



CITY OF MADISON SOLID WASTE PLAN: *ON THE ROAD TO ZERO WASTE*

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Contents

Section 1 – Introduction.....	1
1.1 Why a Zero Waste Plan?.....	1
1.2 Population and Solid Waste Trends	1
1.3 Solid Waste Goals	1
Section 2 – Current Services	2
2.1 Residential and Commercial Refuse Collection.....	2
2.2 Curbside Recycling.....	3
2.3 Large Item Collection.....	3
2.4 Curbside Brush, Leaf Collection, and Yard Waste Drop Off Sites.....	4
2.5 Waste Oil Recycling	4
2.6 Waste Reduction Outreach Programs.....	4
2.7 Dane County Services	5
Section 3 – Current Facilities	6
3.1 Waste Transfer Stations	6
3.2 Full Service Drop-Off Sites	6
3.3 Material Recycling Facilities	6
3.4 Dane County Rodefild Landfill	7
3.5 Dane County Compost Sites	7
Section 4 – Waste Disposal Options Analysis	8
4.1 Refuse Disposal Options.....	8
4.2 Increasing Organics Diversion with Anaerobic Digestion.....	11
4.3 Increasing Recycling Collection and MRF Opportunities.....	14
4.4 Expanding Full Service Drop-Off Sites	14
4.5 Transfer Station Options	15
4.6 Expanding Other City Services.....	15
4.7 Product Bans.....	15
4.8 Product Stewardship	15
Section 5 – Waste Disposal Recommendations.....	17
5.1 Goal: Secure a cost-efficient landfill disposal option	17
5.2 Goal: Divert organics from the landfill waste stream	17
5.3 Goal: Increase waste reduction and landfill diversion efforts	18
5.4 Goal: Respond to customer and community needs	18

Tables

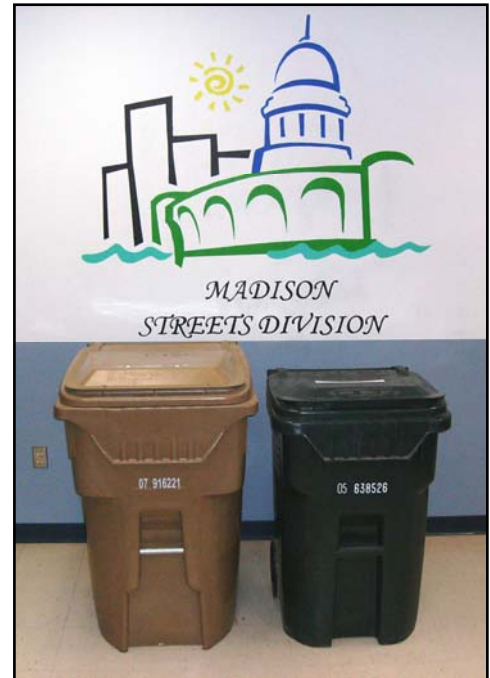
- 1 Summary of Solid Waste Materials Collected from 2007 thru 2011
- 2 Rodefild Landfill Expansion Stages
- 3 Landfill Refuse Disposal Cost Comparison of Hauling to a Different Landfill

Section 1 – Introduction

1.1 Why a Zero Waste Plan?

The City of Madison is moving towards a goal of zero waste. That goal means that Madison would send no waste to a landfill or incinerator, and it presents a huge challenge. Is it possible for a community to eliminate all of its waste? Who knows? But, there is a saying among those working for zero waste, “If you are not for zero waste, how much waste are you for?”

The purpose of this solid waste plan update is to review our past plans, evaluate regulatory changes, evaluate new technology, look for areas of increased cooperation with Dane County and surrounding communities, and offer plans and recommendations regarding feasible options for reaching a zero waste future.



1.2 Population and Solid Waste Trends

Based on data from the 2010 Census, Madison’s population is projected to increase by 20,400 people over the next five years, a 9.5 % increase. In response, the City is expected to add approximately 8,400 new dwelling units in the next five years, balanced geographically across the City. Currently, the City collects approximately 50,000 tons of solid waste annually. Based on the population projections and current waste generation rates, the City can expect to handle 55,000 tons of solid waste annually by 2015 and 60,000 by 2018. These amounts reflect only materials collected by the Streets Division, and do not include private haulers.

These projections assume that the economy will continue to improve. If they are accurate, the expected growth will require the Streets Division to redraw waste collection routes and expand some City services.

1.3 Solid Waste Goals

City staff, in partnership with regional solid waste managers, elected officials, and state and university experts, propose the following solid waste goals:

- Secure cost-efficient landfill disposal options
- Divert organics from the landfill waste stream
- Increase recycling and waste reduction efforts
- Respond to customer and community needs as the City grows
- Improve long-term flexibility of waste systems
- Protect public and environmental health and safety

Section 2 – Current Services

The City's solid waste system can be viewed as a network of interrelated elements: collection, processing, transfer, transportation, disposal, and waste prevention activities. Each facility, service, and program that handles waste generated is part of the solid waste system. The Streets Division is the primary provider of solid waste services, although the Parks Division provides waste collection at City parks, around the Capital Concourse, and along State Street Mall. **Table 1** provides a summary of the tonnage of various solid waste materials collected over the past five years. Additional descriptions of each service are included below.

Table 1. Summary of Solid Waste Materials Collected from 2007 thru 2011.

Material	2007	2008	2009	2010	2011
Refuse (tons)	38,716	39,553	39,523	39,886	40,086
Recycling (tons)	21,051	20,818	19,323	19,389	19,229
Large items (tons)	9,195	8,244	7,707	7,211	6,954
Large items recycled (tons)	2,796	1,032	1,008	2,456	2,701
Brush collection (tons)	14,070	11,292	15,113	7,630	10,871
Leaf collection (tons)	16,060	18,918	19,323	15,965	15,430
Yard waste drop-off (tons)	5,686	5,702	6,098	5,149	3,966
Waste oil recycled (gallons)	54,290	33,810	32,350	26,800	35,070
Waste oil filters (tons)	23	18	16	16	16

2.1 Residential and Commercial Refuse Collection

The Streets Division provides automated curbside collection of refuse on a weekly basis to both residential and commercial customers. As determined by City ordinances, service is limited to customers with no more than four 95-gallon carts, and to commercial buildings with eight units or less. Currently, our customer base consists of 67,000 households (largely single family and multifamily residential units) and 500 to 600 commercial customers. Refuse is taken to the city owned transfer station and then hauled to the Dane County Landfill.

Madison has been in the forefront of collection innovations, and in the early 1980's, became one of the first cities in the country to use one-person refuse collection trucks. Nationally, the trend in solid waste and recycling collection is toward automated collection systems that have virtually eliminated the manual handling of refuse and recycling collection containers. These systems have reduced on the job injuries, improved collection efficiency, increased recycling participation and diversion and resulted in cleaner neighborhoods.

In September 2007, City refuse collection was automated, resulting in increased productivity and decreased worker's compensation costs. By using the same trucks for both recycling and refuse collection, there are also fewer vehicles in the fleet, although they have higher overall maintenance costs due to more moving parts.

2.2 Curbside Recycling

In 1968, the City became the first community in the nation to begin curbside recycling with the collection of newspapers in specially designed metal racks installed on refuse packers. The program was expanded citywide in 1970 and became mandatory in 1986. In 1987, the City began a drop off recycling program for household containers at 13 drop-off locations. In 1991, Madison began the curbside collection of aluminum, corrugated cardboard, glass, PETE and HDPE plastics, and steel cans. In 1994, magazines and catalogs were added to the program. During this period, containers were placed in clear plastic bags and paper and cardboard were bound separately. The material was then picked up manually and put into two separate compartments on the recycling trucks.



Since 2005, the Streets Division has provided automated, single-stream curbside collection of recycling on an every other week basis to both residential and commercial customers. Switching from manual, dual-stream collection to an automated, single-stream allows customers put all recyclables, glass, metal cans, plastic, and paper products in the same cart. At this time, mixed paper, office paper, paper beverage cartons and aseptic packaging, and #3 thru #7 plastic bottles were added to the program. The convenience of the new system combined with expanded list of recyclables resulted in a 30% increase in recycling collection. In 2012, the list of approved recyclables was expanded to include dairy tubs and lids, other plastic containers numbered #1 thru #7, empty steel paint cans, plastic bags, metal pots and pans, small metal appliances, and miscellaneous scrap metals such as plumbing fixtures and pipe.



2.3 Large Item Collection

The Streets Division collects large items, such as furniture and carpeting, curbside every other week, opposite the recycling collection. In 1996, the City added a fee for the disposal of select large items, such as appliances and tires. Material may also be taken to the City's two drop-off sites, located at 1501 West Badger Road and 4602 Sycamore Avenue.

Many of the large items collected can be recycled or reused. Large metal items, such as appliances or bicycle frames are taken to a processor, Moor Salvage, for the removal of hazardous materials (e.g. CFCs, ballasts, mercury switches) prior to recycling.

Tires are also collected as part of the large item service and taken to processors for recycling. In 2005, the Streets Division began a pilot project to grind up wood, primarily furniture and lumber. The shredded wood is then hauled to the Dane County landfill and compost sites for use as road base during wet conditions. On average, over 2,000 tons of scrap wood is shredded annually for this program.

2.4 Curbside Brush, Leaf Collection, and Yard Waste Drop Off Sites

The Street Division provides monthly, curbside brush collection, and most brush is chipped at the curb using tow-behind chippers. Large piles of brush and tree trimmings from the Forestry Division are hauled to the City's Olin Transfer Station for processing. Most salvaged wood and brush is converted to wood chips and sold to the public. Starting in 2012, wood mulch produced at the transfer station is being sold to residents, farmers, and landscapers. The program is popular with area farmers who use the material as animal bedding or as a base for agricultural compost.

Since 1980, the City of Madison has collected leaves and garden debris in April and from October through the first week in December, weather permitting. Leaves are collected by small trucks or tractors that push the piles of leaves onto low pans, which empty into rear-loading packers. Material is hauled to one of three composting sites operated by Dane County, and the County makes finished compost available to area residents and businesses for a nominal fee.



The City also operates three drop-off sites which accept brush from private contractors, surrounding units of government, and non-Madison residents for a fee. The sites are located at 4602 Sycamore Avenue, 1501 West Badger Road, and 402 South Point Road. These sites are open seasonally from the end of March through the first weekend in December and were established when the Streets Division stopped collecting yard waste with refuse in 1989.

2.5 Waste Oil Recycling

The City's waste oil recycling program began in 1978 as a way to dissuade citizens from dumping used oil into the storm sewer, which discharges into Madison's streams and lakes. The City manages four waste oil collection sites where residents can dispose of used motor oil and oil filters, although use has declined as fewer people change their own oil. In the last ten years, City Engineering has replaced all of the old collection containers with modern tanks with secondary containment to protect the environment and ensure sufficient capacity. The revenue generated by recycling the waste oil pays for the annual cleaning and maintenance of each site.

2.6 Waste Reduction Outreach Programs

The Streets Division engages in several public outreach waste reduction programs, including home composting, the EnAct program, and the Madison Stuff Exchange. The City partners with Dane County on all of these programs. Since 1991, the City has sold or distributed over 15,000 compost bins to residents to encourage at-home composting. The home composting program diverts on average 660 pounds of yard debris and household organics from the waste stream per household. Since 1994, the City has distributed the Norseman Plastics Earth Machine home composter in a one-day sale each spring.

Two additional key waste reduction programs are the EnAct program and the Madison Stuff Exchange, both of which are cooperative efforts between the City and Dane County. The EnAct program involves

teams of residents who work together to make their households more sustainable by reducing energy consumption, driving less, using less water, and generating less waste. Similarly, the Madison Stuff Exchange is a website where people can give away or sell unwanted items. From 2004 thru 2011, users of the website have diverted over 3 million pounds of material from the landfill. Last, the Streets Division also offers an online waste reduction program called "*Waste Watchers*", consisting of a series of tips and ideas that residents can use to cut their household waste.

2.7 Dane County Services

Dane County operates several services used by the City of Madison, including its compost sites and the Clean Sweep Program. The Clean Sweep Facility accepts hazardous household materials such as oil-based paints, paint-related products, pesticide and poisons, household products containing solvents, ignitable material, aerosols, and rechargeable batteries. It is also anticipated that the County will continue to assist the City with the annual home compost bin sales and in compost education.

Section 3 – Current Facilities

A number of facilities make up the City's solid waste system. Some handle mixed waste, while others act as processors for specific kinds of materials that can be recycled or composted. The purpose of this system is to process, recover, and dispose of all the waste that the City produces in the most efficient, economical, and environmentally sound manner possible.

3.1 Waste Transfer Stations

The Streets Division operates the City's only transfer station located on Olin Avenue, in the City center. The facility can accept unlimited amounts of both wet and dry waste, which is transferred from packer trucks to large trailers for hauling to the Dane County Rodefild Landfill. The Olin Transfer Station was renovated in 2006 and now contains a main tipping floor and a smaller auxiliary tipping area. The smaller area can be used to handle material when the main floor is undergoing maintenance or for transferring a secondary material, such as source separated organics (SSO).



The Olin Transfer Station also serves as the Streets Division collection cart storage facility, as well as the brush processing center. Wood collected by the Streets and Forestry Divisions is shredded on site and sold to the public. The shredder also processes scrap wood furniture from our large item collection. The facility also accepts brush and processing wood from contractors, other local municipalities, and citizens for a fee.

Dane County will begin construction of its first transfer station, located at the Rodefild Landfill, in the summer of 2012. The County's goal is to reduce the volume of construction and demolition waste that enters the landfill by diverting this material for recycling. Other materials could be diverted through this facility as space allows and recovery opportunities emerge. The County's new transfer facility will also be home to a year round Clean Sweep collection program for household hazardous waste.

3.2 Full Service Drop-Off Sites

The Streets Division operates two full-service drop-off sites located at 1501 West Badger Road and 4602 Sycamore Avenue. These sites are open year round and accept all materials collected curbside as well as many items that are only handled at the drop-off locations. Residents may drop off refuse, brush, yard waste, as well as a variety of recyclables, including polystyrene foam, shoes, computers, televisions and electronics, bulky rigid plastics, cooking oil, lumber, and wood furniture.

3.3 Material Recycling Facilities

In 1988, Dane County banned recyclables from its landfills and agreed to take the lead on providing a material recycling facility (MRF)—a specialized plant to receive, separate, and prepare recyclable materials for marketing to end-user manufactures. Under the County's contract with Waste

Management, communities using the MRF paid a tipping fee, but also received 80% of the revenue from the sale of their material. As of December 2011, the City of Madison has received payments from the MRF totaling \$4,368,000, and it has used this revenue to offset the cost of collection.

In 2011, the City contracted directly with Pellitteri Waste Systems for MRF services, rather than continue to partner with the County using the Waste Management MRF. For the first time since switching to single-stream recycling in 2005, all Streets Division recyclables will be processed within the City of Madison. The new Pellitteri MRF will also accommodate school and community tours to further enhance our understanding of our recycling process. As recycling in Dane County has evolved, most communities rely on private haulers to collect their recyclables. There are three principle private collectors of recyclables in the County, Waste Management, Pellitteri Waste Systems, and Veolia ES.

3.4 Dane County Rodefild Landfill

Dane County owns and operates the Rodefild Landfill located along US Hwy 12/18 at the intersection with County Hwy AB. The Rodefild Landfill is the only public landfill open in the county since Dane County closed the Verona Landfill. The Rodefild Landfill has been in operation since 1985 and had an original design capacity of 7.2 million cubic yards of waste.

The Rodefild Landfill has undergone several expansions, and in March 2012 was estimated to have approximately 148,400 CY of airspace remaining. The landfill currently accepts on average 153,800 CY of refuse a year, which means it is estimated to reach capacity in February 2013. In anticipation of reaching this limit, the County has applied to the DNR to overfill the open cells of the landfill by an additional 5%. It is anticipated that the overfill request will be granted, which should extend the life of the landfill by another 6 months.

Based on an August 15, 1973 agreement, the City is required to deliver a minimum tonnage of solid waste to the Dane County landfill. The agreement requires a minimum of 500 tons over a five-day week, or approximately 100 tons per day. Currently, the City generates approximately 50,000 tons per year, or 190 tons per day. Almost all of this is taken to the Dane County Rodefild Landfill, although small quantities of specialty waste go to other disposal sites like Waste Management's Mad-Prairie Landfill.

3.5 Dane County Compost Sites

Dane County currently operates three composting sites located in Verona, Waunakee, and on Highway 12/18 next to the Rodefild Landfill. The City takes much of its collected yard waste to these three facilities for further composting. To fund the sites, the County charges a per capita fee, and the City of Madison is the primary users of these facilities. Presently, the fee is \$0.23 per person, and the City pays approximately \$52,000 annually for use of the sites. The County's compost sites operate in an efficient manner using a minimum of technology, including the option of screening the compost. They also charge a minimum for sale of the material.

Section 4 – Waste Disposal Options Analysis

This section researches waste disposal options for the City's entire waste disposal stream. The evaluations are designed to inform City agencies and the Common Council as they prepare for managing the City's solid waste going forward. It focuses on the following service areas and facilities:

- Refuse disposal options
- Anaerobic digestion of source-separated organics
- Increasing recycling
- Drop-off site options
- Transfer station option

4.1 Refuse Disposal Options

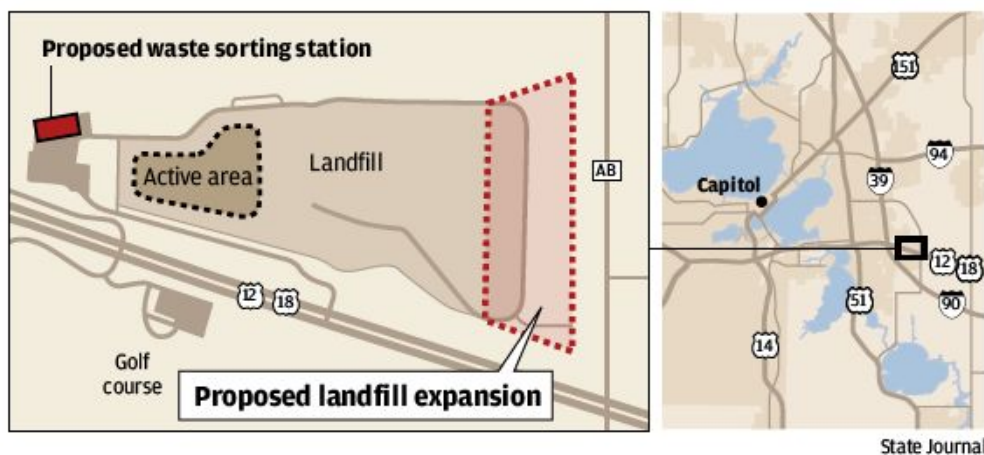
With the Dane County Rodefild Landfill projected to reach capacity in 2013, City staff analyzed the following refuse disposal options:

- Dane County Rodefild Landfill Expansion
- Hauling City refuse to a different landfill
- Constructing a new City of Madison landfill

Dane County Rodefild Landfill Expansion

Dane County's Rodefild Landfill is projected to reach capacity in 2013. In anticipation, the County is undertaking a major expansion project designed to extend the life of the facility until 2035 to 2040. The proposed expansion would add 32 acres to the current 76-acre site and add up to 6.2 million cubic feet (CF) of capacity. The project also includes additional leachate recirculation, to make greater use of the added capacity by speeding up the decomposition of material.

To acquire the necessary setbacks required for the expansion, Dane County is planning to purchase several properties east of the landfill, along County Hwy AB. The County intends to use some of this land to site a new highway department facility, which was originally planned for the area that is now part of the proposed expansion. In addition, the City of Madison owns several parcels adjacent to the Rodefild Landfill, which the City may decide to trade to the County to include in the expansion.



As mentioned previously, the County has already applied to the WDNR for approval to overfill several phases of the landfill by an additional 5% above final grade. The purpose of this request is to allow for settlement of waste after placement and before final cover construction. The request does not change the final waste grades, permitted capacity or the closure sequencing for the landfill. The overfill permit will apply to phases 6, 7, 8, and part of phase 1, and is expected to give the site another 6 to 9 months of use. It is expected that the overfill quantity will settle to final waste grades within two years. However, due to permitting logistics, it is unlikely the County will officially close the landfill before they finish the expansion plans. A more likely scenario is that the County will slow down on the waste they accept to avoid officially moving the site into closure.

The County is expected to hire a consultant by September 2012 to manage the investigation, WDNR reporting, permitting, and engineering. A best case scenario for the duration of time needed before the County can begin accepting waste into the expansion is a minimum of two years—September 2014. A more realistic scenario assumes 3 ½ years, or February 2016. A two year approval process would require that the expansion not be contested, and that the Initial Site Report, Feasibility Report, and Plan of Operation Report are determined to be complete on their first submittal. This may not be a realistic scenario given the nature of the expansion—vertical and horizontal—and the existence of potential complications.

Table 2. The Rodefild Landfill expansion can be divided into four stages.

Phase	Activities	Timeframe
Phase 1 – Initial Site Report	Submittal of <i>Initial Site Report</i> to WDNR and issuance of WDNR <i>Initial Site Report Opinion</i>	6 to 9 months
Phase 2 – Feasibility Report	Submittal of <i>Feasibility Report</i> to WDNR, 30-day public notice, public information hearings, finalization of WDNR <i>Environmental Assessment</i> , and issuance of WDNR <i>Feasibility Determination</i>	6 months to 2 years* * If the landfill is contested in court, it adds typically 1 year to the process.
Phase 3 – Plan of Operation	Submittal of <i>Plan of Operation</i> engineering plans to the WDNR and receipt of WDNR approval	4 to 6 months
Phase 4 – Construction	Construction is typically restricted to between June and November. Once complete, the WDNR has 90 days to approve operation.	6 months (weather dependent)

Typically, the Feasibility Report process takes the most time and can often last for several years. The Feasibility Report requires a comprehensive and detailed site-specific geologic and hydrogeologic investigation, baseline groundwater quality data, preliminary engineering designs, an environmental assessment, and an alternatives analysis. This is also the stage at which impacted parties may contest the proposed expansion through the court system. When the Rodefild Landfill was originally sited it was contested, and the expansion in the 1990s was also contested, although the case was later dropped. Based on the above timeline, the City may need to begin hauling its refuse to a different landfill beginning in 2014 for 1 to 4 years.

Hauling City Refuse to a Different Public or Private Landfill

An alternative to taking refuse to the expanded Dane County Landfill is to haul City refuse to a different private or public landfill. All of the nearby available facilities would involve increased hauling costs, as well as the likelihood of higher tipping fees. The only nearby public sector landfill is owned and operated by the City of Janesville—the Rock County-City of Janesville Sanitary Landfill. However, Janesville’s official policy is to currently not accept waste from outside Rock County.

In addition to the Rock County-City of Janesville Landfill, there are several private sector landfills that could accommodate the City’s refuse. Private sector landfills include: (1) the Waste Management Deer Track Landfill in Johnson Creek, WI, (2) the Veolia ES Mallard Ridge Landfill in Delavan, WI, and (3) the Winnebago Landfill in Rockford, IL. (The Mad-Prairie Landfill mentioned earlier is not permitted to accept municipal waste, and is therefore not an option.) A table summarizing the additional costs associated with hauling to each site is included below (**Table 3**). Please note that the tipping fees presented in this analysis are estimates based upon each facility’s published gate rates. The actual fee charge for our material cannot be known until the City solicits formal proposals.

If hauling to a different landfill were required, the most economical option would be hauling to the Rock County-Janesville Landfill. This option would require that Janesville temporarily agree to accept waste from outside Rock County. The private landfills may or may not be more economically feasible in the future. However, City staff believes that the region needs a publically-owned landfill to ensure a competitive waste disposal environment. Supporting a regional public landfill not only keeps costs down, but also allows independent waste haulers to compete with the large, integrated companies that both haul waste and manage private landfills.

Table 3. Comparison of projected landfill refuse disposal costs if required to haul to a new site.

Landfill	Dane County Rodefild Landfill	Rock County-Janesville Landfill	Deer Track Park Landfill	Mallard Ridge Landfill	Winnebago Landfill
Ownership	Public	Public	Waste Management	Veolia ES	Winnebago Landfill Co.
Location	Hwy 12/18	Janesville, WI	Johnson Creek, WI	Delavan, WI	Rockford, IL
Tipping Fee per Ton	\$40	\$35	\$48	\$41.40	\$48
Total Refuse Tipping Fees	\$2,106,400	\$1,843,100	\$2,527,680	\$2,180,124	\$2,527,680
Landfill Misc Tipping Fees (sweepings, recovered wood, grubbing material)	\$12,0542	\$114,150	\$438,336	\$378,065	\$438,336
Annual Equipment and Fuel Costs	\$140,355	\$662,912	\$654,140	\$934,849	\$1,419,457
Total Salaries + Fringe Benefits	\$144,198	\$288,397	\$288,397	\$288,397	\$288,397
Total Annual Hauling and Disposal Costs	\$2,511,495	\$2,908,559	\$3,908,553	\$3,781,435	\$4,673,870
Difference from Dane County Cost	\$0	\$397,064	\$1,397,057	\$1,269,939	\$2,162,374

In the table above, the additional costs associated with equipment and salaries assume the City will be required to purchase two new tractors, two new trailers, and hire two new fulltime employees. In addition, hauling farther distances will increase the wear and tear on our current tractors and trailers and will likely require that they be replaced sooner than presently scheduled.

Constructing a New City of Madison Landfill

There has been City staff discussion regarding the possibility of the City of Madison purchasing land and going through the permitting and construction process for our own facility. Such a facility could then be sold to the County or remain under the operation of the City. Dane County has estimated that their cost to site, permit, and open a new landfill would approach \$100 million. City staff agrees that the costs would be the same for a City-owned facility. Due to the high initial capital costs and the uncertainty of the permitting process, City staff did not research this option further. At this point, the most economical and environmentally-sound option is to support Dane County with their expansion of the Rodefild Landfill.

4.2 Increasing Organics Diversion with Anaerobic Digestion

A significant portion of the City of Madison's refuse is organic material that could be diverted from the City's landfill disposal stream. A 2010 waste audit concluded that 25% of our waste stream is composed of food scraps and soiled paper products. Including pet waste, disposable diapers and small amounts of yard waste brings the organic portion to 39% of our waste stream. Household organics diversion programs have been successful in many communities in Canada, California, Oregon, and Minnesota, as well as throughout Europe. In Wisconsin, several commercial facilities successfully divert food waste for composting.

In order to significantly increase the City's landfill diversion rate, the City must evaluate methods for diverting household and commercial organic waste. For the last several years, the Streets Division has researched an organics diversion program. As a result, the City has already completed or is in the process of conducting the following studies related to organics diversion:

- 2010 waste sort audit by RecycleWorlds Consulting
- 2011 Organics Pilot Collection Program (*ongoing*)
- March 2012 waste sort audit by RecycleWorlds Consulting
- 2012 Anaerobic Digester Feasibility Study by OWS, Inc. (*due in September 2012*)

Organic Waste Commercial and Industrial Sources

In 2011, the City of Madison started a voluntary pilot collection program for source separated organics (SSO). The organics pilot started with 440 households from two separate neighborhoods and expanded to 530 households and restaurants in 2012. The pilot collects all food waste, soiled paper products (e.g. paper napkins, plates, towels), pet waste, disposable diapers, and small amounts of regular yard waste. The material collected is hauled to the Columbia County Compost Facility near Portage, WI for composting. Results from the first seven months of the organics pilot show participating households diverting an average of 13.9 pounds of material per week. If that average is extrapolated over the entire 66,000 households served by the Streets Division, it would yield 23,780 tons of material per year. The pilot organics program is supplying integral information on collection costs and on public attitudes.

In addition to the organic material from the City of Madison, there are other potential sources of organic material from surrounding communities and organizations. The City of Fitchburg began a 300-household organics pilot collection program in April 2012. The catering operation at Monona Terrace has operated a successful food waste diversion program since 2010. Starting in 2009, the UW-Madison campus began composting vegetable and fruit waste and paper products used in the preparation of food served in campus kitchens. Additionally, in 2012, Metcalfe Market groceries launched a zero waste initiative to compost waste from their produce department.

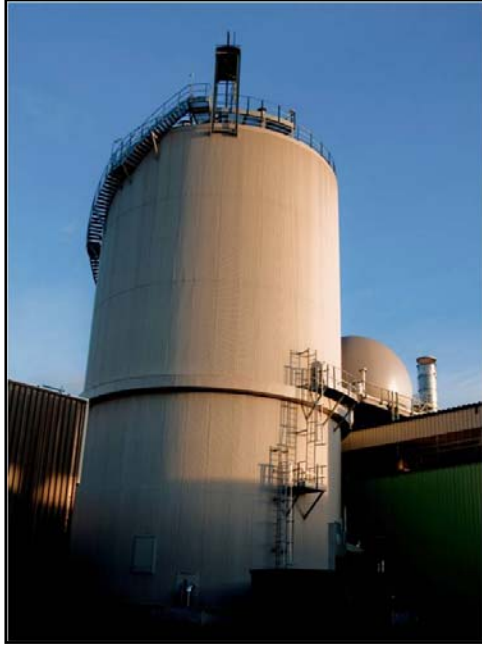
It is anticipated that the volume of organic material from all sources could grow to 50,000 tons per year within five years. City staff proposes to study the potential volume of material generated from these sources and to gauge their willingness to participate in a food waste diversion program. At the same time, staff will survey potential program participants, including the University of Wisconsin, area hospitals, caterers, large employers with cafeterias for their employees, and area restaurants.

Organic Waste Collection

Residential and commercial customers currently have two carts, and the diversion of SSO will require a third organics cart. Due to public health concerns, the organics cart will necessitate weekly collection. However, once organics are removed from the refuse cart, it is likely City staff will propose to collect the tan refuse cart less frequently. Switching refuse collection to every other week would halve the additional collection costs anticipated with implementing a curbside organics collection program. A waste audit of the organics pilot program showed that most of the material remaining in the refuse cart consisted of non-recyclable plastics, misrouted recyclable material and organics, household and hygiene products, and textiles. Streets Division staff intends to further evaluate the costs associated with adding a curbside organics collection program.



Because one purpose of the organics pilot program is maximum diversion, OWS is including disposable diapers and pet waste in the feasibility study. However, both these materials present multiple processing complications that impact the quality of the final digestate and compost. Including human and pet waste may result in limitations in how the City can market the material to the public. In addition, while 80% of a disposable diaper is compostable, the remaining plastic outer layers will require pre and post-treatment for removal. Finally, both wastes have low biogas potential, as the material has already been digested once. Biogas is the gas produced by the breakdown of organic material in the absence of oxygen and is discussed further in the next section. So far, preliminary lab results from the feasibility study indicate that, on average, our organic waste stream has reasonably high biogas potential. The final report will be available in September 2012. Based on the findings of the report, funds for further engineering studies, site acquisition, and site preparation should be to be included in the 2013 City Budget.



Anaerobic Digestion of Organic Waste

Once organic waste is collected, there are two technologies for processing the material: composting or anaerobic digestion. While both technologies can efficiently breakdown organic material into compost, only anaerobic digestion creates energy during the process. As a result, City staff did not further evaluate composting as a processing technology for our organic waste stream.

Anaerobic digesters (AD) have been in use in Wisconsin for many years in the dairy industry, and Dane County has constructed one AD system in Waunakee, WI and has another on the drawing board in Middleton, WI. AD systems for SSO have been proven effective in Europe and Toronto and are making inroads in other places. AD systems provide a cost effective way to manage organic material because in addition to generating nutrient-rich compost they produce energy from the biogas generated during the digestion

process.

Anaerobic digestion systems decompose organic materials in the absence of oxygen, and there are two basic systems: wet and dry. In a wet system, water is added to the waste to create a slurry, and often the water must be removed from the solids at the end. In a dry system, minimal water is added, and the solid material often requires no further dewatering. OWS, Inc. is currently evaluating the advantages and disadvantages of each system and will make recommendations in their September 2012 report. Ultimately, however, the type of system constructed will be determined by competitive bidding and a thorough fiscal analysis.

The largest source of revenue from an AD system comes from the biogas produced. The City's feasibility report will evaluate whether the City should burn the biogas to produce electricity, transform it into compressed natural gas (CNG) for vehicle fuel, or clean it sufficiently to put into the natural gas supply system. Each potential usage requires a different level of cleaning and processing with higher costs associated with each step. The OWS feasibility study will include a market analysis that will help guide the City's decision on the end use of the biogas.

In addition, the digestate, solid material that remains after the AD process, may be processed and sold as compost as another revenue source. The material is high in nutrients and will likely require additional composting with yard waste prior to marketing to the public. Finally, a significant amount of waste heat will be created during the AD process, which could be used to heat and cool the digester facility and/or other buildings.

Aside from choosing an AD technology, other critical components of an anaerobic digestion system include preprocessing equipment (e.g. shredders, screens), odor control equipment, the biogas scrubber, the electrical generation system (including an interconnection with the utility), a CNG fueling system, and a composting area where the digestate will be mixed with yard waste for final treatment to maximize the value of the material. The compost system may also include a bagging system for marketing the compost through garden centers and hardware stores.

The most promising location of a proposed AD facility is adjacent to the Dane County Rodefild Landfill, located on US Hwy 12/18 and Cty Hwy AB. If this site is chosen, the facility can take advantage of the landfill's gas to energy infrastructure, including their existing electrical generation facility, power purchase contract, and CNG fueling facility. The City owns land adjacent to the County's proposed landfill expansion, and there is potential for swapping this land for other nearby property. Such a swap would allow the County to further expand their landfill, and would give the City a better building site for the AD system.

4.3 Increasing Recycling Collection and MRF Opportunities

The Streets Division is constantly looking for ways to recycle more material. In evaluating potential recyclables, they consider the toxicity of the material, the material volume and the availability of recycling options. Since the *2004 City of Madison Solid Waste Plan*, the Streets Division has added the following materials: all #3 thru #7 plastic containers, plastic bags, metal pots and pans, and small metal appliances and power tools. In addition, Madison residents may now recycle lumber, computers, televisions and electronics, wooden furniture, pallets, cooking oil, rigid plastic (e.g. totes, trash cans, toys), shoes, clothing, and Styrofoam at the City's two drop-off sites. As markets for additional material become available these items may join the curbside program.

The City has just entered a new contract with Pellitteri Waste Systems to provide a new Materials Recycling Facility (MRF) for City use. The contract allows for future growth in the volume and types of materials collected in the City's curbside program. Future targets for recycling include diversion of organics, carpet, mattresses and box springs, textiles, and more reusable goods. The City should explore investing in our regional recycling infrastructure to address these materials. In addition to increasing landfill diversion, these facilities could provide employment and economic development. The Streets Division intends continue to identify new companies and nonprofits able to use the City's recyclables.

4.4 Expanding Full Service Drop-Off Sites

The operations centers on Badger Road and Sycamore Avenue were not designed to function as public drop-off sites. Extensive redesign and some construction have made Sycamore Avenue more customer friendly, as did an improved traffic flow pattern at Badger Road. However, the Badger Road facility continues to be a tight fit as the Streets and Engineering Divisions share the space. The future space needs of both divisions may require more property than is currently available. In addition, there are plans to convert the yard-waste-only site at South Point Road into a full service facility prior to the construction of the Far West Public Works Facility.

Drop-off sites will continue to offer City residents and customers the opportunity to take advantage of recycling markets that open up for materials not suited for curbside collection. Any expansion of the drop-off programs will have to take into account the limited space available at the current sites as well as the possible need to increase staffing.

It is also anticipated that additional capacity for brush processing will become necessary when the emerald ash borer (EAB) beetle reaches Madison's ash trees. It is difficult to predict the volume of material that will result from an EAB infestation and when that debris will be generated. At present, the plan is to process as much of the material as possible at the Olin Avenue facility using existing equipment. However, the volume tree debris may dictate the need for additional satellite locations for

wood waste processing. Ideally, this work will take place on land already owned by the City, and any location would require some site preparation such as adequate access, paving and utility extension.

4.5 Transfer Station Options

The City currently operates only one transfer station in the city center. This contrasts the conclusion of multiple City and County studies which show it is more economical to operate separate east and west side transfer stations, rather than one large facility in the city center. While two transfer stations would significantly reduce haul costs, the political and regulatory situation does not allow for new facilities to be easily sited.

If the City is required to haul waste outside the County, it will require that all City refuse be loaded onto large semi-trailers. Presently, almost all waste transferred to the County landfill is hauled in large trailers, and City staff is confident that the Olin Transfer Station can handle all City refuse if hauling to a different landfill is required. Once the Olin Transfer Station remodel is complete, the facility should be better able to handle all refuse transfer. There are several privately-owned waste transfer stations outside of Madison. However, these facilities are too small to handle Madison's waste stream, but may be used during emergencies as needed.

4.6 Expanding Other City Services

City staff also evaluated the expansion of several other City services:

Drop-off Yard Waste Sites - The use of the drop-off yard waste sites remains constant, with most of the material consisting of grass clippings, although some leaves and garden waste are brought in as well. Based upon the stable pattern of use, the hours and locations appear adequate to meet the needs of the public. There are no plans to expand the yard waste drop off program at this time.

Waste Oil Recycling Facilities – The current four drop-off sites provide adequate coverage of most of the City, except the far west side. The City should consider incorporating a waste oil collection site in the plans for the Far West Public Works Facility.

4.7 Product Bans

The City of Madison has not adopted any product bans, as state law forbids bans aimed at primary packaging. The City does, however, have the ability to ban plastic bags and carry-out containers. City staff explored a ban on plastic bags in 2009, but rather than adopt a ban, choose to create a recycling program. The plastic bag program has collected 23 tons of plastic bags since late 2009. In 2012 plastic bags were added to the curbside collection program. Should the City establish an organic diversion program, the City may wish to revisit the issue of banning polystyrene and other non-compostable carry-out containers.

4.8 Product Stewardship

Product Stewardship requires that all parties involved in the manufacture, sale, and use of a product are responsible for the environmental, health, and safety impacts of that product and its packaging. For manufacturers, this includes planning for the recycling or disposal of the product at the end of its useful life. This may be achieved, in part, by redesigning products to use fewer harmful substances, to be more

durable, reusable and recyclable, and to make products from recycled materials. For retailers and consumers, this means taking an active role in ensuring the proper disposal or recycling of an end-of-life product.

Extended Producer Responsibility (EPR) is a type of product stewardship that requires that a manufacturer's responsibility for their product extends to post-consumer management of that product and its packaging. There are two important features of most EPR policy: (1) shifting financial and management responsibility, with government oversight, upstream to the producer and away from the public sector; and (2) providing incentives to producers to incorporate environmental considerations into the design of their products and packaging. Deposit legislation is one example of an EPR system. City staff will continue to monitor this trend and look for proposals which might make sense for Madison.

Section 5 – Waste Disposal Recommendations

5.1 Goal: Secure a cost-efficient landfill disposal option

The objectives of this goal are to cost-efficiently address the City’s refuse needs as the Dane County Rodefled Landfill nears closure. These items will be completed by Streets and Engineering Division staff.

1.0 Support Dane County with the proposed Rodefled Landfill expansion	The most economic and environmentally sound solution to managing the City’s refuse needs is to support Dane County with their landfill expansion plans. The City should explore a possible land exchange with the County to better meet the needs of both parties.
2.0 Improve City of Madison and Dane County landfill relations	City and County staff should meet regularly to address scheduling and tipping fee concerns regarding the proposed expansion.
3.0 Prepare logistics for hauling City refuse to different landfill if needed	Staff should allow at least 15 months for budgeting and addressing the logistics of hauling City refuse to a different landfill if the proposed Rodefled Landfill expansion is not completed in time. Such logistics will include soliciting tipping fee bids, assessing equipment needs, and hiring new employees.

5.2 Goal: Divert organics from the landfill waste stream

In order to significantly increase the City’s landfill diversion rate, the City must evaluate methods for diverting household and commercial organic waste. The objectives below will be completed by Streets and Engineering Division staff, in addition to assistance from staff from Finance, the Mayor’s office, and the City Attorney’s office.

1.0 Evaluate the logistical and economic feasibility of a City anaerobic digester	This analysis is being conducted by the City’s consultant, OWS, Inc. and the report is expected in September 2012. Based on the results of the study, City staff will prepare an RFP to hire a firm to assist with writing the necessary bid specifications over the fall of 2012.
2.0 Conduct a financial analysis of collection of curbside organics	This analysis will be conducted by staff from the Streets Division and will address the logistics and costs of introducing a third cart, fleet needs, and hiring of additional employees. Streets Division staff will also evaluate switching refuse to every other week collection.
3.0 Evaluate potential organics sources	Hospitals, school, caterers, restaurants, and other large employers will be evaluated by City staff regarding their willingness to participate in a City anaerobic digester (AD) project.

5.3 Goal: Increase waste reduction and landfill diversion efforts

The Streets Division is constantly looking for ways to recycle more material. In evaluating potential recyclables, they consider the toxicity of the material, the material volume and the availability of recycling options. Future targets for recycling include diversion of organics, carpet, mattresses and box springs, textiles, and more reusable goods.

1.0 Support new recycling infrastructure	City staff s should continue to identify new companies and nonprofits that can use the City’s recycling stream for economic development.
2.0 Expand curbside recycling service	Streets Division staff should evaluate the list of recyclables that can only be recycled at the drop-off sites to identify items that should be added to the curbside pickup. Items should be added to curbside pickup as markets and systems allow.

5.4 Goal: Respond to customer and community needs

In response to requests by customers and in anticipation of future challenges, City staff proposes the following objectives to address changing needs.

1.0 Expanding full service drop-off sites	The City should consider converting the South Point Public Works Facility from a yard waste only site to a full service facility. This would include all services available at the other two drop-off sites, including the ability to accept recyclables, refuse, cooking oil, etc.
2.0 Westside transfer station	City staff should evaluate the pros and cons of siting a transfer station at the South Point Public Works Facility.
3.0 Brush processing capabilities	<p>As part of its City’s emerald ash borer response plan, staff should evaluate other ways to process trees besides shredding. This analysis should include milling logs, and all of the associated costs with such an operation. These capabilities would also allow the City to better respond to weather related emergencies (e.g. wind or ice storms).</p> <p>In addition, the analysis should consider temporary satellite processing locations if the volume of EAB tree debris requires it.</p>
4.0 Waste Oil Recycling	The City’s waste oil facilities provide good coverage for most areas of the City, with the exception of the far west side. The City should consider incorporating a waste oil collection site in the plans for the Far West Public Works Facility.