue Bag™* web page for more information and details.)

Randy's staff have stated that *Blue Bags™* can also be used for some commercial accounts where the quantity of organics is not large enough to fill an entire dumpster dedicated only to organics.

Randy's staff has stated that other haulers can use the *Blue Bags™* with appropriate arrangements with Randy's and the subsidiary program *Blue Bag™ Organics* (see the web page, www.BlueBagOrganics.com, for more details and a public education video).

3.1.4 Orono

In 2006, the county awarded a $25,000 Waste Abatement Incentive Fund grant to the City of Orono to help establish a curbside residential organics collection program. As an incentive to the haulers, a portion of the grant was used to reimburse haulers for the purchase of organics carts. The county also helped with education and outreach.

3.2 Other Communities in Minnesota

A wide variety of studies have been completed that have information on the quantities and qualities of SSO collected separately from residences or commercial establishments. The most relevant of these studies are summarized in the following sections.

The Solid Waste Management Coordinating Board (SWMCB) published a study, *Source Separated Food Waste and Organic Materials Management Report* in October 2007[20]. This study examined available supplies of food waste and other organic materials as well as estimated current reduction and recovery by various programs. The study concluded that while there are notable recovery efforts in place, there is significant diversion potential remaining. The SWMCB 2007 report provided a summary of current and potential recovery programs for the six-county, SWMCB region that were known at the time. For purposes of the SWMCB report, "organics" was defined to include food waste and non-recyclable paper, but excluded fats, oil, grease, wood, and yard wastes. Organics recovery programs described included:

- Backyard composting.
- Food rescue (edible food back to people).
- Food-to-animals via direct livestock feeding.
- Food-to-animals livestock feed manufacturing.
- Organics composting facilities (e.g., SET – Empire).

The SWMCB 2007 report estimated that in the six-county area about 200,000 TPY of residential organics remained in the mixed MSW stream and about 180,000 TPY of commercial organics are not recovered for a total of about 380,000 TPY. About one-half of these organics were estimated to be food waste and the other half were non-recyclable paper.

Selected conclusions from the SWMCB 2007 report include:

- There is significant amounts of organic material that remains in the waste stream that could be recovered, but more organic management capacity will be needed.
- There is very little redundancy in the system today because there are only a few service providers within each organics management option.
- The State, region and counties will need to continue to provide financial and technical assistance and staff resources to increase organics management.
- The development process of residential curbside organics programs is similar to the development of residential curbside recycling programs in the late 1980's.

3.3 Other National / Canadian Case Studies

In December 2008, SWANA prepared a research memorandum titled, *Curbside Collection of Residential Food Waste* that provided recycling managers with information on current curbside collection programs for residential food waste.[21] The following is a summary of the information presented in this memorandum.

The SWANA memorandum identified 56 communities in the U.S. that had implemented a curbside collection program for residential food waste. Four larger programs; Alameda County in California; San Francisco, California; Seattle, Washington; and Cedar Rapids, Iowa were discussed in more detail in the memorandum. All four organics collection programs co-collect yard waste, food scraps and food-soiled paper in one container. Collection is automated using

varying sized carts on a weekly or every other week basis for all four communities. Weekly collection reduces odor issues and allows the waste to be removed prior to the completion of the fly-breeding cycle. If a city utilizes every-other-week collection, they often prohibit materials such as meat, fish and dairy products. These materials may also be prohibited from a program if the receiving facilities are not equipped to handle these food types.

In San Francisco, the collection of all materials is completed simultaneously using one collection truck with separate compartments for the different materials (recyclables, MSW and organics). In most cases the participation in the organics collection program is voluntary. In April 2009, San Francisco was planning on making organics collection mandatory. In October 2009, San Francisco became the first City to require residents to properly dispose of organics by participating in a mandatory organics recycling program. The cost for recycling and organics collection in San Francisco is included in the household monthly bill.

In Seattle, it is estimated that the cost charged to residents only covers approximately 50 percent of the true cost for the service.

Cedar Rapids uses municipal crews to collect organics from residents. The costs to cover these services are also included in the resident's monthly bill.

Four communities in the U.S. have reported data that allows for a calculation of comparable recovery rates in terms of pounds of SSO recovered per household served per year. This is a more standard measure used with other curbside recycling program evaluations and is based on the actual tonnage divided by all households served rather than just the households participating. Thus factors such as participation rate and per household recovery of available food waste are considered into one comparable recovery rate ratio. The range of calculated recovery rates ranges from 97 to 264 pounds of SSO per total household serviced per year (including those households not participating). This wide range is indicative of the variance in program types and performance.

3.3.1 City of Madison, Wisconsin

In 2011, the City of Madison started a voluntary pilot collection program for SSO that collects all food waste, soiled paper products, pet waste, disposable diapers, and small amounts of regular yard waste. Currently 547 households are participating in the pilot program. The City is currently planning on moving its organics program towards anaerobic digestion (A.D.) as the preferred SSO processing technology. Planning is underway and a new A.D. facility may be available by 2016. The City is also developing plans and pilot operations to collect from selected commercial establishments. In 2012, three businesses were added to the pilot program. Appendix D contains more detailed information about this program.

3.3.2 Additional SSO Case Studies in Ontario, Canada

Toronto, Ontario, Canada consists of a metropolitan area (Toronto) and surrounding suburban areas (Halton, Peel, Durham, and York). The surrounding suburban area is also known as the Greater Toronto Area (GTA). Each of these areas within Ontario has a residential curbside SSO

collection program. A general summary of the program for Toronto and the GTA is described below followed by a brief summary of unique components of each area's program.

Information provided below is from phone interviews conducted, emails, *BioCycle* magazine articles, and the municipalities' websites. Appendix E contains more detailed information about these programs such as population, households served, participation rates, and quantity data.

The SSO programs in these areas are generally the same with a few differences. Generally, residents are offered EOW garbage (except Peel) and yard waste collection, and weekly, curbside *"Blue Box"* (recyclables), and *"Green Bin"* (SSO) collection. The *Green Bin* is a 12 gallon container manufactured by Norseman Environmental Products. The *Green Bins* are collected in a split body vehicle with the recyclables and require manual dumping by the collection crews into the truck body. Residents are also provided with a 7 liter kitchen container to collect SSO. Residents may line their kitchen containers or their larger *Green Bins* with compostable plastic bags, newspaper, paper towels, paper bags, or traditional polyethylene plastic bags (Toronto only). Yard waste collection is offered to residents as a separate service. However, small houseplants may be placed in the *Green Bin*. Acceptable waste materials in the *Green Bin* include: food waste, non-recyclable paper, and, in some communities, diapers and pet waste (Toronto and York only).

The City of Toronto's *Green Bin* program began in 2002. After four years (by 2006), all single family homes were included in the *Green Bin* Program. This roll-out was combined with a change to co-collecting single stream recyclables. Also in 2002, pilot projects were conducted on multi-family units. The *Green Bin* program became available for some multi-family units in the fall of 2008. The delay was due to lack of processing capacity. The majority of multi-family units will be served by the end of 2014. Toronto has a volume based rate system for waste collection where single family residents select a size for their garbage container (small to extra-large). The solid waste rate charged to residents for trash containers increases as size increases. Residents pay a fee for their garbage service based on the container size they choose and all other services are provided at no additional charge. Toronto allows residents to line their containers (indoor or outdoor) with regular plastic bags. [22, 23]

Halton Region's *Green Bin* program began in April 2008 and total waste diversion has increased from 40 percent to 58 percent including other forms of waste diversion (e.g., recycling, leaf and yard waste etc.). Halton does not allow diapers and pet waste in their SSO program. Yard waste is collected using separate trucks on the same EOW schedule as regular garbage collection. [24, 25, 26] See Appendix F for Halton Region's *Green Bin* and other recycling instructions.

The Region of Peel's *Green Bin* program began in April 2007. Unlike Toronto and the other regions in the GTA, Peel residents currently have weekly garbage collection. In the next few years, Peel hopes to switch to EOW garbage collection. Recently, a one year pilot study was completed on four neighborhoods consisting of 1,500 homes each, reducing garbage collection to EOW. As a result, participation in the *Green Bin* program increased among those homes by 4 percent. Currently, only single family homes are offered the *Green Bin* service with a 40 percent participation rate. Multi-family units (e.g., apartment buildings) are not in the *Green Bin*

program yet. Residents pay for their waste management services on their property taxes. A home valued at $350,000 pays approximately $3.25 per week for all their waste management services. This money also funds mitigation for closed landfills and infrastructure. Peel does not allow diapers and pet waste in their *Green Bin* SSO program. A new facility will need to be constructed to handle current and future increases in capacity. During the phone interview, Peel highlighted that residents must make sure that the liners used for their containers (either for their kitchen container or the *Green Bin*) are compostable. Compostable liners must be certified by BPI – Biodegradable Products Institute. or BNQ – Bureau of Normalization du Quebec meeting ASTM 6400 equivalent compostability standards for film plastic. [27, 28, 29]

In the Durham Region, the switch from weekly garbage collection to EOW garbage collection increased participation in their *"Green Bin"* program by 5 percent. In 2009, the Regional Municipality of Durham standardized collection services Region-wide with weekly *Blue Box* and *Green Bin* collection, and EOW garbage collection with a four bag limit per household every two weeks. Durham stopped collecting grass clippings in 2004 in order to coincide with the Ontario, province-wide initiative designed to reduce lawn watering, while improving groundwater quality, through reduced use of fertilizers and pesticides. Since that time, the Region of Durham has actively promoted "GrassCycling" (e.g., mulching and "leave it, don't collect it") to its residents. Yard waste is collected at different collection frequencies depending on the season: spring – weekly; summer – EOW; and fall – weekly. Durham does not allow diapers and pet waste in their *Green Bin* program. [30, 31] According to a 2011 study for the Region of Durham conducted by AET[32], the participation rate in their *Green Bin* program is currently averaging around 66 percent (as measured by those residents that set-out *Green Bins* at least once over a two-week audit period). Looking at the organics stream, residents set out an average of 0.59 *Green Bins* each week with an average full container equivalent of 0.26. (See Appendix G for more details on the Durham Region *Green Bin* program and the 2011 study results.)

York Region's *Green Bin* program began in 2005. The York Region allows pet waste, kitty litter, diapers, and sanitary products. The York Region encourages residents to either line their small kitchen buckets with a small, compostable bag or line the *Green Bin.* York used to allow residents to use traditional polyethylene plastic bags, however in 2011; the Region's Council mandated the use of compostable bags only. At this time there is not any enforcement tied to this mandate. York believes 70 percent of liner bags currently used by York residents are still the regular plastic bags. Compostable bags are available for sale in most local grocery stores. (See Appendix H for a summary of the York Region pilot study on compostable grocery bags.)

4 Collection Options for City-Wide Collection of Organic Waste: Qualitative Descriptions and Preliminary Cost Estimates

This section describes four alternative methods of collecting and managing organic waste:

- **<u>No SSO Sorting or Separate Collections</u> (Option #1)**
  No separation by residents or separate collection. The organic waste is commingled with other MSW and collected as garbage for energy recovery in the County's HERC facility.

- **<u>Collect SSO Alone</u> (Option #2)**
  Separate from any other materials. Separate collection and composting of SSO as per the current pilot operations.

- **<u>SSO with Yard Waste</u> (Options #3.a and #3.b)**
  Collect commingled with yard waste **(Option #3.a)** or in *Blue Bag*™ within the yard waste **(Option #3.b)**.

- **<u>SSO with MSW</u> (Option #4)**
  Collect in *Blue Bags*™ within the mixed solid waste for later separation and recovery.

These options each have their own relative economic feasibility as determined by costs to the City, convenience to the residents, collection technologies (including carts and compostable bags); transfer capacity; and sorting/ processing / composting capacity. This section provides a summary description of these options including detailed assumptions about potential operations and additional (incremental) costs.

Table 4-1 itemizes the four basic options available today to the City of Minneapolis. Each option is given an identification number, title and then further basic operating description, including whether or not:

- A separate SSO cart would be required;
- *Blue Bags*™ would be required; and/or
- A separate companion barrel would be required for residents to load the SSO into *Blue Bags*™. The *Blue Bag*™ program currently uses a plastic, 30-gallon (nominal size), round trash can. Randy's Environmental Service has developed a relationship with *Rehrig Pacific Corporation* for the companion *Blue Bag*™ garbage can. These companion trash cans contain and hold up the SSO in the *Blue Bag*™ and provide a means for residents to meter the maximum amount of SSO to be put in the *Blue Bag*™ before tying it off (using a simple knot within the top slack of the bag).

Table 4-1
SSO Collection Options Available Today to Minneapolis

Option No.	**1**	**2**	**3.a**	**3.b**	**4**
Option Title	**No SSO Collections**	**SSO Alone**	**SSO + YW No *Blue Bag™***	**SSO + YW With *Blue Bag™***	**SSO + MSW With *Blue Bag™***
Separate Cart	No	Yes	Yes	Yes	No
With *Blue Bag™*	No	No	No	Yes	Yes
***Separate Blue Bag™ barrel* (e.g., Rehrig)**	No	No	No	Yes	Yes

In some communities that offer SSO collection (e.g., Wayzata), the residents that participate in the organic waste recycling program are allowed to decrease their mixed MSW service to once EOW trash service. Generally, the residents' rates are less for EOW trash service compared to weekly service. Such savings for changing to EOW trash service may help residents cover any added costs for SSO collection, if any. There is some concern, however, that the lower rates for smaller carts and EOW trash service levels may result in increased contamination of the SSO and recyclables streams. This is part of the reason that the assumed design of the future SSO program would continue to be voluntary (i.e., "opt-in") so as to focus the new service on those residents that may be more willing to follow the program guidelines to help make it more successful.

This strategy of EOW trash collection as an incentive to encourage Minneapolis residents to sign up and participate in SSO recycling was considered for this analysis. However, the EOW trash collection strategy was determined not to be feasible for the short-term period during any roll-out of a city-wide SSO program.

Each SSO collection methodology option detailed in this section is based on the assumption that the program will remain voluntary on a subscription basis, at least during the short-term period of planning and city-wide roll-out of the program. While many residents will subscribe (assume 40 percent subscription rate), not all residents will choose to "opt-in" to the new SSO program, regardless of which collection option is implemented. Therefore, the other non-participating residents would likely not be allowed to switch to EOW trash service. While the city-wide SSO program is in a subscription / "opt-in" mode, it would be extremely difficult and, perhaps, prohibitively expensive to route and schedule EOW trash service for SSO participants while still providing weekly trash service for non-participants. This patchwork of weekly and EOW trash stops is not economically feasible at this early planning stage. Therefore, EOW trash service was not analyzed further in this study. This also helps provide a more comparative analysis between the four options described in this section.

The City will need to develop or procure adequate transfer station / processing facility capacity to handle any of the optional SSO streams identified in this study. These options are discussed further in Section 5 – Local Transfer and Processing Facility Options. One procurement option

for the City is to release a request for proposals (RFP) in mid to late 2014 for this potential transfer / organics composting service.

Table 4-2 displays the assumed program service levels and tonnages.

Table 4-3 displays the preliminary cost estimates of each of the four SSO collection options. The cost assumptions and calculations for each option and major line item are further described below in this Section 4.

With options 2.a, 2.b, 3.a, 3.b and 4 it is assumed that the residents' preparation of organics will primarily take place in the kitchen and they have similar access for disposal for all options. Therefore, tons of SSO per year should be the same for all options.

Table 4-2
Assumed Levels of Service, Rates of Subscription, and Materials Tonnages

City Wide SSO Options						
	Option Number:	**1**	**2**	**3.a**	**3.b**	**4**
	Option Title:	**No SSO Collections**	**SSO Alone**	**SSO + YW No *Blue Bag™***	**SSO + YW With *Blue Bag™***	**SSO + MSW With *Blue Bag™***
Metric Variable	**(Units)**					
Total DUs Serviced	(Total DU Count city-wide)	105,500	105,500	105,500	105,500	105,500
SSO Subscription Rate	(% of Total Households)	0%	40%	60%	40%	40%
Subscribing Households	(Count of Subscribers City-wide)		42,200	63,300	42,200	42,200
SSO Recovery Rate (TOTAL)	(SSO Pounds per Total Household Served)	n.a.	150	150	150	150
SSO Recovery Rate (PER SUBSCRIBER)	(SSO Pounds per Subscribing Household Served)		375	375	375	375
Tons of SSO per Year [(a)]	(Tons per Year)	n.a.	7,913	7,913	7,913	7,913
Tons of Yard Waste per Year	(Tons per Year)	17,500	17,500	17,500	17,500	17,500
Tons of mixed MSW per Year	(Tons per Year)	86,000	78,088	78,088	78,088	78,088
TOTAL	**(Tons per Year, rounded)**	**103,500**	**103,500**	**103,500**	**103,500**	**103,500**

n.a. = not applicable

(a) 7,913 tons per year of SSO represents an assumed diversion rate of 9.2% of mixed municipal solid waste, not including yard waste (7,913 / (7,913 + 78,088)).

Table 4-3
Added, Incremental Costs Estimates for Each SSO Collection Option ($ / year)

Option Number:	**1**	**2**	**2.b**	**3.a**	**3.b**	**4**
Option Title:	**No SSO Collections**	**SSO Alone**	**SSO Alone (w/out County tip fee subsidy)**	**SSO + YW** No *Blue Bag™*	**SSO + YW** With *Blue Bag™*	**SSO + MSW** With *Blue Bag™*
Assumed additional trucks/crews [(a)]:		12	12	12	12	0
Capital Costs:						
Trucks	n.a.	$440,000	$440,000	$440,000	$440,000	$0
Carts	n.a.	$235,000	$235,000	$352,000	$352,000	$0
Operating and Maintenance Costs:						
Truck O&M	n.a.	$524,000	$524,000	$350,000	$350,000	$0
Cart replacement parts	n.a.	$47,000	$47,000	$56,400	$56,400	$0
Blue Bag™ costs	n.a.	n.a.	n.a.	n.a.	$3,187,000	$3,187,000
Personnel / Labor Costs:						
Collection crews	n.a.	$1,746,000	$1,746,000	$1,119,000	$1,119,000	$0
Cart maintenance (including flatbed truck costs)	n.a.	$87,000	$87,000	$104,000	$104,000	$0
Disposal (i.e., tipping fees):						
SSO tipping fees per year	n.a.	$119,000	$514,000	$1,779,000	$1,906,000	$6,880,000
SSO Tipping Fee per Ton	*n.a.*	*$15*	*65*	*$70*	*$75*	*$80*
Estimated annual capital costs for transfer station upgrades	n.a.	n.a.	n.a.	$147,000	$147,000	$147,000
(Savings in mixed MSW tipping fees)	n.a.	($372,000)	($372,000)	($372,000)	($372,000)	($372,000)
(Savings in YW tipping fees)	n.a.	n.a.	n.a.	($788,000)	($788,000)	n.a.
TOTAL	**$0**	**$2,826,000**	**$3,221,065**	**$3,187,000**	**$6,481,000**	**$9,822,000**
Total annual cost per all DUs serviced (all households city-wide, including DUs not subscribed to SSO service)	**$0.00**	**$26.79**	**$30.53**	**$30.21**	**$61.43**	**$93.10**
Total monthly cost per all DUs serviced *(all households, city-wide)*	***$0***	***$2.23***	***$2.54***	***$2.52***	***$5.12***	***$7.76***

(a) "Total" number of additional trucks/crews assumed. The yard waste options (3.a and 3.b) will involve less trucks/crews during the winter season.

4.1 No Separation or Separate Collection of Organic Wastes (Option #1)

This first option is based on current solid waste collection and energy recovery systems in place for the City and County. The base assumptions for this option include:

- No organics separation by residents for separate curbside/alley collection.
- Increased promotion of backyard composting of food waste.
- Weekly collection of mixed MSW from 105,500 households as per the current City system.
- Organic materials would continue to be disposed within mixed MSW for energy recovery.

4.1.1 Cost Analysis

Current equipment needs for mixed MSW are sufficient to perform this option, therefore there are no additional equipment costs.

Current personnel levels for mixed MSW would not be changed to perform this option. There would be no additional personnel costs associated with this method.

The current tipping fees at HERC for mixed MSW loads from the City of Minneapolis are at the contracted rate of $47 per ton (as of January 1, 2012). Given the City (together with MRI) collected and tipped about 94,000[33] tons of mixed MSW at HERC in 2012, the total annual tipping fees paid were about $4.4 million. The composition analysis conducted for Hennepin County indicates that 24.4 percent (or about 23,000 tons) of this was organic waste, not including yard waste (see Table 3-1).

4.2 Collect SSO Separately (Option #2)

This second option is based on current SSO pilot system design and collection operations. For this study, the assumptions for this collection option include:

- Voluntary “opt-in” subscription by willing residents only. Only SSO service subscribers get SSO carts.
- Extensive promotions to sign-up and “opt-in”. City-wide public education campaign similar to the pilot routes.
- Increased promotion of backyard composting of food waste.
- No kitchen “buckets” provided for SSO. Instead, the City will provide lists of such commercially available products for individual purchase and suggest reuse options for free (e.g., paper bags, ice cream pails, etc.).
- No liners would be used for the SSO carts. Residents would be instructed to rinse out their carts on a regular schedule.
- Weekly collection schedule for SSO.

- Haul to Hennepin County's BPTS or a suitable alternative SSO transfer operation yet to be developed. (See Section 5 for more discussion of alternative transfer stations analyzed.)
- The cost for this organics service could either be charged directly to participants or the base fee could be increased for all customers.
- Additional carts would need to be purchased and maintained.
- Average city-wide subscription rate of 40 percent for separate SSO collections.
- Average annual recovery rate of 150 pounds of SSO per total households served. This is a measured recovery rate per total households serviced and is based on the subscription rate of 40 percent.
- The city-wide total amount of SSO is calculated at 7,913 tons per year (150 pounds per total household served X 105,500 households city-wide divided by 2,000 pounds per ton).

4.2.1 Cost Analysis

The following cost estimates are based directly on current City SSO pilot operations. Additional background data is derived from other existing City operations cost data for collection of traditional mixed MSW, recyclables and yard waste for the other options.

Cost estimates for all SSO collection options are provided on a city-wide basis. The current system divides the City in half. One half of the residents are served by City crews and the other half are served by the City's contractor, Minneapolis Refuse Inc. (MRI). The City would be responsible for the purchase of all SSO carts, improving/expanding the City's fleet as needed to handle the new SSO collections, and additional City crew staffing. The City would also be responsible for proposing an amended contract with the collection contractor regarding any new SSO contract obligations in that half of the City.

Current SSO pilot route collection efforts have demonstrated productivity rates. This productivity standard was used to estimate the necessary numbers of SSO crew members required to provide the new, additional service to the SSO participants.

SSO route productivity for 2011 and 2012 were analyzed for the Wednesday, Thursday and Friday pilot routes. These three pilot routes were designed for SSO to be collected on the same day as garbage, from the standard garbage route block areas, to enable research on overall SSO recovery rates and crew productivity compared to garbage collection rates. An average on-route collection productivity of 113 DUs serviced (total households on the route) per hour on-route.

On average, the SSO collection crew spends about 6½ hours each day performing on-route collection activities. The remaining 1½ hours are allocated to their other daily tasks such as:

- Pre-trip activities (administrative tasks, safety checks, etc.)
- Driving to their routes
- Break times
- Driving to and from the recycling or disposal facility
- Post-route administrative duties

The daily SSO collection productivity is currently estimated at 735 total DUs serviced per day (6½ hours times an average of 113 total DUs serviced per hour). Given this on-route productivity estimate, 12 total SSO collection crews and trucks would be needed to service the entire City[34].

Table 4-3 itemizes the cost estimates for this SSO collection option (#2). The amortized cost of a new truck is $31,430 ($220,000 per truck divided by 7 years; No interest rate charges assuming the City self-finances; rounded). The total annual capital cost of trucks for 12 new trucks, plus 2 spare trucks, is $440,000 per year ($31,430 per truck per year X 14 trucks).

The current inventory of SSO carts would need to be expanded to provide SSO carts to all subscribers on a city-wide basis. The assumed subscription rate is 40 percent, or 42,200 dwelling units (DUs) city-wide. (See Table 4-2 for more details on the base assumptions for this subscription rate.)

There will be a need to keep a surplus inventory of additional carts for future increases in subscribers and for replacements due to necessary repairs. It is expected the City will be keeping a surplus of about 5 percent, or about 2,110, additional carts. At the current purchase price of approximately $53 per cart, the city-wide cost of purchasing 44,310 carts (including the surplus) is approximately $2.35 million (rounded). The annualized capital cost of the carts for this option (#2) is estimated at about $235,000 (44,310 carts, X $53 per cart amortized over 7 years, rounded).

The City's truck operating and maintenance (O&M) cost (including fuel) is approximately $21 per hour.[35] This equates to $43,680 per year (at 2,080 operating hours per year at 40 hours per week). Given the daily, city-wide estimate of 12 SSO collection crews and trucks, under this option (#2), the city-wide truck O&M costs would be about $524,000 per year ($43,680 per year X 12 trucks, rounded).

City staff has indicated that the current costs of replacement carts for refuse and recycling carts is approximately 2 percent of the cart purchase price. Applying this parts ratio to this SSO collection option (#2), the estimated, cart replacement parts costs for the SSO carts would be about $47,000 per year ($2.35 million in initial capital costs of carts X 2 percent).

The City's current SSO pilot operations use 2 staff per crew to tip and empty the SSO carts. Therefore city-wide SSO operations would need 24 FTEs, plus another 2 FTEs (rounded) to account for vacation and sick time, for total of 26 FTEs. The City reports the fully loaded cost for each FTE (including wages, benefits and overhead costs) is approximately $67,142 per year. Using these productivity and labor cost rates, the total city-wide cost for SSO collection labor is estimated at $1,746,000 per year.

Maintenance of the City's current refuse and recycling carts requires 5 full time equivalents (FTE's), plus equipment. By adding 42,200 additional SSO carts to SSO subscribers, it can be expected that the additional effort for the SSO carts will require one (1) additional FTE at $67,142 per year plus one flat-bed, stake-body truck with a hydraulic lift gate. Based on current capital and operating costs for a flatbed truck to service the garbage and recycling carts, the

flatbed truck for the additional SSO carts is estimated to cost about $20,000 per year. The total additional cost associated with the SSO cart maintenance is estimated at about $87,000 per year ($67,142 for labor, plus $20,000 for the flatbed truck, rounded).

For Option #2.a, the estimated SSO tipping fees at the Hennepin County BPTS are to remain at the current $15 per ton for this collection option (SSO alone). Therefore, the annual cost of SSO tipping fees for Option #2.a is $119,000 (7,913 tons X $15 per ton, rounded). This tipping fee estimate is based on the assumption that the County does not increase these SSO tipping fees.

It is recognized that the County Board could at any time in the future reduce the amount of its BPTS tipping fee subsidy for SSO collection programs in Hennepin County. The full cost of the BPTS service (including transfer, haul, and composting facility tipping fee) is estimated at $65 per ton (see Section 2.3 for more details). For Option #2.b, the assumed tipping is calculated at $65 per ton as a means of comparison to Option #2.a. Therefore, the annual cost of SSO tipping fees for Option #2.b is $514,000 (7,913 tons X $65 per ton, rounded).

The assumed city-wide SSO tonnage is estimated at 7,913 tons per year city-wide (150 pounds per total route DUs serviced X 105,500 total DU count city-wide). There will be a corresponding reduction in mixed MSW tipping fees at HERC. The estimated savings in mixed MSW tipping fees is about $372,000 per year (7,913 tons of SSO per year X $47 per ton avoided tipping fees at HERC, rounded).

The total, estimated added costs for this "SSO alone" Option #2.a is about $2,826,000 and for Option #2.b is about $3,221,000. The disposal savings are factored into these totals from the avoided mixed MSW tipping fees.

4.3 Collect SSO Commingled with Yard Waste (Option #3.a)

This option is based on current yard waste collection operations, modified to allow subscribing residents to commingle SSO with their yard waste. The base assumptions for this option include:

- Voluntary, "opt-in" SSO + yard waste subscription by willing residents only. Only SSO + yard waste service subscribers would get SSO + yard waste carts.
- Residents that do not set out yard waste may still subscribe to the SSO service. These SSO only carts would be collected along with the yard waste + SSO carts on the same route and truck.
- Average city-wide participation rate of 40 percent in the SSO portion for residents that subscribe to this SSO + yard waste option (#3.a). Plus, an average city-wide participation rate of 20 percent in the yard waste portion (only) but are residents that still subscribe to this SSO + yard waste option (#3.a).

  > Note that these residents may subscribe to the SSO + yard waste program in part to get the organics cart and thereby avoid the costs of compostable bags required to be purchased by residents for yard waste. Yet they may elect not to separate and set-out their organics into their SSO + yard waste cart.

It is also important to note that the yard waste set out rate increases significantly in the spring and late fall. (See Figure 2-2 for the graph displaying the seasonal peaks of yard waste collections in the spring and fall.)

- Residents that set out yard waste only must use the same procedures as per the City's current yard waste program. Yard waste only participants will NOT be given a SSO + yard waste cart and must use compostable bags or their own reusable containers. For detailed instructions, see the City's web page: http://www.minneapolismn.gov/solid-waste/yardwaste/solid-waste_yardwaste and the City's yard waste collection brochure: http://www.minneapolismn.gov/www/groups/public/@publicworks/documents/webcontent/wcms1p-087994.pdf.)
- Average city-wide participation rate of 10 percent in the traditional yard waste collection service is in compostable bags. These are residents that do not subscribe to the SSO + yard waste option and therefore do not receive SSO + yard waste carts but still use compostable bags or reusable containers and set out yard waste for separate collection. The yard waste (only) in compostable bags would be collected in the same truck as the materials set out in the SSO + yard waste carts.
- Extensive promotions to sign-up and "opt-in" to the SSO + yard waste option. City-wide public education campaign similar to the pilot routes.
- Increased promotion of backyard composting of food waste.
- No kitchen "buckets" provided for SSO. Instead, the City will provide lists of such commercially available products for individual purchase and suggest reuse options for free (e.g., used milk cartons, ice cream pails, etc.).
- Weekly collection for SSO + yard waste participants. SSO commingled with yard waste inside of SSO + yard waste cart during the yard waste season. SSO alone in the same cart during the winter months (without yard waste).
- Additional carts would need to be purchased and maintained.
- The cost for this separate SSO recovery service could either be charged directly to participants or the base fee could be increased for all customers.
- The replacement plan for the older trucks used for yard waste will need to be accelerated due to additional collections during the winter season, approximately December through March each year.
- The change to a year round SSO + yard waste service will require improvements to the trucks currently used for yard waste collection. For example, additional cart tipping devices (one "flipper" per truck) will need to be added to more of the trucks to provide for semi-automated loading of the SSO + yard waste set out in carts.
- Collection schedule and routing system stays the same as per current yard waste collection operations (e.g., residents set out SSO + yard waste or yard waste only on the same day as garbage/recycling; weekly collection).
- SSO + yard waste collection crews will be assigned routes as per work load (e.g., more area covered in off-peak weeks with less SSO + yard waste stops; less area covered in

peak weeks with more SSO + yard waste stops). The operational design objective is to get a full load of SSO + yard waste before driving to the transfer station.

- Brush and small branches less than 3 – inches in diameter would continue to be accepted in the City's yard waste collection program.
- During the Emerald Ash Borer (EAB) "flight season" (approximately May through September), all yard waste must first be processed (e.g., shredded) to meet requirements for the Minnesota Department of Agriculture's (MDA's) EAB control program before transfer to an out-of-county composting facility.
- All yard waste collected will assume to have a minimum amount of SSO and therefore all yard waste will be transferred for composting as if it contains SSO.
- Average recovery rate of 150 pounds of SSO per total households served.

As stated above, residents could participate in this option in three different ways:

1. Subscribe, receive a SSO + yard waste cart and then separate and set out their SSO commingled directly with yard waste during the yard waste season (i.e., April through November). These same residents would continue to set out SSO (alone) in the SSO + yard waste cart during the winter months as well (i.e., December through March). SSO subscribership and participation under this SSO + yard waste option (#3.a.) is assumed to be 40 percent (or 42,200 households), which is the same as the other options.

2. Subscribe, receive a SSO + yard waste cart and then not separate their organic materials, but simply use the cart for yard waste only during the yard waste season. It is assumed that an additional 20 percent of all residents in the City (or 21,100 households) will subscribe to this new service just to get the "free" cart for SSO + yard waste collection services and then use the cart only for yard waste.

3. Not subscribe and not receive a SSO + yard waste cart but still collect and set out their yard waste in a compostable bag or reusable container for separate collection during the yard waste season. This analysis assumes that 10 percent (or 10,550 households) will continue to participate in these traditional yard services without carts.

This means 60 percent of all households in the city (or 63,300 households) will be receiving SSO + yard waste carts. Separate yard waste collection services would continue to be provided to those residents that comply with the City's requirements for using compostable bags or reusable containers for yard waste and bundled brush even though they do not receive a cart by proactively subscribing to the SSO + yard waste program. Therefore, it is assumed that a total of 70 percent of the City (or 73,850 households) will be actually get some form of the SSO + yard waste collection service under this option (#3.a).

The collection system design and cost analysis for this option (#3.a) must accommodate all three of these groups of participants. The crews must collect all three forms of SSO + yard waste in the same truck on the same route. The yard waste tonnage is forecasted to be over twice (17,500 tons per year) the amount of SSO (7,900 tons per year). The yard waste fraction is generated for eight months only and has very significant peaks in the spring yard clean up and fall leaf seasons

(see Figure 2-2). Bundled brush can be the predominant material collected (rather than leaves or grass) during the summer months. Yet the SSO fraction will be collected on a 12-month, year-round basis. SSO will also have its own seasonal peaks, but not nearly as significant as the yard waste fluctuations.

4.3.1 Cost Analysis

Estimated staffing and equipment levels for this SSO + yard waste collection option (#3.a) are based on the City's existing yard waste collection and disposal system but blended together with SSO commingled directly into new SSO + yard waste carts. To implement this option (#3.a), there would be a need to increase yard waste crews, trucks, and other equipment.

In order to control for minor variables and better compare costs between the alternative collection methods, similar operating assumptions were used for this SSO + yard waste option (#3.a) as were used for the cost analysis for the SSO alone option (#2). For example, for collection operations during the winter months, the same city-wide crew/truck compliment and route productivity assumptions were used for this SSO + yard waste option (#3.a) as were used for the SSO alone option (#2). For example, it is assumed that 12 crews/trucks will be needed to service the SSO routes during the winter months under this option (#3.a)

Current yard collections are operated over approximately 8 months with varying levels of staff and equipment. The City currently utilizes an average of 7 crews and trucks for yard waste collections. City-wide, this analysis assumes that 14 crews and trucks currently provide yard waste collection services and that about 17,500 tons per year of yard waste is delivered to one of two different processing / transfer sites within the City limits. These current yard waste operations provide the baseline for this comparative collection, processing and composting cost analysis. To more easily compare costs between the collection options, tonnage estimates are held constant for both the SSO and the yard waste fractions.

Using the previous estimated productivity rates, the total number of routes during the seasonal yard waste season can be extrapolated. The total estimated number of households to be serviced under this option (73,850 households), divided by 5 week days equals 14,770 DUs per day. This divided by the productivity rate of 735 total DUs per truck/crew per day, equals about 20 crews (6 more than the current estimated level of 14 crews). This is the level of effort is necessary for the 8 months of yard waste collection service.

The City trucks currently used for yard waste collection are the oldest solid waste, rear-load packers of the City's entire fleet. They are not equipped with "flippers" for emptying carts because the crews manually load compostable bags and bundled brush without any carts. This SSO + yard waste option (#3.a) would require year-round collection effort. Similar to the capital truck cost assumptions for the other options, this option (#3.a) assumes new trucks at an initial capital cost of $220,000 each, including installed cart flippers. The amortized annual cost of these trucks is $31,430 per year (on a 7-year, zero interest basis of financing). This comparative analysis allocates the capital cost of 12 additional, new trucks to this option (#3.a), plus 2 spare trucks (as redundant equipment for downtime, repairs, etc.), for a total of 14 new trucks. The annual capital cost estimated for this option, is $440,000 for 14 new trucks ($31,430 X 14 new trucks, rounded). But this SSO + yard waste operations is only for the 8-month yard waste

season (approximately April through November). The prorated capital costs of trucks for this portion of the year is $293,000 per year ($440,000 ÷ 12 months X 8 months, rounded). This capital cost estimate accounts for the seasonal swing in demand for SSO + yard waste trucks and also accounts for replacement of the existing, older yard waste trucks in the City or MRI fleets (estimated at about 14 trucks city-wide).

This option (#3.a) assumes that the SSO will be collected alone in the SSO + yard waste carts during the four winter months of December through March in the same manner as the SSO alone option (#2). To estimate the capital cost of trucks during these winter-month operations, this analysis simply prorated the capital cost of trucks for the SSO alone option (#2), $440,000 per year, over four months. The prorated capital costs of trucks for winter months is $147,000 ($440,000 ÷ 12 months X 4 months, rounded).

The total capital cost of trucks, therefore, is $440,000 per year ($293,000 per year plus $147,000 per year).

The annualized capital cost of the carts for this option (#3.a) is estimated at about $352,000 per year (63,300 households serviced with carts, plus a 5 percent excess inventory of carts, X $53 per cart amortized over 10 years).

The truck O&M costs (including fuel) for this option (#3.a) are based on the same assumptions as the SSO alone collection option (#2). The hourly O&M costs are about $21 per hour and the annual costs are about $43,700 per year ($21 per hour X 2,080 operating hours per year). The O&M costs for the yard waste season are about $175,000 per year ($262,000 per year = 6 additional trucks x $43,700 per year/12 X 8), prorated for 8 months of yard waste season service. The O&M costs for the winter season are also about $175,000 per year ($43,700 per month from option #2 X 4 months), prorated for 4 months of winter season service. The total truck O&M costs, therefore, are about $350,000 per year.

Similarly, the estimated labor costs for this option (#3.a) are based on the same assumptions as the SSO alone collection option (#2). For example, this analysis always uses the same fully-loaded labor cost assumption for one FTE of $67,142 per year. For the yard waste season, the additional labor for 6 additional SSO + yard waste crews (@ 2 crew members per truck) is estimated at $537,000 per year prorated for 8 months of the year. For the winter season, the additional labor for the SSO alone collections is the same as the labor costs in the SSO alone collection option (#2), but prorated for 4 months of the year, estimated at $582,000 per year. The total labor costs for this SSO + yard waste option (#3.a), therefore, are about $1,119,000 per year.

The added annual labor costs of cart maintenance (including the costs of a flatbed truck) are estimated at $104,000 per year. This is simply 20 percent more than the same costs for cart maintenance for the SSO alone option (#2) to reflect the added SSO + yard waste carts that are assumed to be needed for this SSO + yard waste collection option (#3.a).

The estimated transfer station tipping fees are estimated at up to $70 per ton for this collection option (#3.a). The commingled SSO (7,913 tons per year) plus the yard waste (17,500 tons per year) totals 25,413 tons per year. The total tipping fees for this option ($3.a) are about

$1,779,000 per year (25,413 tons per year X $70 per ton, rounded). This tipping fee assumption is based on a preliminary estimate from one potential transfer / organics composting service provider. If the City contracts for this service, this tipping fee should cover the following services:

- Receiving, inspecting and accepting incoming loads.
- Stockpiling the commingled SSO + yard waste.
- Grinding of the commingled SSO + yard waste during the EAB flight season, approximately May through September each year. No grinding is required during the non-EAB flight season of approximately October through April each year. (See Section 7.4 for more details on the Minnesota Department of Agriculture EAB grinding requirements for quarantined material).
- Loading the ground SSO + yard waste material (during the EAB flight season), or the unprocessed material during the non-EAB flight season, into larger semi-trailers for hauling to a permitted composting facility.
- Hauling of the material to the composting facility.
- Composting the material.
- Marketing of the finished compost.

The estimate $70 per ton tipping fee does not include the added facility improvement costs to:

- Upgrade a transfer station to handle these SSO + yard waste volumes
- Expand a composting facility's pad to accommodate more SSO without a composting rule change by MPCA. (See section 7.2 for more details about the status and content of MPCA's SSO rule amendment or Appendix J for draft rule language.)

The annual capital costs to make such transfer station upgrades and improvements are estimated at $147,000 per year. This is based on a series of assumptions including:

- Estimated capital costs of the transfer station upgrade = $2,000,000
- Estimated SSO rule change by MPCA effective in 2015 which will require an all-weather working surface but not a full impervious pad
- 20 year facility life and amortization schedule.
- 4 percent interest as a part of the cost of financing the upgrades.

Table 4-3 also indicates under "Disposal" that there would be about $372,000 per year in savings due to avoided mixed MSW tipping fees at HERC (7,913 tons of SSO per year at $47 per ton).

Also under disposal, Table 4-3 indicates there would be about $788,000 per year in savings due to the displaced yard waste tipping fees at current processing/transfer facilities at an average tipping fee of $45 per ton. This assumes all of the yard waste, 17,500 tons per year, would be collected under this option #3.a.

The total, estimated added costs for this SSO + yard waste option (#3.a) is about $3,187,000. This is in addition to the existing costs of current yard waste collections from residents. But the disposal savings are factored into this total from the avoided mixed MSW tipping fees and (current) yard waste transfer/composting.

4.4 SSO Co-collected with Yard Waste within *Blue Bags™* (Option #3.b)

This is a conceptual option that has recently been discussed with local industry stakeholder companies. Randy's Environmental Services has developed the *Blue Bag™* Organics concept including the specifications for the compostable *Blue Bags™* mil thickness. Randy's has trade-marked the *Blue Bags™* and is in the process of developing a sales, distribution and marketing system. While the concept of the *Blue Bag™* Organics program is open and available to other interests, Randy's has retained exclusive rights to the *Blue Bags™* as a stand-alone product. Randy's has also modified their MRF at their headquarters in Delano, Minnesota. This MRF is currently processing both single-stream recyclables and mixed MSW with co-collected SSO in *Blue Bags™*. (See Section 3.1.3 above and Appendix C for more information, additional details, and the hyperlinks to Randy's Environmental Services and their *Blue Bag™* Organics program.)

The assumptions for this SSO *Blue Bag™* + yard waste option (#3.b) for the City of Minneapolis would all be the same as the SSO + yard waste option (#3.a) above except that:

- SSO would be co-collected within *Blue Bags™* with yard waste inside of the SSO + yard waste cart on a weekly schedule during the yard waste season (April through November).
- SSO alone within *Blue Bags™* in the same cart during the winter months (December through March) without yard waste on a weekly schedule.
- The City would provide an SSO + yard waste cart, a supply of *Blue Bags™*, and a 30-gallon, *Blue Bag™* plastic garbage can (e.g., "Rehrig Pacific Corp." type) to SSO subscribers only.
- The City would direct all of its yard waste to a transfer facility that is equipped with at least a sort conveyor. The *Blue Bags™* would be manually sorted from the yard waste, stockpiled, loaded into a semi-trailer and hauled to a remote SSO composting facility.
- The *Blue Bags™*, together with their contents, would be composted along with compostable materials including: yard waste, other sources of SSO and other approved compostable feedstocks.

There are several advantages of the *Blue Bag™* Organics system when co-collected with yard waste as specified in this Minneapolis option (#3.b):

- For eight months of the year, the City can use yard waste collection trucks and crews to co-collect SSO. A separate collection route, with separate trucks and crews, (as per option #2), is not required during this yard waste season (approximately April through November).

- The *Blue Bags*^{TM}, together with the other accessories in the *Blue Bags*^{TM} Organics collection program, help keep the customer's kitchen buckets, *Blue Bag*^{TM} can and yard waste cart clean.
- It may help overcome the "Yuk" fear factor as expressed by some residents as a barrier to subscribing to other non-*Blue Bag*^{TM} SSO collection options.
- The SSO can be kept physically separate from the yard waste such that the SSO does not need to be ground up during the EAB flight season. The *Blue Bags*^{TM} would be manually separated from the yard waste and transferred for composting without further processing at the transfer facility. The yard waste would be ground up on site at the transfer station or another facility within the quarantine zone. The yard waste could then be considered yard waste only and eligible for composting in a permit-by-rule yard waste composting facility and not a full mixed MSW – permitted facility.

4.4.1 Cost Analysis

Table 4-3 contains the line item cost estimates for this SSO (in *Blue Bags*^{TM}) + yard waste collection option (#3.b). The side-by-side comparison indicates that this is option (#3.b) has many of the same capital, operating, maintenance, and labor costs as option #3.a. The main differences are the cost of the *Blue Bags*^{TM} and the different tipping fees.

Table 4-4 lists the prices for the *Blue Bags*^{TM} and the recommended accessories as part of the *Blue Bags*^{TM} Organics program as provided by Randy's Environmental Services.

Table 4-4
List Prices for Blue BagTM Organics Program Supplies

Supplies	($ per bag)
32-gallon *Blue Bag*^{TM} liners	$1.14
18-gallon *Blue Bag*^{TM} liners	$0.63
Kitchen buckets	$5.00
Kitchen liners	$0.15
Blue Bag^{TM} cans (e.g., *Rehrig)*	$21.00

Source: Randy's Environmental Services (April 2013 and June 2013)[36]

Table 4-5 itemizes the estimated costs of the *Blue Bags*^{TM} based on the unit prices in Table 4-4 and the assumed subscription rates in Table 4-2. A series of additional assumptions were needed for this SSO (in *Blue Bags*^{TM}) + yard waste collection option (#3.b) to complete the cost analysis:

- Half (50 percent) of the subscribers would elect to use the 32-gallon *Blue Bag*^{TM} liners and half (50 percent) would elect to use the 18-gallon *Blue Bag*^{TM} liners.
- It would be the subscribing residents' choice to purchase the "kitchen buckets" and/or "kitchen liners". "Free" alternative kitchen containers and liners would be encouraged by the City and could be used instead (e.g., used ice cream pails; paper towels or paper bags for liners; etc.). For this cost analysis, it is assumed that 20 percent of the subscribers

would elect to purchase the kitchen buckets and kitchen liners. (Note: These costs are included in this cost analysis as an additional cost to the City, but these kitchen bucket / liner costs can be deleted in subsequent scenarios on this option.)

- 100 percent of the subscribers would be given a *Blue Bag*™ can (e.g., *Rehrig* model).

Table 4-5
Costs Estimates for Blue BagTM Options (#3.b and #4)
($ / year)

		ID Number:	**3.b**	**4**
		Option Title:	**SSO + YW With *Blue Bag*™**	**SSO + MSW With *Blue Bag*™**
	Percent of Participating Households	(Units per Year)		
32-gallon *Blue Bag*™ liners	50%	54	$1,298,916	$1,298,916
18-gallon *Blue Bag*™ liners	50%	108	$1,428,808	$1,428,808
Kitchen buckets	20%	1 bucket per household	$8,440	$8,440
Kitchen liners	20%	200	$253,200	$253,200
Blue Bag™ cans (e.g., *Rehrig)*	100%	1 can per household	$177,240	$177,240
TOTAL			**$3,166,604**	**$3,166,604**

Based on the above prices and assumptions, the estimated annual costs of the *Blue Bags*™ and accessories would be about $3,200,000 per year (rounded). (Note that the prices and assumptions are the same for both option #3.b and #4.)

The same yard waste tipping fee savings assumptions and calculations are used option #3.b as per option 3.a. Table 4-3 indicates there would be about $788,000 per year in savings due to the displaced yard waste tipping fees at current processing/transfer facilities at an average tipping fee of $45 per ton. This assumes all of the yard waste, 17,500 tons per year, would be collected under this option #3.b (similar to option #3.b).

The total net costs (after savings from avoided MSW tipping fees and diverted yard waste from existing transfer/processing facilities) for this SSO (in *Blue Bags*™) + yard waste option (#3.b) is about $6,481,000 per year. This higher cost is primarily due to the high costs of the *Blue Bags*™ and the higher costs of the transfer / processing tipping fee (i.e., $75 per ton).

4.5 Collect in *Blue Bags* within the Mixed Solid Waste (Option #4)

This option is based on current mixed solid waste collection operations modified to include SSO in *Blue Bags*™ inside of the regular trash carts. The following assumptions are also based on how the program has been outlined and promoted by Randy's Environmental Services. (See the Wayzata – *Blue Bag*™ program description in Section 3.1.2 for more details, links to the *Blue Bag*™ instructional video, and Wayzata *Blue Bag*™ contract service prices in Appendix C.) The base assumptions for this option include:

- Voluntary, "opt-in" SSO with *Blue Bag*™ subscription by willing residents only. Only SSO *Blue Bag*™ service subscribers would get SSO *Blue Bags*™.
- Extensive promotions to sign-up and "opt-in". City-wide public education campaign similar to the pilot routes.
- Increased promotion of backyard composting of food waste.
- This option (#4) would use the same *Blue Bag*™ prices and subscription rate assumptions that were used for the previous option (#3.b).
- Weekly collection for all MSW (regardless if SSO is included in the trash cart or not). No EOW garbage collection option allowed.
- All mixed solid waste loads would be assumed to have SSO *Blue Bags*™. Therefore, all loads would need to be tipped and processed through a *Blue Bag*™ sorting operation (e.g., positive, manual pick of *Blue Bag*™ off the sorting conveyor). All *Blue Bag*™ SSO would then be transferred to a composting facility. All remaining mixed solid waste would then be transferred to the County's HERC facility.
- MSW collection schedule and routing stays the same as per current solid waste collection operations (e.g., weekly collections). No additional trucks or crews would be needed since the SSO in *Blue Bags*™ would be inside the normal trash cart to be co-collected with the trash.
- Average city-wide subscription rate of 40 percent for SSO in *Blue Bag*™ within the mixed solid waste carts.
- Average recovery rate of 150 pounds of SSO per total households served.

4.5.1 Cost Analysis

Table 4-3 contains the line item cost estimates for this SSO (in *Blue Bags*™) + mixed MSW collection option (#4). The side-by-side comparison indicates that this is option (#4) has many of the same capital, operating, maintenance, and labor costs as previous options #2 and #3.b. The main differences are derived from no additional truck/crew costs and the different tipping fees.

The first line on Table 4-3 indicates that no additional trucks/crews would be needed for this option (#4). Therefore, no capital costs for trucks or SSO carts are allocated to this option. Also,

no additional truck O&M, cart replacement parts, collection crews, or cart maintenance needs to be allocated.

The prices, subscription rates, and estimated annual costs of the *Blue Bags*^{TM} are assumed to be equal to option #3.b. Thus, the annual cost estimate for purchase of the *Blue Bags*^{TM} each year is $3,200,000 (rounded).

The SSO will be co-collected with the mixed MSW so that "SSO tipping fees" must be applied to the total 86,000 tons per year (rounded) of assumed SSO tonnage plus the balance of the mixed MSW (7,913 tons per year of SSO + 78,088 tons per year of mixed MSW). The assumed tipping fee for this co-collected material is $80 per ton. Therefore, the total SSO + mixed MSW tipping fees assumed in this analysis for option #4 are $6,880,000 per year.

The estimated annual capital costs for transfer station upgrades are the same as for options #3.a and #3.b. This assumption may slightly underestimate the transfer station upgrades because there is over three times as much material that needs to be received, sorted and transferred (e.g., back to HERC).

The "savings in mixed MSW tipping fees" is a reflection that, while all of the mixed MSW is assumed to be part of the SSO (in *Blue Bags*^{TM}) + mixed MSW, only the SSO tons will avoid the HERC tipping fee of $47 per ton (the mixed MSW will still need to be transferred to HERC). The savings in disposal tipping fees of $372,000 per year is a simple reflection of SSO + mixed MSW tons diverted from direct delivery to HERC (7,913 tons per year X $47 per ton tipping fee).

The total net costs (after savings from avoided MSW tipping fees) for this SSO (in *Blue Bags*^{TM}) + mixed MSW option (#4) is about $9,822,000 per year. This higher cost is primarily due to the high costs of the *Blue Bags*^{TM} and the higher costs of the transfer / processing tipping fee (i.e., $80 per ton).

5 Local Transfer & Processing Facility Options

There are a number of SSO transfer stations and processing/composting facilities that serve the Twin Cities metro region. Figure 5-1 displays the list and locations of facilities that were considered as a part of this analysis.

A general estimated cost per ton range is $10 to $20 per ton without any processing costs.

It may be best if the key transfer station operations were enclosed. One reason is to keep the material from freezing in the winter. For purposes of permitting and neighborhood public relations, the following operations could be required to be inside a transfer building:

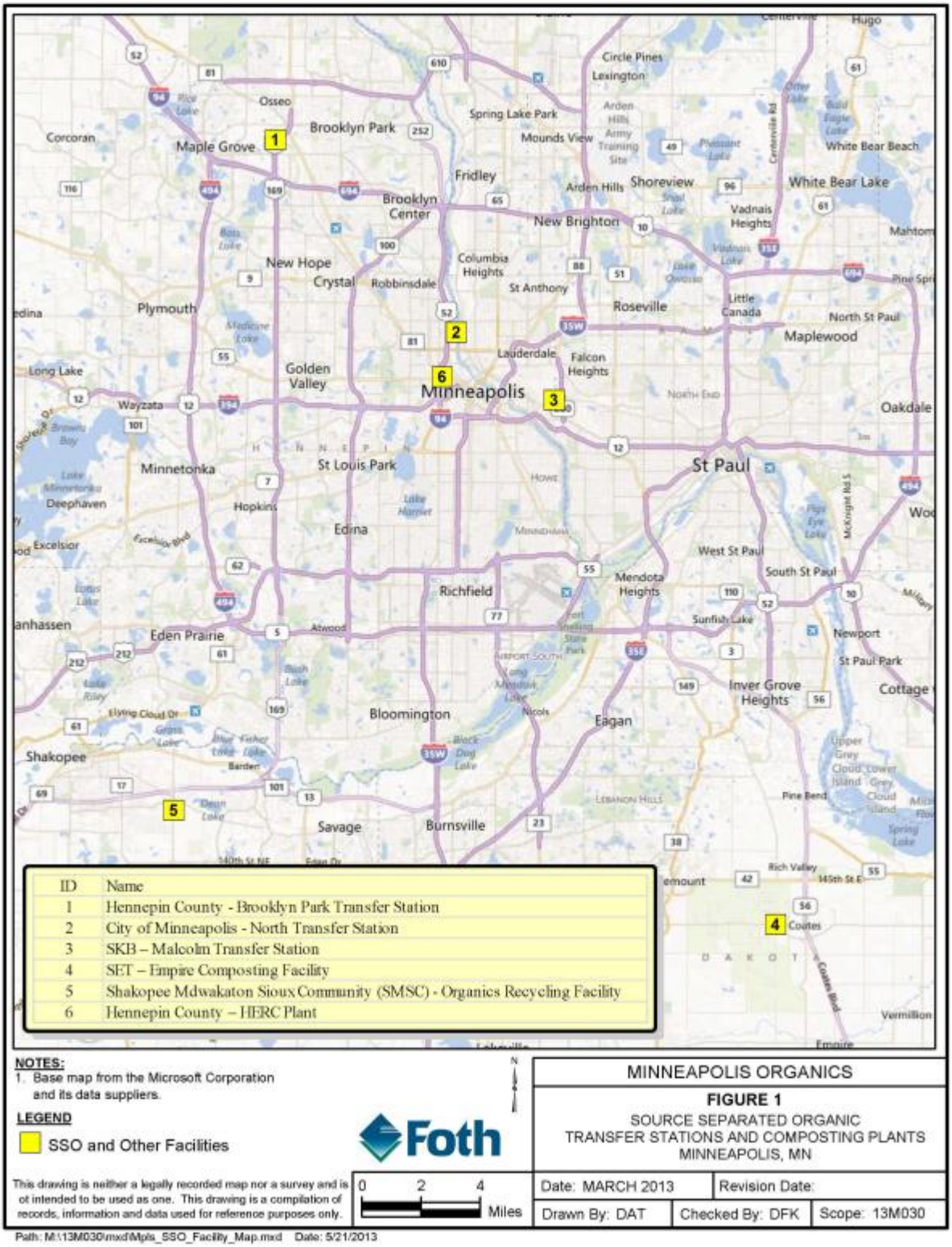
- Tipping floor
- Storage bunker
- Transfer trailer loading area (e.g., pit or ramp).

Table 5-1
General Food Waste Specification for
SSOM Composting Programs

Types of Organic Waste Managed	Acceptable Materials	Unacceptable Materials
Food Waste Non-recyclable paper products (e.g., paper & cardboard packaging) Plant waste	Produce Meats & seafood Dairy products Bakery & other dry goods Deli & frozen foods Fat & bones Cooking oil & grease Organic or compostable food packaging (paper, cardboard and certified compostable foodservice items)	Non-organic food packaging (e.g., plastic, glass & cans) All other trash

Source: Adapted from J.L. Taitt and Associates, May 2010[37]

Figure 5-1
Map of Potential SSO Transfer and Processing/Composting Facilities



5.1 Hennepin County's Brooklyn Park Transfer Station

The City has been utilizing the Hennepin County BPTS for its SSO unloading and transfer services as part of the City's ongoing pilot program. (See facility #1 on Figure 5-1). The SSO delivered to the BPTS must be separate from yard waste or mixed MSW. No commingled or co-collected material is allowed as there is no sorting operation at the BPTS. See Appendix K for the detailed list of "Acceptable" vs. "Unacceptable" organic materials that can be received at the BPTS. At least 7 different private haulers are currently delivering SSO to the BPTS.

Hennepin County has provided SSO transfer services for many years as a service to cities and private haulers delivering commercial SSO material. The current SSO receiving rate at the BPTS is about 18,000 tons per year. Daily amounts of SSO vary from 20 to 100 tons per day. Sources of SSO supplied to the transfer station include:

- Residential (about 25 percent)
- Institutional, such as schools (about 25 percent)
- Commercial (about 50 percent)

Of the commercial loads, about 80 percent is produce (or 40 percent of the total supply). The produce loads sometimes have very high moisture content, including free liquids. The BPTS at the SSO tipping floor has floor drains and the liquids are sewered to the facility's wastewater drain pipes and then into the municipal sanitary waste water treatment system as owned and operated by the Metropolitan Council Environmental Services.

The bunker area is approximately 24 feet wide by 32 feet deep. Separate, portable barricades (5 to 6 feet high) are now used at the BPTS for the SSO bunker to allow bunker expansion and/or easier wall replacement.

SSO is hauled out to SET's compost facility in Empire Township in sealed end dump trailers under contract to SKB. This compares to the mixed MSW which is handled in a different part of the facility and hauled out in walking floor transfer trailers. Typically, 3 end dump trailer loads per day are hauled out on Tuesdays through Thursdays. On Friday, 4 or 5 end dump trailer loads are hauled out.

No incoming loads are accepted after 1 p.m. on Fridays to assure all organic waste is delivered to SET before 3:30 p.m. on Friday. No organics are allowed to be received on weekends. Although incoming loads are received on Monday, none is transferred until Tuesday morning. Loads can freeze in the winter requiring a 20 foot ram attachment on the loader bucket to help load into the end dump trailers.

The County has a composting services contract with SET for processing, composting and marketing of the finished compost. All County SSO materials from the BPTS are delivered to the SET Empire composting facility at this time and have been throughout the history of the County's SSO program at the BPTS.

5.2 Minneapolis North Transfer Station

The City of Minneapolis owns the North Transfer Station located at 2710 Pacific Street, Minneapolis. The Facility consists of a 105' x 75' building to house the transfer facility operations. There is a tipping floor for accepting wastes and a loading area to transfer wastes to larger, top-loading trailers. There is a truck scale located at the site.

The North Transfer Station is permitted to handle 350 tons per day of mixed MSW. It has a temporary storage capacity of up to 200 tons of mixed MSW on the tipping floor area.

The North Transfer Station is currently not used for transfer of mixed MSW or yard waste. In the past, this transfer station building has been used for a variety of waste transfer functions including:

- Mixed MSW transfer
- Yard waste transfer
- Storm debris staging and transfer during disaster recovery events
- Voucher drop-off for City residents

This facility was listed as a contract option for yard waste transfer in the City's recent request for proposals for yard waste processing and disposal services. None of the proposers elected to propose using the North Transfer Station for this yard waste contract in part because of the limited space for any additional processing (e.g., sorting, grinding, screening). These types of additional yard waste processing requirements can be space intensive. Grinding of the yard waste is required during the emerald ash borer (EAB) flight season to comply with the Minnesota Department of Agriculture's (MDA's) quarantine regulations. The North Transfer Station is well suited for bulk transfer, but may be constrained to add sorting or other SSO processing operations such as this type of yard waste grinding. (See Section 7.4 for more detailed information about the EAB grinding requirements.)

5.3 SKB – "Malcolm" Transfer Station

SKB currently owns and operates 2 mixed MSW transfer stations: Minneapolis at the "Malcolm Avenue" site (630 Malcolm Avenue SE, Minneapolis, 55414) and in Blaine (10304 Naples Street NE, Blaine, MN 55449). Both facilities are permitted to accept and actively do accept organic materials such as SSO and yard waste for transfer and processing. The SKB – Malcolm transfer station already is under contract with the City of Minneapolis (via a contract with SET) to process about half of the yard waste from City SW&R and Streets Division programs. The SKB – Malcolm facility is approved to pre-process (i.e., grind) yard waste to comply with MDA's quarantine regulations. The SKB – Malcolm facility is an acceptable drop-off site for wood waste.

SKB owns the land and transfer station buildings and manages the overall facility. SET leases open area immediately to the west of the SKB - Malcolm transfer station building for yard waste handling, storage and processing.

The SKB transfer station building is 150' x 300' in size and has 13 overhead doors. Currently the middle bunker inside the transfer station building can be used for SSO without any major modifications to truck traffic or facility operations. SET stated that SET / SKB could modify the bunkers layout/configuration to handle the City's SSO for a full scale operation (e.g., as per the city-wide collection option #2 whereby SSO would be collected alone).

SET / SKB have had some limited experience with other private haulers bringing in commingled SSO with yard waste, at least during the EAB flight season. This commingled SSO + yard waste must first be ground up to MDA specifications during the months of May through September before it can be transferred out of the quarantine zone (e.g., to the SET compost site in Empire Township in Dakota County, which is outside of the quarantine zone).

If the City were to contract with SET / SKB for SSO + yard waste (options #3.a or #3.b) or SSO + mixed MSW (option #4), SET stated that SET / SKB would put propose to construct a new building to the east of the current SKB transfer station building. Such a new building would be required to handle the additional yard waste or mixed MSW volumes from these commingled or co-collection SSO program options.

5.4 SET – Empire Composting Facility

Specialized Environmental Technologies' (SET's) main SSO composting facility is located in Empire Township near Rosemount in Dakota County. The SET – Empire facility is currently permitted by the Minnesota Pollution Control Agency (MPCA) as a mixed MSW processing and composting facility. This permit type is temporary while MPCA is in the process of amending its rules to regulate SSO composting facilities. SET also works under the MPCA permit-by-rule yard waste composting regulation in adjacent operations. SET – Empire is permitted by MPCA to compost 150 tons per day of SSO. On a six day basis, this is approximately 47,000 tons per year. Recent SSO receiving rates averaged about 16,000 tons per year. Thus, SET is operating at roughly 34 percent of permitted capacity and could handle additional SSO.

Hennepin County also has contracted with SET to receive the transferred organics at the SET – Empire composting facility. The SSO received from the BPTS and other sources, once tipped at the SET – Empire composting facility is immediately mixed with leaves or other bulking agents and formed into active composting windrows. The SSO material specifications by SET have a very low tolerance for contaminants and therefore the City's SSO collection program must only deliver a high quality SSO to the BPTS. (See Section 5.1 for more details about the County's BPTS.)

See Appendix L for a list of the materials accepted at the SET – Empire composting facility.

5.5 Shakopee Mdewakanton Sioux Community (SMSC) Organics Recycling Facility

The Shakopee Mdewakanton Sioux Community (SMSC) owns and operates an organic composting facility. The SMSC "Organics Recycling Facility" (ORF) is a relatively new composting operation just outside of the City limits of Shakopee. The physical address of the access road is 1905 Canterbury Road, Shakopee (see Figure 5-1). The ORF opened on

September 6, 2011 on land held in federal trust on the SMSC property. The overall site is 47 acres and the current, active composting operations occupy 25 acres.

Operational components include: receiving organic waste, tipping loads, stockpiling, grinding, mixing/blending, windrow formation, windrow turning, grinding, screening, and other finishing/curing management. (See Appendix M for the list of acceptable and unacceptable materials to the ORF.)

The ORF is reported to be designed to handle up to 400,000 tons per year of various organic materials. About 75 percent (300,000 tons per year) can come from yard waste and 25 percent (100,000 tons per year) can come from SSO.

At this time, the SMSC's ORF has no official relationship with the State of Minnesota. There is no MPCA facility permit and no MPCA or Minnesota Department of Revenue facility tax exemption determination pursuant to M.S. 297H.06. (See Appendix I for more details and statutory criteria for this exemption process and state agency decisions.)

The SMSC staff and ORF web page have stated that the ORF operations will be managed to the same Minnesota standards. The ORF web page "Quality Standards"[38] states:

> *"ORF managers strive to achieve the Minnesota standard of Process to Further Reduce Pathogens (PFRP) where materials must achieve a temperature of at least 131 degrees for 15 consecutive days. After several months of processing the material and achieving PFRP, the material is screened to produce a uniform compost product. The compost is lab tested for nutrient content, maturity, percent organic content, and contaminants."*

And the ORF web page "Process"[39] states:

> *"…. Odors are minimal in a well-run facility and managing the compost will be a carefully monitored, turned windrow operation. Staff weighs and inspects incoming material and then grinds and mixes it using an established recipe. Workers use a machine that mixes the material by straddling the windrow and this is done regularly for up to three months. Staff also record oxygen, temperature, and moisture regularly and these data are used to guide management."*

One challenge with this facility is that, as a sovereign nation, SMSC is not required to follow State regulations. Yet, the SMSC ORF is operating in the competitive marketplace where other SSO facilities do have to follow MPCA rules and other State regulations. MPCA staff has stated that SMSC staff has discussed the concept of some form of voluntary agreement or memorandum of understanding.[40] Such an agreement between the State and SMSC may allow the SMSC ORF to more officially operate within current and future SSO compost rules. (See Sections 7.5 and 7.2 for more discussion of the status of SMSC as a sovereign nation and the upcoming MPCA SSO compost rule changes, respectively.)

The SMSC ORF was designed with the intent of matching the MPCA MSW compost facility permit requirements including installation of a composting pad. Liquids that contact the compostable materials are drained to a storm water runoff retention pond that is recirculated back onto the compost windrows as needed.

The SMSC ORF facility has received odor complaints over the past year. The City of Shakopee, SMSC, and Scott County have embarked on a scientific odor study to determine the extent of any odor problem.

6 Comparison of Environmental Impacts

Each of the SSO collection options has a different environmental impact. The comparison should consider three sources of impacts:

- Decreased emissions associated with composting organics verses combusting this material at HERC.
- Increased emissions on the SSO routes due to additional trucks if SSO is collected alone and not co-collected or commingled with other streams.
- Increased emissions due to transfer of the SSO to a more distant compost facility.
- Increased emissions if SSO is co-collected in *Blue Bags™* with mixed MSW due to the additional handling and transfer of the mixed MSW from a processing/sorting facility back to HERC.

These environmental impacts can be modeled to estimate net changes in greenhouse gas (GHG) emissions in terms of metric tonnes of carbon dioxide equivalents ($MTCO_{2e}$).

Foth conducted a preliminary analysis of environmental impacts using two different models to estimate the relative GHG emissions for each SSO option. The first model, the Waste Reduction Model (WARM), was created by the U.S. Environmental Protection Agency (EPA) to estimate GHG emission reductions from several different waste management practices. In 2009, Foth prepared a study for Minnesota Pollution Control Agency (MPCA) entitled, *Analysis of Waste Collection Service Arrangements.*[41]

As part of this *MPCA Collection Analysis*, Foth prepared a fuel usage / GHG tool to calculate estimated environmental impacts due to changing route density (i.e., stops per mile). This GHG tool was the second modeled used for this analysis. See Appendix O for the detailed methodology and results of GHG analysis.

Table 6-1 displays the summary level results of net GHG impacts for each option. Option #1 (no SSO sorting or separate collections) will have the least additional SSO route truck emissions because there are no additional collections. The HERC facility is centrally located in downtown Minneapolis and the mixed MSW collection trucks have developed efficient delivery schedules and routes. The trade-off is that there are some GHG savings due to composting organics instead of energy recovery. This Option #1 was used as the baseline scenario for the GHG analysis conducted by Foth and is not applicable (n.a.) in terms of a net change in $MTCO_{2e}$ emissions.

Table 6-1
Net GHG Emission Estimates from MPCA and WARM Models:
In $MTCO_{2e}$ per year increases (reductions)

		SSO Collection Options			
	Option #1	**Option #2**	**Option #3.a**	**Option #3.b**	**Option #4**
MPCA model results	n.a.	407	136	136	0
GHG emission increases					
WARM model results	n.a.	(119)	(121)	(121)	33
GHG emission increase or (reductions)					
NET Impact	n.a.	288	15	15	33

Sources: Foth GHG analysis as detailed in Appendix O using MPCA collection analysis model
Foth analysis using EPA WARM Model (See Table O-3)

Option #2 (collect SSO alone) will have the highest additional route truck emissions because it involves 12 additional SSO trucks year-round, collecting SSO alone without any form of commingling or co-collections with other waste streams. The final GHG analysis assumed the City would use its North Transfer Station for Option #2. The North Transfer Station (2710 Pacific Street) is 2 miles away from downtown Minneapolis (e.g., HERC). The SSO transfer distance is 35 miles from the North Transfer Station to the SET – Empire composting facility near Rosemount (using that facility option for this GHG analysis). This mileage and other appropriate data (e.g., subscription rate assumptions) for SSO collection Option #2 were input to the MPCA GHG tool. The MPCA collection model tool indicates that an additional 407 $MTCO_{2e}$ per year would be emitted due to the separate SSO trucks. The WARM model estimates additional reductions due to composting of the SSO (after transfer) of (119) $MTCO_{2e}$ per year. Thus, the net impact is estimated at an additional 288 $MTCO_{2e}$ per year.

Option #3.a (collect SSO commingled with yard waste) may have the second highest (or fourth lowest) additional truck emissions because it will involve 12 additional SSO trucks for the four winter months when yard waste is not collected (December through March). The commingled SSO + yard waste will need to be processed (e.g., ground up) to comply with MDA's EAB regulations during the EAB flight season (May through September). This ground up SSO + yard waste mixture will then need to be transferred ASAP to a composting facility. This GHG analysis assumes the City would utilize the SKB – Malcolm transfer site in Minneapolis for SSO + yard waste processing and transfer. The SSO + yard waste transfer distance to the SET – Empire composting facility is 28 miles. The additional mileage for the residential routes truck to collect SSO alone (e.g., from HERC to the SKB – Malcolm site) is only seven (7) miles. This mileage and subscription rate data for Option #3.a were input to the MPCA GHG tool. The MPCA collection model tool indicates that an additional 136 $MTCO_{2e}$ per year would be emitted due to the additional SSO + yard waste trucks. The WARM model estimates additional reductions due to composting of the SSO (after transfer) of (121) $MTCO_{2e}$ per year. Thus, the net impact is estimated at an additional 15 $MTCO_{2e}$ per year.

Option #3.b (co-collect SSO with yard waste in *Blue Bags*™) may have the third highest (also the third lowest) additional truck emissions for the same reasons and rationale as Option #3.a.

Option 3.b will also involve 12 additional trucks for the four winter months when yard waste is not collected (December through March). During the yard waste season (April through November), the SSO will be separated and co-collected with yard waste using the *Blue Bags*^{TM}. Under this option, the SSO does not need to be ground. But the separated SSO (still in the *Blue Bags*^{TM}) will then need to be transferred ASAP to a composting facility. This GHG analysis assumes the City would utilize the SKB – Malcolm transfer site in Minneapolis for SSO + yard waste sorting and SSO transfer (after appropriate upgrades including construction of a new processing / sorting building). Therefore, the transfer distance to the SET – Empire composting facility and added collection route truck distance would be the same as per Option #3.a described immediately above. The mileage and other subscription rate data for Option #3.b were the same as for Option #3.a. Thus, the net impact is the same as Option #3.a, an additional 15 $MTCO_{2e}$ per year.

Option #4 (SSO co-collected with mixed MSW in *Blue Bags*^{TM}) may have the fourth greatest (second lowest) truck emissions. In other words, this option has the least truck emissions above option #1 because there are no additional SSO trucks/routes required; the SSO is co-collected with the regular mixed MSW year-round (no seasonal adjustments like the yard waste options). This analysis assumes Option #4 utilizes the existing mixed MSW collection infrastructure of trucks, crews and designated residential routes. The only change in collection operations would be that all garbage collection crews would deposit their loads at a facility that could sort the *Blue Bags*^{TM} containing SSO from the mixed MSW. This GHG analysis assumes the City would utilize the SKB – Malcolm transfer site in Minneapolis for SSO + mixed MSW sorting and SSO transfer (after appropriate upgrades including construction of a new processing / sorting building). Therefore, the SSO transfer distance to the SET – Empire composting facility and added route truck distance would be the same as per Option #3.a described above. The other factor with this option is that the mixed MSW would also need to be transferred back to HERC for energy recovery. Thus, there is no additional collection truck route mileage for Option #4 such that there will be zero GHG emissions estimated from the MPCA spreadsheet tool. The WARM model estimates additional emissions due to composting of the SSO (after transfer of the mixed MSW back to HERC) is 33 $MTCO_{2e}$ per year. Thus, the net impact is estimated at an additional 33 $MTCO_{2e}$ per year.

In summary, Option #2 has the highest GHG net impact at an estimated 288 $MTCO_{2e}$ per year. Options #3.a. and #3.b have the lowest GHG net impacts at an estimated 15 $MTCO_{2e}$ per year. Option #4 has the next lowest net impact at 33 $MTCO_{2e}$ per year. The additional impacts of Option #4 are due in part to the need to retransfer all mixed MSW back to HERC after sorting out the *Blue Bags*^{TM} of SSO. This is a preliminary analysis to compare environmental impacts of each SSO collection option using the incremental increases in fuel use and emissions compared to the benefits of composting.

7 External Legal and Policy Considerations

7.1 State Law – Source-Separated Compostable Materials

Minnesota State statutes were amended in 2010 to define "source-separated compostable materials" (SSCM). These SSCM are now third in the legislated hierarchy in order of preference just after waste reduction / reuse and recycling, but before resource recovery through mixed MSW composting or incineration and, finally, land disposal. See Appendix I for excerpts from the Minnesota Statutes (M.S. 115A.02).

Other relevant provisions of Minnesota Statutes pertaining to SSCM are also excerpted in Appendix I. SSCM are considered as a recyclable materials spelled out in statute (M.S. 115A.03, Subds. 25a. and 32a). Finally, SSCM are exempt from mixed MSW taxes and county environmental charges if an exemption is granted by the State if certain composting facility specifications are met (M.S. 297H.06, Subd. 7).

7.2 MPCA's New SSO Composting Rule

MPCA has been in the process of developing an amendment to its solid waste facility permitting rules to clarify regulatory requirements appropriate to source-separated organic material (SSOM). Current rules specify MPCA regulations for yard waste and mixed MSW composting facilities, but not SSOM facilities. MPCA's intent is to provide regulatory relief without jeopardizing environmental protection. Under the proposed new rules, SSOM facility owners that meet the proposed new definitions and facility requirements would not be required to obtain full MSW composting facility permits.

The proposed new SSOM composting rule:

- Defines acceptable source-separated organic materials;
- Establishes siting requirements;
- Specifies composting pad design and construction requirements;
- Specifies storm water controls;
- Establishes operating and training requirements; and
- Defines compost end use classifications and distribution requirements.

Appendix J provides a few of the relevant excerpts from MPCA's draft composting rule. Some of the highlights of the new rule include:

- SSOM must be separated at the generator, not picked from mixed MSW.
- All weather work surface required.
- Operation requirements to mitigate nuisance odors.
- Training requirements for larger facilities.

The draft rule specifies that materials accepted at a SSOM facility should **not** include: fish and animal wastes, diapers, sanitary products, and industrial wastes that do not meet established rule criteria.

7.3 State and County Organics Goals and Policies

Table 7-1 helps summarize State and County planning goals and recovery rate targets for organics recovery. The Minnesota Pollution Control Agency (MPCA) and Hennepin County's Solid Waste Management Master Plan (April 2012) states:

Table 7-1
MPCA and Hennepin County Solid Waste Management Goals

Management Method	2015	2020	2025	2030
Source Reduction and Reuse	1-2%	2-4%	3-5%	4-6%
Recycling	45-48%	47-51%	49-54%	64-60%
Organics Recovery	3-6%	4-8%	6-12%	9-15%
Resource Recovery	32-34%	32-33%	30-31%	24-28%
Maximum Landfill	20%	17%	15%	9%

Source: *Hennepin County Solid Waste Management Master Plan* (April 2012)[42]

Hennepin County adopted the goals established by the MPCA in its Policy Plan with the exception that the county has an organics recovery goal of 6 percent by 2015 and by 2020.

The County *Master Plan* states that "Municipalities are responsible for cooperating with the County in an effort to reach the County's goals for recycling and organics recovery." Also, the County *Master Plan* states that:

> **"3. Support municipalities in developing curbside organics collection programs**
>
> "The County will support municipalities in developing curbside organics collection programs in several ways. Currently, the County offers support to municipalities for developing curbside organics collection programs in the form of grants, technical assistance, and educational and promotional materials. To continue to expand residential organics collection in Hennepin County, new forms of assistance will be offered. First, the County's Residential Recycling Funding Policy is being amended to allow municipalities to use SCORE funding to support residential organics programs.
>
> "Second, the County will collaborate with municipalities to develop a model contract for curbside collection of organics. Recent changes to state law removed the biggest barrier to municipalities contracting for city-wide curbside organics collection by including source-separated compostable materials in the definition of recyclable materials, which are exempt from many of the organized collection statutes. Combined with these changes to state law, a model contract could help accelerate implementation of curbside programs for municipalities that seek to make such programs work in their communities.

"Third, various collection options will be evaluated to determine cost and diversion effectiveness, including co-collection with MSW, co-collection with recyclables, commingled collection with yard waste and every-other-week (EOW) garbage collection. Development of additional curbside collection programs is needed in order to meet organics diversion goals, but the programs need to be implemented in a cost effective manner."

"Implementation – A model contract will be developed with input from the municipalities in the second half of 2012. The model contract will be distributed in 2013. Before the end of 2012, the County will determine what collection methods will be studied. Evaluation will begin in early 2013 and additional methods will be selected for evaluation thereafter. The result will be a written analysis. Recommendations will be brought forward and implementation will begin after strategies are adopted. Performance measures will be developed to track the success of the strategies.

"4. Evaluate and support development of adequate processing capacity

"Additional capacity is needed to receive and transfer organics in close proximity to high density routes. Additional capacity is also needed for processing organics within a reasonable distance from key areas of generation in the County. In order to keep pace with the continued increase in organics diversion, the County will evaluate available short-term and long-term processing options. The County will also consider various ways to best support development of adequate processing capacity, including private sector development, public-private partnerships, partnerships with other public entities and the County serving as a lead developer.

"In the short-term, additional composting capacity will be needed to handle the increased quantities being diverted. Recent local composting efforts that relied on static pile composting experienced serious odor problems. County efforts to grow local composting capacity should focus on aerated methods, including aerated static piles, in-vessel composting and indoor systems."

"Simultaneous with efforts to develop additional composting capacity, the County will continue research into additional processing methods capable of managing large quantities of source-separated organics and create renewable, bio-based energy as a byproduct. Examples of these technologies include anaerobic and aerobic digestion, thermal gasification, and various technologies to produce biodiesel and green chemicals. For any of these technologies, research should include the feasibility of implementing these technologies at smaller, community-level scale, as well as large-scale. Research will also investigate the feasibility of using these processing technologies as the center – and source of energy – of a larger development that provides additional community benefits

"**Implementation** – The evaluation of the feasibility of new technologies will be ongoing. Research results will be documented. The County will develop a plan for developing processing capacity during the second half of 2012. Implementation will begin after the plan is approved. Performance measures will be developed to track the success of the developing capacity.

7.4 Minnesota Department of Agriculture (MDA) Emerald Ash Borer (EAB) Quarantine

The emerald ash borer (EAB) is an insect that attacks and kills ash trees. The adults are small, iridescent green beetles that live outside of trees during the summer months. The larvae are grub or worm-like and live underneath the bark of ash trees. Trees are killed by the tunneling of the larvae under the tree's bark. Millions of ash trees have already been killed in infested areas. Minnesota has the highest volume of ash trees in the U.S. with almost a billion forestland and urban wood ash trees.[43] To help slow the spread of EAB to other areas, a quarantine has been imposed by the MDA on the movement of wood waste from Ramsey, Hennepin, Houston, and Winona Counties (latest quarantine notice effective as of February 22, 2012).[44]

In the Minneapolis yard waste collection program, residents can set out brush along with leaves and grass. The City's residential yard waste program collects the brush commingled with the leaves and grass. Even though the leaves/grass are now required to be contained in a compostable bag or reusable container, it is nearly impossible to separate brush from leaves/grass given current program operations. Also, it is nearly impossible (and therefore not a permitted EAB management alternative allowed by MDA) to separate ash brush from non-ash brush. Therefore, the MDA quarantine controls handling of all yard wastes collected by the City of Minneapolis during the "EAB flight season" as determined by MDA.

Currently, the EAB flight season is defined by MDA as May 2 through September 30 each year. The formal EAB quarantine requires processing of regulated materials during this EAB flight season, including yard wastes from the City. The movement of regulated materials (e.g., unprocessed wood waste) from any quarantined area to any non-quarantined area is prohibited during this flight season. The MDA's quarantine currently in effect includes all of Hennepin and Ramsey Counties such that the yard waste must first be ground up before being trucked out of these two counties during the EAB flight season. The transit of such ash wood material is not regulated during the non-flight season of October 1 through May 1 of each year.[45] Approximately 50 percent of the City's yard waste is regulated by MDA during the EAB flight season (May through September) and therefore must be ground before leaving the quarantined zone. The other 50 percent of the City's yard waste is not regulated by MDA during the non-flight season during the months of April, October and November.

Yard waste from the City during the flight season are ground to chips 1 inch or less in two dimensions (two of three measurements – length, width, and thickness – shall be 1" or smaller). This grinding currently occurs at one of two contracted, yard waste processing / transfer facilities: SKB – Malcolm operated by SET; and OTI's north Minneapolis yard waste processing / transfer site. These contractors have formal compliance agreements with the MDA to assure proper management of the yard waste (including brush material) pursuant to the quarantine regulations.

The MDA's quarantine regulations and conditions may change in the future. However, this study assumes that any future City yard waste transfer, processing and composting operations must remain in compliance with MDA current requirements for management of the regulated wood waste materials. Additional counties could theoretically be included in the quarantine in the future, thereby potentially increasing the counties where yard wastes could be delivered prior to processing. But this speculative theory was not assumed in this study's cost analysis.

7.5 SMSC as a Sovereign Nation

Tribal sovereignty in the United States refers to the inherent authority of indigenous tribes to govern themselves within the borders of the United States of America. The federal government recognizes tribal nations as "domestic dependent nations" and has established a number of laws attempting to clarify the relationship between the federal, state, and tribal governments.[46]

SMSC voluntarily submitted a "Yard Waste Annual Report" on February 27, 2013 to the MPCA.[47]

> *"The ORF is located on land held in Trust for the SMSC by the U.S. Government, and therefore, is not subject to Minnesota regulation. We intend to continue to operate this facility in a transparent manner that is consistent with MPCA regulations and MPCA staff is welcome to visit the facility and review our operation at any time. I believe our facility meets Minnesota solid waste facility design standards. I plan to review those standards and use this fact as a basis for a Memorandum of Agreement between the MNPCA, USEPA, and SMSC in 2013."*

The letter report form, signed by Michael Whitt, Natural Resources Manager, also discussed the odor complaints, the SMSC nuisance ordinance, ORF odor monitoring and complaint response programs. The report further provides details of the total amount of waste received (28,142 tons) and processed (18,636 tons) in 2012. SSO represented 4,087 tons of waste received/processed in 2012. The vast majority of waste received and processed is yard waste and brush/wood waste.

8 Policy Considerations

A variety of pending policy questions are put on the table with this analysis. These policy questions are both internal to the City of Minneapolis (e.g., program funding, how to incentivize subscribers) and external in the hands of other levels of government (e.g., Hennepin County, State of Minnesota) or private interests.

As a technical study, the scope did not include recommending which funding or financing policies are "best" for the City because this is a larger political discussion that may be best led by the elected officials. However, this section outlines key policy questions for this larger political discussion.

8.1 Internal Policy Questions for City Consideration

The City of Minneapolis residential solid waste & recycling program services are paid for through the City's monthly utility billing as charged to residents served (via the bill payer if it is rental property). These fees become part of the City's solid waste & recycling enterprise fund. Section 2.7 identifies the various solid waste & recycling (SW&R) services and 2013 budget allocations from this fund (as adopted by City Council on December 12, 2012)

The City's pilot SSO operations have historically been, and continue to be, based on an "opt-in" policy. This approach has saved the City considerable capital expenditures as opposed to an "opt-out" program, since carts were not purchased and delivered to all residents, including citizens that are not interested in participating in the program. Also, carts did not have to be removed from non-participatory residents.

The added costs of the SSO pilot operations have been paid from the City's solid waste & recycling enterprise fund. Subscribing residents are not charged an additional fee to participate in the SSO program. Subscribers receive the SSO cart and additional weekly collection service without having an additional charge. The costs of the pilot program are spread throughout the entire City customer base. This policy of spreading the costs of the SSO service among all households serviced in the City is similar to the approach for other SW&R services such as: one-sort recycling; yard waste collection; large item collection; vouchers; and other programs.

The current 2013 City budget allocation for the SSO program ($464,134) is divided among all City dwelling units serviced (105,500), or a cost of about $4.39 per year ($0.37 per month) per total DU serviced city-wide. This cost is currently just over 1 percent of the total SW&R services. The total SW&R budget for 2013 ($32 million) equals about $303 per total DU serviced city-wide.

Table 4-3 displays the estimated, added incremental costs of the four SSO collection options on both a total cost per year and a dollar per total DU serviced city-wide basis. The bottom line on this Table 4-3 states the following estimated, added incremental costs for each option as summarized in Table 8-1.

Table 8-1
Summary of SSO Collection Options Cost
per Total Dwelling Unit (DU)*

$ per Total DU Serviced City-Wide Per Month
(* Including households that do not subscribe to the SSO service or set-out SSO)

SSO Collection Option	$ per DU per month city-wide
SSO Alone - with continued County tip fee subsidy (Option #2.a)	$2.23
SSO Alone - without any County tip fee subsidy (Option #2.b)	$2.54
SSO +Yard Waste - no *Blue Bag* (Option #3.a)	$2.52
SSO +Yard Waste - with *Blue Bag* (Option #3.b)	$5.12
SSO +mixed MSW – with *Blue Bag* (Option #4)	$7.76

Source: Table 4-3

Some persons have found that participation in the SSO pilot program allows them to decrease the number or size of "regular" garbage carts; these people do see at least a $3.00 per month cost savings ($24 per year). Other studies have also indicated that participation in SSO programs also helps increase rates of traditional recycling. The additional promotions and contact related to a new SSO initiative will help improve traditional recycling. By the end of 2012, 12 percent of SSO subscribers had switched to small garbage carts. This compares to all other households in the City outside of the SSO pilot neighborhood which had a 7 percent switch rate.

The SSO initiative also allows the City to discuss the longer-range option of every-other-week (EOW) garbage collection. EOW garbage service may not be as practical within a "voluntary" ("opt-in") operations system compared to a more uniform, standard collection schedule that all households would be under. It would be more difficult to collect on the same route some households with every week garbage service along with other "opt-in" EOW households. To obtain the optimum cost savings and other benefits to residents, the SSO collection system and EOW garbage collection element should both be "mandatory" ("opt-out"). But "mandatory" SSO collection may not result in the same high quality SSO material as is collected currently in the "voluntary" SSO pilot program. The current differential between the City's "large cart" disposal fee and the "small cart" disposal fee is $3.00 per month ($36 per year).

8.2 External Policy Questions for City Consideration

Hennepin County is currently subsidizing the SSO tipping fee at the BPTS down to $15 per ton as discussed and analyzed in Section 4.2.1 above (assumption used for Option #2.a). The City could engage in discussions with the County about if this same level of subsidy could be applied to the City's SSO tipping fees regardless if the City delivers the material to the BPTS or not.

8.3 Alternative to Promote Back Yard Composting and Other Food Waste Reduction

As an alternative to continuing or expanding curbside collection of SSO, the City could expand its public education efforts to promote backyard composting of most organic materials. Also the City could promote food waste reduction strategies that residents can employ to reduce the amount of organic waste they generate in the first place. Such alternative public education efforts are not mutually exclusive of curbside SSO collection.

9 Observations and Conclusions

The City has been operating a SSO pilot collection program in parts of south Minneapolis for over four years. In November 2012, the City Council authorized this study of the pilot program to independently evaluate the costs of current operations and analyze the comparative costs of alternative collection designs.

Over the past few years, there have been several innovations and plans in the private marketplace for SSO collection, processing and composting facilities. Also, government regulations are changing that will affect the City's future SSO operations both directly (e.g., the proposed MPCA composting rule) and indirectly (e.g., the MDA EAB quarantine).

This section itemizes major observations that are findings and conclusions from this study. An abridged form of these conclusions comprise the Executive Summary.

1. The City is currently operating a SSO pilot program in five collection "routes" within parts of eight neighborhoods in south Minneapolis. The first pilot program was started in 2008. There is a rich history of experience and performance data. The pilots have been very successful in demonstrating the feasibility of SSO collections using one form of collection: separate SSO alone (without any other waste stream).
2. The original pilot SSO collection operations were expanded in 2010 to collect from parts of eight neighborhoods. Today the routes include the entire Linden Hills neighborhood (the original pilot route), the entire East Calhoun (ECCO) neighborhood (the second pilot route started in 2009) and parts of other neighborhoods (Cooper, Hiawatha, Howe, Longfellow, Phillips, and Seward) started in 2010 where the routes follow existing garbage collection route boundaries.
3. The City's SSO service includes weekly, separate collection of the designated SSO materials. (See Table 2-1 for a list of acceptable and unacceptable materials.) The City provides a separate green SSO cart to subscribing households. The City has dedicated a two-person crew operating a standard, rear-load packer truck equipped with a cart flipper to collect the SSO. One SSO route is collected per day and the SSO crew collects five days per week. The material is delivered to the Hennepin County BPTS and the City pays the County $15 per ton for transfer and composting costs.
4. There are several statistics that help quantify the performance of the City's SSO pilot programs:

    - **The total number of households served in the pilots today =** 5,370 households (all dwelling units within the designated pilot routes, including those that have not elected to subscribe to the SSO service). This is about 5 percent of the total dwelling units (DUs) in the City (105,500) that are eligible for the City-managed garbage and recycling services.
    - **The total SSO tons collected in 2012 =** 476 tons for the year

- **The Number of subscribers =** 2,453 (a weighted average of about 46 percent of total DUs served) of the pilot route households have signed up and have received the City's green SSO cart.
- **Recovery rates:**
  - 147 pounds of SSO per DU served per year
    (SSO rate for all households on the route, including residents that do not subscribe and do not set out green SSO carts)
  - 388 pounds per year per SSO subscribing household
    (SSO rate per households that sign-up and receive a green SSO cart)

5. This study indicates that the pilot programs have been very successful. However, there are ample opportunities for improvements in subscription rates, recovery rates and collection efficiencies.
6. Several neighborhood and citizen organizations have helped plan, implement and promote the program. Hennepin County provided a grant to help with some of the initial capital costs of the pilots and continues to advocate for SSO service expansion in the City.
7. The pilot routes reflect a diversity of neighborhoods, resident demographics and program promotions. The level of effort to educate pilot route residents and encourage SSO subscriptions varies between neighborhoods. The first two neighborhoods (Linden Hills and ECCO) have had a significant presence of volunteers and neighborhood organizations helping to encourage voluntary sign-ups and participation. For example, Linden Hill Power & Light has been a significant leader and advocate for the SSO program from the beginning. Table 2-2 displays the range of subscription rates from a low of about 30 percent in the "Thursday" route compared to a high of about 52 percent in Linden Hills / ECCO ("Monday/Tuesday" routes). Additional promotions and incentives could be considered to help increase subscriptions and participation in the SSO program. Analysis of potential improvements in promotions, public education and other incentives was not the primary focus of this study.
8. The City may need to conduct an updated opinion survey to inquire further about stated willingness to participate in and/or pay more for SSO collection service.
9. This study looked at similar SSO programs in Hennepin County as well as other large, northern climate cities in North America (e.g., Madison, WI; and municipalities throughout the Greater Toronto Area). When comparing SSO program performance, it is critical to understand the context of the overall solid waste and recycling collection systems, as well as the details of SSO collection operations and background demographics. It is often difficult to directly compare recovery and participation rates unless all terms are clearly defined and units of measurement are specified. While a number of other cities have longer histories and higher recovery rates, Minneapolis has some of the best data because of daily SSO and mixed MSW weights by route and accurate subscription information. The Minneapolis pilot program recovery rate of 177[48] pounds per total household serviced per year is on the low end of the range. Other cities

have achieved in the range of 300 to 700 pounds per total household serviced per year. (See Appendices C through G for anecdotal case study details of other SSO programs.)

10. All Minneapolis pilot routes continue to use the same collection system operational design (e.g., separate weekly collection in green SSO carts without co-collection or commingling with other waste streams, direct delivery to Hennepin County's BPTS).

11. Four collections options were analyzed for this study:

    - No SSO sorting or separate collections such that the organics would be disposed within mixed MSW (option #1).
    - Separate collection of SSO alone similar to the current pilot operations (option #2).
    - Collection of SSO with yard waste (option #3.a - commingled with yard waste and option #3.b – co-collected with yard waste with SSO contained within *Blue Bags*™).
    - Co-collection of SSO within the mixed MSW, but the SSO is contained within *Blue Bags*™ (option #4).

    The assumed performance of each collection option (e.g., participation and recovery rates) was held constant so as to focus on cost differences due to collection operations. Each option has its own set of advantages and disadvantages but the relative convenience and ease of each option to the residents to participate is approximately the same. All options assumed a "voluntary" (i.e., "opt in") incentive structure (e.g., only residents that sign up get a green SSO cart).

12. The calculated total amount of SSO per year is calculated at 7,913 tons per year city-wide based directly on pilot performance data and a projected recovery rate of 150[49] pounds of SSO per household per year. This recovery rate is for all dwelling units serviced, including households that do not subscribe or participate.

13. The City's North Transfer Station is currently not actively receiving and transferring yard waste or MSW. With minor modifications, the North Transfer Station could handle bulk transfer of SSO under any of the collection options identified in this study. But the North Transfer Station does not have the space as currently configured to grind, sort or otherwise process yard waste on-site for purposes of compliances with MDA's EAB quarantine regulations (e.g., as would be required under collection Option #3.a). Nor does the North Transfer Station have floor space to sort the entire city-wide volumes of mixed MSW for SSO contained in *Blue Bags*™ (e.g., as would be required under collection option #4).

14. One private transfer station (SKB) owner/operator and their yard waste operating partner (SET) were interviewed for this study. SET and SKB representatives indicated that they could handle any form of the SSO that Minneapolis collects at their SKB – Malcolm transfer station, even on a city-wide basis. Modifications to the current facility layout and operations would be required to handle volumes projected that might be collected on a city-wide basis. SET provided very preliminary, approximate estimates on the costs of receiving, transferring and composting the SSO ranging from $60 to $75 per ton or more

depending on the type of collection operation, quality of material and total tonnages received.

15. The SKB – Malcolm facility is already handling limited SSO from other cities and is expected to increase its SSO receiving / transfer operations (regardless of the City of Minneapolis decisions about this program). All SSO and yard waste received is processed and/or directly transferred to SET's composting facility in Empire Township (near Rosemount). The SKB – Malcolm facility has the capacity to handle projected Minneapolis city-wide volumes of SSO alone (option #2). Expansion into new buildings would be required if the City moves to commingled or co-collection with yard waste (options #3.a or #3.b) or mixed MSW (option #4).

16. This study indicates that the SSO alone, collection option (#2.a), may be the least costly SSO collection option at $2.23 per DU per month city-wide (all households, including those that do not subscribe). (See Table 8-1 for the cost comparison of the five options on a basis of $ per DU per month.) This is the same collection method and costs estimates as currently used in the City's SSO pilot program. This rank for option #2.a as the least cost option is due in large part to the ongoing Hennepin County SSO tipping fee subsidy at the BPTS.

17. Table 8-1 shows the estimated cost change for collection option #2.b increases to $2.52 per DU per month city-wide if the Hennepin County SSO tipping fee subsidy were removed by a change in County policy. This estimated cost for option #2.b is based on the assumption of the full cost of transfer and composting being charged by the County at the BPTS.

18. Table 8-1 shows that SSO commingled with yard waste option without *Blue Bag*™ (option #3.a) is estimated to provide the second least cost alternative. This collection system and the related alternative of co-collecting SSO in a *Blue Bag*™ with yard waste (option #3.b) have not yet been fully tested by a public agency in Minnesota. Private haulers have experimented with these options as a means to avoid the added costs of separate SSO collection alone.

19. Every other week (EOW) trash collection was not included in this analysis. EOW is too complicated for this stage of development of SSO collection. For example, EOW trash service on a voluntary, "opt-in" subscription basis would make route scheduling much more difficult..

20. There is adequate SSO processing (i.e., composting facility) capacity that currently exists within the Twin Cities metro area. Additional composting facility capacity exists immediately outside of the Twin Cities metro area.

21. Each collection option has different environmental impacts. Below is the comparative list of options in terms of truck emissions (in order of least impact to the greatest impact).

Least GHG impact from trucks:	Option #1: No SSO sorting or separate collections

Second lowest GHG truck impacts:	Option #3.a or #3.b: SSO commingled or co-collected with yard waste (with or without *Blue Bags™)*
Third lowest GHG truck impacts:	Option #4: SSO co-collected with mixed MSW in *Blue Bags™*
Highest GHG impact from trucks:	Option #2: Collect SSO alone (as per current pilot operations)

22. The proposed, new MPCA composting rules governing SSO facilities will help provide more stability to SSO facility regulations and operations. Once these rules are adopted, it is anticipated that they may help encourage additional capital investments by private composting companies that should lead to additional competition for SSO and yard waste feedstock.
23. If SMSC executes a letter of agreement with MPCA pertaining to its composting facility, this will improve the feasibility of suppliers using this compost site. The SMSC is presently regarded by some local governments as a totally sovereign nation and not regulated to the same degree as a MPCA – permitted facility.
24. Other composting and anaerobic digestion (AD) options are being planned and developed. These additional facilities will help with the composting capacity and may help promote competition for supply.
25. The EAB rules are currently a significant impediment to more efficient processing and handling of SSO if commingled with yard waste. The commingled SSO + yard waste option (#3.a) requires pre-grinding in Hennepin or Ramsey Counties before the material can be transferred to SET – Empire (Dakota County) or SMSC – Shakopee (Scott County) outside of the current quarantine zone. This impediment may go away if EAB is discovered in either of these two Counties and if the MDA designates such county to be included in the quarantine zone.

10 Recommendations

1. The City of Minneapolis should continue to engage Hennepin County in the policy discussions about the future of SSO programs in the County.

2. The City may wish to ask the County if the County's SSO tipping fee subsidy could be applied to the City's SSO if delivered to a different transfer / processing station and if delivered in alternative form (e.g., commingled with yard waste; co-collected with yard waste in *Blue Bags*™ or co-collected with mixed MSW in *Blue Bags*™).

3. The City may wish to consider using its North Side Transfer station for bulk transfer of SSO. The feasibility of using this facility will depend on the outcome of discussions with Hennepin County and the design of the SSO collection system (i.e., whether or not SSO is commingled or co-collected with yard waste).

4. The City should consider conducting an opinion survey to inquire further about residents stated willingness to participate in and/or pay more for SSO collection service.

Appendices

(Contained in a Separate Document)

Report End Notes

[1] City of Minneapolis and Hennepin County Residential Recycling Recovery Rate Study, Final Report (August 14, 2007).

[2] City of Minneapolis *Interim SSO Report: Source Separated Organics Collection Pilot Programs* (November 2009) http://www.ci.minneapolis.mn.us/www/groups/public/@council/documents/webcontent/convert_282314.pdf

[3] "Linden Hills Power & Light: Anaerobic Digester Feasibility Study." (June 2008). John Christopher Madole Associates, Inc. St. Paul, MN.

[4] "2009 Linden Hills Composting Participant Survey Report (February 11, 2010) by Karen Ba, StrataVerve, Inc. (Power Point presentation as provided by Hennepin County staff.)

[5] Hennepin County staff, personal communication via meeting with City staff on February 19, 2013.

[6] City of Minneapolis Solid Waste & Recycling: "About Us: Statistics" web page (as downloaded in March 2013): http://www.minneapolismn.gov/solid-waste/about/stats/index.htm

[7] City of Minneapolis Sustainability Report (as downloaded in March 2013): http://www.ci.minneapolis.mn.us/www/groups/public/@citycoordinator/documents/webcontent/wcms1p-100400.pdf and online version: http://www.ci.minneapolis.mn.us/sustainability/index.htm

[8] City of Minneapolis Sustainability Indicators: Source Separated Organics page (as downloaded in March 2013): http://www.ci.minneapolis.mn.us/sustainability/indicators/WCMS1P-082096

[9] City of Minneapolis, *Request for Proposals for Yard Waste Processing and Disposal Services* …. (January 2012).

[10] City of Minneapolis *2013 Council Adopted Budget* as adopted on December 12, 2012 (downloaded on May 19, 2013): http://www.minneapolismn.gov/finance/budget/WCMS1P-103488#section8

[11] City of Minneapolis, Department of Public Works 2012 budget statement (as downloaded on May 19, 2013): http://www.minneapolismn.gov/www/groups/public/@finance/documents/webcontent/wcms1p-084870.pdf

[12] City of Minneapolis, Department of Public Works 2013 budget statement (as downloaded on May 19, 2013): http://www.minneapolismn.gov/www/groups/public/@finance/documents/webcontent/wcms1p-103528.pdf

[13] Hennepin County Solid Waste Management Master Plan (April 10, 2012). By Hennepin County Environmental Services. http://www.hennepin.us/files/HennepinUS/Environmental percent20Services/Solid percent20waste percent20planning percent20and percent20reports/Solid_Waste_version9.pdf

[14] Hennepin County Solid Waste Management Master Plan. Op. cit.

[15] Hennepin County Solid Waste Management Master Plan. Op. cit. Including the report letter by SAIC as Appendix C of the County Solid Waste Management Plan: *Waste Composition: Hennepin County and Rational Energies Study* (November 30, 2011)

[16] Hennepin County / Rational Energies, *Waste Composition Study* (November 30, 2011). Ibid, as per endnote above

[17] Hennepin County Solid Waste Management Master Plan. Op. cit.

[18] Hennepin County staff memo (May 14, 2011) "Organics in Orono… and Shorewood Going Forward"

[19] Hennepin County web page "Organics Recycling for Residents" (as downloaded in March 2013): http://hennepin.us/portal/site/HennepinUS/menuitem.b1ab75471750e40fa01dfb47ccf06498/?vgnextoid=80105b40aabb4210VgnVCM10000049114689RCRD

[20] Solid Waste Management Coordinating Board (SWMCB), *Source Separated Food Waste and Organic Materials Management Report,* (October 2007).

[21] SWANA Curbside Collection of Residential Food Waste. (December 2008). A Research memorandum prepared for the SWANA Applied Research Foundation.

[22] Renee Dello, Toronto's Senior Analyst for Waste Diversion Planning (personal communication via email responses as of May 17, 2013).

[23] City of Toronto's *Green Bin* web page: http://www.toronto.ca/greenbin/

[24] *BioCycle* article, *Greater Toronto At Full Steam With Residential Organics Programs, August 2010, Vol. 51, No. 8, p. 36*): http://www.biocycle.net/2010/08/greater-toronto-at-full-steam-with-residential-organics-programs/

[25] Halton Region, Ontario website (http://www.halton.ca/living_in_halton/recycling_waste/) (as downloaded in May 2013).

[26] Halton Region, *Put Waste In Its Place* web page (as downloaded on May 18, 2013): http://www.halton.ca/common/pages/UserFile.aspx?fileId=15644

[27] Personal communications via phone interview and emails with Trevor Barton, Peel's Supervisor of Waste Planning on May 15, 2013.

[28] Op. cit. *BioCycle* article, *Greater Toronto At Full Steam With Residential Organics Programs, August 2010, Vol. 51, No. 8, p. 36*): http://www.biocycle.net/2010/08/greater-toronto-at-full-steam-with-residential-organics-programs/

[29] Peel Region's organics web page (downloaded as of May 17, 2013): http://www.peelregion.ca/pw/waste/organics1/.

[30] Durham Region *Green Bin* web page (downloaded as of May 18, 2013): http://www.durham.ca/works.asp?nr=/departments/works/waste/foodwaste.htm&setFooter=/includes/wasteFooter.inc

[31] Durham Region *Green Bin* education flyer (downloaded May 18, 2013): http://www.durham.ca/departments/works/waste/GreenBinFlyer.pdf

[32] *Region of Durham Large Blue Box Container Study: Waste Audit and Trend Analysis Report* (December 2011). By AET.

[33] The City recently began implementing its new single-stream recycling program. The phased roll-out of the program is currently underway. There is an expected increase in tons of recyclables. Also mixed MSW generation is expected to continue to decrease. Therefore, the projected amount of mixed MSW in 2014 is 86,000 tons or 8,000 tons less than recorded for 2012.

[34] Estimate of 12 collection crews was calculated as follows:

- 105,500 total dwelling units city-wide, divided by 5 days per week = 21,100 total dwelling units per day
- 40 percent subscription rate = 8,440 subscribers per day
- 8,440 subscribers divided by 735 DUs per day per crew = 11.5 crews per day, or, rounding up = 12 crews and new trucks.

[35] Personal communications with City of Minneapolis SW&R Division staff.

[36] Personal communications with Jim Wollschlager, Randy's Environmental Services (April 24, April 25, and June 6, 2013), including email from Deb Gatz (June 6, 2013)

[37] J.L. Taitt's report to the Ramsey/Washington County Resource Recovery Project Board, *An Integrated Organic Waste Management System: From the Perspective of the Commercial Waste Generator* (May 10, 2010):

[38] Shakopee Mdewakanton Sioux Community (SMSC) – Organics Recycling Facility (ORF), "*Quality Standards*" web page: http://www.smscorf.com/standards (as downloaded on April 25, 2013).

[39] Shakopee Mdewakanton Sioux Community (SMSC) – Organics Recycling Facility (ORF), "*Process*" web page: http://www.smscorf.com/process (as downloaded on April 25, 2013).

[40] MPCA staff personal communications.

[41] MPCA report, *Analysis of Waste Collection Service Arrangements* prepared by Foth Infrastructure & Environment, LLC (June 2009): http://www.pca.state.mn.us/index.php/view-document.html?gid=4514

[41] Climate Leaders Greenhouse Gas Inventory Protocol Care Module Guidance, Direct Emissions from Mobile Sources, EPA 430-K-08-004, (May 2008)

[42] Hennepin County / Rational Energies 2011 Waste Composition Study. Op. cit.

[43] Minnesota Department of Agriculture (MDA) web page, *Emerald Ash Borer Prevention, Early Detection & Rapid Response* (as downloaded on March 2013): http://www.mda.state.mn.us/plants/pestmanagement/eab.aspx)

[44] MDA web page *Emerald Ash Borer – Minnesota Quarantine*, (as downloaded on March 2013): http://www.mda.state.mn.us/plants/pestmanagement/eab/eabquarantine.aspx

[45] MDA ibid.

[46] *Tribal sovereignty in the United States*, http://en.wikipedia.org/wiki/Tribal_sovereignty_in_the_United_States (as downloaded on March 2013).

[47] SMSC voluntary 2012 Yard Waste Annual Report for the Organics Recycling Facility submitted by Michael Whitt, Natural Resources Manager, SMSC to Ms. Lisa Mojsiej, MPCA (dated February 27, 2013).

[48] 177 pounds per household per year is the weighted average: all tons (476 tons in 2012) divided by all households served (105,500 DUs).

[49] 147 pounds per household per year is an average of the individual routes recovery rates. See Table 2-2 for the individual recovery rates of by route ((217 + 136 + 77 + 158) divided by 4). The assumed recovery rate for a city-wide program is slightly rounded up to 150 pounds per household per year.

Appendices

Assessment of Residential Source Separated Organics Collection Options

A Study for the City of Minneapolis

Project I.D.: 13M030

Minneapolis, Minnesota

October 2013

Assessment of Residential Source Separated Organics Collection Options

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Appendix A
Public Education Tools from the City of Minneapolis SSO Pilot Program

Table A-1
Index of Examples of City Public Education Tools

Appendix Number	Document Name	Neighborhood	Date of Use	Method of Distribution
A.1	ECCO Introduction Letter	ECCO	2009	Direct Mailing?
A.2	Linden Hills Intro Letter	Linden Hills	July 2008	Direct Mailing
A.3	Linden Hills Reply Card	Linden Hills	July 2008	Direct Mailing
A.4	Organics - Cart Brochure	Both	Unknown	Unknown
A.5	Organics Brochure	Both	July 2008 – Current	Cart Hanger @ Delivery of Cart and in Direct Mailing
A.6	Linden Hills Cart Hanger 1	Linden Hills and/or ECCO	Unknown	Cart Hanger @ Delivery of Cart
A.7	Linden Hills Cart Hanger 2	Linden Hills and/or ECCO	Unknown	Cart Hanger @ Delivery of Cart
A.8	Linden Hills Cart Hanger Letter 1	Linden Hills	September 2008	Cart Hanger @ Delivery of Cart
A.9	Generic Neighborhood Cart Hanger Letter 1	Both	Through July 2010	Cart Hanger @ Delivery of Cart
A.10	Generic Neighborhood Cart Hanger Letter 2	Both	August 2010 – February 2012	Cart Hanger @ Delivery of Cart
A.11	Generic Neighborhood Cart Hanger Letter 3	Both	February 2012 – Current	Cart Hanger @ Delivery of Cart

Source: City of Minneapolis, Solid Waste and Recycling Program[1]

SSO Pilot Literature as sent by email from Jeff Jenks, City staff SW&R Program, on 2-11-13.

Appendix A.1
ECCO Introduction Letter

Department of Public Works
Division of Solid Waste & Recycling
309 Second Avenue South - Room 210
Minneapolis MN 55401-2281

Office (612) 673-2917
Fax 673-2250
TTY 673-2157

City of Minneapolis

Greetings:

The City of Minneapolis is expanding a pilot program to evaluate the separate collection of organic materials, such as food wastes and non-recyclable paper products, from residential customers. I am writing today to invite you to participate in this innovative, voluntary program.

You have a real opportunity to make a reduction in your environmental impact and it's as easy as taking out the trash! The pilot project has been popular in its first Minneapolis neighborhood, and the City is now offering organics collection to your trash collection route. I offer to you my personal invitation to join your neighbors in reducing the amount of trash that goes to the incinerator, reducing the environmental footprint of our city and making a usable compost product. Simply sign up for a green organics cart AT NO ADDITIONAL CHARGE, and we'll deliver it to your door.

This is an easy way to make a real difference. Many participants in the initial pilot program have been absolutely surprised at how easy it is to collect "organics" using the City service.

- Weekly pickup: The City picks up your green organics cart weekly on trash day, along with your regular black trash cart! The City will take it, whether you have a little or a lot of organics waste. (Just order a green organics cart from the City, at no additional charge, to get started.)
- Kitchen system: Participants say... simply put a second trash bin or compost pail in your kitchen and get started. Sort it while you throw it. Household cooperation works.
- Better than backyard composting: No piles to manage and turn, less space needed, and the City accepts more food/meat and non-food items than you can compost in your backyard bin.
- Not just food but the paper it comes in: Even if you live alone, you will be surprised at how much compostable waste you generate (just think about all that non-recyclable paper you throw away). Current participants have been very impressed, reporting that their big trash carts now get only 30-50% full most weeks. (Order a smaller black cart to realize a $2.00 per month savings on your City utility bill.)

The City is still testing organics collection in Minneapolis but we are encouraged so far with the results on: a) resident participation, b) quantity of organic materials collected, and c) collection operations. You can now help us evaluate whether these positive results will hold as we expand the routes offering organics collection into new areas of the city.

We would like your participation in the expanded pilot program. Please send back the attached form to order your FREE green organics cart or email me at susan.young@ci.minneapolis.mn.us. You may also call Solid Waste and Recycling at 612-673-2917 or call 311. I look forward to partnering with you.

Susan Young

www.ci.minneapolis.mn.us
Affirmative Action Employer

How to Compost with the City of Minneapolis. Steps 1, 2, 3...

1. Organics are collected weekly, on your regular trash day!
    - Simply order an "Organics" cart (green color) from the city. There will be NO additional charge for this service! You may place this cart next to your regular black trash cart on your regular garbage collection day.
    - You keep your existing recycling bin and black garbage cart. Many participants find they can opt for a smaller black cart for a $2.00 per month savings on their City Utility bill.

2. Sort only once – when you throw it away! Simply designated a separate compost waste bin, and you're ready to go. Most people use a small trash bin, compost pail or a larger divided trash bin to separate their trash from compost. Hardware stores and websites sell many configurations of under the counter units as well. Many people use paper grocery bags or newspapers as compost liners but specially formulated compostable garbage bags are very convenient and clean to use. Bags must be marked "compostable", not just "biodegradable." (see website www.lhpowerandlight.org for more information and ideas.)

3. Optimize your output! Anything "organic" should not go into your regular trash. Even if you live alone, you will be surprised at how much compost you can generate! See list of eligible items attached.

   "Organics" includes...
    - All food scraps (including meat!),
    - Non-recyclable paper such as pizza boxes, milk/juice cartons, egg cartons, frozen food boxes, ice cream packages, frozen juice tubes (without metal ends or plastic liners), paper takeout food containers, paper soda or coffee cups, giftwrap (without metal foil), tissue paper, packaging paper,
    - Paper scrap such as used paper towels, napkins, tissues (not diapers or hygiene products).
    - Odds & ends - vacuum cleaner bags (with contents), houseplant trimmings. Cotton balls and swabs (if all cotton and no plastic).
    - Not allowed in compost cart - Plastics, glass, metals or pet droppings please! Yard waste is still collected separately at curbside, not in the compost cart. Recyclable paper and cardboard should still be placed in your recycling bin.

Additional Information...

Please read the information below, and consider joining with other citizens of Minneapolis in a service that makes it easy for you to help us reduce waste that needs to be incinerated and reduce the environmental footprint of the City of Minneapolis.

Solid Waste and Recycling Program Highlights:

Minneapolis has long been at the forefront of environmentally protective waste management practices, while focusing on cost efficiency and customer service. Minneapolis is a very clean city for that reason.

- Minneapolis began recycling programs in the mid-80's, yard waste collection in the 80's, and electronics recycling in the 90's – a program that has been praised as a national model and is well valued by electronics businesses and manufacturers for helping them safely comply with electronics recycling mandates.
- Minneapolis Solid Waste and Recycling is an Enterprise Fund, and operates within a budget approved by the Minneapolis City Council. Property tax funds are not used to provide Solid Waste and Recycling services.
- "Organics" collection is the next wave of waste management transformation in Minnesota and across the nation. Minneapolis is again ahead of the curve by evaluating organics collection before most other major cities.
- You may find that participating in the Organic Pilot program will reduce your need for a "large" garbage cart. You can decide to have a smaller cart (22 gallons) that will save you $2.00 per month on your city utility bill. There is no additional cost for switching to the smaller cart, but you will still have to put all garbage in the smaller cart in plastic bags (just like the large cart).

YES!!! I want to be part of the Source Separated Organics Pilot Program!

Name _____

Address _____

Daytime Phone Number _____

Email Address _____

This looks like an interesting program, but I have the following questions:

Please send or fax this completed page to:

Minneapolis Solid Waste & Recycling
309 Second Avenue South, Room 210
Minneapolis. MN 55401-2281

Fax: 612-673-2250

Appendix A.2
Linden Hills Introduction Letter

Department of Public Works
Division of Solid Waste & Recycling
309 Second Avenue South - Room 210
Minneapolis MN 55401-2281

Office (612) 673-2917
Fax 673-2250
TTY 673-2157

City of Minneapolis

Source Separated Organic Materials
Linden Hills Pilot Project
July, 2008

Greetings:

The City of Minneapolis is beginning a pilot program to evaluate the separate collection of organic materials, such as food wastes and non-recyclable paper products, from residential customers. I am writing today to invite you to participate in this innovative, voluntary program.

Residents that choose to participate in this program will be given an "Organics" cart to separate compostable items from their "regular" trash. These organic materials include all food scraps, non-recyclable paper such as pizza boxes, milk and orange juice cartons, egg cartons, frozen food packaging, food papers, tissues, paper towels and napkins, and even vacuum cleaner bags and their contents! No plastics or yard wastes may be put in your Organics Cart. The Organics Cart will be emptied by City crews every week on your garbage day, at your garbage and recycling collection point. **There is no charge to you to participate in this pilot program**. You may keep your existing recycling bin and garbage cart, although you may wish to consider having one of our "small" garbage carts, for a $2.00 per month savings on your City Utility bill.

The pilot program will evaluate: (1) the willingness of residents to separate organic materials from their garbage, (2) the amount of organic materials, recyclables and garbage that can be collected from residential customers, (3) collection operations information such as optimal collection frequency, route size, tonnage, seasonal variations in wastes and efficiency, (4) education methods and materials, (5) other factors that will help me evaluate the potential for city-wide implementation of organics collections.

This pilot program would not be possible without enthusiastic partners. Hennepin County is making a financial contribution for the transfer and tipping costs for organic materials, and contributing program expertise and consultation. The Linden Hills Neighborhood Council and Linden Hills Power and Light have been relentless drivers and cheerleaders, and have recruited many of your neighbors to be Block Captains for this effort. Mayor Rybak and Council Member Hodges have provided enthusiasm and leadership in securing budget support from the City Council.

Minneapolis has long been a leader in environmentally protective waste management practices, that are also cost effective and customer oriented. Long before State law banned electronic items from garbage, Minneapolis customers could put their TVs and computers out for recycling; we continue to be the only city in the United States to provide this service at no additional cost to customers. I believe that organics collections will be the next "big thing" in the garbage industry. The Linden Hills Pilot Program will provide critical information to me to determine the feasibility of a city-wide organic composting program.

If you wish to participate in the program you can send back the form attached to this letter, e-mail me at susan.young@ci.minneapolis.mn.us, call Solid Waste and Recycling at 612-673-2917 or call 311. I look forward to partnering with you to bring this innovative and environmentally progressive service to Minneapolis!

Susan Young, Director
Minneapolis Solid Waste and Recycling Services

www.ci.minneapolis.mn.us
Affirmative Action Employer

Appendix A.3
Linden Hills Reply Card

Department of Public Works
Division of Solid Waste & Recycling
309 Second Avenue South - Room 210
Minneapolis MN 55401-2281

Office (612) 673-2917
Fax 673-2250
TTY 673-2157

City of Minneapolis

YES!!! I want to be part of the Source Separated Organics Pilot Program in Linden Hills Neighborhood.

Name _____

Address _____

_____

Daytime Phone Number _____

Email Address _____

This looks like an interesting program, but I have the following questions:

Please send or fax this completed page to:
Minneapolis Solid Waste & Recycling
309 Second Avenue South, Room 210
Minneapolis. MN 55401-2281

Fax: 612-673-2250

www.ci.minneapolis.mn.us
Affirmative Action Employer

Appendix A.4
Organics – Cart Brochure

Appendix A.5
Organics Brochure

How does Organics Recycling work?

It's as easy as 1, 2, 3

1. Collect your food scraps & food-soiled paper products
2. Empty your food scraps & food-soiled paper products into the organics cart provided by your waste hauler
3. Set out your organics cart on the curb on your trash collection day

What is Accepted?

Food Scraps:
- Fruits & vegetables
- Meat, fish & bones
- Bread, pasta & baked goods
- Egg shells
- Dairy products
- Coffee grounds

Food-soiled paper products:
- Paper towels & napkins
- Paper plates & cups
- Milk & juice cartons
- Pizza boxes
- Egg cartons
- Boxes from frozen & refrigerated foods
- Waxed paper & paper containgrs
- Coffee filters & tea bags

Other compostable items:
- Full vacuum cleaner bags
- Dryer lint
- Tissues & cotton balls
- Floral trimmings & house plants

How to Get Started

You can add organics recycling to your trash collection services at NO additional charge! **Sign up now by calling 673-2917, e-mailing us at Susan.Young@ci.minneapolis.mn.us or sending back the form attached to the enclosed letter.**

For general information on organics recycling, call 673-2917 or visit www.ci.minneapolis.mn.us/solid-waste.

Not Accepted:
- Styrofoam®
- Plastics, glass or metal
- Plastic bags
- Foil-lined containers (juice boxes)
- Diapers & wipes
- Kitty litter & pet droppings
- Grass, leaves & brush

Appendix A.6
Linden Hills Cart Hanger 1

Appendix A.7
Linden Hills Cart Hanger 2

Front of hanger

Back of hanger

Appendix A.8
Linden Hills Cart Hanger Letter 1

Thank You for Your Interest in the Linden Hills Organics Collection Pilot!

Organics Collection is scheduled to Begin the Week of September 15, 2008!

Greetings:

Your Organics Cart has arrived! Source Separated Organics collection is scheduled to begin the week of September 15, 2008. Please place your organics cart at your collection point by 6 a.m. on your regularly scheduled pick up day. All source separated organics must be placed in compostable bags or an alternate, compostable container for collection. Please remember that source separated organics and yard wastes **can not** be combined at this time.

The Division of Solid Waste and Recycling has provided you with a sample compostable bag for your first organics collection along with an organics recycling brochure. Please note that the car litter bag that these are in is not compostable. Additional compostable bags are available for purchase at several retail outlets. All compostable bags approved by the Biodegradable Products Institute (BPI) are acceptable to use with the Minneapolis pilot. Approved products will display the BPI Logo. A list of BPI approved products can be found at www.bpiworld.org or by calling 1-888-BPI-LOGO (274-5646).

Compostable Bag Retail Outlets:

Bayers Do It Best (Linden Hills)
Linden Hills Coop
Lakewinds Coop
Clancy's Meats
Festival Foods
Ace Hardware Stores
Jerry's Foods
Kowalski Markets
Lunds/Byerly's
Menards
Cub Foods

Compostable Containers:

Cardboard Milk Cartons
Boxboard Food Containers
Wrapped in Newspaper

Biodegradable Products Institute Logo:

To protect the health and safety of Solid Waste and Recycling workers all organic recycling material must be securely contained in compostable bags or compostable containers that are tied or closed.

If you have questions about this program, please call 612-673-2917 between 8:00 am and 4:25 pm, or talk with your Block Captain. Block Captains are listed at www.lhpowerandlight.org.

Thank you for your participation in this innovative and environmentally progressive pilot!

Sincerely,

Susan A. Young, Director
Minneapolis Solid Waste and Recycling

Appendix A.9
Generic Neighborhood Cart Hanger Letter 1

Department of Public Works
Division of Solid Waste & Recycling
309 Second Avenue South - Room 210
Minneapolis MN 55401-2281

Office (612) 673-2917
Fax 673-2250
TTY 673-2157

City of Minneapolis

Thank You for Your Interest in your Neighborhood Organics Collection Pilot!

Greetings:

Your Organics Cart has arrived! Please place your organics cart at your collection point by 6 a.m. on your regularly scheduled pick up day. All source separated organics must be placed in compostable bags or an alternate, compostable container for collection. Please remember that source separated organics and yard wastes can not be combined at this time.

The Division of Solid Waste and Recycling has provided you with a sample compostable bag for your first organics collection along with an organics recycling brochure. Please note that the car litter bag containing these items is not compostable. Additional compostable bags are available for purchase at several retail outlets. All compostable bags approved by the Biodegradable Products Institute (BPI) are acceptable to use with the Minneapolis pilot. Approved products will display the BPI Logo. A list of BPI approved products can be found at www.bpiworld.org or by calling 1-888-BPI-LOGO (274-5646).

Compostable Bag Retail Outlets:

Bayers Do It Best (Linden Hills)
Linden Hills Coop
Lakewinds Coop
Clancy's Meats
Festival Foods
Ace Hardware Stores
Jerry's Foods
Kowalski Markets
Lunds/Byerly's
Menards
Cub Foods

Compostable Containers:

Cardboard Milk Cartons
Boxboard Food Containers
Wrapped in Newspaper

Biodegradable Products Institute Logo:

COMPOSTABLE

To protect the health and safety of Solid Waste and Recycling workers all organic recycling material must be securely contained in compostable bags or compostable containers that are tied or closed.

If you have questions about this pilot program, please call 612-673-2917 between 8:00 am and 4:25 pm.

Thank you for your participation in this innovative and environmentally progressive pilot!

Sincerely,

Susan A. Young, Director
Minneapolis Solid Waste and Recycling

www.ci.minneapolis.mn.us
Affirmative Action Employer

Appendix A.10
Generic Neighborhood Cart Hanger Letter 2

Thank You for Your Interest in your Neighborhood Organics Collection Pilot!

Greetings:

Your Organics Cart has arrived! Please place your organics cart at your collection point by 6 a.m. on your regularly scheduled pick up day. All source separated organics must be placed in compostable bags or an alternate, compostable container for collection. Please remember that source separated organics and yard wastes **can not** be combined at this time.

The Division of Solid Waste and Recycling has provided you with a sample compostable bag for your first organics collection along with an organics recycling brochure. Please note that the car litter bag containing these items is not compostable. Additional compostable bags are available for purchase at several retail outlets. All compostable bags approved by the Biodegradable Products Institute (BPI) are acceptable to use with the Minneapolis pilot. Approved products will display the BPI Logo. A list of BPI approved products can be found at www.bpiworld.org or by calling 1-888-BPI-LOGO (274-5646).

Compostable Bag Retail Outlets:

Bayers Do It Best (Linden Hills)
Linden Hills Coop
Lakewinds Coop
Clancy's Meats
Festival Foods
Ace Hardware Stores
Jerry's Foods
Kowalski Markets
Lunds/Byerly's
Menards
Cub Foods

Compostable Containers:

Cardboard Milk Cartons
Boxboard Food Containers
Wrapped in Newspaper

Biodegradable Products Institute Logo:

To protect the health and safety of Solid Waste and Recycling workers all organic recycling material must be securely contained in compostable bags or compostable containers that are tied or closed.

If you have questions about this pilot program, please call 612-673-2917 between 8:00 am and 4:25 pm.

Thank you for your participation in this innovative and environmentally progressive pilot!

Sincerely,

Jeff Jenks, Interim Director
Minneapolis Solid Waste and Recycling

Appendix A.11

Generic Neighborhood Cart Hanger Letter 3

Thank You for Your Interest in your Neighborhood Organics Collection Pilot!

Greetings:

Your Organics Cart has arrived! Please place your organics cart at your collection point by 6 a.m. on your regularly scheduled pick up day. All source separated organics must be placed in compostable bags or an alternate, compostable container for collection. Please remember that source separated organics and yard wastes **can not** be combined at this time.

The Division of Solid Waste and Recycling has provided you with a sample compostable bag for your first organics collection along with an organics recycling brochure. Please note that the car litter bag containing these items is not compostable. Additional compostable bags are available for purchase at most retail outlets. All compostable bags approved by the Biodegradable Products Institute (BPI) are acceptable to use with the Minneapolis pilot. Look for certified compostable bags that display one of the logos below and state that they meet ASTM D6400 or ASTM D6868 standards for composting. A list of BPI approved products can be found at www.bpiworld.org or by calling 1-888-BPI-LOGO (1-888-274-5646).

To protect the health and safety of Solid Waste and Recycling workers all organic recycling material must be securely contained in compostable bags or compostable containers that are tied or closed.

If you have questions about this pilot program, please call 612-673-2917 between 8:00 am and 4:25 pm.

Thank you for your participation in this innovative and environmentally progressive pilot!

Sincerely,

David Herberholz, Director
Minneapolis Solid Waste and Recycling

Appendix B
Hennepin County Solid Waste Composition Analysis: Selected Excerpts

Appendix B
Hennepin County Solid Waste Composition Analysis[1]: Selected Excerpts

The SAIC study sort category for "organic waste" waste divided into five sub-categories as shown in Table B-1.

Table B-1
Hennepin County / Rational Energy 2011 Waste Composition Analysis: Definition of "Organic Waste" Sub-Categories

Organic Waste		
24.	Food Waste[1]	Food preparation wastes, food scraps, and spoiled food including meat and bones.
25.	Liquid Waste[2]	Liquids, such as water, soda, juice, etc., that are disposed in a sealed bottle or other type of container.
26.	Food Soiled & Non-Recyclable Paper	Paper products including paper napkins, towels, and tissues; paper plates, cups and food containers; paper egg cartons: fast food paper bags and wrappers, including waxed paper and parchment: paper milk & juice cartons (no juice boxes or pouches): pizza boxes and boxes from refrigerated & frozen food packaging: and coffee filters & grounds and tea bags.
27.	Compostable Food Service Ware & Other Compostable Items	Biodegradable Products Institute (BPI)-certified compostable plastic utensils. cups and containers; paper vacuum bags, dryer lint, human and pet hair, wooden toothpicks, ice cream & corn dog sticks, chop sticks, cotton balls, house plants.
28.	Yard Waste	Grass clippings, leaves, braches, sticks, garden waste, brush, and trees.

'When feasible, food waste will be removed from containers (e.g., Tupperware, carry-out containers, etc.) and the food waste will be placed in the Food Waste category and the container will be placed in category #30- "Containers that Held Food Waste and/or Liquid Waste.

Liquids such as water, soda, juice, etc. will be removed from containers (e.g., PET bottles, milk cartons, glass jars) and the liquids will be emptied into a 5-gallon or similar-sized bucket and the bottle or container will be placed in category #30- "Containers that Held Food Waste and/or Liquid Waste."

Appendix C
Additional Details from the City of Wayzata, MN

Appendix C
Additional Details from the City of Wayzata, MN

Historical Background

In 2003, Hennepin County awarded an Innovative Waste Reduction and Recycling grant to the city of Wayzata to conduct a pilot project for a residential curbside collection program for SSO. In addition, the Solid Waste Management Coordinating Board (SWMCB) also provided grant funding to the city to assist with the pilot project.

The pilot project's primary collaborators were: Wayzata resident neighborhood coordinators, Hennepin County and Randy's Sanitation. The pilot project was split into two phases and ran from April 2003 – June 2005.

County staff estimated that up to 40 percent of Wayzata's residential waste stream is paper that could be either recycled or composted. They also estimated that 25 percent of a typical household's waste is food scraps and non-recyclable paper.

The project was designed to evaluate how to:

Effectively educate residents to separate the organic portion of their trash; and
Economically collect the organics that have been separated.

After the first phase of the pilot project (ended in March 2004), preliminary results indicated an artificially high monthly costs. Thus, a final cost/benefit assessment of the City's initial pilot project (Phase I) would be premature. City staff were concerned that any proposed SSO collection service fee based on the Phase I estimates would have resulted in the Wayzata City Council and/or residents not supporting an ongoing organics collection program. Thus, the City requested a one-year extension to:

Increase resident awareness, participation and recycling and organic tonnages;
Search for ongoing revenue sources; and
Minimize costs for a residential organic collection.

Phase II started in April 2004 and ran through June 2005. The purpose of Phase II was to reduce the eventual organic collection costs. Part of the intent of Phase II was to help minimize any user fees added to residents' utility bills needed to finance the new SSO collection service.

Description of Program Operation Details

During the pilot study, the organics material collected from residents included food scraps and non-recyclable paper. The following items **were** accepted for composting:
All food scraps – including meat & bones
Soiled & non-recyclable paper products, such as:
Napkins, paper towels, tissues
Paper plates, cups, food containers, pizza boxes
Paper milk and juice cartons

Paper bags and waxed paper
Waxed cardboard
Coffee filters and tea bags
Other compostable items such as:
Paper vacuum bags
Dryer lint
House plants

The following items were **NOT** accepted for composting:
All plastics (except biodegradable bags), including:
Utensils
Baggies, wrapping film, bags
Cups and containers
Foam trays, plates, bowls, packing material, etc.
Condiment packets, chip bags, candy wrappers
Recyclable materials such as:
Bottles
Cans and scrap metal

To help residents understand which items were acceptable for compositing, the City utilized several types of education outreach tools including:
Paper free garbage stickers
Cash prizes
Organic newsletter
Local newspaper articles
Brochures
Cart hangers
Neighborhood events
Lawn signs
New uniforms for City personnel
Cable programs
Council meetings
Distribution of compost at Public Works site
Targeted mailing to non-participators
Video showing organics full cycle
Visits to Wayzata homes
Anonymous survey completed by residents
Meetings with groups or individuals of non-participators to discuss the new program, show the organics video and answer questions

In addition to these educational tools, several neighborhoods had a specified neighborhood coordinator. The neighborhood volunteers went door-to-door with information, staffed information booths and put out weekly yard signs to remind their neighbors about “organics” collection day. Wayzata found that many of the residents were supportive and appreciative of the organics pilot project.

During the pilot project, residents separately collected the acceptable organics materials from the rest of their garbage. Each resident was provided with a special, sealable food container to keep in their kitchen to collect food scraps on a daily basis. This food container was supposed to help with odor and storage. Residents were also provided with a specific organics cart to keep next to their regular municipal solid waste (MSW) cart. The City sold biodegradable plastic bags, suitable for composting, for residents to place their organic waste prior to placing in the organics carts. The biodegradable "organics bags" came in three sizes and were available at local stores.

Residents set out their organics cart with their MSW cart. Both materials were collected on a weekly basis.

The city of Wayzata has one contracted waste hauler, Randy's Sanitation, which handles all of the city's MSW and recycling. City officials said the proactive cooperation of Randy's Sanitation made starting the organics collection pilot project easier to implement. After Randy's Sanitation collected the SSO, the material was taken to the Hennepin County Recycling Center and Transfer Station in Brooklyn Park. The SSO loads were tipped and inspected to ensure that non-biodegradable contaminants were below threshold levels. After the material was inspected, it was transported by Hennepin County to the NRG SSO composting facility in Empire Township in Dakota County.

The organics that Wayzata residents placed out on the curb was turned into compost at NRG. A portion of the final compost product was returned to the city of Wayzata and used in neighborhood community gardens. The city of Wayzata also used an estimated 50 cubic yards of the compost in its municipal public works operations.

Results of the Pilot Program

During the pilot program, 70 percent of the households (1,200 total households) in the City participated at least once and a total of 189 tons of organic material were collected and composted. In any given month, about 50 percent of Wayzata residents set out SSO for composting.

The SSO collected from Wayzata's curbside program was very clean. All material sent to NRG during the pilot project was able to be composted. The amount of material collected weekly was typically between 1.5 to 2.0 tons. The average SSO tons abated from the MSW during the pilot project was approximately 8 tons per month.

Since the two-year SSO collection pilot program began, there has been a 12 percent decrease in the City's trash (1,056 tons in 2002 to 926 tons in 2004) and a 23 percent increase in the City's overall recycling. One theory is that City residents became more thoughtful about separating their waste, including traditional recyclables.

When the pilot project ended in 2005, the city of Wayzata added organics collection to the City's residential curbside collection program. Wayzata was the first city in the Twin Cities metro area to offer curbside collection of organics to all its residents.

City-Wide SSO Collections 2006 - 2012

Wayzata continued the organics collection program after the grant funding from the County. The City increased MSW and recycling fees to cover the additional costs associated with the new SSO collection program (i.e., adding curbside collection, transportation and composting of the organics). The City and their contractor, Randy's Sanitation, offered every-other-week MSW collection to help cut participants' trash bills. Based on the cost-benefit analysis prepared for the organics collection pilot project, the City Council approved raising garbage rates to continue organics collection.

To continue providing organic collection to Wayzata's residents, the per household recycling charge needed to be increased $2.65 to $6.25 per month. After restructuring the fees charged by Randy's Sanitation for garbage and organics collection, the net increase on monthly utility bills ranged from $1.55 per month for households with the lowest level of service (base) up to $3.00 per month for households with the highest level of service (90 gallon). This new rate schedule went into effect in July 2005. This increase in the monthly recycling fee paid for:

Weekly recycling and SSO collection;
Seasonal grass, leaves and brush drop-off sites;
Spring clean-up; and
Fall leaf and Christmas tree pick-up

Individual households can now offset the increased fees by reducing their level of MSW service. Once the organics and recyclables (glass, paper, plastic, etc.) are recycled, there isn't much left for disposal in the MSW cart (e.g., non-recyclable plastics such as polystyrene, miscellaneous junk, etc.).

Economics

Due to the decrease in waste that goes into the MSW cart, every-other-week MSW service became a viable option. By offering every-other-week pickup for MSW, residents were be able to save money or at least break even, despite the 2005 fee increase. Organics (food waste/non-recyclable paper) and recyclables (plastic, metal, newspaper, junk mail, etc.) were still picked up every week. If residents were able to recycle enough to cut their MSW production further, they were also able to save money by using a cheaper, smaller MSW cart.

The monthly bottom line economic impact on Wayzata households included one of three scenarios:
Save money by lowering the level of MSW service (e.g., lower from a 90 gallon cart to a 60 gallon cart);
Break-even by lowering their frequency of MSW service to every-other-week MSW collection; or
Pay up to $1.55 to $3.00 more per month depending on their current level of MSW service.

Change to "Blue Bag" SSO Collection Program

The City of Wayzata recently converted their separate collection of SSO to the "Blue Bag" system whereby residents place SSO materials in a blue bag that is then placed within the garbage cart for co-collection. The "Blue Bags" are then manually separated from the mixed MSW at Randy's new materials recovery facility (MRF) / transfer station in Orono.

The City of Wayzata's web page[1] states:

"Wayzata residents can recycle their organics through the Blue Bag Organics Composting System. With the Blue Bag Organics program, residents can toss food waste, such as apple cores and coffee grounds, and food-soiled paper, think pizza boxes and paper plates, into a Blue Bag Organics BPI-certified bag. Unlike most trash bags, these liners are made to be compostable. On trash day, residents then place the Blue Bag liner inside their regular garbage cart for pick-up. Click here for a detailed list of what is and what is not compostable."

[1] City of Wayzata, MN web page on "Garbage, Recycling and Organics": http://www.wayzata.org/index.asp?Type=B_BASIC&SEC={4C20444F-EB06-4E14-9CBA-E37B117A9BC2}&DE=

Table C-1
Wayzata's Contract with Randy's Environmental Services:
Previous & Current Rates

Service Level	2012 Billing Rates	2013 Billing Rates	Comments
Base	$ 1.02	$ 2.50[1]	Minimum service based on the rate for 35 Gallon, every other week (EOW)
35 Gallon	$ 4.69	$ 5.00	
35 Gallon-EOW	$ 2.35	$ 2.50	
65 Gallon	$ 6.78	$ 7.00	
65 Gallon-EOW	$ 3.41	$ 3.50	
95 Gallon	$ 8.87	$ 9.00	
95 Gallon-EOW	$ 4.44	$ 4.50	
4-CAN	$ 12.90	$ 13.22	
5-CAN	$17.56	$ 17.99	
6-CAN	$22.24	$ 22.78	
7-CAN	$23.92	$ 24.50	
8-CAN	$26.91	$ 27.56	
9-CAN	$31.58	$ 32.34	
10-CAN	$36.26	$ 37.14	
12-CAN	$46.03	$ 47.14	
Cart Rental (Wayzata Green MSW Carts)	$ 1.02	$ 1.02	Each (Some services require multiple carts)
Drive-Up	$10.20	$ 10.20	
Drive-Up EOW	$ 5.10	$ 5.10	
Single Sort Recycling-EOW	NA	$ 3.00	($3.50 on other than 10 Yr Contract)
Two Sort Recycling	$ 1.50	N/A	Two Sort Recycling Option Goes Away
Organics	$ 2.86	$ 5.00	New-Blue Bag Organics

Propose minimum service to be equal to 35 gal. Every Other Week (EOW) which is S2.50

Table C-2
City of Wayzata Contract with Randy's Sanitation:
Current Rate Schedule

35 gal every other week	$2.50
35 gal	$5.00
65 gal every other week	$3.50
65 gal	$7.00
95 gal every other week	$4.50
95ga1	$9.00
4 can	$13.22
5 can	$17.99
6 can	$22.78
7 can	$24.50
8 can	$27.56
9 can	$32.34
10 can	$37.14
12 can	$47.14
Drive up	$10.20
Recycle Drive up	$ 5.10
Wayzata Green MSW Carts (some services require multiple carts)	$1.02 each
Organics –Blue Bag Program	$5.00

Appendix D
City of Madison, Wisconsin SSO Pilot Program

Appendix D
City of Madison, Wisconsin
SSO Pilot Program

In 2011, the City of Madison started a voluntary pilot collection program for SSO that collects all food waste, soiled paper products, pet waste, disposable diapers, and small amounts of regular yard waste. Information provided below is from a phone interview conducted on May 21, 2013 and the municipality's website. Appendix D contains more detailed information about this program.

Currently 547 households are participating in the pilot program. The volunteer houses are located in two neighborhoods in the east and west sides of Madison. The City has provided participants with a 35-gallon Rehrig cart (to facilitate automated SSO collection) and a kitchen container. The City also provides participants with compostable bags for lining these containers. The City's Streets Division collects material from participants on a weekly basis using a fully automated collection truck. Currently the City is using two trucks that were formerly used for garbage collection to collect this material. The material is processed at the Columbia County Compost Facility near Portage, Wisconsin.

The City is currently planning on moving its organics program towards anaerobic digestion (AD) as the preferred SSO processing technology. Planning is underway and a new AD facility may be available by 2016.

In the near future, some SSO material collected from the City's current pilot program may be processed at the UW- Oshkosh AD facility as part of a research study funded by the State on the AD digestibility of various compostable bags.

The City is also developing plans and pilot operations to collect from selected commercial establishments as well. In 2012, three businesses were added to the pilot program; Madison Children's Museum, Fair Oaks Diner, and American Family Insurance. The City is interested in adding more commercial businesses to the pilot program followed by adding more households.

If a City-wide SSO program is implemented, participation will not be mandatory. However, the City would consider reducing "residual" collection (what remains after SSO, yard waste, and recyclables collection) to every other week (EOW) or maybe even monthly to encourage participation in the SSO program. "Residual" material can also be known as mixed MSW.

The City's plans for an AD facility may shape the list of acceptable organic materials that will be targeted for collection in the SSO program in the future. Due to anaerobic digestibility of certain feedstocks and the new Wisconsin Department of Natural Resources (DNR) composting regulations, a city-wide program would differ from the pilot program in what materials are acceptable as SSO (likely no diapers or pet waste).

The City stated that results from the first seven months of the organics pilot show that participating households diverted an average of 13.9 pounds of material per week. The City further states that if the average was extrapolated over the entire 66,000 households served by the Streets Division, it would yield 23,780 tons of material per year. Extrapolating the pilot results

across the residents served may offer some level of risk in estimating future feedstock, so consideration should be given to balancing the estimates from residential SSO collection with potential other feedstock sources (e.g., commercial SSO establishments).

The City of Madison's web page, "Organics Collection Pilot Program[2]," states that:

"The City of Madison is conducting a pilot project to test the feasibility of a city-wide household organics collection. During this pilot program, the Streets Division will collect organic material from volunteer households in the designated pilot area. The pilot collection program began on June 7th, 2011. Additional households were added to the program in 2012 and there are two businesses in the program, the Madison Children's Museum and the Fair Oaks Diner. The program is funded through 2012 and there are plans to continue the program for 2013 as well. Organics are collected from the participating household weekly. All of the volunteers are in the Tuesday refuse collection district. The material collected [is] taken to the Columbia County Compost Facility near Portage."

"What Materials Are Accepted?"

The City is collecting food scraps. Any discarded fruits, vegetables, meat, fish, and bones are accepted. House plants, weeds, and small amounts of regular yard waste are also welcome in the program. There are lots of other, accepted compostable materials such as: paper towels, paper napkins, paper plates, pizza boxes, and any paper product too contaminated to be recycled. The City is also taking pet waste of all kinds including cat litter. Finally, the City is accepting disposable diapers.
"Many of these items cannot be safely composted in a backyard compost bin. However, they will compost quite nicely in a large scale compost system where temperatures are high enough to kill any harmful pathogens, such as the Columbia County facility."

"The pilot program will help determine the cost of a separate collection program for organic material. The City is also going to evaluate composting options, the energy potential of the material, and the opinions of the volunteers about what did and did not work during the test run."

"Funds for [the City's organic collection program] design work and system selection were included in the 2013 City Budget. The City also hopes to expand the pilot program to other neighborhoods if possible. At this time is appears that the best location for a digester will be adjacent to Dane County's Rodefeld Landfill. This location could reduce the cost of a facility because the digester could share some systems like electrical generators, vehicle fueling and the scale with the landfill."

[2] City of Madison, Wisconsin web page: "Organic Collection Pilot Program" (as downloaded in March 2013): http://www.cityofmadison.com/streets/compost/organics.cfm

Appendix E
Additional Details of Ontario, Canada SSO Recycling Programs

Appendix E
Additional Details of Ontario, Canada
SSO Recycling Programs

City or Region	Population	Total Households Served	Participation Rate	Tonnes Per Year	Lbs PerTotal HH Served Per Year
Durham	600,000		85%	28,000	333
Halton	500,000	179,013	60%	25,933	606
Peel	1,500,000	322,000	40%	27,696	330
Toronto	2,600,000	894,000	90%	105,491	496
York	1,000,000	293,500	80%	101,920	703

Appendix F
Halton Region's *Green Bin* and Other Recycling Instructions

Appendix F

Halton Region's *Green Bin* and Other Recycling Instructions

Source: Halton Region's web page: http://www.halton.ca/common/pages/UserFile.aspx?fileId=15644

Appendix G
Additional Details from the Region of Durham, Ontario

Appendix G
Additional Details from the Region of Durham, Ontario

The Regional Municipality of Durham, informally referred to as Durham Region, is a regional municipality located in Southern Ontario east of Toronto, Ontario. It has an area of approximately 2,500 square kilometres and includes the municipalities of Ajax, Brox, Clarington, Pickering, Oshawa, Scugog, Uxbridge, and Whitby. The southern portion of the region, on Lake Ontario is primarily suburban in nature, forming the eastern end of the 905 belt of suburbs around Toronto. The northern area comprises rural areas and small towns.3

In 2009, the Regional Municipality of Durham standardized collection services Region-wide, with weekly "Blue Box" and "Green Bin" collection, and bi-weekly (every two weeks) garbage collection with a four bag limit per household. Collected biweekly, garbage bags or reusable containers, when full, must not exceed 20 kilograms (44 pounds) each. A standard-size garbage bag, or garbage can, counts as one bag. Garbage bags that break when lifted will not be collected. There is a limit of four untagged bags or containers of garbage for bi-weekly collection per household. A standard size garbage bag or garbage can counts as one bag. Residents setting out more than four bags of garbage every two weeks are required to tag each bag over the four-bag limit. Garbage Bag Tags are special peel-and-stick labels that can be attached to garbage bags. Residents setting out more than four bags of garbage are required to tag each bag over the four bag limit. Residents can purchase bag tags at locations throughout the Durham Region.[4]

The Region of Durham coordinates waste and recyclables collection, including their separate "Blue Box", "Green Bin" (for SSO), and yard waste systems. But each municipality sets their own collection schedule and manages their local programs.

Durham stopped collecting grass clippings in 2004 in order to coincide with the Ontario, province-wide initiative designed to reduce lawn watering, while improving groundwater quality, through reduced use of fertilizers and pesticides. Since that time, the Region of Durham has actively promoted "GrassCycling" (e.g., mulching and "leave it, don't collect it") to its residents.[5]

Yard waste is collected at different collection frequencies depending on the season:
Spring – weekly
Summer – bi-weekly
Fall – weekly

Residents set out 70 percent of their yard waste during the fall leaf season. There are no limits on the number of compostable yard waste bags that residents can set out, but there is a 44 pound limit on the weight of each yard waste bag. Traditional polyethylene plastic bags are not allowed

[3] Region of Durham, Ontario – Summary description in Wikipedia: http://en.wikipedia.org/wiki/Regional_Municipality_of_Durham
[4] Region of Durham: Garbage - http://www.durham.ca/works.asp?nr=/departments/works/waste/garbage.htm&setFooter=/includes/wasteFooter.inc
[5] Region of Durham: Yard Waste – Frequently Asked Questions: http://www.durham.ca/works.asp?nr=/departments/works/waste/yardwastefaq.htm&setFooter=/includes/wasteFooter.inc

for yard waste. Brush must be bundled and there is a three-bundle limit. The Region of Durham has a set of collection by-laws that provide all of the detailed regulations pertaining to solid waste management and recycling programs.[6] In 2011, the Region of Durham commissioned a study by AET to look at its waste diversion and recycling programs, including their "Green Bin" service for SSO.[7] In 2008, Durham Regional Council set an aggressive waste diversion goal of 70 percent. In order to achieve this goal it was determined that an important step would be to increase the existing capture rate for recyclables in the "Blue Box" program. The Region of Durham's "Blue Box" program currently operates on a two stream system, with residents setting out recyclable fibres and recyclable containers in separate containers, on a weekly basis. A previous report by Golder Associates Limited identified that the capacity of the existing Blue Box was a barrier to increasing recyclable capture rates. In order to remove this barrier, the Region decided to provide residents with a larger (83L) Blue Box for the containers stream. Prior to this decision, residents had been provided with a single 53L Blue Box, and had to purchase another recycling bin/container in order to correctly participate in the Region's two stream recycling program. In addition to providing partial funding for the purchase and distribution of the blue boxes, the Continuous Improvement Fund (CIF) funded a study to monitor the impact of the rollout of the new larger Blue Boxes.[8]

The following are a few highlights from the 2011 Durham *Large Blue Box Study* by AET that pertain to organics (i.e., SSO) and the Region's "Green Bin" program.

"Participation in the organics stream has decreased over time, from 68.97 percent during the June 2010 audit, to 65.57 percent during the most recent 2011 audit; while the number of organics items and full container equivalents set out per household per week has remained constant over the course of the four waste audits."

"Overall diversion rates are not reported in (Durham *Large Blue Box Study* by AET) due to the fact that a large percentage of the waste generated was unknown since the organic stream and recyclable fibres stream were not audited."

"Organics: Refers to material that can be composted. The material accepted in an organics program is dependent on the type of composting facility accepting the material, how it is processed and what quality of processed material is desired."

[6] Region of Durham By-Law 46-2011, *A By-Law to Regulate the Provision of the Waste Management Services Under the Jurisdiction of the Regional Municipality of Durham,* http://www.durham.ca/departments/works/waste/bylaw/WasteByLaw.pdf and "*Frequently Asked Questions*" about the By-Law: http://www.durham.ca/works.asp?nr=/departments/works/waste/wastebylawfaq.htm&setFooter=/includes/worksFooter.inc.
[7] *Region of Durham Large Blue Box Container Study: Waste Audit and Trend Analysis Report* (December 2011). By AET.
[8] Durham AET *Large Blue Box Study* (December 2011), ibid.

Table G-1
Durham Region's *Large Blue Box Study*
June 2011 Collection Results Summary

Table 3.1 June 2011 Collection Results Summary

Total Two Week Period		Organics	Recycling	Garbage
Total number of households sampled[1]	Wk 1-	998	998	500
	Wk 2-	936	937	436
	Total	**1934**	**1935**	**936**
Total number of household set-outs	Wk 1-	590	765	436
	Wk 2-	573	765	391
	Total	**1163**	**1530**	**827**
Participation Rate[2]		**67.23%**	**79.07%**	**88.35%**
Total number of items	Wk 1-	594	1624	1151
	Wk 2-	578	1615	1010
	Total	**1172**	**3239**	**2161**
Average number of items/hh/wk[3]		**0.61**	**1.67**	**1.15**
Total number of full container equivalents	Wk 1-	258.75	1218.25	1090.25
	Wk 2-	248.50	1208.50	975.25
	Total	**507.25**	**2426.75**	**2065.50**
Average number of full container equivalents/hh/wk		**0.26**	**1.25**	**1.10**
Average number of full container equivalents/set-out		**0.44**	**1.59**	**1.25**

[1] Number of households sampled is adjusted to omit those households that were picked up by hauler prior to the audit
[2] Organics participation is the proportion of households that had a set out at least once over the two week period.
[3] Averaged across all sampled households (including those with no set-outs, but not those collected by hauler). This does not represent the average per household with a set-out.

Source: Region of Durham Large Blue Box Container Study (December 2011). By AET.

"Looking at the organics stream, residents set out an average of 0.59 green bins each week with an average full container equivalent of 0.26 and an overall participation rate of 65.57 percent. For the organics stream, households must set out their green bin at least once over the two week period to be counted as participating in the organics program."

"During the pre-rollout audit (June 2010) the total organic material in the garbage stream was 102.18 kg/hh/yr. However in the June 2011 audit, the total organic material in the garbage stream was found to be 146.81 kg/hh/yr. This decrease in organics capture rate is supported by the fact that organics stream participation rate has declined over the course of the waste audits. This is discussed in more detail towards the end of section 3.6.4 and shown in Figure 3.16."

Table G-2
Durham Region's Large Blue Box Study
November 2011 Collection Results Summary

Table 3.5 November 2011 Collection Results Summary

Total Two Week Period		Organics	Recycling	Garbage
Total number of households sampled[1]	Wk 1-	997	998	498
	Wk 2-	999	923	499
	Total	**1996**	**1921**	**997**
Total number of household set-outs	Wk 1-	601	811	526
	Wk 2-	564	728	358
	Total	**1165**	**1539**	**884**
Participation Rate[2]		**65.57%**	**80.11%**	**88.67%**
Total number of items	Wk 1-	604	1676	1314
	Wk 2-	569	1530	863
	Total	**1173**	**3206**	**2177**
Average number of items/hh/wk[3]		**0.59**	**1.67**	**1.09**
Total number of full container equivalents	Wk 1-	272.75	1213.00	1249.25
	Wk 2-	250.75	1084.00	835.50
	Total	**523.50**	**2297.00**	**2084.75**
Average number of full container equivalents/hh/wk		**0.26**	**1.20**	**1.05**
Average number of full container equivalents/set-out		**0.45**	**1.49**	**1.18**

[1] Number of households sampled is adjusted to omit those households that were picked up by hauler prior to the audit
[2] Organics participation is the proportion of households that had a set out at least once over the two week period.
[3] Averaged across all sampled households (including those with no set-outs, but not those collected by hauler). This does not represent the average per household with a set-out.

Source: *Region of Durham Large Blue Box Container Study* (December 2011). By AET.

"In general, the participation rate in the garbage and organics streams has decreased slightly over time, while the participation in the recycling stream has increased. Trends in participation in each of these streams will be discussed in more detail in the following sections."

"…. In general, the participation rate in the organics stream has seen a slight decrease over time. In fact, each audit after the June 2010 waste audit showed a decrease in organics stream participation when compared to the pre-rollout audit. The highest organics stream capture rate was during the June 2010 audit when participation was at 68.97 percent, while the lowest capture rate was during the most recent November 2011 audit when participation was at 65.57 percent. Note that these participation rates are based on a household setting out a Green Bin at least once over a two week period."

Table G-3
Durham Region's Large Blue Box Study
Participation Rates Trend Over Time

Table 3.16 Participation Rate Trend Over Time

Audit Period	Garbage Participation Rate (%)	Recycling Participation Rate (%)	Organics Participation Rate (%)
June 2010	89.00%	77.32%	68.97%
November 2010	89.62%	78.62%	66.67%
June 2011	88.35%	79.07%	67.23%
November 2011	88.67%	80.11%	65.57%
Average	**88.91%**	**78.78%**	**67.11%**

Source: Region of Durham Large Blue Box Container Study (December 2011). By AET.

"…. Both the number of organic stream items and number of full container equivalents set out by single family households stayed relatively constant over the period of time between the June 2010 audit and the November 2011 audit, with very little fluctuation. The number of organics stream items per household per week averaged out to 0.59 items over this period, with a standard deviation of only 0.01. The average number of full container equivalents over the same period was 0.27 items, with a standard deviation of 0.01."

The Durham *Large Blue Box Study* concluded that "It would be beneficial to include the organics stream and recyclable fibres stream in future waste composition audits in order to get a better picture of capture rates and diversion rates in the Region."

Appendix H
Additional Details from the Region of York, Ontario: Summary of Compostable Bag Pilot Program

Appendix H
Additional Details from the Region of York, Ontario: Summary of Compostable Bag Pilot Program

A 15-week pilot study was completed with Loblaw (a local grocer) offering carry-out compostable bags in five stores across the York Region as an alternative to plastic carry-out bags. Only a small percentage of customers purchased the compostable carry-out bags over the plastic bags (2.5 percent). Materials collected in the *Green Bin* program are currently composted by two processors. Both facilities need to manage the plastic in the organics stream, including bags, diapers and sanitary products to create a valuable compost end product. Since some of the plastic bags are compostable, ensuring degradation of this material is challenging for systems designed to remove plastics. At one of the composting facilities, much of the screening for plastic occurs at the front end of the process. As the use of compostable bags increase, Region staff plan to work with processors to optimize processes to increase compostable bag degradation rates.[9] I got this information and paraphrased it from the report in footnote 9.

"York Region, Orgaworld and Novamont, a manufacturer of certified compostable resin, collaborated in September 2012 to quantify degradation rates for compostable bags in conjunction with the Loblaw pilot program. Operational trials were performed at Orgaworld by processing materials through the high intensity portion of their composting process for four weeks. Initial results showed a 35 per cent degradation of the Novamont bag in a four week period. Orgaworld's process retention time is normally two weeks. Based on test results, Novamont staff indicated that bag degradation rates would likely improve with a longer continuous retention time at a higher moisture rate.

Based on degradation test results and suggestions from Novamont, Orgaworld has agreed to trial a modified process with an extended processing time at a higher moisture rate. Bag degradation tests will be performed during this trial and are anticipated to be completed in the summer of 2013. Region staff will monitor results of the modified process. To date, residue rates at Orgaworld have not decreased as a result of implementing mandatory compostable bags due to low use and degradation rates. Changes in Orgaworld's processing operations have the potential to decrease residue rates but may also result in increased cost due to longer retention time, impacting the Region's overall program costs. Orgaworld is committed to working with the Region to optimize their processes to balance compostable bag degradation, residue rates and cost to meet the Region's objectives." [10]

[9] York Region *Green Bin* website (downloaded as of May 18, 2013): http://www.york.ca/Services/Environmental+Services/Waste+Management/Green+Bin.htm#accepted.

[10] http://www.york.ca/NR/rdonlyres/jdevzi3ve3jyzchg25yn4aii7njsoq77sl53yyfdhttsipiowephmfkhoj6uyuq7i4rdxt6vm4fcltktbjq2eg2i3e/rpt+4+cls+3.pdf

Appendix I
Excerpts of Minnesota Statutes Relating to Source-Separated Compostable Materials

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Excerpts of Minnesota Statutes Relating to Source-Separated Compostable Materials

The Minnesota Waste Management Act contained within Minnesota Statutes (M.S.) 115A provide four provisions addressing source-separated compostable materials (SSCM) or source-separated waste materials as excerpted below. **SSO** or **SSCM** provisions are bolded for ease of reference.

115A.02 LEGISLATIVE DECLARATION OF POLICY; PURPOSES.

The waste management goal of the state is to foster an integrated waste management system in a manner appropriate to the characteristics of the waste stream and thereby protect the state's land, air, water, and other natural resources and the public health. The following waste management practices are in order of preference:

waste reduction and reuse;
waste recycling;

composting of source-separated compostable materials, including but not limited to, yard waste and food waste;

resource recovery through mixed municipal solid waste composting or incineration;
land disposal which produces no measurable methane gas or which involves the retrieval of methane gas as a fuel for the production of energy to be used on site or for sale; and
land disposal which produces measurable methane and which does not involve the retrieval of methane gas as a fuel for the production of energy to be used on site or for sale.

115A.03 DEFINITIONS.

Subd. 25a. Recyclable materials.

"Recyclable materials" means materials that are separated from mixed municipal solid waste for the purpose of recycling or composting, including paper, glass, plastics, metals, automobile oil, batteries, and **source-separated compostable materials**. Refuse-derived fuel or other material that is destroyed by incineration is not a recyclable material.

Subd. 32a. Source-separated compostable materials.

"Source-separated compostable materials" means materials that:

are separated at the source by waste generators for the purpose of preparing them for use as compost;
are collected separately from mixed municipal solid waste, and are governed by the licensing provisions of section 115A.93;
are comprised of food wastes, fish and animal waste, plant materials, diapers, sanitary products, and paper that is not recyclable because the commissioner has determined that no other person is willing to accept the paper for recycling;

are delivered to a facility to undergo controlled microbial degradation to yield a humus-like product meeting the agency's class I or class II, or equivalent, compost standards and where process residues do not exceed 15 percent by weight of the total material delivered to the facility; and

may be delivered to a transfer station, mixed municipal solid waste processing facility, or recycling facility only for the purposes of composting or transfer to a composting facility, unless the commissioner determines that no other person is willing to accept the materials.

115A.931 YARD WASTE PROHIBITION.

Except as authorized by the agency, in the metropolitan area after January 1, 1990, and outside the metropolitan area after January 1, 1992, a person may not place yard waste:

in mixed municipal solid waste;

in a disposal facility; or

in a resource recovery facility except for the purposes of reuse, composting, or cocomposting.

MS 2008 [Renumbered 115A.03, subd 38]

On or after January 1, 2010, a person may not place yard waste or **source-separated compostable materials** generated in a metropolitan county in a plastic bag delivered to a transfer station or compost facility unless the bag meets all the specifications in ASTM Standard Specification for Compostable Plastics (D6400). For purposes of this paragraph, "metropolitan county" has the meaning given in section 473.121, subdivision 4, and "ASTM" has the meaning given in section 296A.01, subdivision 6.

A person who immediately empties a plastic bag containing yard waste or source-separated compostable materials delivered to a transfer station or compost facility and removes the plastic bag from the transfer station or compost facility is exempt from paragraph (c).

Residents of a city of the first class that currently contracts for the collection of yard waste are exempt from paragraph (c) until January 1, 2013, if, by that date, the city implements a citywide source-separated compostable materials collection program using durable carts.

297H.06 EXEMPTIONS.

Subdivision 1.**Certain surcharges or fees.**

The amount of a surcharge, fee, or charge established pursuant to section 115A.919, 115A.921, 115A.923, 400.08, 473.811, or 473.843, or a service charge by a home rule charter or statutory city that owns and operates a solid waste-to-energy resource recovery facility, is exempt from the solid waste management tax. The exemption does not apply to the tax imposed on market price under section 297H.02, subdivision 1, paragraphs (b) and (c), or section 297H.03, subdivision 1, paragraphs (b) and (c).

Subd. 2.**Materials.**

The tax is not imposed upon charges to generators of mixed municipal solid waste or upon the volume of nonmixed municipal solid waste for waste management services to manage the following materials:

(6) recyclable materials that are separated from mixed municipal solid waste by the generator, collected and delivered to a waste facility that recycles at least 85 percent of its waste, and are collected with mixed municipal solid waste that is segregated in leakproof bags, provided that the mixed municipal solid waste does not exceed five percent of the total weight of the materials delivered to the facility and is ultimately delivered to a waste facility identified as a preferred waste management facility in county solid waste plans under section 115A.46;

(7) source-separated compostable waste, if the waste is delivered to a facility exempted as described in this clause. To initially qualify for an exemption, a facility must apply for an exemption in its application for a new or amended solid waste permit to the Pollution Control Agency. The first time a facility applies to the agency it must certify in its application that it will comply with the criteria in items (i) to (v) and the commissioner of the agency shall so certify to the commissioner of revenue who must grant the exemption. For each subsequent calendar year, by October 1 of the preceding year, the facility must apply to the agency for certification to renew its exemption for the following year. The application must be filed according to the procedures of, and contain the information required by, the agency. The commissioner of revenue shall grant the exemption if the commissioner of the Pollution Control Agency finds and certifies to the commissioner of revenue that based on an evaluation of the composition of incoming waste and residuals and the quality and use of the product:

(i) generators separate materials at the source;

(ii) the separation is performed in a manner appropriate to the technology specific to the facility that:

(A) maximizes the quality of the product;

(B) minimizes the toxicity and quantity of residuals; and

(C) provides an opportunity for significant improvement in the environmental efficiency of the operation;

(iii) the operator of the facility educates generators, in coordination with each county using the facility, about separating the waste to maximize the quality of the waste stream for technology specific to the facility;

(iv) process residuals do not exceed 15 percent of the weight of the total material delivered to the facility; and

(v) the final product is accepted for use;

(8) waste and waste by-products for which the tax has been paid; and

(9) daily cover for landfills that has been approved in writing by the Minnesota Pollution Control Agency.

Appendix J
Minnesota Pollution Control Agency's Draft Source-Separated Composting Rules

Appendix J
Minnesota Pollution Control Agency's Draft Source-Separated Composting Rules[11]

(Excerpts from the Latest Draft as of October 10, 2012;
Released for public comments due by November 16, 2012.)

☞ Underscored text highlighted in yellow indicate proposed revisions.
☞ New requirements are generally built on existing language and existing language will not be highlighted so that it is easier to see actual changes. Be aware that when a draft rule is published, all text will appear as new text for subparts 8, 9, 10 and 11 AND unedited sections of the rule will simply be referenced as "For text of subp. 2-7, see M.R."

******Note this is a preliminary draft that will undergo further revisions before it is public noticed. ******

7001.3075 SOLID WASTE MANAGEMENT FACILITY PERMIT APPLICATION.

[For text of subps. 1 to 3, see M.R.]

Subp. 4. Source-separated organic material composting ~~Transfer~~ facilities extended permit term.

A. For source-separated organic material composting facilities ~~transfer facilities~~ that have operated under an existing permit issued under parts 7001.0010 to 7001.0200, no application is required for permit reissuance upon the expiration date of the permit and the term of the permit shall be extended indefinitely unless (1) the commissioner requires the facility to be repermitted as provided in part 7001.3410, subpart 3, or (2) the owner or operator of the facility plans to make a major modification to the facility. In either of these cases, the owner and operator shall submit an application for reissuance or modification of the permit as provided in this chapter. This application shall be approved or denied following the procedures in this chapter. As used in this part, "operated" means to have accepted materials as described by part 7035.0300, subp. 105a for composting ~~waste~~ at levels constituting normal expected volumes for facilities for a minimum of one year during the most recent five-year term of the permit, such that the agency can reasonably conclude that the facility is operating in compliance with applicable rules and its permit. For purposes of this part, a "major modification" means a change in the type of ~~waste~~ materials managed at the facility, an increase beyond the original permitted capacity, or a change that could significantly affect compliance with the design or operation standards of part ~~7035.2870~~ 7035.2836, subparts 8,~~4~~ and 9~~5~~. ~~The owner or operator may request, in writing, that the agency make a written determination as to whether any planned changes significantly affect compliance with~~

[11] MPCA's latest, publicly available draft of their proposed compost rule changes: *"Preliminary Draft #2 for Stakeholder Feedback Due 11/16/2012"* as downloaded from MPCA's web page: http://www.pca.state.mn.us/index.php/view-document.html?gid=14913 (the very last section, pages 166 through 176 posted within this larger, 176-page document that starts with "Final Agenda & Concept Framework for November 19, 2010 Meeting")

~~design or operation standards.~~

B. Owners and operators of source-separated organic material composting ~~transfer~~ facilities operating under an extended permit may make minor modifications as listed in part 7001.3550, subpart 3, at any time, provided that notice of the minor modification is given to the agency as provided in part 7001.3410, subparts 1 and 2. Owners of facilities operating under an extended permit must follow the requirements in part 7001.0190, subpart 2, before transferring ownership and control of the facility. Source-separated organic material composting ~~Transfer~~ facilities operating under an extended permit, as provided in this subpart, must submit to the agency the notification required by part 7001.3410, and the annual report required under part 7035.2585.

7001.3375 FINAL APPLICATION INFORMATION REQUIREMENTS FOR COMPOST FACILITIES. The application for a compost facility permit must include the following information in addition to the information required by part 7001.3300:

A. a description of the area proposed to be used for each stage of the composting process;

B. a description of the design and physical features of the facility, including run-off, run- on, and leachate control systems;

C. a description of the material to be composted;

D. a description of the residue's composition;

E. a description of the disposal method for the residue; F. the design of an odor control system;

G. the design and performance specifications of the composting facility;

H. a description of the composting method to be used including retention time, temperature to be achieved, number of turns needed, and the air flow design;

I. an operating plan indicating how the provisions of part 7035.2836 will be met, including a waste analysis plan; ~~and~~

J. a description of the proposed uses for the compost.; and

K. for source-separated organic material composting facilities, evidence that the owner and operator have obtained all necessary municipality approvals. Municipalities are not required to approve their own applications. The owner or operator must submit a copy of any approvals obtained. If the facility is located in an area where no municipality approval is required, the owner or operator shall submit a signed written statement indicating that no municipality approval is required.

7001.3410 EXTENDED PERMIT NOTIFICATION AND TERMINATION PROCEDURES.

Subpart 1. **Notification contents.** Owners or operators of transfer facilities or source- separated organic material composting facilities operating under an extended permit shall submit to the agency, upon the anniversary of the expiration

date of the permit, ~~or five years after November 30, 2005, whichever is sooner,~~ and every five years thereafter, a notification containing the following information:

A. the facility name, address, mailing address, and facility contact name and telephone number;

B. the permit number;

C. any minor modifications that have been made at the facility since permit issuance or the date of last notification;

D. transfer facilities and source-separated organic material composting facilities must include a summary of annual updates, if any, to the industrial solid waste management plan required by part 7035.2535, subpart 5; the contingency action plan required by part 7035.2615; the emergency response plan required by part 7035.2595, subpart 5; the operations and maintenance plan required by part 7001.3300, item P; the inspection schedule required by part 7035.2535, subpart 4; the ~~storm water~~ stormwater pollution prevention plan if required under parts 7001.1000 to 7001.1100; and the closure plan as provided under part 7035.2625; and

E. signatures and certifications in accordance with parts 7001.0060, 7001.0070, and 7001.3150.

Subp. 2. **Updates in the annual report.**

For any minor modifications and for any changes to the plans and schedules listed under subpart 1, item D , the owner or operator shall include a description of any changes in the annual report submitted under part 7035.2585, item L. These changes are considered approved upon receipt by the agency, but the owner or operator must amend the plans or schedules if, at any time, the agency notifies the owner or operator that the plans or schedules are deficient.

Subp. 3. **Termination of extended permit operation as allowed under part 7001.3075.**

The agency shall notify the owner or operator of a transfer facility or a source-separated organic material composting facility operating under an extended permit that the transfer facility or source-separated organic material composting facility is no longer eligible to operate under an extended permit and must be repermitted under chapter 7001 under any of the following conditions:

A. the transfer facility or source-separated organic material composting facility has unresolved noncompliance or has not been operated substantially in accordance with applicable standards;

B. the owner or operator has made changes to the facility that require a major modification as described in part 7001.3075, subpart 3, without filing a permit application;

C. the owner or operator has failed to update required plans or schedules or has submitted reports that contain material deficiencies and has not corrected those deficiencies; or

D. the owner or operator has failed to submit the notification or the

annual report required under part 7035.2585.

In the termination notice, the agency shall state the reasons why the agency proposes to require repermitting of the facility and shall provide the owner or operator with 30 days to respond to the notice. Following receipt of the response, if any, the agency shall make a final determination and shall notify the owner and operator of that decision. Upon receipt of this final determination, the owner or operator may elect to seek to continue the operation of the transfer facility or source-separated organic material composting facility by submitting a permit application, or may close the facility. If the owner or operator elects to continue the operation, the owner or operator shall submit a permit application within 30 days of receipt of the final determination. This application will be approved or denied following the procedures in chapter 7001. If the owner or operator elects to close the facility, the owner or operator must notify the agency and initiate closure procedures within 30 days of receipt of the final determination.

7035.0300 DEFINITIONS

[For text of subps. 1 - 6, see M.R.]

Subp. 7. ~~Backyard~~Small compost site. "~~Backyard~~ Small compost site means:

A. a site used to compost food scraps, garden wastes, weeds, lawn cuttings, leaves, and prunings;

~~from a single family *or* household, apartment building, or a single commercial office, a member of which is the owner, occupant, or lessee of the property.~~

B. a site that does not accept fats, oils, grease, meat, dairy, animal manure, diapers, sanitary products, nonrecyclable paper, and compostable materials meeting ASTMD6400 or ASTM D6868, as amended;

C. a site that does not exceed 80 cubic yards on site at any one time, including collected raw materials and compost being processed, but excluding finished compost; and

D. a site used to manage the materials under item A appropriately to avoid odor and the creation of nuisances and public health risks.

[For text of subps. 8 - 38, see M.R.]

Subp. 38b. Source-separated organic material composting facility. "Source-separated organic material composting facility" means a site used to compost source-separated organic material including all structures or processing equipment used to control drainage, manage contact water and ~~storm water~~stormwater, and storage areas for the incoming material, the final

product, and residuals resulting from the composting process.

[For text of subps. 39 - 105, see M.R.]

Subp. 105a. Source-separated organic material. "Source-separated organic material" includes the materials in section 115A.03, subdivision 32a and 38, vegetative wastes generated from industrial or manufacturing processes that prepare food for human consumption and compostable materials that meet the standard in ASTM D6400 and D6868, as amended. It does not include fish wastes and animal waste, meat by-products generated from industrial or manufacturing process, sanitary products, diapers, sewage sludge, biosolids, or septage, unless specifically permitted by the commissioner under part 7001.0150.

[For text of subps. 106 - 121, see M.R.]

7035.2525 SOLID WASTE MANAGEMENT FACILITIES GOVERNED.

Subpart 1. **General requirements.** Parts 7035.2525 to 7035.2915 apply to owners and operators of all facilities that treat, transfer, store, process, or dispose of solid waste except as specifically provided otherwise in this part.

Subp. 2. **Exceptions.** Parts 7035.2525 to 7035.2915 do not apply to the following solid waste management facilities or persons, except as indicated:

A. ~~backyard compost sites~~ small compost sites;

B. recycling facilities in compliance with part 7035.2845 must only comply with parts 7035.2535, subparts 1, 2, and 3, 7035.2545, 7035.2555, 7035.2565, 7035.2595, 7035.2605, and 7035.2625, subparts 1 and 2;

C. recycling drop-off sheds, divided roll-off boxes, separate dumpsters, and other containers or small structures where recyclable materials that have been separated from mixed municipal solid waste by the generator in order to avoid contaminating the materials or to expedite the collection or processing of them for recycling are collected in total volumes not exceeding 40 cubic yards, at any one time, must only comply with part 7035.2845, subpart 3;

D. individual generators of recyclable materials, such as homeowners, businesses, and government agencies;

E. manufacturers using recyclable materials as feedstock; F. industrial solid waste land disposal facilities;

G. solid waste from the extraction, beneficiation, and processing, of ores and minerals stored, collected, transferred, transported, utilized, processed, and disposed of or reclaimed, provided the facility is permitted for such use under part 7001.0020, item D, and chapter 6130; H. permit-by-rule transfer facilities in compliance with part 7001.3050, subpart 3, item A, must only comply with parts 7035.2535, subparts 1, 2, 3, 4, items A, B, D, and E, and 5; 7035.2545; 7035.2555; 7035.2565, subparts 1, 3, and 4; 7035.2575, subparts 1 and 2; 7035.2585; 7035.2595; 7035.2605; 7035.2625; 7035.2635; 7035.2855; and 7035.2870, subparts 2 and 5;

I. mobile transfer facilities in compliance with part 7001.3050, subpart 2, item

G, must only comply with parts 7035.2535, subpart 1; 7035.2565, subparts 1, 3, and 4; and 7035.2870, subpart 2;

J. temporary community cleanup event transfer facilities in compliance with part 7001.3050, subpart 2, item H, must only comply with parts 7035.2535, subpart 1; 7035.2565, subparts 1, 3, and 4; and 7035.2870, subpart 2; and

K. limited collection transfer facilities in compliance with part 7001.3050, subpart 2, item I, must only comply with parts 7035.2535, subpart 1; 7035.2555; 7035.2565, subparts 1, 3, and 4; and 7035.2870, subpart 2.

7035.2585 ANNUAL REPORT.

The owner or operator of a solid waste management facility shall prepare and submit a single copy of an annual report to the commissioner no later than February 1 for the preceding calendar year. A report form and instructions may be obtained from the commissioner. The annual report must cover all facility activities during the previous calendar year and must include the following information:

A. the permit number, name, and address of the solid waste management facility;

B. the year covered by the report;

C. the quantity of each type of waste handled at the solid waste management facility; D. the remaining capacity for storage or disposal of waste at the facility based on the amount of waste received and the original site capacity approved;

E. the rates charged at the solid waste management facility and anticipated changes in the rate for the next year;

F. the most recent closure cost estimate prepared under part 7035.2625, the most recent contingency action cost estimate under part 7035.2615, and, for land disposal facilities, the most recent postclosure cost estimate under part 7035.2645;

G. an assessment of the adequacy of the closure, postclosure, and contingency action plans;

H. the summary evaluation of the groundwater monitoring program required under parts 7035.2815, subpart 14, item Q; and 7035.2885, subpart 16;

I. the summary evaluation reports required for the specific solid waste management facilities in parts 7035.2825, subpart 9; 7035.2836, subparts 3, item G, 5, items J and K, and 11, item O; 7035.2845, subpart 4a; and 7035.2875, subpart 5;

J. the personnel training information required by part 7035.2545, subpart 1;

K. a certification by the owner or operator of the solid waste management facility; and

L. for transfer facilities or source-separated organic material composting facilities operating under an extended permit term, the information required in part 7001.3410, subpart 2.

Waste facilities that do not dispose of waste need not include items D, H, and I.

7035.2836 COMPOST FACILITIES.

Subpart 1. Scope. The owner or operator of a yard waste compost facility must

comply with subparts 2 and 3 only. The requirements of subparts 4 to 7 apply to the owner and operator of a facility used to compost solid waste, ~~including source separated compostables except as provided in part 7035.2525, subpar~~t 2. ~~The owner or operator of a yard waste compost facility must comply with subparts 2 and 3 only.~~ The owner or operator of a source-separated organic material composting facility as defined by part 7035.0300, subp. 38b must comply with subparts 6, 7, 8, 9 ,10, and 11.

[For text of subps. 2 to 7, see M.R.]

Subp. 8. Location requirements for a source-separated organic material composting facility. An owner or operator may not establish or construct a source-separated organic material composting facility in the following areas:

A. within locations described in 7035.2555;

B. on a site with karst features including sinkholes, disappearing streams, and caves; C. within five feet of a water table; and

D. unless specified otherwise by a local unit of government, within 500 feet of the nearest residence, place of business or public area, such as parks, wildlife areas, and public buildings, except as provided below:

(1) upon approval of the commissioner, operational modifications, geographic features, or other natural or man-made physical characteristics that reduce nuisance conditions (noise, litter and odor) may be used to reduce the 500 foot horizontal separation distance.

(2) the landowner's or operator's residence, plant nurseries and turf farms are excluded from the separation requirement for a residence for the purposes of this paragraph.

Subp. 9. Design requirements for a source-separated organic material ~~solid waste~~ composting facility. The owner or operator of a compost facility shall submit an engineering design report to the commissioner for approval with the facility permit application. The engineering report must comply with the design requirement in items A to ~~G~~I.

A. Site preparations must include clearing and grubbing for the compost operating and storage areas, building locations, topsoil stripping, excavations, berm construction, drainage control structures, ~~leachate~~ stormwater and contact water collection systems, access roads, screening, fencing, and other special design features.

B. Access to the facility must be controlled to prevent unauthorized entry. ~~by a~~ A perimeter fence and gate, ~~or~~ enclosed structures, or other physical barriers may be used to prevent unauthorized entry to the facility.

C. Surface water drainage must be diverted around and away from the site operating

area. The drainage control system must be designed to manage a 24-hour, 25-year storm event. A drainage control system, including changes in the site topography, ditches, berms, sedimentation ponds, culverts, energy breaks, and erosion control measures, must comply with part 7035.2855, subpart 3, items C to E. For the purposes of this subpart, water that has come into contact with compost in the curing and finished storage areas is considered surface water. For this subpart, compost has reached the curing stage after PFRP as described in subp. 11, item K has been achieved and the Solvita Maturity Index is greater than or equal to 4.

~~D. The composting, curing, and storage areas for immature compost must be located on a liner capable of minimizing migration of waste or leachate into the subsurface soil, groundwater, and surface water. The liner must have a permeability no greater than 1 x 10^{-7} centimeters per second and, if constructed of natural soils, be at least two feet thick. The liner~~ must comply with part 7035.2855, ~~subparts 3, item A; 4; and 5.~~

~~E. Liquid in contact with waste , immature compost, and residuals must be diverted to a leachate collection and treatment system. The leachate collection and treatment system must comply with part 7035.2855, subpart 3, item B, and the applicable portions of part 7035.2815, subpart 9, items B to K.~~

~~F. The facility must be designed for collection of residuals and must provide for the final transportation and proper disposal of residuals.~~

~~G. The facility must be designed and operated to control odors in compliance with the applicable provisions of any agency odor rules.~~

D. Liquid in contact with ~~waste~~ source-separated organic material, immature compost, and residuals must be diverted to a contact water ~~leachate~~ collection and treatment system. The ~~leachate~~ contact water collection a~~nd treatment system must comply~~ with part 7035.2855, subpart 3, item B, and ~~the~~ applicable portions of part 7035.2815, subpart 9~~, items B to K~~. For this subpart, immature compost is defined as not having reached the curing stage as described above in item C.

E. The facility must be designed for collection of residuals and must provide for the final transportation and proper disposal of residuals.

F. The tipping, mixing, active composting, curing, and storage areas for ~~immature~~ compost must be located on a ~~liner~~ hard-packed, all weather surface capable of minimizing migration of waste or ~~leachate~~ contact water into the subsurface soil, groundwater, and surface water. ~~The liner must have a permeability no greater than 1 x 10^{-7} centimeters per second and, if constructed of natural soils, be at~~ least two feet thick. The liner must comply with part 7035.2855, subparts 3, item A; 4; and 5.

G. The working surface of a source-separated organic material composting facility must have a minimum of five feet of soil separation to the groundwater.

H. Unless designed as allowed under item I of this subpart, the site must have at least five feet of any combination of the following soil types above the zone of continuous groundwater saturation: sandy clay loam, loam, silt loam, silt, sandy clay, clay loam, silty clay loam, clay, and silty clay. The commissioner may increase or decrease this separation distance based upon recent climatic conditions. Water tables classified as perched or epi-saturated by the Natural Resources Conservations Service are not considered to be the seasonal high water table. The soil profile shall be characterized by the use of soil borings, piezometers, and/or test pits as certified by a state of Minnesota licensed soil scientist, engineer or geologist. The commissioner may approve the use of soil surveys published by the Natural Resources Conservation Service, if the owner or operator can demonstrate that the soil surveys provide sufficient soil characterization. If the site cannot meet the soil criteria, an impervious pad or liner must be installed under all activity areas except curing and storage of finished compost.

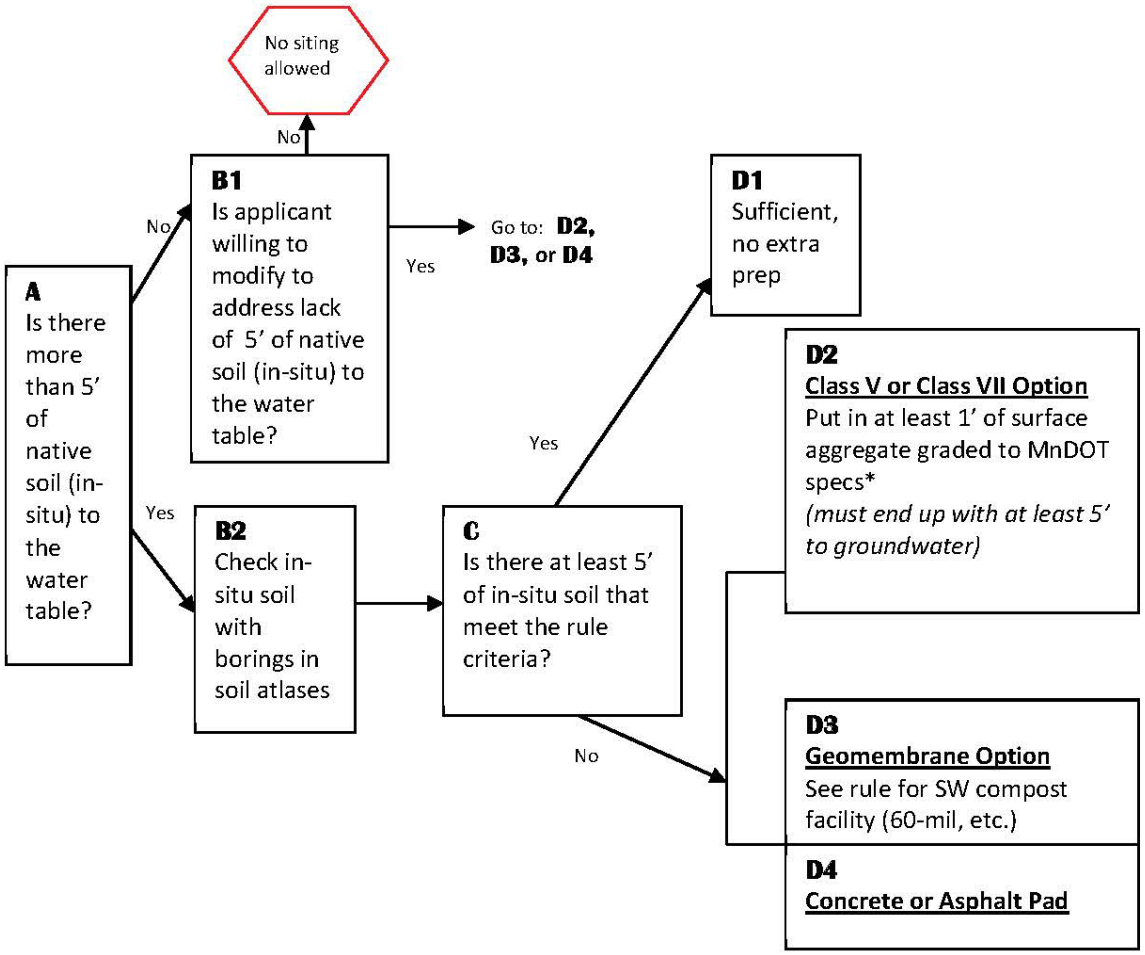
I. Sites unable to meet the soil requirement listed under item G of this subpart must install a pad system in all areas where source-separated organic materials will be managed and composted prior to curing. For this subpart, compost has reached the curing stage after PFRP as described in subp. 11, item K has been achieved and the Solvita Maturity Index is greater than or equal to 5 with an ammonia test result of greater than or equal to 4. Sites requiring a pad may utilize the options listed below:

1) If low permeability soils are used, the surface must be a minimum of one foot of dense-graded compacted soils meeting MnDOT specifications for surface aggregate. The aggregate must be placed in accordance with MNDOT construction specifications.

2) If a geomembrane is used, the liner system must be designed and built in accordance with the applicable criteria in part 7035.2815, subp. 7, item A. The surface must comply with part 7035.2855, subparts 3, item A; 4; and 5.

3) If a concrete or asphalt pads are used, the surface must meet MNDOT minimum standards for road design. The pad must be inspected routinely; any cracks, crumbling, and failure must be repaired immediately. The results of all inspections and repairs must be included in the annual report submitted to the commissioner.

[The following outlines intent of items G, H and I. It will not appear in rule, but will be part of SONAR.]



Subp. 10. Construction requirements for a source-separated organic material composting facility. The construction requirements in items A to F must be incorporated into the project specifications for all major design features, at a minimum:

A. The owner or operator must notify the commissioner at least ten days before the day construction is expected to begin on any major design features.

B. The construction firm's inspector must record all procedures completed during construction at a source-separated organic material compost facility. The record must document that design features were constructed in accordance with parts 7035.2525 to 7035.2915. This record must include pictures, field notes, and all test results.

C. The owner or operator must install a permanent benchmark on-site and show its location on the facility as-built plan.

D. The owner or operator must complete tests for compaction, grain size distribution, and field moisture density, at a minimum, for soil pads constructed at the facility.

E. Flexible membranes must be installed during dry conditions. The seams joining membrane panels must be inspected as construction proceeds. Seams must be air tested and
field seams must be tested for tensile strength. All flexible membranes must be protected after placement. The natural layer above and below the barrier layer must be free of roots, sharp
objects, rocks, or other items that might puncture the liner.

F. A quality control/quality assurance program must be established for all construction projects. The program must include the tests to be completed during construction. The program also must establish the frequency of inspection and testing, the accuracy and precision standards for the tests, procedures to be followed during inspections and sample collection, and the method of documentation for all field notes including testing, pictures, and observations.

Subp. 11. Operation requirements for a source-separated organic ~~solid waste~~ material composting facility. The owner or operator of a source-separated organic ~~waste~~ material composting facility shall submit an operation and maintenance manual to the commissioner for approval with the facility permit application. The manual must include a source-separated organic materials management plan, a personnel training program plan, a ~~leachate~~ contact water management plan, a stormwater management plan, an odor management plan, and a compost sampling plan ~~and must comply with the operation requirements in items A to L~~. The facility operations must meet the requirements in items A to P, at a minimum.

A. All access points must be secured when the facility is not open for business or when no authorized personnel are on site.

B. All ~~wastes~~ source-separated organic materials and compostable materials delivered to the facility must be confined to a designated delivery area and processed or removed ~~at least once a week~~ by the end of the day to prevent nuisances such as odors, vector intrusion, and aesthetic degradation.

C. All salvageable and recyclable materials must be containerized or stored and removed from the facility in a manner that prevents nuisances such as odors, vector intrusion, and aesthetic degradation.

D. All non-compostable residuals must be stored to prevent nuisances such as odors, vector intrusion, and aesthetic degradation. ~~The residuals musts be removed and properly disposed of at least once a week.~~ All residuals must be managed to prevent contact water. All contact water from residuals and residuals storage areas must be diverted to the contact water collection and treatment system.

E. ~~. The leachate management plan must describe how the facility will store, reuse, or dispose of collected leachate. If leachate is to be recirculated into the compost, it must be~~

~~added prior to initiating~~ ~~the PFRP process described in item I.~~ Liquid that has come in contact with waste, immature compost, and residuals must be diverted to a collection and treatment system.

F Contact water or ~~storm water~~ stormwater may be reused in the compost process. It must be added to the source-separated organic materials prior to initiating the PFRP process described in item K. Any water to be discharged into waters of the state must meet all Federal and State NPDES requirements.

G The facility must operate and maintain a ~~Surface water~~ drainage system to ~~must be~~ divert~~ed~~ surface water around and away from the site operating area. ~~A drainage control system, including changes in the site topography, ditches, berms, sedimentation ponds, culverts, energy breaks, and erosion control measures, must comply with part 7035.2855, subpart 3, items C to E. For the purposes of this subpart, storm water that has come in contact with compost in the curing and finished storage areas is considered surface water.~~

H. ~~Odors emitted by the facility must comply with any applicable agency odor rules.~~ Source- separated organic material composting facilities within designated non-attainment areas for the criteria pollutant Ozone as designated by the Federal Clean Air Act, facilities and defined in part 7035.2836, must use best management practices (BMP) to mitigate the release of reactive volatile organic compounds (VOC).

I. The owner or operator must cover or otherwise manage the waste to control wind dispersion of any particulate matter.

J. The owner or operator must develop and maintain a source-separated organic material management plan. The plan must, at a minimum:

1. include a waste analysis plan to characterize source-separated organic materials prior to acceptance at the facility;
2. identify the area of the facility where source-separated organic materials will be delivered; and
3. describe management methods to be employed when source-separated organic materials are delivered to the facility. The management methods must address reducing odor, vectors, managing liquids and mixing source-separated organic materials to achieve the proper moisture content, carbon to nitrogen ratio (C:N ratio), porosity and pH. Acceptable source-separated organic materials are defined in 7035.0300, subp. 105a and acceptable bulking agents include untreated wood waste, non-recyclable paper, ground tree and shrub materials and other similar materials approved by the commissioner.

K. Compost must be produced by a process to further reduce pathogens (PFRP). The temperature and retention time for the material being composted must be monitored and recorded each working day until PRFP is achieved, and weekly thereafter. Each time temperature is measured, it must be measured before turning the pile and after turning the pile. Three acceptable methods of a PFRP are described in subitems (1) to (3):

(1) The static passive windrow method for reducing pathogens consists

of an unconfined composting process involving periodic aeration and mixing. Construction of passive windrow shall include a minimum of 12 inches of porous materials at the base of each windrow that promotes aerobic conditions within the windrow. Blended source-separated organic materials may be placed on top of the porous material to a maximum height of 12 feet. Aerobic conditions must be maintained during the compost process. A temperature of 55 degrees Celsius must be maintained in the windrow for at least ~~three weeks~~fifteen days. The windrow must be turned at least once every three to five days.

(2) The static aerated pile method for reducing pathogens consists of an unconfined composting process involving mechanical aeration of insulated compost piles. Windrow height shall not exceed 12 feet. Aerobic conditions must be maintained during the compost process. The temperature of the compost pile must be maintained at 55 degrees Celsius for at least seven days.

(3) The enclosed vessel method for reducing pathogens consists of a confined compost process involving mechanical mixing of compost under controlled environmental conditions. The retention time in the vessel must be at least 24 hours with the temperature maintained at 55 degrees Celsius. A stabilization period of at least seven days must follow the enclosed vessel retention period. Temperature in the compost pile must be maintained at

L. The owner or operator must comply with subp. 5, item J. Additionally, for Class I compost, the owner or operator may request removal of mercury (Hg) and polychlorinated biphenyls (PCB) sampling and testing requirements based on five years of sampling batch data. The data must demonstrate non-detect results for Hg and PCB. In addition to Subp. 6, B (1) and (2), the Commissioner may require testing with changes in source- separated organic materials accepted.

M The owner or operator of a source-separated organic material composting facility must develop and maintain an odor minimization plan detailing the best management practices to be used during normal operations to prevent odors. These BMPs must address how the oxygen levels and porosity will be managed to minimize odors. The plans should detail how the facility will handle odor complaints and the steps that would go beyond normal operations should the facility receive persistent complaints. At a minimum the odor minimization plan should address best management practices to minimize odor generation in the mixing/tipping areas, active compost processing areas, contact and stormwater ponding areas.

N. The personnel training program ~~plan~~ must address the requirements of part 7035.2545, subparts 3 and 4, and the specific training needed to operate a source-separated organic material compost facility in compliance with this subpart and subparts 6 and ~~7~~10. Personnel training for a source-separated organic material composting facility shall include a training schedule that:

(1) provides a initial 24 contact hour training session within 12 months of employment; and

(2) provides five contact hours of training on an annual basis.

A contact hour means a pertinent instructional or training session of 50 minutes. The agency commissioner shall prepare and make available to the operators and inspectors a list of accredited training courses and approved educational activities for which credit may be obtained. Approval by the Commissioner shall be based on whether the following content criteria are met: topics such as the compost process, composting methods, facility operations, odor control, source-separated organic materials management or other topics related to the best management practices of operating a compost facility are addressed.

O. The owner or operator of a source-separated organic material facility must submit an annual report in accordance with subp. 5, item K. The annual report must be submitted on a form prescribed by the commissioner. For source-separated organic material composting facilities, the annual report must include the county of origin and volume of source-separated compostable materials received.

P. If for any reason, the facility becomes inoperable, the owner or operator of the facility must notify the commissioner within 48 hours and implement the contingency action plan developed under part 7035.2615.

Appendix K
Hennepin County – Brooklyn Park Transfer Station:
List of Acceptable / Unacceptable Organic Materials

Appendix K

Table K-1

Hennepin County – Brooklyn Park Transfer Station:

List of Acceptable / Unacceptable Organic Materials

Facility	Acceptable	Unacceptable
Hennepin County – Brooklyn Park Transfer Station	♦ All food scraps – including meat & bones ♦ Food-soiled and non-recyclable paper products: ▸ Paper napkins, paper towels, & tissues ▸ Paper plates, cups, food containers ▸ Paper bags & waxed paper (fast food wrappers, parchment paper, etc.) ▸ Paper milk & juice cartons (remove plastic spounts – NO juice boxes or pouches) ▸ Pizza boxes and boex ▸ Coffee filters (and grounds), tea bags ♦ BPI-certified compostable plastic[12] ♦ Other compostable items: ▸ Paper vacuum bags, dryer lint, human and pet hair ▸ Wooden toothpicks, ice cram & corn dog sticks, chop sticks ▸ Cotton balls ▸ House plants ♦ Halloween pumpkins (special guidelines apply to allow seasonal acceptance of pumpkins from November 1-17 each year).	♦ Yard waste – leaves, branches, sticks ♦ Non-compostable plastic: ▸ Baggies, bags, wrapping film* ▸ Food containers ▸ Utensils, cups, bottles, plates, bowls, ▸ "Styrofoam" (expanded polystyrene): trays, food containers, cups, bowls, plates ♦ Recyclable items: ▸ Glass ▸ Metal ▸ Recyclable paper – Newsprint, mail, office and school papers, cardboard, boxboard ♦ NO juice boxes or pouches

Sources: Hennepin County "Organics" web page[13]

[12] Biodegradable Products Institute (BPI) lists of products certified to be biodegradable in a managed composting facility: http://www.bpiworld.org/BPI-Public/Approved/1.html

[13] Hennepin County "Organics" web page: http://www.hennepinatoz.org/azguide/item/302

Appendix L
SET / The Mulch Store:
List of Acceptable / Unacceptable Organic Materials

Appendix L

Table L-1

SET / The Mulch Store:

List of Acceptable / Unacceptable Organic Materials

Facility	Acceptable	Unacceptable
SET – Empire	♦ All FOOD scraps ♦ All grass, leaves, yard trimmings, plant trimmings ♦ All non-recyclable PAPER products: ▸ Napkins, paper towels, & food containers ▸ Paper milk & juice cartons ▸ Paper bags & waxed paper (fast food wraps, etc.) ▸ Coffee grounds, filters, tea bags ▸ Pizza boxes ♦ All compostable products as certified by the Biodegradable Products Institute (www.BPIWorld.org)	♦ Plastics of any kind: ▸ Plastic bottles ▸ "Styrofoam" (expanded polystyrene) ♦ Foil ♦ Condiment packets ♦ Chip bags & candy wrappers

Sources: The Mulch Store web page[14]
SET's training/education Power Point by Anne Ludvik (as of 1-14-2011)

[14] SET / The Mulch Store web page: http://www.mulchstoremn.com/organics.html

Appendix M
Shakopee Mdewakanton Sioux Community (SMSC) – Organics Recycling Facility (ORF):
List of Acceptable / Unacceptable Organic Materials

Appendix M

Table M-1

Shakopee Mdewakanton Sioux Community (SMSC) – Organics Recycling Facility (ORF): List of Acceptable / Unacceptable Organic Materials

Facility	Acceptable	Unacceptable
Shakopee Mdewakanton Sioux Community (SMSC)	Any clean organic material, including ♦ Food wastes from households to large industrial providers ♦ Fruits ♦ Vegetables ♦ Table scraps ♦ Meat ♦ Yard wastes: ▸ Grass ▸ Garden plants ▸ Leaves ▸ Vines ▸ Brush ▸ Logs / stumps ♦ Wood chips ♦ Straw ♦ Sod ♦ Landscaping soils ♦ Livestock manure	♦ Trash ♦ Plastic ♦ Rocks ♦ Treated, painted or stained wood ♦ Metal ♦ Glass ♦ Any hazardous materials "Facility managers reserve the right to reject or ban any load or hauler that knowingly brings unacceptable materials to the ORF. We will regularly test incoming material for unseen contaminants such as herbicides and other products that could affect compost quality."

Source: SMSC – ORF web page[15]

[15] Shakopee Mdewakanton Sioux Community (SMSC) – Organics Recycling Facility (ORF) web page: http://www.smscorf.com/

Appendix N
Suggested Guidelines for the Design of
Any SSO Transfer Station / Processing Facility in Minneapolis

Appendix N
Suggested Guidelines for the Design of Any SSO Transfer Station / Processing Facility in Minneapolis

The following are generic, suggested guidelines for the future design, planning and operations management of any SSO transfer / processing facility that may be located in Minneapolis. These guidelines are purposely generic and will need to be further refined to be customized to the specific conditions, permit requirements and other local approvals of individual SSO facility proposals that may come forward.

1. A very clear, tightly worded SSO specification should be adopted by the owner and operators (i.e., detailed list of "acceptable" and "unacceptable" materials). If this list varies from the Minneapolis SSO program collection specification, the City should review, comment and approve the variance in the SSO specification.

2. The material should be transferred out in leak proof end dumps.

3. The City may wish to require that the material not sit at the transfer station for any longer than 24 hours. The City may wish to require that loads should not be received on weekends.

4. The tipping floor should preferably be constructed of sealed, impervious concrete sloped to a floor drain. The floor drain should have adequate capacity and design to handle liquids and semi-solid food waste (i.e., sludge-like consistency).

5. Any organic/food waste liquids should not be allowed to sit in puddles. Operators should push the liquids into the floor drain.

6. Any liquid materials from the SSO should immediately be blended with dry, carbon bulking material (e.g., leaves, wood chips, shredded non-recyclable paper).

7. The tipping floor, bunkers and any transfer trailers (end dumps) should be entirely cleaned and washed down at least once per week if not daily. This means the transfer station area should be entirely emptied (e.g., Friday afternoon or Saturday morning).

8. Any transfer station considered should have a sealed concrete storage bunker.

9. The push walls / bunker barricades should preferably be made of concrete and preferably permanent or otherwise designed and constructed to avoid crevices where liquids or organics can accumulate. Permanent push walls should be 10 to 12 feet high.

10. The corner of the tipping floor and temporary bunker barricades should be sealed in some manner to prevent "nooks and crannies" for fugitive food waste and liquids to be lodged into. I.e., the bunker wall/floor design and installation should make cleaning as easy as

possible (e.g., so that the barricades do not have to be moved for cleaning the behind or underneath).

11. Ideally, the transfer station tipping area, storage bunkers and trailer bays would be in an enclosed building.

12. Any transfer station considered should have a storm water management plan that will allow SSO/food waste and any run off to be contained and treated (e.g., aerated or pumped and removed) as necessary.

13. Other measures should be taken to control odors.

Appendix O
Preliminary Analysis of Environmental Impacts: Methods, Models and Assumptions

Appendix O
Preliminary Analysis of Environmental Impacts

Methods, Models and Assumptions

Foth conducted a preliminary analysis of environmental impacts using two different models to estimate the relative greenhouse gas (GHG) emissions for each SSO option: WARM and MPCA's Collection Analysis Tool. Both models help provide approximate estimates of the metric tonnes of carbon dioxide equivalents ($MTCO_{2e}$) emitted as GHG. The quantitative results are shown either as an increase in $MTCO_{2e}$ over the baseline waste management scenario or as a decrease as a "savings" or reduction in the amount of $MTCO_{2e.}$

This preliminary GHG analysis used the four SSO collection options outlined in Section 4 of the report:

- **<u>No SSO Sorting or Separate Collections</u> (Option #1)**
  No separation by residents or separate collection. The organic waste is commingled with other MSW and collected as garbage for energy recovery in the County's HERC facility. (This Option #1 was defined as the "baseline" waste management scenario for purposes of the GHG analysis.)

- **<u>Collect SSO Alone</u> (Option #2)**
  Separate from any other materials. Separate collection and composting of SSO as per the current pilot operations (except that the SSO is transferred to the City of Minneapolis North Transfer Station instead of the County's Brooklyn Park Transfer Station).

- **<u>SSO with Yard Waste</u> (Option #3.a and #3.b)**
  Collect commingled with yard waste **(Option #3.a)** or in *Blue Bag™* within the yard waste **(Option #3.b)**.

- **<u>SSO with MSW</u> (Option #4)**
  Collect in *Blue Bags™* within the mixed solid waste for later separation and recovery.

Option #1 was defined as the "baseline" waste management scenario for purposes of environmental impact modeling. The alternative SSO collection options (#2 through #4) were then compared to this baseline scenario in terms of impacts on $MTCO_{2e}$ increases or decreases. The environment impact estimates were derived from three operational components of each of the collection system options:

- Route truck emissions (if the option includes additional trucks).

- Transport of the SSO to more distant organics composing facilities (e.g., via larger trucks using a transfer station).

- GHG savings due to composting compared to combustion with energy recovery.

WARM Model

The Waste Reduction Model (WARM) was created by the U.S. Environmental Protection Agency (EPA) to estimate GHG emission reductions from several different waste management practices.16 WARM was used to calculate GHG emissions for this study for the second two components of the SSO collection options: transfer and composting. EPA developed the WARM model using GHG emission factors after careful analysis of life-cycle assessments of each solid waste management alternative. The alternatives compared in this study are combustion with energy recovery at HERC (the base scenario) vs. composting at a more remote organics processing/composting/marketing facility.

The most significant change in GHG emissions would have been shown if landfilling had been the base scenario. In WARM, the savings in GHG emissions by changing to combustion with energy recovery from landfilling are much greater than the environmental benefits when changing from combustion to composting. This later system change is the focus of this study but the greater savings in moving from landfilling to combustion is shown for comparative purposes.

Tonnage Assumptions

The tonnage assumption used in the WARM model associated with SSO, yard waste and MSW was from Table 4-2 in the full *Minneapolis Organics Study* report. Table O-1 below is a summary of those tonnage assumptions excerpted from Table 4-2 of the report. Note that all mixed MSW is combusted for energy recovery at HERC and all yard waste and SSO is composted.

Table O-1
Tonnage Assumptions Used for WARM Modeling of GHG Impacts
(Excerpt of Table 4-2 from *Minneapolis Organics Study* report)

	Option Number:	**1**	**2**	**3.a**	**3.b**	**4**
	Option Title:	**No SSO Collections**	**SSO Alone**	**SSO + YW No *Blue Bag*™**	**SSO + YW With *Blue Bag*™**	**SSO + MSW With *Blue Bag*™**
Tons of SSO per Year	(Tons per Year)	n.a.	7,913	7,913	7,913	7,913
Tons of Yard Waste per Year	(Tons per Year)	17,500	17,500	17,500	17,500	17,500
Tons of mixed MSW per Year	(Tons per Year)	86,000	78,088	78,088	78,088	78,088
TOTAL	**(Tons per Year, rounded)**	**103,500**	**103,500**	**103,500**	**103,500**	**103,500**

[16] The WARM model and background information is available on EPA's website at: http://www.EPA.gov/warm.

WARM Material Definitions

EPA has established standard, national definitions for waste materials and recyclables used in their WARM model[17] as follows:

- **Food Scraps**– Food scraps consist of uneaten food and wasted, prepared food from residences, commercial establishments such as grocery stores and restaurants, institutional sources such as school cafeterias, and industrial sources such as factory lunchrooms.

- **Yard Trimmings** – Yard trimmings are assumed to be 30 percent grass, 40 percent leaves, and 30 percent tree and brush trimmings from residential, institutional, and commercial sources.

- **Grass** – Grass consists of grass clippings from residential, institutional and commercial sources.

- **Leaves** – Leaves consist of fallen leaves from deciduous trees recovered from residential, institutional and commercial sources.

- **Branches** – Branches are assumed to be the woody clippings from trees and brush from residential, institutional and commercial sources.

- **Mixed Organics** – Mixed organics are made up of 48 percent food scraps and 52 percent yard trimmings. (See detailed definitions above.)

- **Mixed MSW** – Mixed MSW (municipal solid waste) comprises the waste materials typically discarded by households and collected by curbside collection vehicles; it does not include white goods (e.g., refrigerators, toasters) or industrial waste.

A limitation of the WARM model is that the analysis must select from these standard materials categories and definitions. Customizing the definition of the materials (e.g., changing the composition of "mixed organics") to reflect local definitions and materials specifications is not possible. Foth used "mixed organics" as per the WARM model definitions to approximate the equivalent of SSO as defined in this study. WARM does not have a material category or definition for "non-recyclable residential paper". Nor does WARM allow the user to change the definition of "mixed organics" to substitute yard trimmings for mixed residential paper.

This inability of WARM to be customized is a limitation for this preliminary GHG analysis. However, the relative comparison of GHG savings of combusting mixed organics vs. composting mixed organics should be valid even without the ability to customize the model to accommodate the Minneapolis definition of SSO instead of the WARM definition of mixed organics.

[17] EPA's standard category definitions for materials used in the WARM model: http://epa.gov/epawaste/conserve/tools/warm/materials.html?width=750 (as downloaded on June 23, 2013)

Mileage Assumptions

The mileage for transporting the various streams becomes a critical variable for this GHG analysis. The following assumptions were used by Foth for the WARM modeling:

- **Option #1 –** All mixed MSW (including residential food waste without any source separation) is hauled directly from the residential routes to HERC in downtown Minneapolis via standard packer trucks. For purposes of establishing this as the baseline waste management scenario, the haul distance to HERC is assumed to be zero additional miles.

- **Option #2 –** SSO is collected separately and hauled to the Minneapolis North Transfer Station which is approximately 2 miles from downtown Minneapolis, one way. The SSO is then transferred from this North Transfer Station to a more remote organic waste composting facility. For this preliminary GHG analysis, the SET – Empire composting facility near Rosemount was used as a placeholder assumption for the composting facility. The SET – Empire composting facility is approximately 35 miles from the North Transfer Station, one way. The remaining mixed MSW is hauled directly to HERC in the same manner as Option #1 (i.e., assumed to be zero additional miles).

- **Option #3.a.** – SSO is commingled with yard waste and hauled to a transfer station within the City of Minneapolis for processing and/or transfer. For this preliminary GHG analysis, the SKB – Malcolm transfer station in south east Minneapolis was used as a placeholder assumption for the processing and transfer facility for options #3.a, #3.b and #4. This is SKB – Malcolm transfer station is assumed to take an additional seven (7) route miles for the SSO (compared to 14 miles to the BPTS in Option #2). Residential yard waste collected by or on behalf of the SW&R Division is already hauled directly to SKB – Malcolm so this portion of the commingled SSO + YW route truck miles is already accounted in the baseline scenario.

  The processed (i.e., shredded) SSO + YW would be hauled to SET – Empire (approximately 28 miles away) in commingled form during the five months of the out EAB flight season (May through September) when the material is required to be ground up due the MDA quarantine. During the other three months of the yard waste season (April, October, and November) the commingled material could be transported to SET – Empire in bulk form without processing. SSO collected alone during the other four winter months (December, January, February, and March) would be transferred from SKB – Malcolm in straight loads of SSO to SET – Empire.

- **Option #3.b.** – SSO is co-collected with yard waste in *Blue Bags*™. The route truck and transfer mileage assumptions are the same as Option #3.a. However, it is recognized there will be some processing, logistics and composting efficiencies gained due to the manual separation and then separate handling/transport of the SSO in *Blue Bags*™. For example, straight loads of SSO in *Blue Bags*™ would be hauled to SET – Empire in Option #3.b year round, even during the five months of the EAB flight season.

- **Option #4** – SSO is co-collected with mixed MSW in *Blue Bags*^{TM}. The route truck mileage is assumed to be an additional seven (7) miles for the co-collected SSO + mixed MSW. For this preliminary GHG analysis, the SKB – Malcolm transfer station in south east Minneapolis was again used as a placeholder assumption for the processing and transfer facility. The SSO in *Blue Bags*^{TM} is manually removed from the mixed MSW and then transferred in straight loads of SSO *Blue Bags*^{TM} to SET – Empire (approximately 28 miles). The remaining mixed MSW would then need to be transferred to HERC in downtown Minneapolis (approximately 7 miles).

WARM GHG Emission Factors

In WARM, GHG emission factors are developed through comprehensive life-cycle analyses including the environmental impacts of end-of-life disposal method: landfilling, combustion, recycling, composting, etc. The WARM tool is based on a life-cycle approach, which reflects emissions and avoided emissions upstream and downstream from the point of use. As such, the emission factors provided in these tools provide an account of the net benefit of these actions to the environment.

Table O-2 (see next page) displays the GHG emission factors for each of the organic materials as defined by the EPA as part of the WARM model. Table O-2 is derived directly from the WARM model. The following are per ton estimates of GHG emissions per management method, by material type. Numbers in parenthesis indicates a reduction in GHG emissions. Table O-2 also displays the percent change: "Combustion Over Landfilling" and "Composting Over Combustion" as a means to display relative significance of these two waste management methods by material. Minnesota was selected as the model region to account for the avoided electricity-related emissions with landfilling and combustion management methods. EPA assigns the appropriate regional "marginal" electricity grid mix emission factor based on your location.

The most significant environmental benefits in terms of GHG emission reductions are derived from changing from landfilling to combustion of: grass (177 percent), mixed organics (164 percent), and food scraps (123 percent). These are national averages and but can be used to approximate the Minneapolis and Minnesota situation. This study is focused on the environmental costs and benefits from changing from combustion (i.e., waste to energy at HERC) to composting (e.g., via transfer to SET – Empire). The most significant environmental benefits in terms of GHG emission reductions are derived from changing from combustion to composting of food scraps (25 percent) and mixed organics (11 percent), again using national averages. This is due to the high moisture in these materials and their significant value as "carbon sinks" when composted for use a soil amendments. Using national EPA data, there is no net change from the composting of yard trimmings, grass, leaves and branches compared to combustion.

Table O-2
GHG Emission Factors from WARM Model[18]:
Per Ton Estimates of GHG Emissions for Alternative Management Scenarios

(In MTCO2e per Ton of Material)

Material	GHG Emissions per Ton of Material Landfilled ($MTCO_2E$)	GHG Emissions per Ton of Material Combusted ($MTCO_2E$)	GHG Emissions per Ton of Material Composted ($MTCO_2E$)	% Change Combustion Over Landfilling	% Change Composting Over Combustion
Food Scraps	0.69	(0.16)	(0.20)	123%	25%
Yard Trimmings	(0.16)	(0.20)	(0.20)	-27%	0%
Grass	0.26	(0.20)	(0.20)	177%	0%
Leaves	(0.56)	(0.20)	(0.20)	65%	0%
Branches	(0.73)	(0.20)	(0.20)	73%	0%
Mixed Organics	0.28	(0.18)	(0.20)	164%	11%

Source: EPA WARM Model

Summary of WARM Model Results

Table O-3 displays the summary results of the WARM modeling. Each collection option scenario was modeled with tonnage and mileage assumptions listed above. The baseline scenario (Option #1 without any SSO collections and all mixed MSW processed at HERC) needed to be modeled both without yard trimmings (#1.a) and with yard trimmings (#1.b) for purposes of comparison to the SSO collection options. The total amount of GHG gases for Option #1.a (without yard trimmings) is estimated at a reduction of (10,804) $MTCO_{2e}$ per year for this first baseline scenario. The total amount of GHG gases for Option #1.b (with yard trimmings) is estimated at a reduction of (14,226) $MTCO_{2e}$ per year for this second baseline scenario.

Table O-3 displays that Option #2 (SSO collected separately, alone) has total estimated GHG emissions at a reduction of (10,899) $MTCO_{2e}$ per year. When compared to the baseline scenario Option #1.a (10,804), the change is an additional reduction of (119) $MTCO_{2e}$ per year.

Options #3.a. and #3.b (SSO collected with yard waste) both have total estimated GHG emissions at (14,347) $MTCO_{2e}$ per year. When compared to the baseline scenario Option #1.b (14,226), the change is an additional reduction of (121) $MTCO_{2e}$ per year.

Option #4 (SSO co-collected with mixed MSW in *Blue Bags*™) has total estimated GHG emissions at a reduction of (10,771) $MTCO_{2e}$ per year. When compared to the baseline scenario Option #1.a (10,804), the change is an increase in GHG emissions of 33 $MTCO_{2e}$ per year. This is in part due to the increased amount of fuel consumption and truck emissions needed to

[18] U.S. EPA WARM model as downloaded on June 24, 2013, *"Per Ton Estimates of GHG Emissions for Alternative Management Scenarios"*: http://www.epa.gov/epawaste/conserve/tools/warm/downloads/WARM.zip

transport the co-collected SSO with mixed MSW to the transfer / processing facility (seven miles, one way).

Table O-3
GHG Emission Estimates from WARM Model:
Total vs. Change Compared to Baseline Scenario

(In MTCO2e reduction)

Scenario	**Total**	**Change from Baseline Scenario Option**
Option #1.a (without yard trimmings)	(10,804)	n.a.
Option #1.b (with yard trimmings)	(14,226)	n.a.
Option #2	(10,923)	(119) [(a)] Compared to baseline scenario Option #1.a (without yard trimmings)
Option #3.a & #3.b	(14,347)	(121) [(b)] Compared to Option #1.b (with yard trimmings)
Option #4	(10,771)	33 [(c)] Compared to baseline scenario Option #1.a (without yard trimmings)

Source: Foth analysis using EPA WARM Model
Notes:
(a) Option #2 GHG compared to Option #1.a: (10,923) – (10,804) = (119)
(b) Options #3.a and #3.b GHG compared to Option #1.b: (14,347) – (14,226) = (121)
(c) Option #4 GHG compared to Option #1.a: (10,771) – (10,804) = 33

MPCA Collection Study – Model of GHG Emissions

In 2009, Foth prepared a study for MPCA entitled, *Analysis of Waste Collection Service Arrangements*[19]. As one part of this MPCA collection study, Foth analyzed the environmental impacts of open hauling systems vs. contract systems. Open hauling systems allow residents to subscribe to the licensed hauler of their choice and generally result in multiple haulers serving the same geographic area. Contract or "organized" hauling systems require 100 percent of the route to be served by only one hauler. Open hauling systems have additional route truck miles traveled and fuel consumed that contributes to GHG emissions due to the multiple haulers serving the same geographic area. As the percentage of the number of households served/collected (or "route density") increases, there is greater efficiency in collection and less drive time (time spent driving without performing collections). This same efficiency relative to route density can be compared to the level of subscription to the City's SSO program.

To estimate these fuel efficiencies for the MPCA *Collection* study, Foth measured fuel consumption for collection services while actually on a collection route. This data allowed Foth to determine the amount of fuel used per household collected. To estimate GHG emissions, a CO_2 emission factor of 10.15 kg CO_2 per gallon of diesel fuel (22.38 pounds of CO_2 per gallon)

[19] MPCA report, *Analysis of Waste Collection Service Arrangements* prepared by Foth Infrastructure & Environment, LLC (June 2009): http://www.pca.state.mn.us/index.php/view-document.html?gid=4514

was used based on an EPA technical reference[20]. This factor is used for all on-road diesel fuel miles.

As part of the MPCA *Collection* study, Foth prepared an Excel spreadsheet tool to determine an estimate of GHG savings based on the following variables:

- The number of single family households receiving curbside collection service.
- Total distance driven.
- Calculated distance per household.
- Calculated fuel consumption rates in the spreadsheet tool.

The spreadsheet tool then calculates the total annual fuel consumption and total annual $CO_{2e.}$

Summary of GHG Emissions from the MPCA Collection Model and Net GHG Emissions

Table O-4 displays the results of the MPCA collection model, the WARM model (from Table O-3 above) and the net impact of GHG emissions. The net impact is the sum of these two GHG emission estimates.

The appropriate data for the Minneapolis solid waste system base scenario (Option #1 without any SSO collection) were input to this MPCA spreadsheet tool. The model estimates that the City solid waste system generates about 161 $MTCO_{2e}$ per year. This Option #1 becomes the base scenario and therefore GHG emission increases are not applicable (n.a.).

The appropriate data for the Minneapolis SSO Option #2 were then also input to the MPCA spreadsheet tool (e.g., 40% subscription rate or 42,200 subscribing households) indicating that an additional 407 $MTCO_{2e}$ per year would be emitted due to the separate SSO trucks. The WARM model estimates an additional reduction due to composting of the SSO (after transfer) is (119) $MTCO_{2e}$ per year. Thus, the net impact is an additional 288 $MTCO_{2e}$ per year.

Table O-4
Net GHG Emission Estimates from MPCA and WARM Models:
In MTCO2e per year increase (reduction)

		SSO Collection Options			
	Option #1	Option #2	Option #3.a	Option #3.b	Option #4
MPCA model results GHG emission increases	n.a.	407	136	136	0
WARM model results GHG emission increase or (reductions)	n.a.	(119)	(121)	(121)	33
NET Impact	n.a.	288	15	15	33

Sources: Foth analysis using MPCA model
Foth analysis using EPA WARM Model (See Table O-3)

[20] Climate Leaders Greenhouse Gas Inventory Protocol Care Module Guidance, Direct Emissions from Mobile Sources, EPA 430-K-08-004, (May 2008)

The appropriate data for the Minneapolis SSO Options #3.a and #3.b were then also input to the MPCA spreadsheet tool indicating that an additional 136 $MTCO_{2e}$ per year would be emitted due to the additional trucks collecting separate SSO during the winter months. The WARM model estimates an additional reduction due to composting of the SSO (after transfer) is (121) $MTCO_{2e}$ per year. Thus, the net impact is only an additional 15 $MTCO_{2e}$ per year. The increase in GHG emissions due to the additional trucks necessary for collection is almost offset by the GHG emission savings associated with composting this material rather than combusting it.

Note that SSO Option #4 (SSO co-collected with mixed MSW in *BlueBags*™) has no additional GHG emissions because no additional route truck trips are needed. The WARM model estimates additional GHG emissions due to composting of the SSO (after transfer) and transfer of the mixed MSW is 33 $MTCO_{2e}$ per year as stated above and in Table O-3. Thus, the net impact is an additional 33 $MTCO_{2e}$ per year.

In summary, Option #2 has the highest GHG net impact at an estimated 288 $MTCO_{2e}$ per year. Options #3.a. and #3.b have the lowest GHG net impacts at an estimated 15 $MTCO_{2e}$ per year. Option #4 has the next lowest net impact at 33 $MTCO_{2e}$ per year. The additional impacts of Option #4 are due in part to the need to retransfer all mixed MSW back to HERC after sorting out the *BlueBags*™ of SSO.