



Reclay StewardEdge

Product Stewardship Solutions

Minnesota Pollution Control Agency

Recycling and Solid Waste Infrastructure Evaluation

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with



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Executive Summary

This report presents the results of an assessment of Minnesota’s recycling and mixed municipal solid waste (MMSW) management infrastructure. The purpose of this assessment was to evaluate Minnesota’s recycling and MMSW management infrastructure in the context of the state’s needs, and include an analysis of Minnesota’s recycled materials and markets so that the state can assess investment needs and recycling economic development opportunities. The report also summarizes the County institutional arrangements supporting multi-County cooperation.

Recycling Processing Infrastructure Findings

Minnesota’s recycling processing infrastructure is composed of a variety of facilities including private paper and metal recyclers who do not report recycling data directly to the state, seven privately-owned single-stream materials recovery facilities (MRFs) found within the Twin Cities Metro Area, and scores of smaller multi-stream MRFs throughout the state, many of which are publicly owned.

Based on a combination of survey data requested and site visits to a few MRF facilities, we found:

- Generally, the large, single-stream MRFs are well-capitalized and have enough capacity to handle the recyclable materials portion of the 75 percent recycling goal for the seven-county Metro Area. These MRFs currently do not process organic materials.
- Based on 2013 data, some 80 percent of all recycled paper, metal, glass, and plastic materials that came through a materials recovery facility in Minnesota was processed at that time by six large, single-stream MRFs located in the Metro Area.
- Other MRFs on average have processing equipment that is at or near the end of its useful life, and buildings also at or near the end of their useful life. The average age of the processing equipment was reported as 14 years and the average age of the MRF buildings was reported as 21 years.
- MRFs market their materials to a combination of Minnesota markets, other markets in surrounding states and the region, as well as to international markets such as China.
- Tracing the flows of recyclables from collection to processing and ultimately to markets was very challenging – much of the collection and processing infrastructure in the state is private and processors were reluctant to share what they consider to be proprietary data.

Minnesota Recyclables Markets Findings

Minnesota has good in-state market capacity for most recovered paper grades, although mixed paper must go to markets outside of the state. There is good regional demand for mixed paper.

While Minnesota has good HDPE market demand in-state, PET goes to PET reclaimers in other states, where there is currently excess PET reclamation capacity. A weak point in plastics markets is facilities that will accept and sort mixed plastics primarily composed of resin identification coded #3-#7 plastics, especially for lower volume plastic types. The whole region of states around Minnesota lacks a facility of this type.

Metals markets are strong in Minnesota. The state has excess recycling capacity compared to collection. However, because aluminum cans are recycled closed loop in national-scale plants, all aluminum cans that are recycled leave the Midwest to go to these national markets.

The area most in need of immediate attention is glass beneficiation facilities. Although Minnesota previously hosted two beneficiaries, one closed in 2014, and now there is insufficient beneficiation capacity

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for the glass that is collected for recycling in the state. If this capacity is not replaced, other glass uses may need to be developed, which may include lower value applications.

Mixed Municipal Solid Waste Infrastructure Findings

The infrastructure for processing and land disposal of Minnesota's MMSW includes:

- 146 transfer stations;
- 3 refuse derived fuel (RDF) processing facilities;
- 8 in-state and 1 out-of-state waste-to-energy facilities; and
- 21 in-state landfills and 8 out-of-state landfills.

Based on a combination of survey data requested and analysis of data for MMSW management, we found:

- Ten MMSW processing facilities serve significant portions of 32 Counties and fulfil Minnesota's goal to recover materials and energy from waste while also reducing dependence on land disposal. Almost half of Minnesota's MMSW is processed. Most of these processing facilities have operated for 20 years or more.
- Large geographic areas of Minnesota are served only by MMSW landfills. Most of these areas are served by county-owned and operated landfills. Several large privately-owned and operated merchant landfills located in Minnesota accept large quantities of MMSW from the metropolitan and surrounding counties. Several landfills located in Wisconsin, Iowa, and North and South Dakota accept MMSW from Minnesota for land disposal.
- Minnesota's processing facilities have limited capacity. Some unused MMSW processing capacity is available in the metro area and in Olmsted County. Yet, additional processing facilities and/or capacity will be needed to achieve State of Minnesota policies related to recovering resources from waste and reducing land disposal of unprocessed MMSW. Additional incentives appear to be needed to motivate Counties and private enterprises to build MMSW processing infrastructure instead of continuing to expand MMSW landfills.

Minnesota is served by ten public and private MMSW processing facilities that process MMSW to recover materials and energy from MMSW. MMSW processing capacity in these facilities is over 1.8 million tons per year. These facilities include facilities that process MMSW to recover recyclable materials, manufacture refuse derived fuel, and operate mass burn waste-to-energy facilities that burn waste to generate steam and electrical power. Processing facilities are supported by transfer stations and residual materials landfills. MMSW processing systems are configured to serve limited multi-County regions of the State of Minnesota (and one serving Minnesota and Wisconsin). The state's processing capacity is limited and new infrastructure is needed if Minnesota is to reduce its reliance on landfills.

Land disposal facilities manage unprocessed MMSW from those geographic areas of Minnesota that are not serviced by MMSW processing facilities. Generally, County landfills provide MMSW land disposal in regions of Minnesota outside of the metropolitan area. Several large private landfills provide MMSW disposal for unprocessed MMSW generated in the metropolitan area and some adjacent greater Minnesota Counties. Transfer stations also serve landfills and extend the functional service area of landfills. In a recent Environmental Impact Statement for the proposed Advanced Disposal landfill in Wright County, MPCA evaluated the permitted capacity of landfills serving the metropolitan area and 26 greater Minnesota Counties. That evaluation, which was corroborated by the MMSW flow data analyzed for this study, found that several out-of-state landfills provide a small amount of MMSW land disposal; however, some landfills located in Wisconsin and Iowa have greater permitted capacities and have, in the past, disposed of large quantities of unprocessed MMSW from Minnesota.

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Reporting requirements for municipal solid waste flows provides good data that was useful in characterizing waste shed areas and flows of waste from those areas to disposal facilities. However, good data was lacking on some flows to out-of-state facilities, some data was conflicting on county-of-origin, and flows were not always clear, especially where transfer and disposal facilities handle multiple streams of discards (municipal solid waste, recyclables, construction and demolition debris, etc.) since the flow data reports county-of-origin for all materials in the aggregate, not based on specific material types. Despite some of the data limitations, the majority of flows were able to be estimated with reasonable confidence.

County Cooperation Findings

The infrastructure for much of Minnesota's recycling and MMSW management infrastructure is built on county cooperative arrangements. These formal and informal institutional arrangements are a vehicle for achieving cooperation between political subdivisions, an incentive for private investment in infrastructure, a major factor in obtaining economies of scale related to infrastructure, and a keystone for providing effective consistent services to the public. These arrangements include:

- Joint Powers agreements covering waste delivery, debt service, ownership or operation of facilities;
- Multi-county contracts to assure waste delivery and/or pledge cooperation in operating facilities;
- County groups that cooperate jointly to complete the state's 10 year County planning requirements;
- County groups that cooperate to operate Household Hazardous Waste (HHW) and waste education programs; and
- County coordinating groups that periodically meet to share information.

Effective institutional arrangements among counties and between counties and the owners and operators of recycling and MMSW management infrastructure are essential.

Figure ES-1 below illustrates the principal flows from each county to final disposal facilities. Because of the large number and complexity of flows from the Twin Cities Metro Area counties, those flows have been omitted from this particular figure to better illustrate the flows from Greater Minnesota. Metro Area flows are included in Appendix H Metro Region of the main portion of this report.

Figure ES-1
Minnesota Municipal Solid Waste Flow – All County Flows (Excludes Metro Flows)

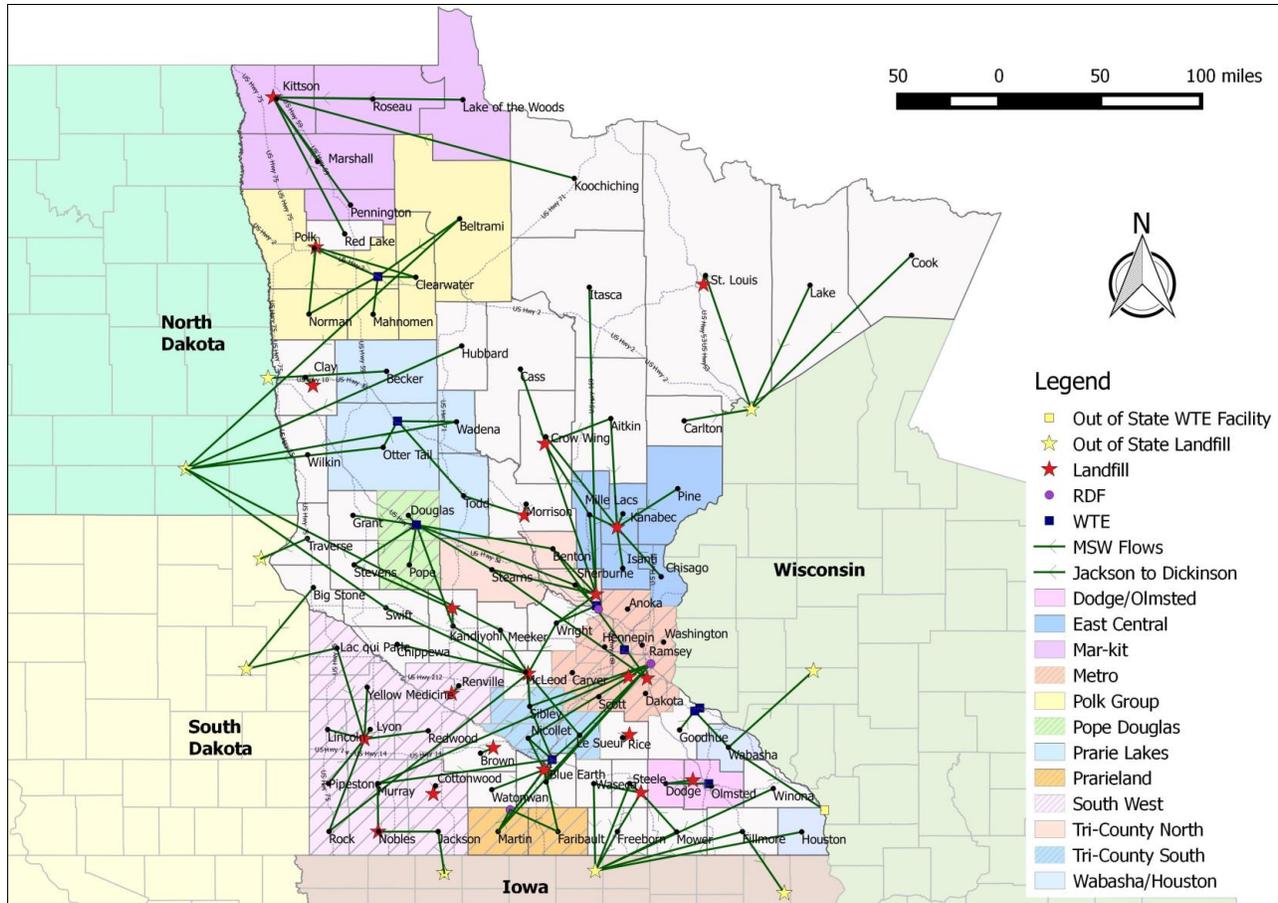


Figure ES-1 shows that many Minnesota Counties have coordinated waste management programs, and that much of Minnesota’s MMSW is managed at processing facilities and landfills located in Minnesota. Some MMSW is shipped out-of-state to land disposal facilities and a processing facility in La Crosse, Wisconsin. As such interstate shipment is part of the disposal infrastructure for certain counties, especially for counties in remote parts of the state. Overall, however, out-of-state disposal facilities only receive 213,000 tons (seven percent) of Minnesota municipal solid waste that is disposed. Approximately 1.2 million tons of non-recycled waste is processed by energy recovery, or approximately 75 percent of the state’s capacity.

Figure ES-1 also shows that many of the counties that are not currently part of regional planning groups use the same disposal facilities, and they can work more closely together to plan for regional management of solid waste within their waste sheds. Furthermore, several of these existing planning groups lack robust recycling or energy recovery assets within the counties that compose their groups, and as a result their focus is on the county-owned landfill disposal assets that they have. There may be opportunities to encourage the further building out of recycling and landfill diversion assets in these groups to reduce the loss of resources to landfills.

Conclusions and Recommendations

Conclusions and recommendations from this analysis of recycling and waste disposal infrastructure, and recycling markets, include:

- The private waste and recycling sectors provide for the vast majority of recyclables processing and over 60 percent of landfill capacity (both in-state and out-of-state) for Minnesota. The private sectors' investment in infrastructure for the management of Minnesota's discards is very significant.
- Except for some of the privately owned and operated single-stream MRFs in the Metro Area, many MRFs in the state have processing equipment that is at or near the end of its useful life. Furthermore, some of the existing building infrastructure also may be at or near the end of its useful life. These facilities either need to be recapitalized or more recyclables need to be transferred to the more highly capitalized MRFs.
- Minnesota's recycling processing capacity is currently not operating at full capacity in some locations.
- Some 760,700 tons per year of potentially recyclable materials are not presently being recovered, and so are disposed in landfills and energy recovery facilities.
- Of this, 192,600 tons is film plastic – plastic retail bags, pallet wrap, construction film, silage bags, and other film. Processing would need to be developed to address this potential film recycling stream.
- The state's waste-to-energy and refuse-derived-fuel plants are being used at approximately 75 percent of capacity. There is an opportunity to divert more non-recycled materials from Minnesota's landfills to these energy recovery facilities.
- Recyclables materials markets for glass containers and mixed plastics are lacking in Minnesota and market development for these materials should be a priority. While strong regional demand for other materials' grades exists, there may be opportunities for Minnesota to add value to more recovered materials in the state and build jobs and economic activity.
- The private waste and recycling sectors provide for the vast majority of recyclables processing and over 60 percent of landfill capacity (both in-state and out-of-state) for Minnesota. The private sector's investment in infrastructure for the management of Minnesota's discards is very significant.
- Minnesota will need to sustain and expand efforts to retain MMSW processing capacity and to expand MMSW infrastructure to regions of Minnesota served only by landfills if increasing levels of MMSW are to be diverted from land disposal. The short term financial incentives related to MMSW land disposal are not effectively counterbalanced in large portions of Minnesota.
- As state and local policy-makers consider the state's infrastructure requirements more inter-county cooperative arrangements are necessary, especially those focused on diverting MMSW from landfills. Both in the metropolitan area and in greater Minnesota, counties can do more via institutional arrangements to establish infrastructure for sustainable materials management and to expand collaboration between the public and the private sectors.

Additional detail about the high-level overview provided in this executive summary can be found in the remainder of this report.

1. Introduction

This report presents the results of an assessment of Minnesota’s recycling and solid waste infrastructure needs, including an analysis of Minnesota’s recycled materials and markets. This assessment was performed by the team of Reclay StewardEdge Inc. (RSE) and Burns & McDonnell Inc. (together the Project Team).

This report provides:

- Estimates of recyclable materials and mixed municipal solid waste (MMSW)¹ generated statewide and on a county-by-county basis and flows based on available data;
- An assessment of the state’s materials recovery and solid waste infrastructure; and
- An assessment of primary end markets for materials recovered from Minnesota discards.

2. Summary of Data Sources and Study Approach

Table 1 summarizes data sources that were reviewed for use in this study, both in terms of estimating waste and recyclables generation quantities, as well as for estimating waste and recycling flows:

**Table 1
Primary Data Sources for Existing Waste and Recycling Generation and Flow Data**

Data Source	Data Type and Year	Notes
MPCA facilities annual permit reporting	Recycling and solid waste (2013,2014)	<ul style="list-style-type: none"> • Annual tonnages of recyclables shipped to market reported by materials recovery facilities, transfer stations and landfills • Waste sent to disposal facilities, including county of origin • Does not identify generating sector (residential vs. ICI) • Only for permitted “waste facilities” (paper stock dealers and scrap metal yards are not required to report) • Facilities that receive multiple streams (MMSW, C&D, recyclables, organics) only need report county-of-origin as a composite, not separately for each stream
Governor’s Select Committee on Recycling and Environment (SCORE)	Recycling and solid waste generated/ diverted (2011, 2012)	<ul style="list-style-type: none"> • Annual recycling tonnage estimates reported by county governments for all municipal and private sector recycling within the boundaries of the county • Recycled quantities reported in broad categories, some of which are mixed materials categories • Estimated quantities recycled by businesses and industry

¹ This study was focused on recyclables that are collected as commingled materials and require further sorting and processing for shipment to market – recycling of construction and demolition debris and organics have been the subject of other Minnesota Pollution Control Agency investigations near the time of this study and were not included in the scope of this work. Similarly, this study focused on disposal of mixed municipal solid waste-disposal of construction and demolition debris and other industrial waste streams was not in the scope of this work.

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Data Source	Data Type and Year	Notes
Re-TRAC	MMSW and Recycling Data for Twin Cities Metropolitan Area and Greater Minnesota (2011,2012, 2013)	<ul style="list-style-type: none"> • County demographic data • City recycling and HHW program costs • Quantities of recyclable materials collected via residential curbside, drop-offs, and events • Quantities of MMSW and recyclable materials managed and transferred to designated locations
County Solid Waste Management Plans	Solid Waste and Recycling Programs (varied)	<ul style="list-style-type: none"> • Multi-county programs • Solid waste generation and materials diverted from disposal
2013 Statewide Waste Characterization Study	Disposal (2013)	<ul style="list-style-type: none"> • Characterized the quantities of materials by material type received for disposal (landfills and waste-to-energy facilities)

The Minnesota Pollution Control Agency (MPCA) transitioned to a new ReTRAC Connect data management and reporting system for regulated solid waste establishments with the initial data reporting due in 2014. The data that solid waste facilities, which includes recycling facilities, landfills, waste transfer stations, and solid waste processing facilities (such as waste-to-energy plants and refuse-derived fuel plants) reported served as an additional source of information for this analysis. This data included quantities handled of different classifications of waste and recyclables, quantities transferred to other establishments (either in-state or out-of-state), and destinations for these materials.

Building off of the above data, the Project Team analyzed the data and conducted follow-up surveys and telephone conversations to further assess the data sets. The analysis included asking evaluative questions not otherwise covered by numerical reporting and clarifying questions concerning the reported information. The Project Team also conducted site visits of four recycling recyclable materials processors to better understand and evaluate recycling processing, the effectiveness of their processing operations, age and condition of equipment, equipment capabilities and facility and program needs into the future. Finally the Project Team assessed recycling markets for Minnesota recyclables by analyzing market data, interviewing selected markets, and evaluating relevant ReTRAC data.

3. Data Review

3.1. Assessment of Existing Recycling Data

The Project Team reviewed the information for completeness and applicability to the goals of this study. Specifically, the data that the Project Team reviewed were quantities generated by County, lists of facilities that handled or processed recyclables, quantities of recyclables processed/handled by facility, and facility contact information. Additionally, the various data sets were reviewed to determine if the information could be correlated across data sets.

The data provided was used to create a list of facilities to survey to gather additional data concerning facility processing activities. The goal of the survey was to obtain information from facilities that are part of recycling infrastructure system; therefore, all facilities involved with the handling, processing, or transfer of recyclables in Minnesota were included on the list to be surveyed. Because the study analysis was limited to paper, plastic, cardboard, metals and glass being recycled in Minnesota, facilities that processed other materials were not included (e.g. compost, construction and demolition debris, and electronics).

Facilities were categorized to get a better understanding of the recycling infrastructure in Minnesota. The categories used included:

- End Market;
- Material Recover Facility;
- Landfill Drop-Off; and
- Transfer Station Drop-Off.

3.2. Survey

In accordance with the Scope of Work, a survey was distributed by the Project Team to the finalized list of permitted solid waste facilities that manage collected recyclables. In preparing the survey, the Project Team included a series of questions that verified existing information such as contact information and quantities managed, as well as new information such as age of the facility and processing equipment. Additional questions included in the survey inquired about the adequacy of the facility's capacity for the next 5 to 10 years, the processing type (source separated vs. single-stream), and facility costs and revenues. A copy of the survey is included as Appendix D.

A breakdown of types of materials accepted at each of these facilities was also requested in the survey. While data via the MPCA facility permit process containing select sets of relevant information was provided by the MPCA and included in the survey, some survey responders expressed concern that the reported data were inaccurate and instead provided updated material quantities to properly reflect the current processing activities at their facility. However, a number of facilities verified that the quantities provided by the MPCA database were accurate for their facility. For the purposes of the study, the database of information was updated with the revised quantity data for the select facilities.

3.2.1. Survey Responses

The survey was initially sent to 161 facilities across the state, including MRFs, transfer stations, and landfills that had reported some amount of recycling in the most recent annual reports. Overall, 48 facilities responded to the survey request, which represented a 30 percent response rate.

Of the 48 facilities that responded to the survey, 22 were classified as MRFs. For the facilities classified as a MRF, 22 responses represented a 50 percent response rate with 44 facilities of the total 161 facilities considered MRFs. This segment of the survey was important to gather a better understanding of statewide processing capacity.

The following is a summary of the information received.

3.2.2. Respondents

It should be noted that many of the facilities were difficult to classify because the facility served multiple purposes (e.g. collection drop-off, transfer, processing). It was also difficult to classify facilities because the means and methods that recycling processing is undertaken varies across the state, from facility to facility, and is difficult to categorize into just four classifications. In general, facilities were classified based on the facility name, processing capabilities, and the Project Team's knowledge of the respective facilities. An example of the difficulties in classifying the facilities is the case of several transfer stations that have equipment typically seen in a MRF (e.g. sort lines). In those cases, the facilities were classified as transfer station because the name of the facility included "transfer station" and transferring materials was the primary purpose. In summary, the respondents of the survey were categorized into four classifications.

- Material Recover Facility;
- Landfill Drop-Off;

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- Transfer Station Drop-Off; and
- Other.

The locations of the facilities were also noted. The following table summarizes the categories and the MPCA Region of the facilities that responded to the study survey.

Table 2
Respondent Facility Type and Region

Classification	MPCA Region					
	Metro	Marshall - Willmar	Duluth	Rochester	Detroit Lakes	Brainerd
MRF	5	2	6	4	7	0
Landfill	0	0	2	0	2	0
Transfer Station	3	0	7	2	3	1
Other	3	1	0	0	0	0
Total	11	3	15	6	12	1

Of those responding, 38 percent of the facilities were privately owned, 54 percent were publicly owned and 8 percent did not identify an ownership type. It was also found that publicly owned facilities included facilities that were publicly operated, privately operated, and, in some instances, a combination of both. For example the McLeod County MRF includes public staff that manage the MRF and operate the equipment and rolling stock, but contract for sorters through West Central Industries who employ adults with disabilities.

3.2.3. Customers

The survey recipients were asked about the types of customers at their respective recycling facilities. Forty-two survey recipients responded to the customer question. The table below presents the percentage of facilities that responded to the customer question that offer service to the three customer classes: local governments, private haulers and public self-haulers. Note that many facilities indicated more than one customer type that used their facility.

Table 3
Percentage of Facilities Offering Service to Customer Classes

Local Governments	Private Haulers	Public Self-Haulers
70%	77%	84%

3.2.4. Processing Operations

Questions concerning the type of processing system and equipment used at individual facilities were included in the survey. A summary of the processing systems and equipment responses are summarized in the following table.

**Table 4
Processing Systems and Equipment**

Facility Classification	Processing System				Processing Equipment											
	Source Separated	Dual Stream	Single Stream	Other	Conveyors	Baler	Sort Line	Trommel	Ferrous Magnet	Optical Sorter	Eddy Current Separator	Glass Screen	Paper Screen	Air Separator	Glass Clean-Up	Other
Landfill				✓												
Landfill	✓															
Landfill	✓															
MRF	✓				✓	✓										
MRF	✓				✓											
MRF	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
MRF		✓				✓										✓
MRF	✓				✓	✓	✓									
MRF	✓	✓			✓	✓	✓									
MRF			✓		✓	✓	✓									
MRF	✓		✓	✓	✓	✓	✓		✓				✓			
MRF	✓				✓	✓			✓							
MRF			✓		✓	✓	✓	✓	✓		✓	✓	✓	✓		
MRF	✓					✓										
MRF	✓					✓										
MRF	✓	✓		✓	✓	✓	✓									✓
MRF	✓	✓			✓	✓										✓
MRF	✓				✓	✓	✓									
MRF	✓				✓	✓	✓		✓							
MRF	✓				✓	✓	✓									✓
MRF	✓				✓	✓	✓									
MRF		✓			✓	✓					✓					
MRF	✓	✓		✓	✓	✓	✓	✓	✓		✓					
Other			✓													✓
Transfer				✓					✓							
Transfer	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓					
Transfer			✓													
Transfer	✓															
Transfer	✓															
Transfer	✓															
Transfer	✓															
Transfer	✓															
Transfer	✓				✓	✓	✓		✓							
Transfer	✓		✓													
Transfer	✓				✓	✓										
Transfer	✓				✓	✓	✓		✓							

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The above reflects that all three types of processing facilities (source separated, dual stream, and single-stream) are well represented within the state. Typically, the single stream processing facilities include more automated processing equipment, but not in every reported case. Many of the facilities regardless of processing type (source separated, dual stream, or single-stream) include sorting lines for manual sorting of materials. Very few facilities have automated sorting for plastics and glass via optical sorters, glass screens, and glass clean-up equipment.

3.2.5. Facility Age

The survey included questions concerning the age of the processing equipment and building. For the MRF respondents, the average age of the processing equipment was reported as 14 years. The average age of the MRF buildings was reported as 21 years. This was a relatively surprising outcome with the expectation that more equipment and facilities would have been upgraded. A summary of the survey responses addressing the reported age of the processing equipment for respective facilities is provided in Appendix B as Table B-2.

Typical lifecycle projections for equipment are 10 to 15 years, indicating that much of the existing processing equipment is at or near the end of its useful life. Buildings can have a range of lifecycles based on the type of construction; however, it is not uncommon for buildings to have a 20 year lifecycle; therefore, some of the existing building infrastructure also may be at or near the end of its useful life.

Based on the data gathered from the survey responses, fourteen facilities use materials processing equipment that is at least 10 years old. All of these facilities are located in Greater Minnesota. The list of facilities includes some of the larger facilities in Greater Minnesota based on quantities processed including but not limited to Python's in St. Cloud, St Louis County, and Otter Tail County. Additional review of the long term viability of these processing facilities on this list is recommended to target investment for facility upgrades.

The mix of the type of materials' processing facilities located throughout the state of Minnesota varies and continues to evolve. For example, single-stream processing capacity has increased more than 35 percent in the Metropolitan Area in the last three to five years with multiple new single-stream processing facilities. As for Greater Minnesota, we have documented the conversion of a few facilities to single-stream and a handful of others evaluating the potential of facility retrofits.

With a number of processing facilities near the end of their useful life, there are several opportunities to improve existing processing facilities in Minnesota to include additional automated components (e.g. paper screen, eddy current separator, optical sorter). Provided below are planning level cost ranges for purchase and installation of select automated processing equipment.

**Table 5
Potential Processing Equipment Upgrades – Planning Level Costs**

Equipment Types	Costs
Eddy Current Separator	\$150,000 to \$300,000
Optical Sorter	\$400,000 to \$1,000,000
Old Corrugated Containers Screen	\$300,000 to \$500,000

Economies of scale and materials composition are critical to the economic feasibility of adding the equipment components listed in Table 5. For example, eddy current separators separate aluminum cans from the materials stream. Even though aluminum represents the highest value recyclable material in the materials stream, a substantial volume of material is needed for a reasonable payback period for purchase of this component. Optical sorters may be used to sort various types of plastics or paper. Similarly, large quantities of plastics and paper must be recovered to have a reasonable payback period. Old corrugated containers (OCC) screens separate large sheets of corrugated containers (cardboard) from the materials stream.

In formulating a statewide materials processing investment strategy, a number of factors should be considered. First, the processing systems targeted for investment should align with the type and scope of collection occurring within the region. For example, some regions may offer single-stream collection but not have single-stream processing capacity within the region. The results of our survey reflected that the types of materials processing occurring covers the continuum from the limited sorting of source separated materials from drop-offs to state-of-the-art processing of single-stream recyclables. Second, the quantities of materials generated for recovery may be inadequate to create reasonable economies of scale for adding new processing capacity. Using the solid waste planning process to generate additional data on identifying types of collection programs and quantities of recyclable materials available would be prudent for targeting facilities and locations for new investment. Third, the regions targeted for investment should reflect local governmental commitment to the solid waste and recycling policy framework through the use of financial incentives and educational programs to foster additional materials recovery. Sustainable materials recovery programs require continued commitment to address the changing waste stream.

Considering the above factors, a statewide framework of regional recyclable materials processing centers offers the potential for recycling program growth. With nearly 80 percent of all of the existing processing capacity located in the Twin City metropolitan area, investment in Greater Minnesota processing capacity seems prudent. For example, St Louis County has a MRF that serves a portion of the county. The County is presently assessing the potential to increase efficiencies and maximize processing capacity, including conversion to a single-stream processing facility. An upgrade of this facility may provide additional program growth in this region. The new construction of the Redwood/Renville County materials recovery facility will offer similar benefits to the southwest region. The recent upgrade of the resource recovery facility in Perham to include a mixed waste processing system offers additional resource recovery benefits to the region through energy recovery and additional recovery of recyclable materials from the mixed municipal solid waste stream. This facility offers opportunities for program growth in the north central part of the state through the Prairie Lakes Municipal Solid Waste Authority. Lastly, the near completed retrofit of the McLeod County materials recovery facility will offer single sort processing capacity that will benefit the west central region of Minnesota.

Overall, the present framework provides a blueprint for establishing a sustainable statewide processing system. The long haul of recyclables from Greater Minnesota to Metropolitan Area processing centers, however, illustrates the lack of and therefore need for more robust regional processing assets in Greater Minnesota. Such regional processing assets would foster program continuity and provide opportunities for program growth. Unlike the Metropolitan Area, private investment by itself may not be adequate in Greater Minnesota to foster recycling program growth. Select regional investment in processing facilities should be considered by applying the criteria described above.

3.2.6. Markets

The end market location for the recyclables processed by the facilities was also included as a question in the survey. The question was phrased were the materials processed in state (“S”), domestically out of state (“D”), or internationally (“I”). A summary of the end market responses is provided in the following table.

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**Table 6
Recyclable End Markets**

Facility	Recyclable				
	Paper	Cardboard	Glass	Metals	Plastic
Landfill				S	
Landfill	S	S	S	S	S
Landfill	S	S	S	S	S
MRF		S	D	D	D
MRF	S, D	S	D	D	D
MRF	S, D, I	S, D	S	S	S, D
MRF	D	S	D	D	D
MRF	S, D	S	S	S, D	S, D
MRF	S, D	S	S	S, D	S, D, I
MRF	S	S	S	S, D	D
MRF	S	S	S	S, D	S, D
MRF		S		S, D	
MRF	S	S	S	S	S
MRF	S	S	S	S	S
MRF		S, D			
MRF	S	S	D	D	D
MRF	S, D	S, D		S, D	D, I
MRF	D	D	S	S	S
MRF	D	D	S	S, D	S, D
MRF	S	S	S	S	S
MRF	S	S	D	S	D
MRF	S	S	S	S	S, D
MRF	S	S	S	S	S
MRF	S	S	S	S	S
MRF	S	S	S	S	S
MRF	S	S	S	S	S
MRF	S	S	S	D	S
Other	S	S		S	
Transfer		S		S	
Transfer	S	S	S	S	S
Transfer	S	S	S	S	S
Transfer	S	S	S	S	
Transfer	S	S	S	S	S
Transfer	S	S	S	S	S
Transfer	S	S	S	S	S
Transfer	S	S	S	S	S
Transfer	S	S	S	S	S
Transfer	S	S	D	S	S
Transfer	S	S	S	S	S

Markets (S=In State, D=Domestic out of state, I=International)

From the table above, it is noted that most facilities take at least a portion of the recyclables processed to an in-state end market for all types of materials. Paper, cardboard, glass and metal are primarily processed in-state with a few domestic out-of-state end markets (note that one MRF facility indicated that some of their paper is sent to an international end market). Plastic reportedly have the broadest end market, with several domestic out of state end markets noted, and two facilities noting international end markets for some of their

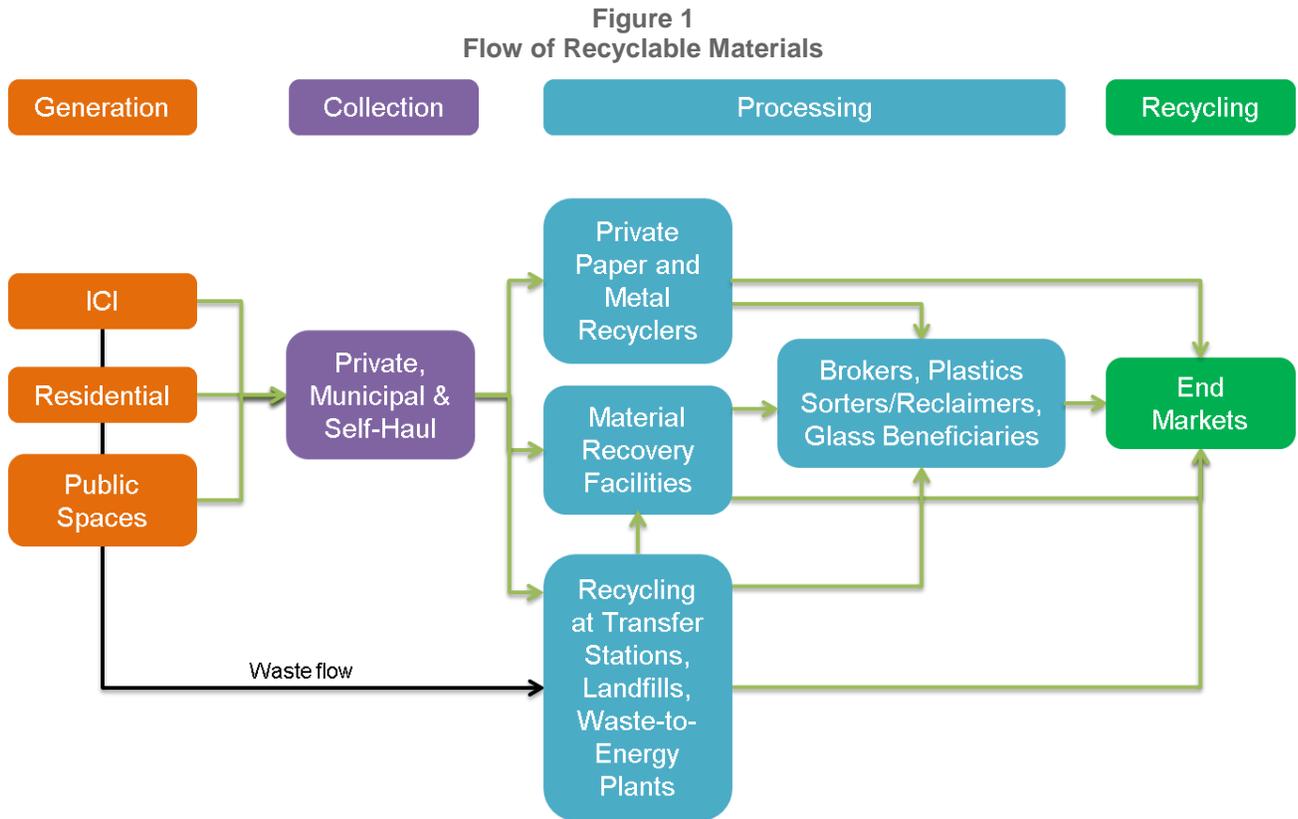
plastic. The facility permit data also offered some insight on end markets for the materials. More detail is discussed below in the recyclable materials markets section.

3.2.7. Costs to Operate the Recycling Facilities

Survey respondents also were asked to provide information related to costs to operate their facilities. Twenty five respondents provided some information related to cost. Some of the respondents considered the responses to these specific questions as proprietary and chose not to respond to these questions. For those responding to these questions, there was a wide range of responses related to the cost of their operations and revenues from the sale of the recyclables and tipping fees, indicating that there are numerous methods to financially operate a facility. Note that less than 20 percent of the respondents indicated they had some type of revenue sharing in their recycling programs.

4. Recyclable Materials Flows

The flow of recyclables is a complex system of collection, transferring, processing and ultimately delivery and use at an end market where the materials are recycled into a new product. Figure 1 below depicts the flow of materials in Minnesota. Note that there are flows that are not presented on this figure, including the residual wastes that result from the materials recovery processing operations.



4.1. Recyclable Materials Generation

Using the SCORE report data in conjunction with the ReTRAC data, the quantity of the recyclable materials of paper, plastic, metals, and glass generated were estimated for each County. A summary of the quantities is presented in Table A-2 in Appendix A. It is estimated that more than 1.6 million tons of these types of recyclable materials are generated in Minnesota.

Per the above flow of materials, generators may be asked to separate their recyclables from mixed municipal solid waste for collection by private or municipally-sponsored recycling programs, or generators may be asked to self-haul or drop off their recyclables at transfer stations, landfills, or waste-to-energy plants. Materials that are collected or dropped off next undergo processing to further sort materials and densify them for transportation to other downstream processors or end markets. These processing locations include:

- **Private Paper and Metal Recyclers:** These types of facilities only accept unmixed materials and are not required to have a solid waste permit or report their recycling quantities to MPCA. This category would also include large generators, such as grocery stores, that may bale some of their own recyclables, such as old corrugated containers, and sell it directly to an end market.
- **Material Recovery Facilities:** Recyclables can be taken directly from collection to a materials recovery facility - or they can go from a transfer station, landfill, or drop-off center to a material recovery facility. The recyclables delivered to materials recovery facilities may be source separated or commingled depending on the processing operations at the MRF. For purposes of this study, MRF's are defined as any facility that has materials separation equipment. A list of the facilities characterized as a MRF is included in Appendix B.
- **Transfer Stations, Landfills, and Waste-to-Energy Plants:** These types of facilities are a location for self-haulers, small business, and other organizations to drop-off recyclables. In some communities, curbside recycling collection companies may take their recyclables to one of these facilities. Additionally, these facilities may receive solid waste and process the solid waste to remove recyclables from the MMSW.

To conduct a review of the balance of materials collected compared to processed, the Project Team developed an estimate of the total materials processed. The Project team reviewed the SCORE and ReTRAC data, as well as gathered reported quantities processed via the survey. A summary of the quantities processed is presented in Table A-2 in Appendix A. It is estimated that more than 900,000 tons of these types of recyclable materials are generated in Minnesota. Therefore, there is a gap of nearly 700,000 tons between the quantities generated compared to processed based on our analysis. Some of the gap is likely materials that are processed by private paper and metal recyclers. In addition, the quantities reported as generated are likely overstated via the existing SCORE reporting process.

A Minnesota statewide waste characterization was conducted in 2013 for the MPCA by the consulting team of Burns & McDonnell, MSW Consultants, and GRG. The results included estimating the quantities and types of materials disposed. The material categories used in the study were developed to include materials recycled, including paper, plastics, metals, and glass. Provided below is a table that depicts the results from this study. The quantities of recyclable materials that are disposed, but could be characterized as recyclable are highlighted. Please note that this reflects a conservative estimate as some materials in the non-highlighted categories may be recoverable.

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Table 7
2012 Statewide Disposed Material Quantities

2012 Statewide Quantities =		2,922,045 tons			
Material	Mean	Tons	Material	Mean	Tons
PAPER			METAL		
Newsprint (ONP)	1.4%	40,400	Aluminum Beverage Containers	0.4%	12,200
High Grade Office Paper	1.1%	33,500	Other Aluminum	0.7%	19,000
Magazines/Catalogs	0.7%	21,500	Steel/Tin (Ferrous) Containers	0.7%	21,100
Phone Books	0.1%	3,900	Other Metal	2.7%	77,900
Gable Top/Aseptic Cartons	0.3%	9,000	Subtotal Metal	4.5%	130,200
OCC and Kraft Bags	3.7%	106,700			
Boxboard	1.6%	45,900	GLASS		
Compostable Paper	9.8%	285,400	Beverage Container Glass	1.3%	38,900
Mixed Recyclable Paper	3.4%	100,400	Glass Containers	0.5%	14,500
Non-Recyclable Paper	2.3%	67,900	Other (Non-Container) Glass	0.4%	12,200
Subtotal Paper	24.5%	714,600	Subtotal Glass	2.2%	65,600
PLASTIC			ELECTRONICS		
#1 PET Beverage Containers	0.8%	23,200	Laptops	0.0%	70
Other PET (e.g. jars/clamshells)	0.5%	15,400	Computer Monitors	NA	NA
HDPE Bottles/Jars	0.5%	14,800	Televisions	0.0%	1,400
Other HDPE	0.6%	16,100	Printers	0.1%	2,100
PVC - #3	0.0%	1,100	All Other Electronic Items	1.1%	31,500
Polystyrene - #6	1.0%	28,900	Subtotal Electronics	1.2%	35,070
LDPE (Rigids) - #4	0.1%	1,700			
Polypropylene - #5	0.6%	17,200	ORGANIC		
Other #7 Plastics	0.1%	2,800	Yard Waste	2.8%	81,500
PLA & Compostable Plastics	0.0%	700	Food Waste	17.8%	519,400
Bag and Film Plastic	6.6%	192,600	Wood	5.7%	168,000
Other Plastic (nonpackaging)	7.1%	208,300	Other Organic Material	4.7%	137,900
Subtotal Plastic	17.9%	522,800	Subtotal Organic	31.0%	906,800
HHW			OTHER WASTES		
Batteries	0.1%	1,500	Mattresses/Box Springs	0.4%	10,800
Mercury Containing Lamps	0.0%	1	Appliances & Furniture	3.0%	87,400
Paint Containers	0.2%	6,600	Textiles & Leather	4.7%	135,900
Oil Containers & Filters	0.0%	100	Carpet	2.3%	67,300
Smoke Detectors	0.0%	4	Sharps and Infectious Waste	0.0%	200
Other HHW	0.2%	4,400	Other Not Elsewhere Classified	8.0%	233,000
Subtotal HHW	0.4%	12,605	Subtotal Other Wastes	18.3%	534,600

Notes: The tons by material category may not equal the statewide tons multiplied by the respective material category mean percentage due to rounding of the mean percentages. Those material categories with 0% mean reflect negligible quantities on a statewide basis because the statistical confidence intervals include 0%.

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From the above results, we estimate an additional 760,700 tons per year of materials disposed are recoverable for recycling. The estimated quantities are summarized below by major material type.

- Paper – 361,300
- Plastics – 312,700
- Metals – 33,300
- Glass – 53,400

Please note that in some materials' subcategories collection and processing may not be technically feasible and/or end markets may not be fully mature for recovery to be viable today. However, most of the material types listed above are presently collected through various Minnesota recycling programs.

The above data and analysis, in combination with recycling estimates and our industry experience, was used to develop a total estimate of the quantity of materials generated by material type and sector. Table shows these generation estimates.

Table 8
Estimates of Recyclables Generation by Sector, 2011

Recyclable Material Type	Residential (tons)	Industrial/ Commercial/ Institutional (tons)	Total (tons)
Paper	589,000	1,100,000	1,689,000
Corrugated Cardboard and Kraft Bags	87,000	421,000	508,000
Newsprint (ONP)	176,000	39,000	215,000
Magazines/Catalogs	36,000	14,000	50,000
Mixed Recyclable Paper*	148,000	406,000	554,000
Compostable Paper	109,000	184,000	293,000
Other Paper**	33,000	37,000	70,000
Plastic	226,000	382,000	608,000
PET Packaging	27,000	42,000	69,000
HDPE Packaging	18,000	35,000	53,000
Mixed Plastic Packaging	34,000	24,000	58,000
Bags and Film Plastic	72,000	137,000	209,000
Other Plastic	75,000	145,000	220,000
Metal	45,000	48,000	93,000
Aluminum Beverage Containers	12,000	18,000	30,000
Steel Containers	33,000	30,000	63,000
Glass	113,000	88,000	200,000
Glass Containers	106,000	51,000	158,000
Other Glass	6,000	36,000	43,000
TOTAL	972,000	1,619,000	2,590,000
Sector portion of generation	38%	62%	

Source: "Extended Producer Responsibility Cost-Benefit Study – Working Paper 2 Appendices", Reclay StewardEdge, January 2014, using available MPCA data, results from the Minnesota Statewide Waste Characterization, and industry experience.

Figures are rounded and may not sum precisely.

*Mixed Recyclable Paper includes office paper, boxboard, gable top and aseptic cartons, phone books, and low-grade paper.

**Other Paper includes polycoated packaging, cups, and other food service packaging.

4.2. Data Gaps

As described above, after collection, recyclable materials can be handled multiple times, or simply taken directly to an end market. For example, collected commingled recyclables can be taken to a transfer station where they are consolidated and hauled to a MRF, and then to a broker, and then to an end market. On the other end of the continuum, materials such as cardboard can be generated by a business, baled at the business and hauled directly to an end market. There are many other variations of transferring, hauling, and processing of recyclables. As a result, tracking the flow of materials requires accurate and comprehensive reporting throughout the various stages of the processes.

During the Project Team's review of the existing MPCA data, completing the survey, and analyzing the results, the following data gaps were identified:

- Lack of county-by-county recyclable materials flow from collection to processing and processor to end market.
 - The existing MPCA data had very limited end market destination information for materials collected and processed.
 - County Solid Waste Plans generally do not identify the processing facilities and end markets for the materials collected within their respective county unless the county owns a processing facility.
 - A variety of external conditions can influence the destination of the recyclable materials and periodically change such end market destinations (i.e. market prices, new markets, changes in processes at facilities, changes in quantities collected).
- It is difficult to characterize the total quantity of recyclable materials processed because materials may be handled by multiple facilities and the flow the materials may not be clearly defined.
- The definitions of an end-market appeared to be misunderstood in some cases by those completing the facility permits, which likely led to the recyclable quantity being categorized incorrectly. For example, some transfer stations labeled the flow of their recyclables to an end market when they actually directed the materials to a MRF.
- The available MPCA data does not clearly breakdown the generation quantities into residential and commercial which limits the ability to clearly define the generation and flow of recyclables.
- The total generation of recyclables by county is likely overstated because of the lack of a rigorous reporting requirement for calculating the quantities of commercial/industrial/institutional recyclable materials. This could improve through new rules requiring haulers to report the amount of recyclables collected from residential and commercial generators by county.
- It is difficult to define facility recycling processes and categories. This includes issues such as defining whether a facility is a transfer station that transfers recyclables to another facility for processing, or some other type of processing.
- Data is not available to identify the amount of recyclables collected by a private curbside collection hauler that hauls recyclables directly from an outstate county to a metro processing facility while bypassing a regional facility (e.g. in the North Central region private haulers provide commingled single-stream recycling and haul to a processing facility in the metro region, which by-passes regional recycling centers). Requiring haulers to provide this data would help with the most significant data gaps in this analysis.

4.3. Flows to Recyclable Materials Processors

Through the review of the available data and the results from the survey, we estimated the total quantities of materials processed for each of the facilities characterized as materials recovery facilities. The complete list is provided in Appendix B. The estimated quantity of materials processed by Minnesota MRFs in 2013 was over 530,000 tons. Please note this likely underestimates the total quantities because other facilities handling recyclable materials not characterized as MRFs are processing materials such as integrated facilities (transfer station/MRF), private paper and metals recyclers, glass beneficiaries, and plastic

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reclaimers. Because of the lack of data from these other types of processing facilities, we focused additional analysis on the MRFS. Please also note that transfer stations reported sending loose Minnesota recyclables to four private MRFs that are located in adjoining states for processing as well.²

To begin assessing the overall materials processing infrastructure, we identified the six facilities processing the greatest quantity of recyclables. Table depicts these results. As reflected below, 80 percent of all of the materials processed in Minnesota are processed at these six facilities in 2013. Moreover, they are all located in the Twin City Metropolitan Area and are private MRFs. Other MRFs located in the Twin City Metropolitan Area include Randy' Sanitation in Delano and Dick's Sanitation in Lakeville.

Table 9
Annual Quantities of Top Six Processing Facilities (2013)

Facility Name	County	Cardboard	Other Paper	Total Paper	Total Metal	Total Glass	Total Plastics	Total Material Recycled
Tennis Sanitation	Washington	5,323	11,890	17,214	1,074	4,842	1,983	25,114
Eureka Recycling	Hennepin	10,385	18,119	28,504	1,405	8,242	1,993	40,145
Dem-Con Materials Recovery Facility	Scott	14,400	28,800	43,200	3,600	14,400	6,480	67,680
Allied Waste Recyclery	Dakota	28,023	25,082	53,106	1,977	11,026	2,489	68,597
Allied Waste Recyclery of Minneapolis	Hennepin	17,441	30,954	48,396	2,430	17,057	4,387	72,270
WM Recycle America	Hennepin	32,477	110,632	143,109	8,859	47,232	12,050	211,250
Total:		108,050	225,478	333,529	19,345	102,799	29,383	485,056
Percent of all materials processed via MRF:		72%	85%	81%	40%	88%	81%	80%

Note: All values are provided in tons per year estimated for from either MPCA permit data or via the study survey results.

² MinnKota, Fargo, ND; Millennium, Sioux Falls, SD; MDK Recycling, New Hampton, IA; Waste Management Recycle America, Superior, WI.

5. Recycling Infrastructure

5.1. Site Visit Outcomes

As part of the recycling infrastructure assessment, Project Team members conducted site visits of material recovery facilities in Minnesota. The purpose of the site visits was to supplement the secondary information gathered via review of the facility permit information and the primary data gathered via the facility survey. Per discussions with the MPCA, a shortlist of potential facilities to visit was developed that represented a cross-section of facility types that vary in size, processing type, ownership type, and location. From the shortlist of facilities, site visits were conducted at the following:

- McLeod County Recycling Center in Hutchinson;
- Dem-Con Material Recovery Facility in Shakopee;
- St. Louis County Recycling Processing Center in Virginia; and
- LJP Enterprises Materials Recovery Facility/Transfer Station in North Mankato.

Additional metro area facilities were contacted for potential site visits; however, none of those facilities were receptive to the visits at this time.

5.1.1. McLeod County

General Assessment

The McLeod County Materials Recovery Facility is located in Hutchinson, Minnesota approximately 50 miles west of the Twin City Metropolitan Area. The MRF presently receives source separated residential and commercial recyclable materials primarily from within the McLeod County with a limited quantity of materials received from private commercial generators from outside the County. The facility is owned and operated by McLeod County with a private contract for sorting activities.

McLeod County initiated an assessment of the facility and the County's long term recycling needs in 2012. The County determined in 2013 that converting to a county-wide single stream recycling program would be preferable. As a result, in July of 2014 the County initiated the process of converting its source separated collection and processing recycling program to a single-stream program. This included a retrofit of its existing facility to a single-stream recycling processing facility. The retrofit includes expanding the building to include a larger tipping floor, renovating the facility docks, adding a new truck scale, and incorporating a new single-stream processing system. The new processing system provides the County with the capability to process single-stream collected recyclable materials. Upon completion of the facility retrofit in the spring of 2015, the facility will be designed to process up to 20,000 tons per year (tpy) of single-stream recyclable materials. Provided below is a summary of the facility parameters.

Table 10
McLeod County Materials Recovery Facility Parameters

Age of the Building	10 years
Recycling Process	Source Separated (Sort Line, Ferrous Magnet, and Baler) converting to a single-stream recovery system by spring 2015
Age of Processing Equipment	10 years
Ownership	Public
Operation	Public
Customers	County communities, private haulers, and self-haulers
Design Capacity	6,000 to 7,500 tons per year
Current Annual Throughput	6,000 tons per year increasing to 20,000 TPY
Material Types	Paper, Cardboard, Metals, and Plastics
Annual Operation Costs	Approximately \$1 million
Revenue from Tip Fees	\$0
Revenue from Sale of Recyclables	Estimate of \$600,000
End Markets	The County hauls materials to a number of end markets both in-state and within the region.

Recommendations

The retrofit of the County’s facility to a single-stream processing facility will benefit the County and the region. The retrofit will offer the County greater flexibility to process single-stream recyclable materials from both within and outside the County. Moreover, the completion of the retrofit will more than double the design capacity of the facility. The County plans to continue to serve the County’s local governments and business and industry customers. However, they are actively soliciting customers from outside the County.

The County presently offers a revenue share for commercial customers transporting corrugated cardboard to the facility for processing. Going forward the County should consider establishing a rate structure that fosters long term financial sustainability as it expands its service area. Specifically, the rate structure should include a processing fee for processing out-of-county materials and revenue share for a broader range of materials provided by commercial customers.

5.1.2. Dem-Con Materials Recovery Facility

General Assessment

The Dem-Con Materials Recovery Facility is located in Shakopee Minnesota, a southwest suburb of the Twin City Metropolitan region. The Dem-Con facility is one of the newest single-stream recycling processing facilities in Minnesota which initiated operation in late 2013. It is an approximately a 60,000 square foot privately owned and operated facility. It is our understanding the facility presently operates 2 shifts, 5 days a week. Dem-Con has partnered with Liberty Diversified Industries, Twin-City based paper manufacturer, to foster recovery of the fiber grades of old corrugated containers and mixed paper. Provided below is a summary of the facility parameters.

Table 11
Dem-Con Materials Recovery Facility Parameters

Age of the Building	1 year
Recycling Process	Source separated, dual stream, and single-stream processing (Sort Line, Ferrous Magnet, Eddy Current Separator, Glass Screen, Glass Clean-up, Paper Screen, Optical Sorter, and Baler)
Age of Processing Equipment	1 year
Ownership	Private
Operation	Private
Customers	Local governments, private haulers, and public self-haulers.
Design Capacity	120,000 tons per year (20 tons per hour)
Current Annual Throughput	72,000 tons
Material Types	Paper, Cardboard, Glass, Metals, and Plastics
Annual Operation Costs	Proprietary
Revenue from Tip Fees	Proprietary
Revenue from Sale of Recyclables	Proprietary
End Markets	In-State and domestic (out-of-state)

Recommendations

The Dem-Con facility is a new facility that is highly flexible with the capability to process source separated, dual, and single-stream collected materials. It also utilizes state-of-the-art processing equipment, including but not limited to an optical sorter and glass clean-up. The partnership with LDI provides a unique business model to foster fiber recovery. Presently, the facility has available single-stream processing capacity which provides an opportunity for additional recovery of materials in the future. Dem-Con has contracts with a number of third party customers and will continue to grow its customer base as additional residential single-stream programs are initiated and the Minnesota mandatory commercial recycling law is fully implemented in 2016. Dem-Con should consider fostering additional partnerships with Greater Minnesota counties that are presently underserved to potentially increase the quantities of residential single-stream materials received for recovery at its facility.

5.1.3. St. Louis County

General Assessment

The St. Louis County Recycling Processing Center in Virginia, Minnesota, is a rural facility in the northwest corner of Minnesota on the Iron Range. It represents facilities in Greater Minnesota and is a dual stream and source separated processing facility. Recyclables brought to the facility are either collected at the curbside or at drop centers.

Currently, the County is focusing on increasing recycling by getting more small towns in the region to recycle more. To do this, they are offering financial incentives to communities that increase their recycling rates.

St. Louis County is also in the process of completing an efficiency study of the facility. The goal of the study is to increase the life of the facility and enhance its processing efficiency. One of the issues the County is considering is more storage space for the processed materials. If the County could store materials for a longer period of time, they could potentially receive a better price for the recyclable materials. The efficiency study will consider alternatives for the facility that may include options such as large capital changes to the

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equipment or the building. This may include modifying the facilities equipment and structure to a single-stream system.

It should be noted that the City of Chisholm has a single-stream recycling program that is operated by Waste Management Recycle America. Based on County observations, it is believed that this single-stream collection program is bypassing the St. Louis County recycling facility and transporting the materials directly to the metro area to a single-stream recycling facility. Converting the County's recycling facility to a single-stream building could result in the Chisholm recyclables potentially being transported to the County facility instead of the metro area facility. In addition, a change to single-stream recycling at the County facility could encourage other communities to convert to single-stream collection systems; and thus, increasing the County recycling rates because of the added convenience of single-stream recycling. Provided below is a summary of the facility parameters.

Table 12
St. Louis County Recycling Processing Center Parameters

Age of the Building	16 years
Recycling Process	Source Separated, Dual Stream (Sort Line, Ferrous Magnet, and Baler); Evaluating facility processing upgrades
Age of Processing Equipment	14 years
Ownership	Public
Operation	Private
Customers	Regional communities, private haulers, and self-haulers
Design Capacity	8,000 tons per year
Current Annual Throughput	4,600 tons
Material Types	Paper, Cardboard, Metals, and Plastics
Annual Operation Costs	Estimate of \$700,000
Revenue from Tip Fees	\$0
Revenue from Sale of Recyclables	Estimate of \$400,000
End Markets	The County hauls materials to several different recycling facilities including: brokers that resell the materials, and several direct end markets that recycle the materials

Note: The budget shortfall of \$300,000 (i.e. the difference between the costs and revenues) is made up with Score Funding and a Solid Waste Service Fee (County Fee)

Recommendations

The St. Louis County facility is a well operated facility that has excess capacity. The County is currently increasing their recycling rates through incentives for surrounding communities.

Although the County processing equipment has the capacity to process more materials and do not need to expand the recycling facility building for that reason, they are looking for ways to do it more efficiently. A larger processed material storage area would allow for the County to store the recyclables for longer periods of time and potentially receive better prices on the sale of the recyclables.

Increasing the efficiency of the facility should help reduce the gap between the costs to operate the facility and the revenues it generates through the sale of recyclables. Reducing this gap helps maintain the long-term viability of the recycling operation. Continued financial support for the facility through SCORE funding and County Solid Waste Fees is critical.

As discussed above, the County is currently undergoing an efficiency study that may include a recommendation to convert to a single-stream recycling system. The feasibility of changing to a single-stream recycling system will depend on the financial viability of such a program. If the MPCA considers single-stream recycling to align with the region’s processing needs, as well as a means to increase the region’s recycling rates, this may offer an opportunity for the state to upgrade recycling infrastructure by providing financial assistance in the form of a grant or low interest loan to the County to benefit the overall region.

5.1.4. LJP Enterprises Integrated MRF/Transfer Facility

General Assessment

The LJP Enterprises MRF/Transfer facility is a privately owned and operated facility located in North, Mankato. The facility was constructed in 2012 and is approximately 40,000 square feet with 25 material loading docks. The facility presently operates two shifts, five days a week. This integrated MRF/transfer facility provides for the processing of industrial/commercial recyclable materials, consolidation and transfer of residential recyclables, MMSW, and C&D, as well as document destruction. Provided below is a summary of the facility parameters.

Table 13
LJP Enterprises MRF/Transfer Facility Parameters

Age of the Building	2 years
Recycling Process	Processing and marketing of industrial/commercial source separated recyclable materials (balers, shredders); transfer of residential recyclable materials and other waste streams.
Age of Processing Equipment	NA
Ownership	Private
Operation	Private
Customers	Industry and businesses in the five state region
Design Capacity	NA
Current Annual Throughput	Approximately 3,000 tons per month; 36,000 tpy
Material Types	More than 50 different paper, plastic, metal, and cloth commodities
Annual Operation Costs	Proprietary
Revenue from Tip Fees	Proprietary
Revenue from Sale of Recyclables	Proprietary
End Markets	Hauls materials to a diverse set of domestic end markets to support diversified set of recovered commodities

Recommendations

LJP Enterprises’ integrated MRF/transfer station facility offers a unique business model by servicing primarily large industry and businesses. Residential single-stream recyclable materials are not processed at the facility, but consolidated and long hauled for processing. The facility is designed and operated in a highly efficient manner. The facility design facilitates loading and unloading of materials with its 25 loading docks and maximizes its capital investment through operating two shifts per day. Because the facility primarily processes materials that are source separated, the capital equipment investment excludes the need for purchase of costly automated processing equipment enhancing its financial viability. Overall, the

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business model supports the processing of a broad range of commodities that aligns with a large and growing customer base.

5.2. MRF Development Costs

The costs to develop a greenfield (e.g. new) MRF typically can be categorized into the following components:

- Design and engineering related costs;
- Land costs;
- Site development costs;
- Building costs
- Equipment capital and installation costs; and
- Other miscellaneous costs (taxes, bonds, etc.).

The typical layout of a building to handle this type of system is an L-shaped clear span, metal building of at least 30,000 square feet, ranging up to over 200,000 square feet. Generally, the proposed building must be large enough to adequately house a receiving area for the collected materials, the processing equipment, and an area to bale, store, and ship the recovered materials. Based on the recent development of similar types of Minnesota facilities, the planning level capital costs for such a building range from approximately \$110 to \$140 per square foot which translates into approximately \$3.3 to \$4.2 million for a 30,000 square foot building. A 200,000 square foot building can have capital costs exceeding \$25 million.

There are a number of recyclable materials processing equipment manufacturers serving Minnesota and the upper Midwest. The types of processing equipment needed for processing single stream collected materials generally include the following:

- Metering drum/in-feed conveyor;
- Pre-sort elevated sorting platform;
- Glass breaker;
- Old corrugated container (OCC) screen;
- Containers/fiber screens (1-4 screens, depending on the design throughput);
- Fiber and container elevated sorting platforms;
- Ferrous magnet;
- Eddy current separator;
- Optical sorters (typically only used in MRFs that process at least 20 tons/hour);
- Multi-materials baler; and
- Various conveyors.

Recycling equipment manufacturers offer processing systems as small as 10 tons per hour ranging up to 50 tons per hour. The projected cost for the purchase and installation of a single stream processing system with the capacity to process 10 tons per hour of single stream materials ranges from approximately \$2.5 to \$3.5 million. This includes the equipment components listed above except for the optical sorters.

For planning level purposes, we have included a \$200,000 allowance for site development costs, but excluded land purchase costs and design and related engineering costs.

The overall planning level costs for developing a “greenfield” single stream MRF designed to process 10 tons per hour are estimated to be \$6.0 to \$7.9 million. Total project costs for very large facilities can range up to \$50 million.

6. Markets for Minnesota Recyclables

6.1. Summary of Quantities and Markets

The following identifies the state’s existing markets and provides an indication of general flows to in-state and out-of-state markets. This discussion also provides markets context that can inform discussions regarding state policies that may result in increased levels of certain recyclables, the ability of markets to consume those additional flows, and needs for or opportunities for market development. Table summarizes the principal markets for Minnesota recyclables to consuming mills and presents estimates of in-state market demand compared to existing recycling levels from the state. It should be noted that not all in- or out-of-state markets are listed in the table, only examples of some of the principal markets, and the estimates of demand are summarized from publicly available information. Following the table is additional material-specific and grade-specific discussion for the materials listed in the table.

Table 14
Principal Markets for Minnesota Recyclables

Material Type	Existing Recycling ¹ (tons)	Approximate In-State Recycling Demand (tons)	Principal Mill and Reclamation Markets
Paper	975,200		
Corrugated Cardboard and Kraft Bags	400,000	350,000	RockTenn (MN), Liberty Paper (MN), IP (IA)
Newsprint (ONP)	164,100	70,000	NewPage (MN), Pactiv (MN)
Magazines, Catalogs and Telephone Books	32,700		
High Grade Office	80,300	70,000	NewPage (MN), SCA Tissue (WI)
Aseptic/Gable-Top Cartons	600	all	Fox River Fiber (WI), Great Lakes Tissue (MI)
Mixed Recyclable Paper	297,500	100,000	RockTenn (MN), Liberty Paper (MN), USG (MN), International Bildrite (MN), IP (IA)
Plastic	73,200		
PET Packaging	26,000	0	Ecostar(WI), Evergreen (OH), Mohawk (GA)
HDPE Packaging	11,000	Over 30,000	Master Mark (MN), Bedford Tech (MN), Envision (NC)
Mixed Plastic	28,200	small	Export, Reprocessed Plastics Inc. (MN)
Bags and Film Plastic	8,000	confidential	Up North Plastics (MN), Wisconsin Film and Bag (WI), Trex (VA)
Metal	460,000		
Aluminum Containers	17,000	0	Alcoa (TN),Novelis (KY)
Other Aluminum Products	20,700	80,000	Spectro Alloys (MN)
Steel Containers	43,400	600,000	Gerdau Ameristeel (MN)
Other Ferrous and Nonferrous Metal	378,900		

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Material Type	Existing Recycling ¹ (tons)	Approximate In-State Recycling Demand (tons)	Principal Mill and Reclamation Markets
Glass			
Glass Containers	103,600	confidential	Strategic Materials (MN), ² Glass Advantage (ND), Anchor Glass (MN)
Non-container Glass	29,400	confidential	Strategic Materials (MN)
Total (standard residential and ICI materials)	1,641,400		

1. Figures derived from residential and industrial, commercial, and institutional marketed quantities as reported in “Report on 2012 SCORE Programs,” Minnesota Pollution Control Agency, December, 2013, and “Cost-Benefit Analysis of a Recycling Refund System in Minnesota,” Reclay StewardEdge Inc., February, 2014.

2. Strategic Materials is one of what had been two glass beneficiaries in Minnesota. E-Cullet had been a second beneficiary until it closed its beneficiary operations in Minnesota in the fall of 2014, in addition to closing its operations in nearly all other US states where it operated. Consuming glass container plants for the cullet produced by Strategic Materials and E-Cullet include Anchor Glass (MN), Verallia (WI).

The markets listed in Table are the principal consuming mills, reclaimers, and beneficiation plants for Minnesota recyclables. These markets perform the step that transforms collected recyclables into raw materials ready for remanufacture. The market infrastructure for Minnesota recovered materials also includes brokers that source materials on behalf of mills (e.g., AMG sources ferrous scrap on behalf of Gerdau Ameristeel), and end users of recycled material. It should also be noted that recyclables collected in Minnesota do not necessarily go to in-state markets, even though in-state markets may be closer. It is not uncommon for materials recovery facilities (MRFs) that are part of large corporations with central national marketing staff to have their materials blocked together with recyclables from across the country and shipped long distances to national and international markets. Even local independent MRFs and recyclables processors sometimes market a portion of their materials to more distant out-of-state markets in order to maintain diverse market relationships or to take advantage of higher prices that may be offered.

6.2. Material and Grade Analysis

6.2.1. Old Corrugated Containers

The vast majority of old corrugated containers (OCC) is collected from industrial, commercial, and institutional (ICI) recycling programs. Residential OCC generation and recycling is growing as consumers increase online purchases and home delivery, and as curbside programs expand their list of accepted recyclables and convert to providing large recycling carts under single-stream collection programs.

According to Moore & Associates, approximately 65 percent of OCC recovered in the US goes to domestic markets, primarily to manufacture containerboard and paperboard, while approximately 35 percent is exported.

End markets for OCC from Minnesota include RockTenn and Liberty Paper in Minnesota, as well as mills in Iowa, Wisconsin, and elsewhere in the Midwest, Canada and overseas. RockTenn consumes approximately 1,000 tons per day of recovered paper at an estimated 70-15-15 ratio for OCC, old newspapers (ONP), and mixed paper (MP). Liberty Paper consumes 300 – 400 tons per day of recovered paper, primarily OCC and small amounts of MP. Combined demand for OCC from both mills is approximately 350,000 tons per year. There is also large demand provided by IP in Cedar Rapids, IA. Any additional quantity of OCC collected for recycling would easily be accommodated by existing out-of-state markets.

6.2.2. Old Newspapers, Old Magazines, Catalogs, and Directories

Old newspapers (ONP) has historically been the primary grade produced by residential materials recovery facilities (MRFs) in terms of both tonnage and revenues produced. Dramatic declines in newspaper circulation and lineage – over 10 percent annual declines in recent years – has resulted in half the generation today compared to the amount generated a decade ago. The days are fast approaching when ONP may no longer be a grade that the majority of MRFs produce – instead, newspapers may be left in and part of mixed paper (MP). At least four of Minnesota’s residential single-stream MRFs no longer produce ONP as a grade.

While old magazines (OMG), which includes catalogs and directories, exists as a separate grade, most is packed mixed with ONP, or packed in MP by large materials recovery facilities. Smaller recycling centers may sort and bale OMG/catalogs/directories as a separate grade. ONP and OMG are similar fiber products and go to common recycling markets.

In the U.S., approximately half of ONP is exported, primarily to Canada and Asia. The major domestic ONP market is recycled newsprint (approximately 30 percent going back into newsprint) with smaller amounts going to paperboard, tissue/toweling and paper manufacturing. There are no recycled newsprint mills in the Midwest – all have shut down – remaining recycled newsprint mills are located in Ontario, Quebec, the U.S. Southeast, or the Pacific Northwest. Primary markets for Minnesota ONP/OMG include the NewPage (Duluth) and Pactiv (Moorhead) mills, plus other regional, Canadian, and overseas mills. NewPage consumes an estimated 150-200 tons per day of recovered ONP to produce recycled content magazine, advertising, and catalog papers, and 150-200 tons per day of recovered office papers to produce deinked market pulp. The Pactiv mill consumes less than 100 tons per day of recovered paper, historically very clean #8 ONP, to produce molded pulp packaging. However, declining ONP quality (partly related to the trend toward single-stream processing) is pushing the mill to use pre-consumer newsprint instead of post-consumer material. Combined demand for ONP from both mills is approximately 70,000 tons per year.

Any increase in newspapers, magazines, catalogs, and directories recycling would be sorted into a combination of ONP and MP grades. In-state markets for both of these grades are currently at capacity and any additional recycling quantity would likely flow out-of-state to other markets, which would have sufficient capacity for the material.

6.2.3. Aseptic/Gable-Top Cartons and Sorted Office Paper

Cartons are a relatively new material in residential recycling programs in Minnesota. There are approximately five domestic markets for cartons, and a large number of export markets. Market demand for recovered cartons is strong and exceeds available supply. Cartons are a substitute grade for sorted office paper (SOP), and like SOP are recycled into tissue and recycled content printing and writing papers. However, not all existing SOP markets are able to recycle cartons, since capital investments must be made in additional screening and fiber cleaning systems, and cartons must be batch pulped separate from SOP.

End markets for cartons recovered in Minnesota include Fox River Fiber (Wisconsin), Great Lakes Tissue (Michigan), ReWall (Iowa) and overseas export. Fox River consumes approximately 190,000 tons per year of recovered paper, primarily sorted office paper, and makes deinked pulp for sale to others. Great Lakes consumes 25,000 tons per year at an estimated 70-30 ratio of SOP-Cartons and manufactures tissue from the recycled material. ReWall located in Des Moines Iowa consumes 1,200 tons per year of cartons to make building materials.

Office paper generation has declined by 20 percent over the last decade as printed documents are increasingly replaced with electronic documents and communications. This also means that the availability of SOP is constrained as well. Alternatively, some end products that use recycled SOP as a raw material continue to grow in their demand, such as tissue and toilet paper production. Because cartons substitute for

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SOP, and because SOP is declining, there is more than sufficient growing regional market demand for any increase in cartons recycling.

6.2.4. Mixed Paper

Mixed Paper is a very diverse grade with a wide range of specifications and subgrades that are packed and sold in the marketplace. Grade definitions and market statistics are therefore difficult to establish. Residential mixed paper (RMP) is generally marketed as “soft mix” due to the higher level of paperboard and groundwood fiber (newspapers, magazines, and directories) compared to commercial MP, which tends to be marketed as “hard mix” due to higher office paper and cardboard content.

Approximately half of mixed paper produced in the United States has been exported in recent years. Domestically, the primary RMP market is for paperboard production with lesser amounts being used for tissue/towel and other paper manufacturing.

Current markets for MP from Minnesota include RockTenn, Liberty Paper, USG Acoustical, and International Bildrite in-state, with approximately 100,000 tons per year of demand, IP in Iowa, and other regional and overseas paper and board mills. Regional demand is also expected to increase. In 2014 Pratt Industries broke ground in Valparaiso, Indiana, for a new large 100 percent recycled paperboard mill that will create significant new regional demand for mixed paper.

In-state markets for MP are currently at capacity and any additional recycling quantity would likely flow out-of-state to other markets, which would have sufficient capacity for the material.

6.2.5. Compostable and Non-recyclable Paper

This category of paper includes wax or plastic coated and food-contaminated packaging papers that are not normally accepted in recycling programs. Example products include paper coffee cups, cold drink cups, ice cream cartons, and quick service restaurant takeout boxes. Currently, there are no markets for these types of paper packaging in Minnesota, or elsewhere in North America, except for areas where household organics are collected for composting or anaerobic digestion. Many of these products have very similar materials compositions to and may be compatible with aseptic and gable-top cartons or some other recovered fiber grade. Market development is needed for these products, which would be a prerequisite to including them in recycling programs, to ensure that they do not cause mill problems.

6.2.6. PET Bottles and Thermoforms

There are no PET reclaimers in Minnesota, and all recovered PET goes to out-of-state markets. Nationally, approximately 75 percent of recycled PET bottles went to domestic markets in 2013, and of this material, the largest market segment was recycled content PET bottles, followed closely by polyester fiber and carpet manufacturing, which is the predominant market segment for plastic bottles that go to markets in the Southeast. The typical market structure for PET bottles outside of the Southeast is for bales from MRFs to be processed by reclaimers who either produce clean flakes or pellets suitable for remanufacturing by other plastics companies into recycled content bottles or for sheet thermoforming. Although Minnesota does not have an in-state PET reclaimer, it does have in-state consumers of recycled PET, such as Dan’s Extrusion. These in-state end users must purchase recycled PET from outside the state.

PET reclaimers generally operate large-scale facilities targeted at 100 million pounds per year (50,000 tons per year) for economies of scale and efficiency and these plants typically draw in materials regionally – such PET reclamation plants are considered to be regional markets, and not generally considered to be state-specific markets. The Midwest has regional reclamation plants in Wisconsin, Illinois, Indiana, and Michigan.

PET thermoforms are recycled by existing PET bottle recyclers. There are technical challenges to recycling PET thermoforms, so only approximately five PET reclaimers in the U.S. and Canada accept more than incidental amounts of thermoforms in PET bottle bales. EcoStar in Madison, Wisconsin and Perpetual Recycling in Indiana, which are the closest markets to Minnesota, accept PET bottles and thermoform PET products in their plants.

Nationally and regionally, there is more PET reclamation capacity than available supply – U.S. domestic reclamation capacity was utilized at only 72 percent in 2013. Any increase in PET recovery from Minnesota would be in demand by existing regional reclaimers, with no need for new reclamation capacity in Minnesota. It should be noted that there are PET product manufacturers (molders and extruders) in Minnesota that can use recycled PET; however, they must purchase recycled PET from outside the state. While there is no need for PET market development in Minnesota, there may be a longer term opportunity for siting a PET reclamation plant in the state, especially if recycled volumes significantly increase.

6.2.7. HDPE Bottles

The recycling market structure for HDPE is similar to PET with reclaimers playing a critical intermediate processing role to produce clean flake and pellets of recycled HDPE that may be sold to manufacturers of molded, extruded and other products or used directly by integrated product manufacturers. The major end markets for recycled HDPE from bottles are non-food application bottles, pipe, lumber, and railroad ties. Domestic markets consume approximately 80 percent of recycled HDPE bottles.

End markets for HDPE bottles collected in Minnesota include reclaimers located out-of-state and in-state manufacturers of lumber and lawn and garden accessories that include Master Mark and Bedford Tech.

Minnesota's in-state markets currently source HDPE from out-of-state to meet their demand. Any additional quantity recovered in state may allow them to purchase more HDPE in-state and reduce their out-of-state HDPE purchasing.

6.2.8. Bottles with Resin Identification Codes 3-7 and Mixed Rigid Plastic Packaging

Plastic packaging that remains after PET and HDPE bottles have been picked out includes a combination of PVC, LDPE, polypropylene (PP), and #7 Other bottles, injection grade cups and tubs, and thermoformed packaging of all resin types. These mixed materials are commonly packed by MRFs into a pre-picked rigids grade that requires further sorting before they can be recycled into products. PET, HDPE and polypropylene (PP) are the most common resins used for non-bottle packaging, although polystyrene composes a significant percentage as well. MRFs also commonly produce a bulky rigids grade that is composed of large items that are removed from the beginning of sort lines that is primarily extrusion and injection grade polyethylene products such as large buckets, crates, and toys.

There is not a widely accepted market specification for bulky rigids and markets for this grade are limited in North America with primary markets located in California, North Carolina, Texas and Ontario. In Minnesota, Reprocessed Plastics Inc. recycles extrusion grade bulky rigid polyethylene.

The vast majority of pre-picked rigids (smaller sized injection grade tubs/lids, thermoforms, and #3-7 bottles) is exported for further manual sorting and recycling in Asia. However, within the last couple of years, several domestic markets have emerged to purchase and further sort pre-picked rigids, and then resell the sorted resins and grades to domestic reclaimers. These sorting facilities, along with the locations of PET bottle reclaimers that accept thermoform PET, and recyclers of other sorted specialty grades of plastic are shown in Figure 2 below.

Figure 2
Recycling Markets for Plastics that are Not PET or HDPE Bottles



Several PP molders exist in Minnesota that may be capable of using recycled PP from bottles or injection grade polypropylene from tubs (Gopher Resource recovers injection grade PP primarily from used auto batteries); however, it is difficult for MRFs to accumulate sufficient quantities of PP to justify sorting them as a separate grade from mixed plastics streams.

Polystyrene is used in packaging in two forms – rigid polystyrene for trays and clamshells, and foam polystyrene for package cushioning or for food service. Foam foodservice polystyrene recycling has few markets because it is difficult to recycle the material economically. Dart has a reclamation facility in Michigan for foodservice foam packaging it has manufactured and then collected through recycling programs operated by its customers – Dart is also a partner in a polystyrene recycling enterprise at Plastic Recycling Inc., Indianapolis, Indiana that is scheduled to open in early 2015 that will take all types of rigid and foam polystyrene for recycling. Expanded foam polystyrene protective packaging has better market demand than foodservice foam; however, this packaging foam must either be delivered to local manufacturers of expanded bead polystyrene blocks and shapes for recycling, or densified thermally or by compression for shipment to more distant markets, all of which are out-of-state from Minnesota. The lone in-state market for expanded foam protective packaging is Plymouth Foam, Becker, MN, which makes expanded bead foam products. Rigid polystyrene packaging faces the same challenges as that of non-PET or HDPE resins – they are found in smaller quantities and it is cost-effective for only the very largest of MRFs to sort them – as a result they are packed into pre-picked mixed rigids and sent elsewhere for further sorting before reclamation.

NatureWorks LLC is headquartered in Minnesota and is the sole U.S. manufacturer of polylactic acid (PLA) in the United States. Its production plant is in Nebraska. NatureWorks will facilitate the recycling of PLA products if they are separated from other plastics and shipped to NatureWork’s production facility.

As Figure 2 shows, there is a need for mixed rigids sorting capacity in the Midwest. While export and other U.S. markets exist, it would be beneficial from a market stability standpoint for Minnesota to consider market development in the area for sorting of mixed plastics.

6.2.9. Plastic Bags and Film

According to the American Chemistry Council (ACC), there is at least 835 million pounds (415,000 tons) of film recycling capacity in the US.³ Approximately 40 percent of US film that is collected for recycling is purchased by overseas export markets with the remaining 60 percent recycled by North American reclaimers. A majority of film that is collected for recycling comes from ICI generators, not residential generators.

The composite decking industry is the largest domestic market for film, representing 55 percent of film recycled in North America – other markets include recycled film and sheet (primarily commercial film), and other garden and general extruded product manufacturing.

Primary markets for plastic bags and film are located outside of Minnesota. An in-state market is Up North Plastics, which requires clean polyethylene film only, and makes trash bags from the recycled material. A major regional market is Wisconsin Film and Bag.

6.2.10. Aluminum Cans

The vast majority of cans recovered in the U.S. go to large smelters that recycle them into rolls of aluminum sheet that are then shipped to manufacturers of new aluminum cans for closed loop recycling. This closed loop system provides the best recycled market value for aluminum cans, so very little are believed to be diverted for other applications such as alloying agents or for cast aluminum parts. These dedicated can smelters are very large national-level recyclers. All of these smelters are located in the Eastern U.S., in New York, Kentucky, Tennessee, Georgia, and Alabama. Minnesota is home to Spectro Alloys Corporation, the Midwest's largest scrap aluminum recycling plant, and Mankato Iron and Metal. While both of these companies recycle aluminum, their operations are focused on recycling non-packaging aluminum, and they generally are not in the market to buy segregated aluminum cans (except to minimally process and resell them). These companies supply some 6-8 in-state end users of their recycled aluminum. Market demand for recovered aluminum of all types exceeds supply. There is no need for market development for additional in-state capacity.

6.2.11. Steel

Approximately 70 percent of recovered ferrous scrap is consumed domestically by steel mills and foundries, with the remaining percentage exported primarily to the Far East, Turkey and India. Steel cans are not typically recycled closed-loop and are instead recycled with other sources of steel scrap in an open-loop steel recycling system into a wide variety of steel products.

Current end markets for steel cans from Minnesota include Gerdau Ameristeel which has a facility in the state, and out-of-state markets. In-state and regional demand for scrap steel far exceeds existing in-state recovery, and there is no need for additional market development with respect to ferrous scrap

6.2.12. Glass Containers

Beneficiation plants crush, color-sort, and screen out contaminants to make recovered glass containers furnace-ready for closed loop bottle manufacturing, which consumes approximately 80 percent of recovered glass in the United States (including high-quality glass from deposit states), with lesser quantities going to fiberglass manufacturing (because of the high purity required by that industry) or other uses. The vast

³ Moore Recycling Associates Inc., *2011 National Postconsumer Plastic Bag & Film Recycling Report*, Prepared for the American Chemistry Council, February 2013.

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majority of glass container manufacturing is performed by only three companies with multiple locations across the United States – Anchor Glass, Owens-Illinois, Inc., and Verallia North America. Where glass container and fiberglass plants are limited, container glass may be simply crushed and used as an aggregate substitute.

In recent years Minnesota had two companies with optical sorting capacity for mixed cullet (E-cullet and Strategic Materials Inc., both in St. Paul) that would sell clean color-sorted cullet to container glass plants, fiberglass manufacturing, and other uses. Counties in the northwest of Minnesota also had access to Glass Advantage in West Fargo, North Dakota for non-container recycling uses such as sand blast media. However, in the fall of 2014, E-cullet closed its doors and only Strategic Materials Inc. (SMI) is left. Consuming glass container plants for SMI's production include the Anchor Glass plant in Minnesota (the only glass container plant in the state) and a Verallia plant in Wisconsin. Anchor Glass also purchases some glass directly from recycling programs where the glass is kept separate from other recyclables and color sorted.

Minnesota does not have adequate glass processing capacity in the state and additional market development is needed in this area for existing levels of recovery. While glass container plants nationally have the capacity and desire to recycle increased amounts of container glass according to an interview with Verallia, which has regional glass container manufacturing plants in Wisconsin and Indiana, there is a concern that less than half of the glass from single-stream collection programs can ultimately be color-sorted and cleaned to suitable quality for their use. The other half of glass that is not able to be cost-effectively cleaned for glass container uses are used by other markets as sand blast media, reflective materials, and civil engineering uses. Additional market development initiatives may be needed, particularly for non-container recycled applications, and as mentioned above, for beneficiation to process recovered glass and make it furnace-ready for high-value end use applications.

6.3. Recycling Market Development

Recycling market development is a specialty area within traditional economic development, which is devoted to growing state and local economies generally. Recycling market development in some states has focused on overcoming gaps and barriers that limit communities from collecting, processing, and marketing certain recyclables. That type of recycling market development is focused on enabling higher levels of diversion from disposal, especially for materials that may not already be collected for recycling. Minnesota's recycling market development program takes a different approach in that it believes that adding value in the state of Minnesota to recovered materials, rather than shipping those materials to out-of-state markets, is better for the environment and the Minnesota economy. Recycling market development in Minnesota therefore works on the demand side to develop new products and expand the capacity for current products being manufactured in Minnesota from recovered materials. Minnesota's recycling market development programs works closely with sustainable materials policy staff to develop and coordinate waste and recycling policy activity with recycling market development so that increased diversion from disposal can have the added benefit of in-state economic growth, versus economic growth elsewhere. Today, it is recognized that increasing recycling of materials to higher-value versus lower-value uses or disposal has impacts on two levels:

1. Localized collection and processing jobs that are realized within the state and directly proportional to additional recyclables collected; and
2. Recycling manufacturing jobs at mills and reclamation facilities, and end users who incorporate recycled material into the products they make.

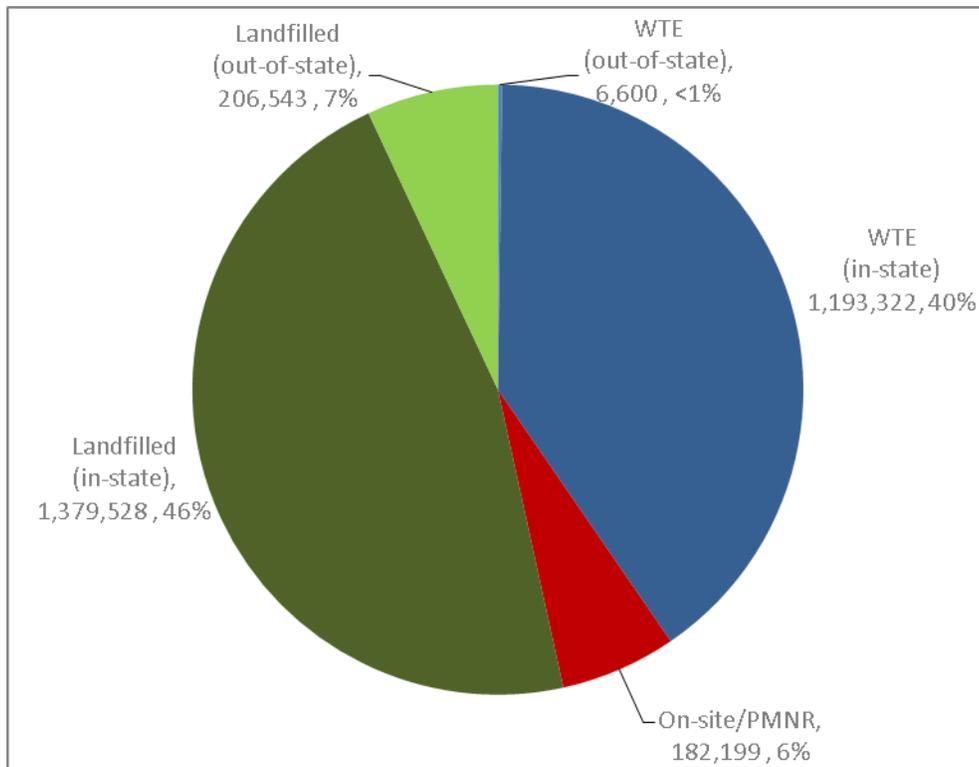
Recycling manufacturing jobs tend to be higher paying than collection and processing jobs. As long as there is sufficient regional demand so that there is not a market "barrier" to increasing the diversion of

recyclables from disposal, recycling manufacturing establishments do not necessarily need to be located in Minnesota, and this whole section on markets has discussed where regional demand is sufficient, or not. However, even for those materials with sufficient regional demand, Minnesota may choose to pursue in-state market development simply for the sake of economic development. The scope of this report was focused on identifying processing and market-related barriers to higher levels of recycling from Minnesota (e.g., glass beneficiation and mixed plastics sorting capacity were identified as needs). Identifying opportunities for market development for the sake of economic development requires detailed analyses of regional market capacity and regional materials flows, which was beyond the scope of this project.

7. Statewide MMSW Management System Overview

Solid waste that is not diverted for recycling or beneficial use is called mixed municipal solid waste (MMSW). MMSW in Minnesota is typically collected and transported to be processed or land disposed, although a small percentage is managed on-site where it is generated or illegally disposed in the environment. According to Minnesota waste flow data reported to MPCA and analyzed for this report, approximately 3.0 million tons of MMSW is not recycled, with 55 percent disposed in landfills, 41 percent is processed at resource recovery facilities, and an additional 0.1 million tons or 4 percent is estimated by MPCA to be disposed on site or is problem materials not recycled that is disposed elsewhere in the environment.⁴ These figures, along with the proportion managed in-state, is shown in Figure 3.

Figure 3
Management of Un-recycled Minnesota Municipal Solid Waste



⁴ “Report on 2013 SCORE Programs,” Minnesota Pollution Control Agency, February 2015.

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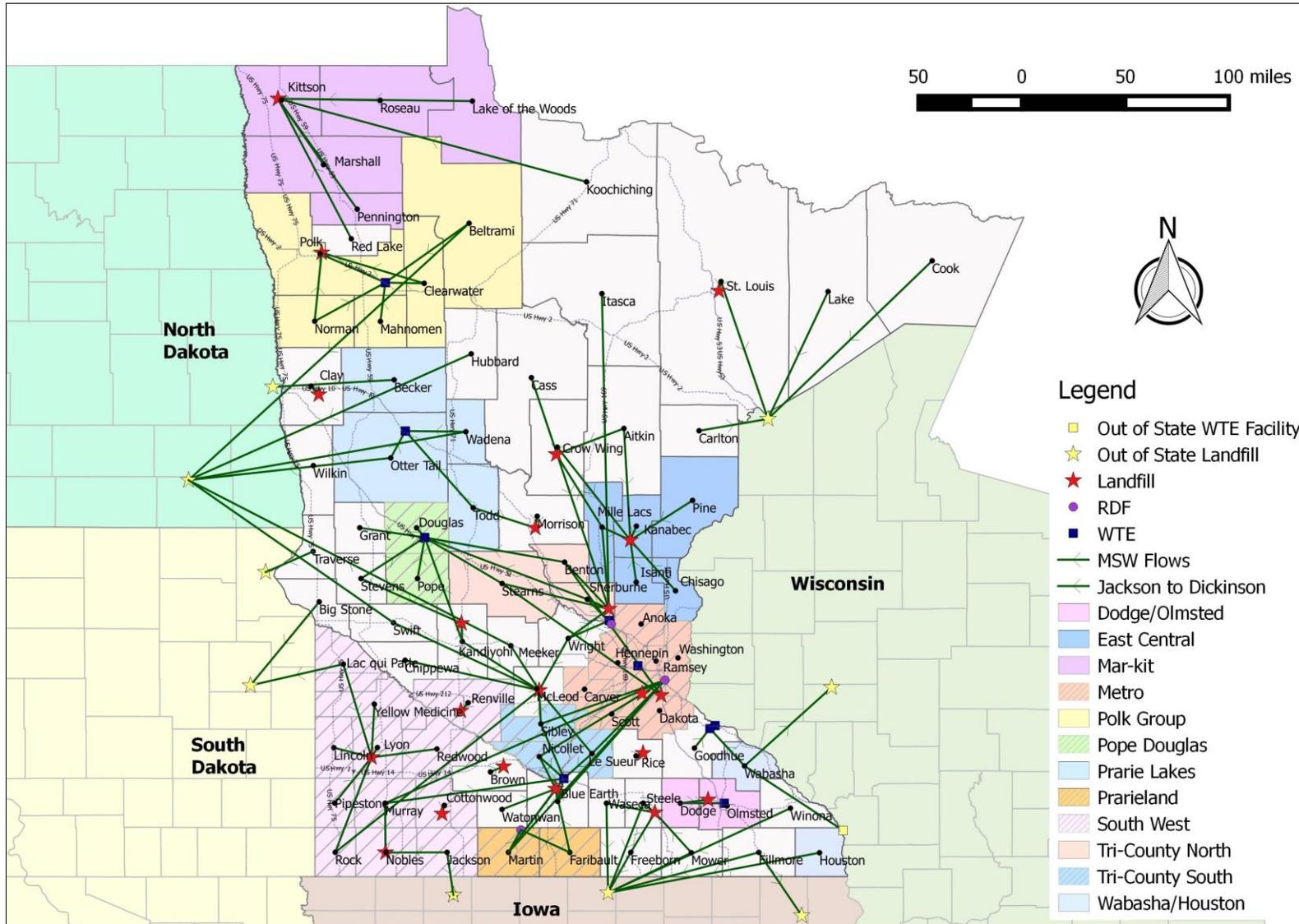
The capacity for managing Minnesota's MMSW includes MRFs with a capacity for sorting mixed recyclables of approximately 0.75 million tons per year, paper and metals processors (with an unknown processing capacity), and in-state waste-to-energy treatment with a capacity to combust 1.7 million tons/year. MMSW that is not recycled or combusted goes to in-state and out-of-state landfills. The current infrastructure for managing Minnesota's MMSW includes:

- 146 transfer stations;
- 3 refuse derived fuel (RDF) processing facilities;
- 8 in-state and 1 out-of-state waste-to-energy facilities; and
- 21 in-state landfills and 8 out-of-state landfills.

In addition to the above facilities, Minnesota has numerous other recycling facilities as discussed previously in this report, plus composting facilities and landfills for construction and demolition debris that were outside the scope of this analysis.

MMSW processing and land disposal facilities for Minnesota's MMSW, both in-state and out-of-state, are shown in Figure 4, along with principal MMSW flows from counties to those disposal facilities. Figure 4 also shows counties that have joint powers agreements in place using different colors of shading; groups of counties that have submitted multi-county solid waste management plans to MPCA are designated with cross-hatching. The seven county metropolitan area is indicated because the region is governed by the Metropolitan Solid Waste Management Policy Plan promulgated by the MPCA every six years and subsequently implemented by individual metropolitan county solid waste management master plans.

Figure 4
Minnesota's Mixed Municipal Solid Waste Flow – All County Flows (Excludes Metro Flows)



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In order to keep Figure 4 from becoming too complex to be informative, only principal flows associated with the top 80 percent of disposed MMSW are shown. The flows associated with waste generated in the Twin Cities Metro Area counties have also been omitted from this figure because their number would obscure flows from Greater Minnesota; Metro Area flows are shown in a Metro Area-specific figure in Appendix H. It should also be noted that flows from each county are represented as originating at the geographic center of each county, represented by a black dot. In reality, waste is generated in greater quantities in the more populated portions of the counties, plus waste may flow through a combination of several transfer stations and direct-collection/direct-delivery flows to disposal facilities. Showing waste originating at one center point been done to simplify the presentation of key waste flow relationships.

The MMSW management facilities shown on Figure 4 are listed in Table 15.

Table 15
Waste Disposal Facilities for Minnesota Disposed Municipal Solid Waste

Facility Type and Name	Location
Refuse Derived Fuel Facilities	
Elk River Resource Processing Plant	Elk River, MN
Prairieland Solid Waste Management Resource Recovery Facility ¹	Truman, MN
RRT Newport Resource Recovery Facility	Newport, MN
In-State Waste-to-Energy Facilities (mass burn & RDF)	
Covanta Hennepin Energy Resource Company L.P.	Minneapolis, MN
GRE Elk River Energy Recovery Station	Elk River, MN
Olmsted Waste-to-Energy Facility	Rochester, MN
Perham Resource Recovery Facility	Perham, MN
Polk County Solid Waste Resource Recovery	Fosston, MN
Pope Douglas Solid Waste Management	Alexandria, MN
Red Wing Solid Waste Boiler Facility ¹	Red Wing, MN
Xcel - Wilmarth Generating Plant	Wilmarth, MN
Xcel Energy - Red Wing Generating Plant	Red Wing, MN
Out-of-state Waste-to-energy Facilities	
Xcel Energy Incinerator	La Crosse, WI
In-state Landfills	
MAR-KIT Sanitary Landfill	Hallock, MN
Pine Bend Landfill (Republic)	Inver Grove Heights, MN
St. Louis County Regional Landfill	Virginia, MN
East Central Sanitary Landfill	Mora, MN
Crow Wing Landfill	Brainerd, MN
Clay County Landfill	Hawley, MN
Lyon County Landfill	Lynd, MN
Spruce Ridge Landfill (Waste Management)	Glencoe, MN

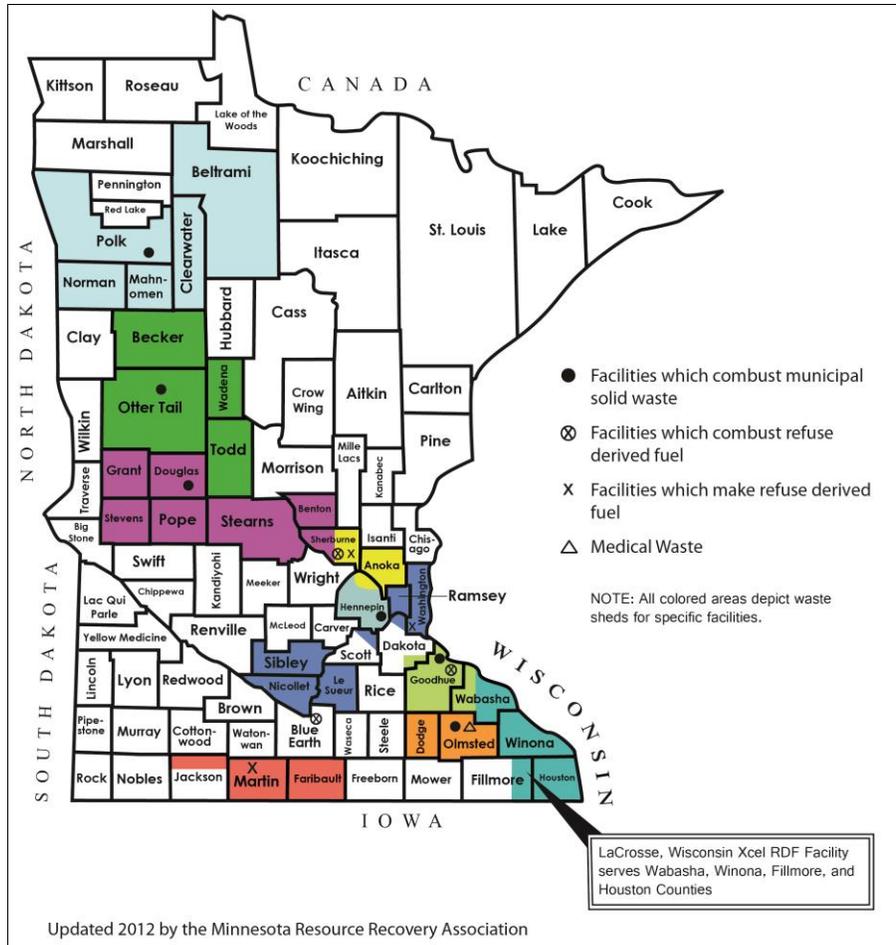
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Facility Type and Name	Location
Kandiyohi County Landfill	New London, MN
Polk County Landfill	Crookston, MN
Morrison County Landfill	Little Falls, MN
Renville County Landfill	Olivia, MN
Brown County Sanitary Landfill	Sleepy Eye, MN
Cottonwood County Landfill	Windom, MN
Nobles County Landfill	Worthington, MN
Ponderosa Landfill (Blue Earth County)	Mankato, MN
Steele County Landfill	Blooming Prairie, MN
Rice County Landfill	Dundas, MN
Kalmar Landfill (Olmsted County)	Rochester, MN
Burnsville Sanitary Landfill (Waste Management)	Burnsville, MN
Elk River Landfill (Waste Management)	Elk River, MN
Out-of-state Landfills	
Central Disposal Systems, Inc. Landfill	Lake Mills, IA
City of Superior Landfill	Superior, WI
Fargo Landfill	Fargo, ND
Seven Mile Creek Landfill (Advanced Disposal)	Eau Claire, WI
Dakota Landfill (Waste Management)	Gwinner, ND
Watertown Regional Landfill	Watertown, SD
Winneshieck County Landfill	Decorah, IA
WM Dickinson County Landfill	Spirit Lake, IA

After the 2013 waste flow data on which this report is based was collected, several changes occurred to Minnesota’s disposal infrastructure. The one facility that used to compost MMSW, Prairieland Solid Waste Management Resource Recovery Facility, switched from composting MMSW to producing a RDF product – it is classified in this table according to how it currently functions. Also, one small waste-to-energy facility, Red Wing Solid Waste Boiler Facility, stopped combusting municipal solid waste in 2014. Two landfills in Wisconsin, Timberline Trail and Sarona, have in the past received large amounts of MMSW generated in Minnesota, but they did not appear to be receiving MMSW from Minnesota in 2013 based on reported flow data.

Figure 5 shows county waste sheds associated with waste-to-energy and RDF facilities.

Figure 5
Minnesota Waste-to-energy Waste Sheds



7.1. County Cooperation – County Groups

Most of the Counties in Minnesota have joined together to cooperate in various ways to plan and/or implement various solid waste management services. These cooperative efforts range from joint ownership and operation of facilities to periodic joint planning to fulfill state requirement for obtaining landfill expansions. Cooperative efforts include management of MMSW, coordinated arrangements for the diversion of materials to household hazardous waste programs, recycling and/or composting systems, and management of non-MMSW.

Cooperative arrangements may take many forms including:

- Joint Powers agreements covering waste delivery, debt service, ownership or operation of facilities;
- Multi-County contracts to assure waste delivery and/or pledge cooperation in operating facilities;
- County groups that cooperate jointly complete the state’s 10 year County planning requirements;
- County groups that cooperate to operate Household Hazardous waste programs; and
- County coordinating groups that periodically meet to share information.

Effective institutional arrangements between Counties and between Counties and the owners and operators of recycling and MMSW management infrastructure are essential vehicles to implement state and local solid waste management goals.

Some of these existing groupings of counties are listed below, with a short description of their approach toward managing waste and if applicable, recyclables.

- **Dodge Olmsted** – This is a two-county region that manages MMSW at the Olmsted County waste-to-energy facility in Rochester with by-pass and ash being landfilled at the Kalmar Landfill located in Olmsted County. The waste-to-energy facility has a small amount of unused capacity. The counties have contracted with waste haulers or implemented waste designation to direct solid waste to the facility. Waste haulers provide curbside recyclable materials collection to residents and businesses in the two county region. To support these efforts, Olmsted and Dodge Counties prohibit recyclable materials from being disposed with mixed municipal solid waste by ordinance.
- **East Central Solid Waste Commission (ECSWC)** – This is a five county region (Chisago, Mille Lacs, Pine, Kanabec and Isanti) that includes the East Central Solid Waste Commission Sanitary Landfill for the disposal of non-recycled waste and the Hinckley and Cambridge transfer stations. The counties have invested in a regional land disposal system that includes MMSW delivery contracts and rebates to private haulers to provide financial incentives to dispose of their solid waste at the ECSWC landfill. Curbside recyclable materials collection is provided by private haulers via subscription. The Commission provides several drop-off facilities for recyclable materials in conjunction with the counties and municipalities.
- **Mar-Kit** – This is a two County Joint Powers Board (Marshall and Kittson) that contracts with other Counties to form a five county region to utilize the MAR-KIT Sanitary Landfill for the disposal of MMSW. The counties utilize several MMSW transfer facilities appurtenant to the MAR-KIT landfill. Several other political subdivisions send significant proportions of their MMSW to the MAR-KIT landfill. Curbside recyclable materials collection is not provided to residents except in International Falls (Koochiching County). Business recycling is supplemented by recyclable drop-off boxes in the region.
- **Metro** – The seven county metropolitan area is defined in statute as the region that encompasses the metropolitan Minneapolis/Saint Paul region of the state. This region is governed by Minnesota Statutes Chapter 473 the Metropolitan Landfill Abatement Act and hence the MPCA's Metropolitan Solid Waste Management Policy Plan. The Solid Waste Management Coordinating Board is a six county joint powers board (Anoka, Carver, Dakota, Hennepin, Ramsey, and Washington) that assists in coordinating waste management strategies. The region relies heavily on waste-to-energy and refuse-derived-fuel plants to process a majority of the waste for energy recovery. Most un-processed MMSW is disposed at private landfills located within the region, although some waste is transferred out-of-state to Wisconsin. The municipalities and counties work together within the region to provide comprehensive curbside recyclable materials collection to residents and businesses. In addition, residential and commercial food waste collection has been initiated in some locations to broaden recovery of organics beyond just yard waste. Several privately owned and operated MRFs process and market the recovered materials.
- **Polk** – This is a five county group, including Beltrami, Clearwater, Mahnomon, and Norman counties, where the counties contract with Polk County to deliver MMSW to the County's waste-to-energy and recycling facility in Fosston. The waste-to-energy facility, located in Fosston, includes an up-front mixed waste processing facility that also processes recyclable materials such as OCC, ferrous metals, and aluminum. Polk County also provides drop-off recycling centers in Fosston and Crookston for residents that choose to source separate their recyclable materials. Other counties within the region supplement these programs with a handful of curbside collection and drop-off programs.
- **Pope/Douglas** – This is a two county joint powers board whose counties have committed to diverting all MMSW from landfills by investing in an MMSW waste-to-energy and recyclables recovery facility.

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While Grant and Stevens counties send much of their MMSW to the Pope/Douglas waste-to-energy facility, they are not formally part of the region. The Tri-County (north) Solid Waste Commission contracts with Pope/Douglas to process MMSW generated in the Tri-County area. The waste-to-energy facility is operating at capacity. The waste-to-energy facility added a third combustor for resource recovery in 2010. Licensed commercial haulers provide curbside collection of recyclable materials to residents and businesses. This is supplemented by a set of recyclable materials drop-offs and a mobile recycling trailer. The waste-to-energy facility includes a mixed waste processing facility on the front end of the facility processing to recover recyclable materials from the mixed waste stream. The MRF primarily recovers OCC through manual sorting, ferrous metals through a magnetic separator, and aluminum through an eddy current separator.

- **Prairie Lakes Municipal Solid Waste Authority (PLMSWA)** – This is a five county region whose counties have committed to diverting MMSW from landfills by owning and operating a waste-to-energy processing facility. The Perham Waste-to-Energy plant is functioning at capacity with Otter Tail, Becker, Wadena, Todd, and Clay Counties directing MMMSW to Perham. Moreover, the waste-to-energy facility was recently upgraded to expand its capacity and a mixed waste processing facility was incorporated into the facility for recovering recyclable materials from the waste prior to combustion. MMSW that cannot be processing is landfilled at the Clay County landfill or the Morrison County landfill (Todd County).
- **Prairieland** – Faribault and Martin Counties formed a joint powers board to own and operate the Prairieland Solid Waste Management Resource Recovery Facility that processes their MMSW to recover metals and manufacture refuse-derived-fuel. The facility formerly also segregated and composed an organic fraction derived from MMMSW. Neighboring counties Blue Earth and Watonwan, while not part of the Prairieland Region, share the same landfills for disposal of residual waste as Faribault and Martin Counties. Brown County is focused on its county-owned landfill, which it currently does not make available to neighboring counties for disposal. Prairieland assists Faribault and Martin Counties with coordination of curbside collection of recyclable materials, including single-stream collection, through public education efforts and collaboration with licensed commercial haulers.
- **Southwest** – This 12 county group plans together and the region contains three county-owned and one privately owned landfills. With respect to waste diversion from landfill, they largely function independently. For example, there is a MRF in the region (in Redwood County) slated to be completed in the spring of 2015. It is presently designated to serve Redwood and Renville counties. Some of the other counties including but not limited Jackson and Lyon have county-wide collection contracts with waste haulers to provide single-stream recyclable materials collection. Generally, the collected materials are hauled to MRFs outside the region for processing.
- **Tri-County North** – This three county joint powers board (Benton, Stearns, and Western Sherburne) utilize the same MMSW facilities, which are a mix of privately-owned landfills and the Pope/Douglas waste-to-energy facility. The eastern portion of Sherburne County utilizes Great River Energy's Elk River Resource Recovery Facility recovers ferrous and non-ferrous metals as part of the process of producing refuse derived fuel. The region's integrated solid waste management system includes a number of single-stream curbside recycling programs including the City of St. Cloud. In addition, there are a few privately owned and operated MRFs in the region that provide materials processing capacity.
- **Tri-County South** – This three county joint powers board (Sibley, Nicollet, and LeSueur) have required that MMSW generated by public entities must be processed (MMSW is shipped to the RRT refuse derived fuel facility in Newport, Minnesota. Waste haulers utilize a mix of privately-owned landfills and Blue Earth County's Ponderosa landfill for managing some MMSW. The recycling or materials processing capacity in the region is limited. However, facilities in North Mankato and McLeod County will have single-stream processing capacity available beginning the spring of 2015 that could assist in serving this region.

- **Wabasha/Houston** – This two county group in the southeastern part of the state directs the flow of their waste, under an agreement with La Crosse County Wisconsin, to the Xcel refuse-derived-fuel processing facility located in La Crosse. The Xcel facility recovers ferrous and non-ferrous metals. Houston County owns a small materials processing facility serving the region.
- **WLSSD** – the Western Lake Superior Sanitary District includes Duluth and portions of Carlton and St. Louis counties near Duluth. The solid waste is directed to the District's transfer station for consolidation and transfer to the City of Superior Wisconsin's landfill. Cook and Lake County also ship MMSW down the north shore to the WLSSD transfer facility. Curbside recycling is offered within the region through subscription with private haulers. Curbside collection is supplemented by WLSSD's materials recovery drop-off center for recyclable materials and other recoverable wastes.

Figure 4 showed that there are a number of counties that adjoin each other whose MMSW flows to the same MMSW processing and land disposal facilities. There are opportunities for these counties to work together regionally to prepare regional solid waste management plans, share disposal facilities, and share recycling processing facilities. Appendices E through S provide additional detail for each of the existing solid waste planning regions, with additional prospective groupings of counties identified by the Project Team as having the potential for coordinated MMSW management planning. Tonnage estimates in the appendix tables come from a combination of data reported to MPCA for 2013 and survey results from the Project Team. It was necessary for the Project Team to conduct these surveys to clarify county of origin because in a number of cases, final disposal facilities' reports on county of origin were in conflict with county of origin reports from transfer stations, who also reported on disposal facility. Furthermore, waste collection companies that collect waste in Minnesota and then direct-deliver it to facilities outside Minnesota's borders, such as waste-to-energy plants, landfills, or transfer stations are not required to report those tons directly to MPCA under the current reporting system.

Appendices



Appendix A County Recyclables Generation and Processed

**Table A-1
Recyclables Processed by County**

County	Cardboard	Paper	Total Paper	Total Metal	Total Glass	Total Plastic	Total Materials Recycled
Aitkin	1,214	1,649	2,862	229	533	205	3,829
Anoka	100	206	306	1,848	7	57	2,217
Becker	429	512	941	852	322	0	2,115
Beltrami	4,542	1,126	5,668	306	0	0	5,974
Benton	0	0	0	72,406	0	0	72,406
Big Stone	0	0	0	0	0	0	0
Blue Earth	4,542	203	4,745	0	0	0	4,745
Brown	323	329	652	67	147	67	932
Carlton	240	97	337	7	72	22	438
Carver	0	0	0	0	0	0	0
Cass	3,188	1,384	4,572	87	0	137	4,796
Chippewa	0	0	0	0	0	0	0
Chisago	1,253	1,808	3,061	200	948	301	4,510
Clay	45	76	121	101	12	6	239
Clearwater	0	0	0	103	0	0	103
Cook	0	0	0	0	0	17	17
Cottonwood	0	0	0	0	0	0	0
Crow Wing	0	0	0	0	0	0	0
Dakota	28,135	25,082	53,218	2,036	11,026	2,489	68,768
Dodge	318	0	318	121	0	0	439
Douglas	498	156	654	1,212	51	44	1,961
Faribault	0	0	0	0	0	0	0
Fillmore	0	0	0	0	0	0	0
Freeborn	2,500	150	2,650	26	0	2,385	5,061
Goodhue	2,795	1,726	4,521	952	667	402	6,542
Grant	0	0	0	0	0	0	0
Hennepin	60,910	159,716	220,626	71,373	72,532	18,431	382,961
Houston	704	397	1,102	403	20	160	1,685
Hubbard	0	0	0	948	0	0	948
Isanti	3	0	3	1,488	0	0	1,490
Itasca	1,726	946	2,672	174	0	131	2,977

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County	Cardboard	Paper	Total Paper	Total Metal	Total Glass	Total Plastic	Total Materials Recycled
Jackson	0	0	0	0	0	0	0
Kanabec	0	0	0	11	0	0	11
Kandiyohi	1,682	1,197	2,879	277	339	207	3,702
Kittson	0	0	0	0	0	0	0
Koochiching	8	220	227	58	93	36	414
Lac qui Parle	0	0	0	0	0	0	0
Lake	143	63	206	18	0	0	224
Lake of The Woods	0	0	0	0	0	0	0
Le Sueur	0	0	0	184	0	0	184
Lincoln	0	0	0	0	0	0	0
Lyon	1,435	0	1,435	23	0	0	1,458
Mahnomen	0	0	0	0	0	0	0
Marshall	0	0	0	0	0	0	0
Martin	0	0	0	0	0	0	0
McLeod	2,535	1,750	4,286	161	485	728	5,659
Meeker	0	0	0	0	0	0	0
Mille Lacs	0	0	0	0	0	0	0
Morrison	64	111	175	127	0	0	302
Mower	296	858	1,154	152	348	122	1,775
Murray	609	214	824	63	279	128	1,294
Nicollet	11,505	6,387	17,892	614	280	772	19,558
Nobles	0	0	0	0	0	0	0
Norman	0	0	0	40	0	0	40
Olmsted	8,766	6,480	15,246	2,520	2,958	0	20,724
Otter Tail	1,226	2,292	3,518	6,903	745	244	11,410
Pennington	1,166	431	1,597	82	92	82	1,853
Pine	0	0	0	0	0	0	0
Pipestone	0	0	0	0	0	0	0
Polk	285	153	438	324	661	139	1,561
Pope/Douglas	0	0	0	0	0	0	0
Ramsey	0	0	0	481	0	0	481
Red Lake	0	0	0	0	0	0	0
Redwood	545	434	980	67	239	162	1,447
Renville	0	0	0	430	0	0	430
Rice	3,191	0	3,191	56	0	0	3,247
Rock	0	0	0	0	0	0	0
Roseau	0	0	0	0	0	0	0

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County	Cardboard	Paper	Total Paper	Total Metal	Total Glass	Total Plastic	Total Materials Recycled
Scott	40,726	33,060	73,787	35,369	16,512	7,208	132,875
Sherburne	0	0	0	1,012	0	0	1,012
Sibley	0	0	0	12,666	0	0	12,666
St. Louis	5,363	5,597	10,960	2,795	2,323	1,277	17,356
Stearns	4,844	4,610	9,454	478	1,360	1,515	12,807
Steele	0	0	0	0	0	0	0
Stevens	0	0	0	0	0	0	0
Swift	0	0	0	0	0	0	0
Todd	384	295	679	203	133	37	1,052
Traverse	0	0	0	0	0	0	0
Wabasha	307	11	317	0	0	0	317
Wadena	131	0	131	0	0	0	131
Waseca	1,242	237	1,479	5	66	41	1,591
Washington	5,349	11,808	17,157	17,322	4,842	1,983	41,305
Watonwan	0	0	0	0	0	0	0
Wilkin	328	490	818	6	34	11	868
Winona	1,762	386	2,148	20,357	0	0	22,505
WLSSD	0	0	0	322	0	0	322
Wright	0	6,451	6,451	300	2,954	1,210	10,916
Yellow Medicine	0	0	0	0	0	0	0
Sum:	207,357	279,099	486,456	258,361	121,080	40,756	906,653

Notes:

1. All values are provided in tons.
2. Data is from 2014 Burns & McDonnell survey of recycling collection facilities. 2013 MPCA Annual Report data was used in lieu of survey data for facilities that did not respond to survey requests.

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**Table A-2
Recyclables Generated by County**

County	Cardboard	Paper	Total Paper	Total Metal	Total Glass	Total Plastic	Total Materials Recycled
Aitkin	569	628	1,197	724	237	105	2,263
Anoka	54,523	31,361	85,884	31,711	5,939	2,518	126,052
Becker	3,152	3,445	6,597	895	481	581	8,554
Beltrami	3,462	748	4,210	524	599	82	5,415
Benton	1,623	10,437	12,060	7,308	1,492	788	21,648
Big Stone	145	343	488	886	130	36	1,540
Blue Earth	13,818	5,061	18,879	20,314	936	4,218	44,347
Brown	4,260	5,706	9,966	13,458	397	733	24,554
Carlton	1,619	1,545	3,164	461	751	324	4,700
Carver	6,807	17,383	24,190	4,380	1,970	1,120	31,660
Cass	3,036	2,763	5,799	211	306	246	6,562
Chippewa	1,023	251	1,274	920	18	218	2,430
Chisago	2,185	2,594	4,779	1,169	836	310	7,094
Clay	2,244	2,375	4,619	5,821	551	212	11,203
Clearwater	196	72	268	565	0	0	833
Cook	475	223	698	160	307	49	1,214
Cottonwood	1,270	504	1,774	362	108	23	2,267
Crow Wing	5,134	3,199	8,333	18,647	1,190	1,644	29,814
Dakota	25,683	89,955	115,638	36,733	15,454	8,294	176,119
Dodge	766	1,509	2,275	1,503	994	244	5,016
Faribault	3,452	2,745	6,197	1,986	95	259	8,537
Fillmore	0	1,685	1,685	1,483	451	119	3,738
Freeborn	8,967	1,007	9,974	3,213	979	2,645	16,811
Goodhue	4,338	8,238	12,576	1,076	1,467	264	15,383
Grant	157	136	293	41	105	35	474
Hennepin	48,667	87,648	136,315	54,465	24,756	16,411	231,947
Houston	436	311	747	1,310	201	46	2,304
Hubbard	1,755	527	2,282	546	412	122	3,362
Isanti	1,621	1,049	2,670	9,535	318	185	12,708
Itasca	2,683	2,395	5,078	3,139	1,098	424	9,739
Jackson	1,166	310	1,476	1,121	81	38	2,716
Kanabec	604	291	895	999	42	304	2,240
Kandiyohi	3,605	1,841	5,446	417	299	350	6,512
Kittson	112	162	274	73	0	24	371

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County	Cardboard	Paper	Total Paper	Total Metal	Total Glass	Total Plastic	Total Materials Recycled
Koochiching	3,575	747	4,322	832	93	38	5,285
Lac qui Parle	638	549	1,187	192	56	55	1,490
Lake	595	481	1,076	102	99	68	1,345
Lake of The Woods	45	0	45	1,400	13	0	1,458
Le Sueur	1,143	866	2,009	3,060	273	385	5,727
Lincoln	329	263	592	87	86	23	788
Lyon	4,318	931	5,249	7,354	303	193	13,099
Mahnomen	162	42	204	64	30	8	306
Marshall	63	175	238	426	0	26	690
Martin	7,244	4,225	11,469	7,768	882	1,026	21,145
McLeod	2,978	3,362	6,340	847	415	4,321	11,923
Meeker	1,271	692	1,963	780	201	83	3,027
Mille Lacs	550	658	1,208	79	194	153	1,634
Morrison	2,495	2,446	4,941	7,956	509	355	13,761
Mower	15,767	887	16,654	325	306	239	17,524
Murray	523	875	1,398	424	176	62	2,060
Nicollet	2,781	10,156	12,937	2,454	311	866	16,568
Nobles	2,795	1,526	4,321	4,141	332	479	9,273
Norman	33	4	37	737	51	22	847
Olmsted	10,928	48,136	59,064	11,673	2,167	1,085	73,989
Otter Tail	3,618	1,126	4,744	6,817	745	244	12,550
Pennington	1,141	389	1,530	28	23	72	1,653
Pine	548	647	1,195	3,414	293	176	5,078
Pipestone	829	405	1,234	41	183	380	1,838
Polk	2,141	779	2,920	4,623	449	114	8,106
Pope/Douglas	3,458	4,811	8,269	3,071	2,121	572	14,033
Ramsey	7,452	29,533	36,985	10,600	10,061	3,127	60,773
Red Lake	241	48	289	277	21	9	596
Redwood	2,244	1,202	3,446	2,016	295	530	6,287
Renville	523	789	1,312	673	523	51	2,559
Rice	13,259	3,214	16,473	6,315	3,122	1,157	27,067
Rock	721	171	892	722	116	64	1,794
Roseau	2,052	342	2,394	1,957	2,505	431	7,287
Scott	14,029	15,536	29,565	16,552	2,339	1,753	50,209
Sherburne	174	7,899	8,073	12,000	2,173	946	23,192
Sibley	333	497	830	283	71	80	1,264

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

County	Cardboard	Paper	Total Paper	Total Metal	Total Glass	Total Plastic	Total Materials Recycled
St. Louis	7,584	2,981	10,565	45,195	1,351	614	57,725
Stearns	8,726	17,343	26,069	22,363	4,677	2,628	55,737
Steele	1,583	3,260	4,843	3,316	20,378	406	28,943
Stevens	526	241	767	503	119	58	1,447
Swift	714	717	1,431	291	304	152	2,178
Todd	1,699	9,223	10,922	216	134	57	11,329
Traverse	119	90	209	239	27	13	488
Wabasha	1,890	407	2,297	233	499	160	3,189
Wadena	1,145	108	1,253	4,797	146	200	6,396
Waseca	3,608	35,760	39,368	1,934	83	217	41,602
Washington	18,305	45,808	64,113	8,110	2,922	1,771	76,916
Watsonwan	1,457	1,259	2,716	56	153	100	3,025
Wilkin	347	243	590	113	66	23	792
Winona	8,900	6,226	15,126	5,848	836	347	22,157
WLSSD	9,597	11,672	21,269	12,269	3,809	1,377	38,724
Wright	12,705	6,620	19,325	5,507	2,727	2,843	30,402
Yellow Medicine	558	424	982	2,756	213	70	4,021
Sum:	400,012	575,238	975,250	459,992	132,981	73,200	1,641,423

Notes:

1. All values are provided in tons.
2. Data presented is from 2012 SCORE Report.

Appendix B Materials Recovery Facilities

**Table B-1
Annual Quantities Processed by Materials Recovery Facilities**

Facility Name	County	Total Paper (tons)	Total Cardboard (tons)	Total Glass (tons)	Total Metal (tons)	Total Plastics (tons)	Total Material Recycled (tons)
WM Recycle America eCycling Services PBR	Hennepin	110,632	32,477	47,232	8,859	12,050	211,250
Allied Waste Recyclery of Minneapolis	Hennepin	30,954	17,441	17,057	2,430	4,387	72,270
Allied Waste Recyclery	Dakota	25,082	28,023	11,026	1,977	2,489	68,597
Dem-Con Materials Recovery Facility PBR	Scott	28,800	14,400	14,400	3,600	6,480	67,680
Eureka Recycling	Hennepin	18,119	10,385	8,242	1,405	1,993	40,145
Tennis Sanitation	Washington	11,890	5,323	4,842	1,074	1,983	25,114
LJP Enterprises of St Peter PBR	Nicollet	5,938	11202	79	412	631	18,263
ADS (Veolia Environmental Services - Midwest PBR)	Olmsted	6,220	4,383	2,958	402	0	13,963
Hartel's/DBJ Recycling	St. Louis	4,246	3,283	2,323	658	735	11,245
Covanta Hennepin Energy Resource Co LP	Hennepin	0	0	0	10,233	0	10,233
Python's of St Cloud Inc. PBR	Stearns	2,884	2,622	584	393	1,515	7,998
McLeod County Solid Waste Management PBR	McLeod	1,750	2,532	485	161	728	5,655
St Louis County Recycling Processing Facility PBR	St. Louis	1,351	1,664	0	1,025	542	4,582
Buckingham Companies Inc. PBR	Scott	4,068	2,064	2,112	372	576	4,510
Otter Tail County Recycling Center PBR	Otter Tail	2,292	1,226	745	6,817	244	4,419
Kandiyohi County Recycling PBR	Kandiyohi	1,197	1,682	339	177	207	3,602
Aitkin County Recycling Center PBR	Aitkin	1,649	1,044	533	134	205	3,564
Dem-Con Recovery & Recycling LLC	Scott	0	449	0	2,500	0	2,949
Red Wing Solid Waste Boiler Facility	Goodhue	690	844	198	535	163	2,430
Bueckers City Sanitation Services	Stearns	863	1,111	388	0	0	2,362

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Facility Name	County	Total Paper (tons)	Total Cardboard (tons)	Total Glass (tons)	Total Metal (tons)	Total Plastics (tons)	Total Material Recycled (tons)
Pope - Douglas Incinerator	Douglas	156	498	51	1,150	44	1,899
Goodhue County Materials Recovery Facility PBR	Goodhue	345	1,107	270	76	76	1,874
L & S Systems	Pennington	431	1,166	92	57	82	1,828
Mower County Recycling	Mower	858	296	348	77	122	1,701
Deer River Hired Hands Inc.	Itasca	946	1,726	472	142	131	1,692
Redwood County Recycling Center PBR	Redwood	434	545	239	67	162	1,447
Polk County Resource Recovery Facility	Polk	153	285	661	206	139	1,443
Fillmore County Resource Recovery	Fillmore	0	0	0	1,354	0	1,354
Murray County Recycling PBR	Murray	214	609	279	63	128	1,294
River Bend Recycling Center PBR	Nicollet	449	303	202	119	141	1,213
Houston County Recycling Center	Houston	236	424	0	275	0	935
Braun & Borth Sanitation PBR	Brown	329	323	147	67	67	932
Cook County Recycling Center PBR	Cook	186	374	221	45	55	881
Richard's Sanitation PBR	Houston	161	280	20	129	160	750
Wilkin County Recycling Facility PBR	Wilkin	490	328	34	36	11	725
Arrowhead Recycling Center PBR	Lake	181	85	45	78	25	414
Elk River Resource Recovery Facility	Sherburne	0	0	0	410	0	410
Coon Rapids Recycling Center	Anoka	205	50	7	78	53	392
Kellner Recycling Center	Olmsted	180	0	0	131	0	311
MinnKota EnviroServices - Moorhead PBR	Clay	76	45	12	71	6	210
Alpha Container Services & Recycling	Dakota	0	112	0	59	0	171
Liberty Tire-St Martin	Stearns	0	0	0	79	0	79
J&J Recycling PBR	Ramsey	0	0	0	26	0	26
TOTAL		264,656	150,712	116,644	47,927	36,329	602,812

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Table B-2
Estimated Age of Processing Equipment by Facility

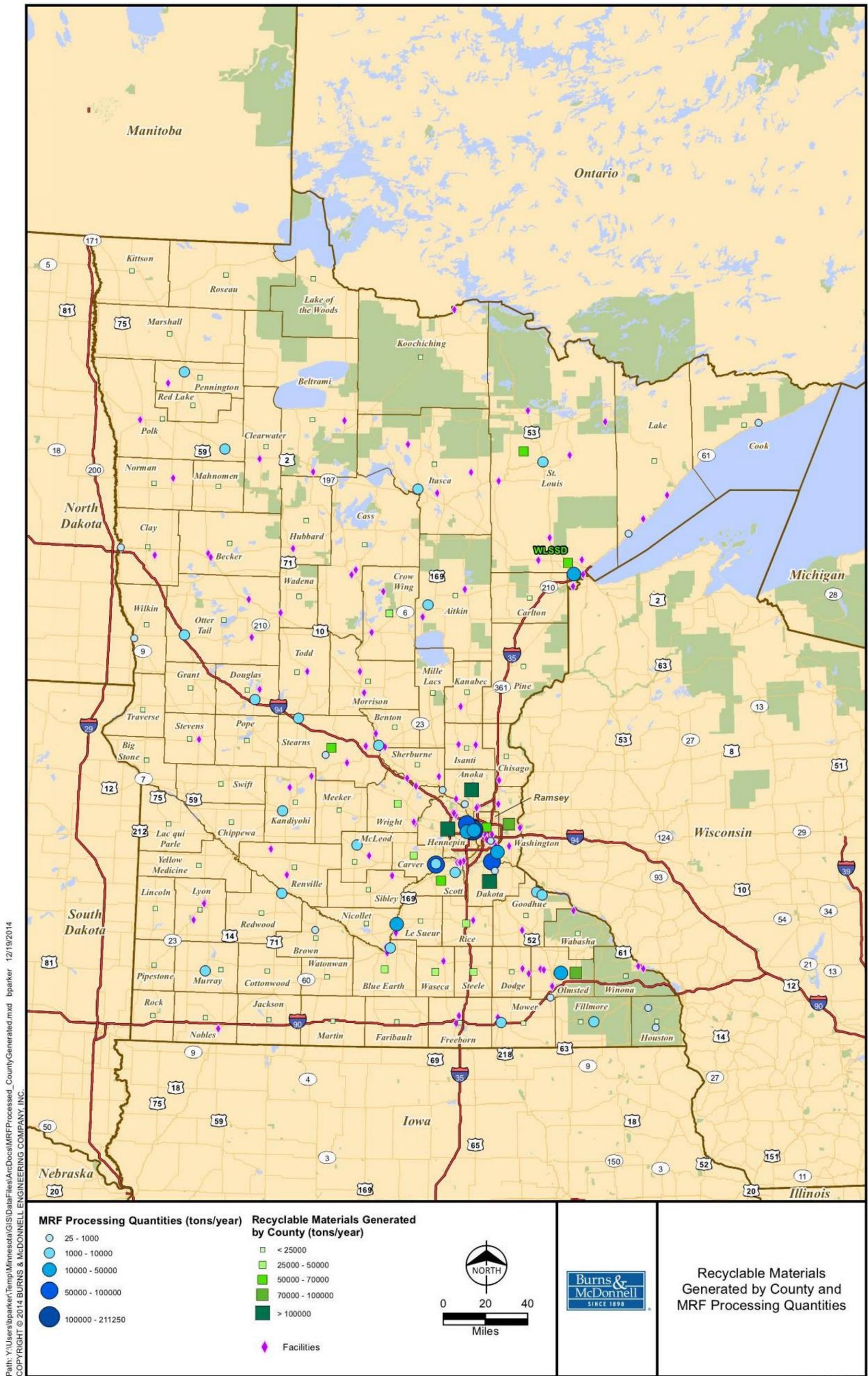
Facility Name	County	Age of Processing Equipment
Mower County Recycling	Mower	>20
Richard's Sanitation PBR	Houston	>20
Arrowhead Recycling Center PBR	Lake	16-20
Braun & Borth Sanitation PBR	Brown	16-20
Koochiching County Transfer Station	Koochiching	16-20
Murray County Recycling PBR	Murray	16-20
Otter Tail County Recycling Center PBR	Otter Tail	16-20
Polk County Resource Recovery Facility	Polk	16-20
Python's of St. Cloud Inc. PBR	Stearns	16-20
Redwood County Recycling Center PBR	Redwood	16-20
Rice County Landfill	Rice	16-20
Todd County Transfer Station PBR	Todd	16-20
Aitkin County Recycling Center PBR	Aitkin	11-15
Deer River Hired Hands Inc.	Itasca	11-15
L & S Systems	Pennington	11-15
MinnKota EnviroServices PBR	Becker	11-15
Pope - Douglas Incinerator	Douglas	11-15
St. Louis County Recycling Processing Facility PBR	St. Louis	11-15
Wilkin County Recycling Facility PBR	Wilkin	11-15
Dem-Con Recovery & Recycling LLC	Scott	6-10
MinnKota EnviroServices - Moorhead PBR	Clay	6-10
Becker County Transfer & Demolition TS Only	Becker	0-5
Buckingham Companies Inc PBR	Scott	0-5
Cook County Recycling Center PBR	Cook	0-5
Dem-Con Materials Recovery Facility PBR	Scott	0-5
Hartel's/DBJ Recycling	St. Louis	0-5
Randy's Sanitation Inc. TS	Wright	0-5

Notes:

1. Based on self-reported data provided by survey respondents.

Appendix C Statewide Generation and Processing

Figure C-1
Recyclable Materials Generated by County and MRF Processing Quantities



Appendix D Survey

Welcome!

Please fill in available information for your facility and provide all recycling quantities in tons.

1. Permit # and Facility Name

2. Contact Information (if different than listed in cover letter)

Contact Name

Facility Address

Facility Address 2

City

State

ZIP/Postal Code

Contact Email Address

Contact Phone Number

3. Facility Ownership

Public

Private

4. Facility Operations

Public

Private

Combination (please explain)

5. Customers (check all that apply)

Local Governments

Private Haulers

Public Self-Haulers

Other (please specify)

6. Annual Throughput (if different than listed in cover letter)

7. Facility Designed Capacity (please specify hourly or annual)

8. Is your processing facility's capacity adequate for the next 5 to 10 years?

Please provide details pertaining to the above answer.

9. Number of Facility Operating Days (e.g. 5 days/week) and Shifts (e.g. 1 , 2 , or 3)

10. Material Types and Quantities Accepted

Paper	<input type="text"/>
Cardboard	<input type="text"/>
Glass	<input type="text"/>
Metals	<input type="text"/>
Plastic	<input type="text"/>

11. Processing Type (check all that apply)

- Source Separated
- Dual Stream (eg fibers and containers)
- Single Stream (eg fully comingled)
- Other (please explain)

12. Processing Equipment (check all that apply)

- Conveyors
- Baler
- Sort Line
- Trommel
- Ferrous Magnet
- Optical Sorter
- Eddy Current Separator
- Glass Screen
- Paper Screen
- Air Separator
- Glass Clean-Up
- Other (please specify)

13. Age of Processing Equipment (years)

14. Age of Building (years)

15. Annual quantities or percentage of materials disposed (eg residuals)

16. Current Markets for Recyclable Materials Received for Processing

	In State	Domestic (out of state)	International
Paper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cardboard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Glass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Metals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plastic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. What are your facility costs (excluding revenues)?

Facility Capital Costs

Annual Operations Costs

Total Per Ton Costs

18. What are your annual facility revenues?

Tipping Fees

Sale of Processed Materials

19. Do you offer revenue share to your customers?

Please provide details pertaining to the above answer.

Appendix E Crow Wing Region

Figure E-1 shows the principal disposed MMSW flows for the Crow Wing region. The five counties shown in Figure E-1 are not currently part of a planning group, but have been grouped by the Project Team primarily due to their geographic proximity to each other, not because of common disposed waste flows.

**Figure E-1
Mixed Municipal Solid Waste Flow – Crow Wing Waste Region**

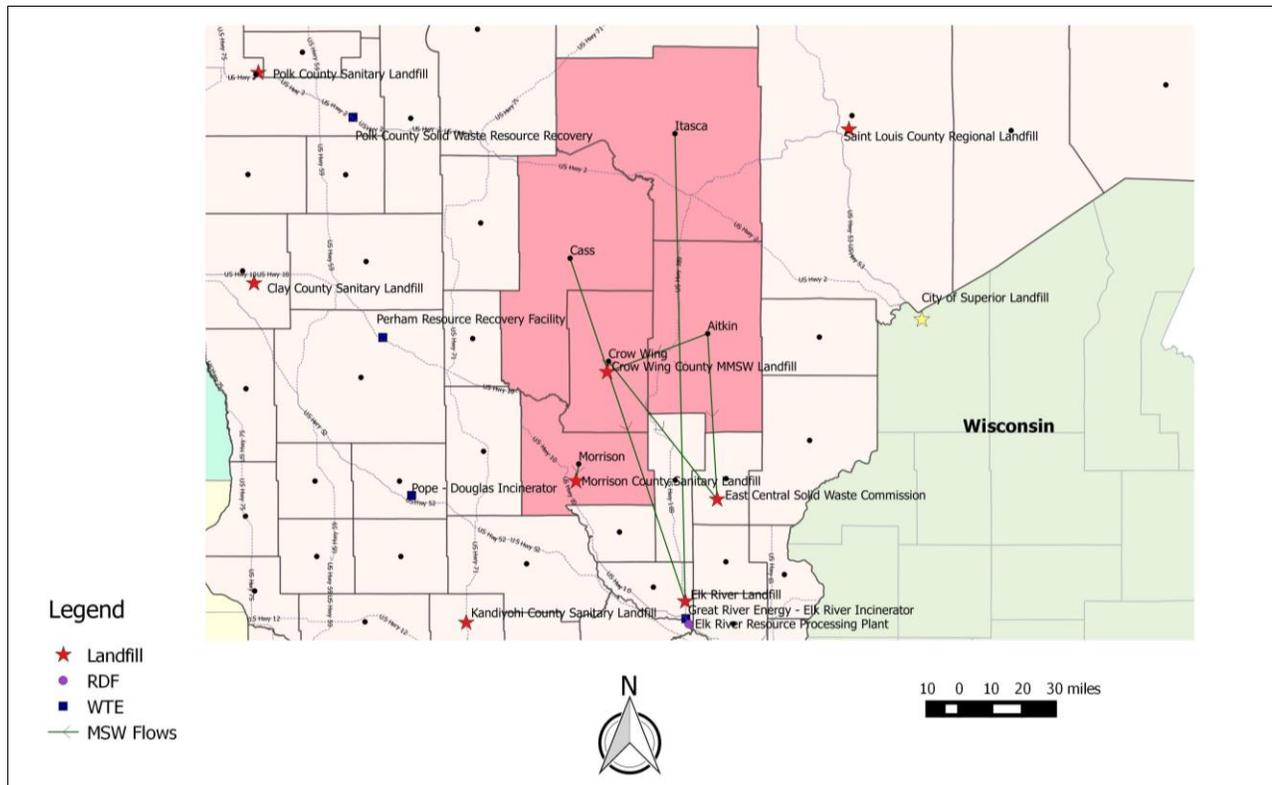


Table E-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and disposal facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

**Table E-1
Waste Flow Data for Counties in the Crow Wing Waste Region (2013)**

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Aitkin County	Garrison Disposal Company	5,651	Crow Wing County Solid Waste Disposal Site SW-376	4,140
Aitkin County			East Central Solid Waste Commission	3,526
Aitkin County	Carlton County Transfer Station	114	Elk River Landfill	48
Cass County	Cass County Transfer Station	11,015	Elk River Landfill	10,487

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Cass County	Garrison Disposal Company	1,884		
Cass County	Hengel Ready Mix and Construction, Inc.	308		
Cass County	Waste Management - Bemidji Transfer Station	229		
Crow Wing County	Garrison Disposal Company	8,477	Crow Wing County Solid Waste Disposal Site SW-376	38,286
Crow Wing County	Cass County Transfer Station	1,224	Spruce Ridge Resource Management, Inc.	134
Crow Wing County	Hengel Ready Mix and Construction, Inc.	1,002		
Itasca County	Itasca County Solid Waste Transfer Station	21,289	Elk River Landfill	21,289
Itasca County	Bray Lake Transfer Station	279	Spruce Ridge Resource Management, Inc.	954
Itasca County	Iron Range Transfer Station	195		
Itasca County	Bigfork Transfer Station	188		
Itasca County	Goodland Transfer Station	159		
Itasca County	Spring Lake Transfer Station	137		
Itasca County	Long Lake Transfer Station	98		
Itasca County	Hibbing Transfer Station	14		
Morrison County	Camp Ripley Transfer Station	710	Morrison County Solid Waste Management Facility	8,632
Morrison County	Minden Transfer Station	361	Spruce Ridge Resource Management, Inc.	15
Morrison County	Hengel Ready Mix and Construction, Inc.	154		
Morrison County	Tom's Refuse	60		

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and MMSW facilities tonnages is not intended to imply that the individual transfer station tons listed go to the disposal facility that happens to be on the same row to the right, after sorting.

Appendix F East Central Region

Figure F-1 shows the principal MMSW flows for the five counties that compose the East Central waste region.

**Figure F-1
Mixed Municipal Solid Waste Flow – East Central Waste Region**

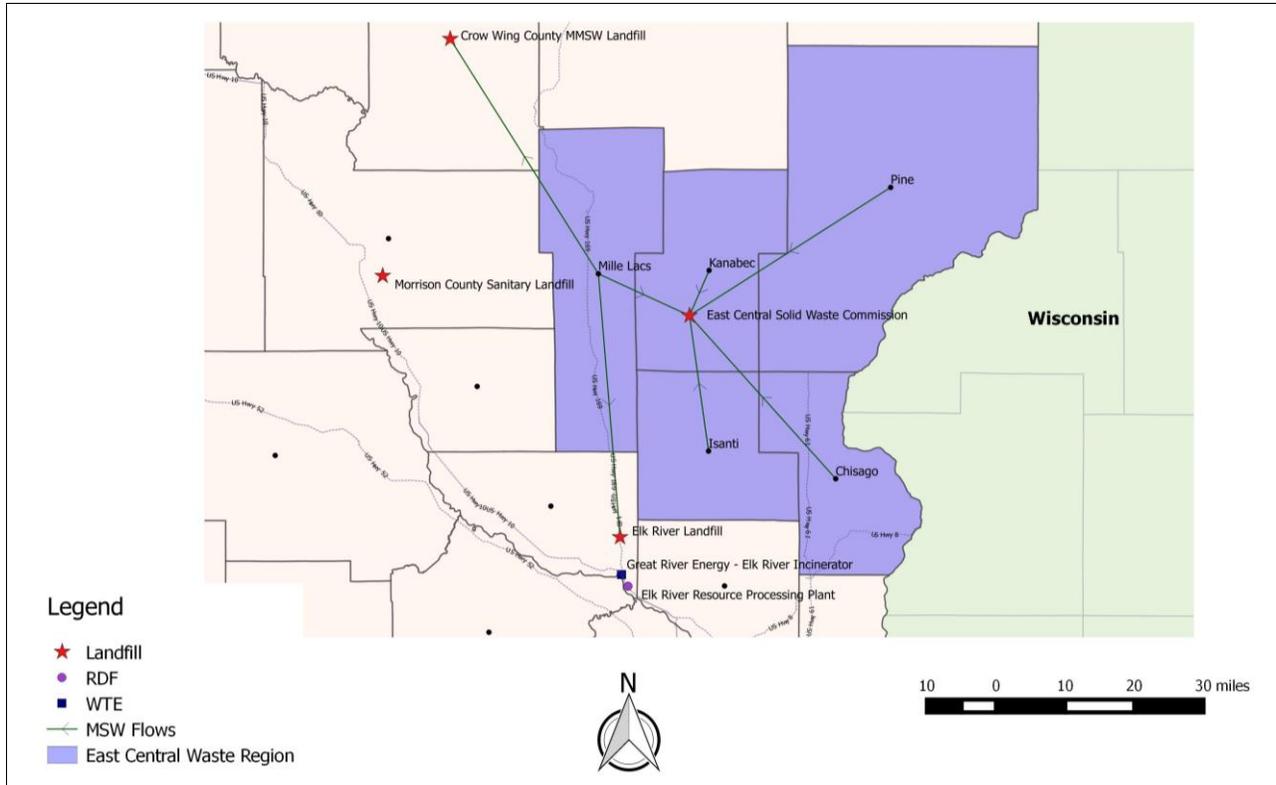


Table F-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and disposal facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

**Table F-1
Waste Flow Data for Counties in the East Central Waste Region (2013)**

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Chisago County	ECSWC Cambridge Transfer Station	22,981	East Central Solid Waste Commission	27,434
Chisago County	SRC, Incorporated	8,365	Newport Resource Recovery Facility	4,733
Chisago County	Hinckley Transfer Station	1,379	Elk River Landfill	95
Chisago County	SKB Transfer Station/Blaine Environmental Campus	1,233		

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Chisago County	Waste Management - Maple Grove Transfer	68		
Chisago County	Malcolm Avenue Recycling & Transfer	44		
Chisago County	Shamrock Recycling & Transfer LLC	5		
Chisago County	Lloyd's Construction Services, Inc. Transfer	<1		
Isanti County	ECSWC Cambridge Transfer Station	23,481	East Central Solid Waste Commission	23,802
Isanti County	SKB Transfer Station/Blaine Environmental Campus	247	Elk River Landfill	1,141
Isanti County	Waste Management - Maple Grove Transfer	68	Spruce Ridge Resource Management, Inc.	15
Isanti County	Lloyd's Construction Services, Inc. Transfer	<1		
Kanabec County			East Central Solid Waste Commission	7,053
Kanabec County			Elk River Landfill	24
Mille Lacs County	Garrison Disposal Company	2,826	East Central Solid Waste Commission	8,816
Mille Lacs County	ECSWC Cambridge Transfer Station	1,499	Elk River Landfill	5,826
Mille Lacs County	Minden Transfer Station	308		
Mille Lacs County	Lloyd's Construction Services, Inc. Transfer	<1		
Pine County	Hinckley Transfer Station	14,972	East Central Solid Waste Commission	15,868
Pine County	Nordstrom's Transfer Facility SW-351	338	Elk River Landfill	24
Pine County	Carlton County Transfer Station	114		
Pine County	SKB Transfer Station/Blaine Environmental Campus	82		

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and MMSW facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix G Mar-Kit Region

Figure G-1 shows the principal MMSW flows for the Mar-Kit region. The figure also shows that Red Lake and Koochiching Counties' waste principally flows to the MAR-KIT Sanitary Landfill, which is same disposal facility as the counties that are part of the Mar-Kit group, even though those two counties were not part of the Mar-Kit group at the time of this report. It is for this reason that the Project Team is suggesting that they be included in the Mar-Kit Region for waste planning purposes.

Figure G-1
Mixed Municipal Solid Waste Flow – Mar-Kit Waste Region

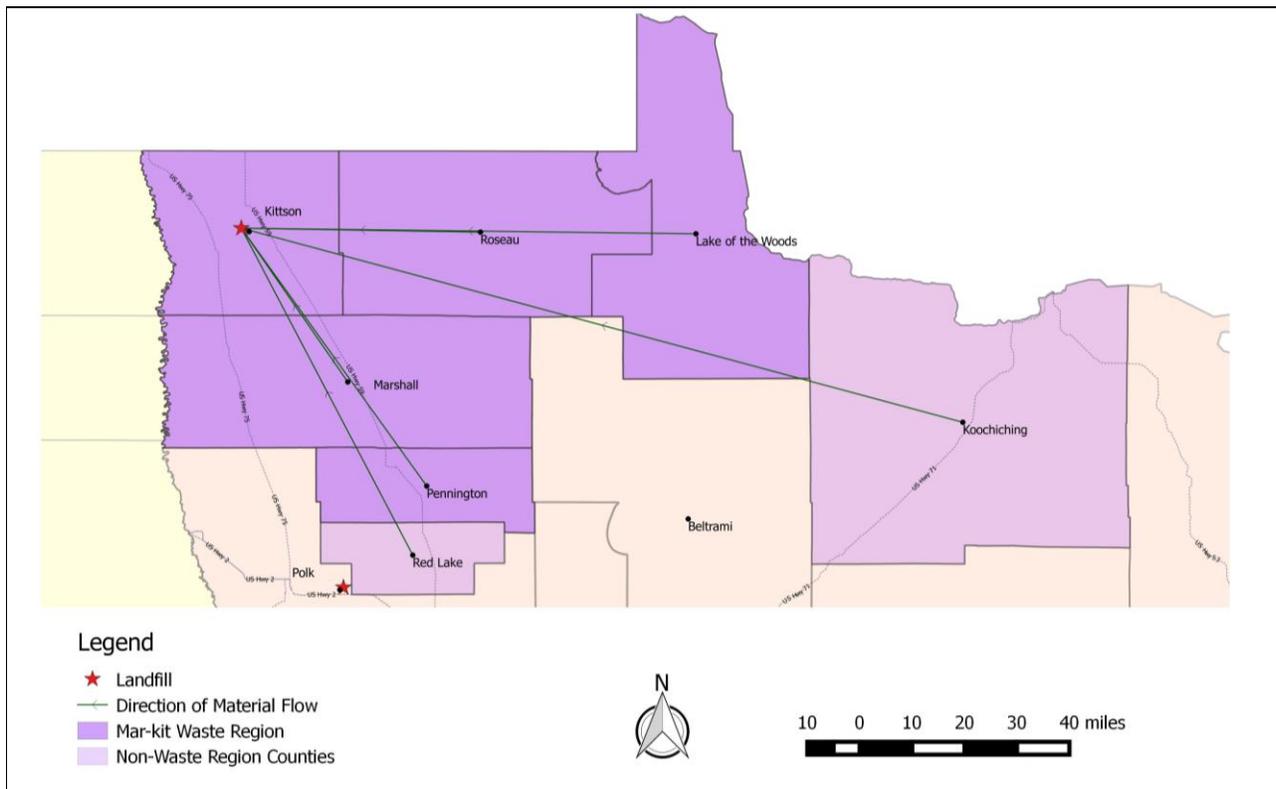


Table G-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and disposal facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

Table G-1
Waste Flow Data for Counties in the Mar-Kit Waste Region (2013)

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Kittson County			MAR-KIT Sanitary Landfill	1,911
Koochiching County	Koochiching County Recycling / Transfer Facility	8,127	MAR-KIT Sanitary Landfill	7,643

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Lake of the Woods County	Northwest Angle SW Transfer Station	220	MAR-KIT Sanitary Landfill	2,866
Marshall County			MAR-KIT Sanitary Landfill	2,388
Pennington County	Pennington County Transfer Station	10,864	MAR-KIT Sanitary Landfill	9,076
Red Lake County			MAR-KIT Sanitary Landfill	1,433
Red Lake County			Spruce Ridge Resource Management, Inc.	74
Roseau County	Roseau County Transfer Station / Demolition Land Disposal Facility	7,562	MAR-KIT Sanitary Landfill	9,076

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and disposal facility columns are then sorted in descending order, respectively. Disposal facility tonnages are the sum of all direct delivery and transfer flows that go to each disposal facility from each county. Side-by-side presentation of transfer station data (if any) and disposal facilities tonnages is not intended to imply that the individual transfer station tons listed go to the disposal facility that happens to be on the same row to the right, after sorting.

Appendix H Metro Region

Figure H-1 shows the principal MMSW flows for the seven counties that compose the Metro waste region.

**Figure H-1
Mixed Municipal Solid Waste Flow – Metro Waste Region**

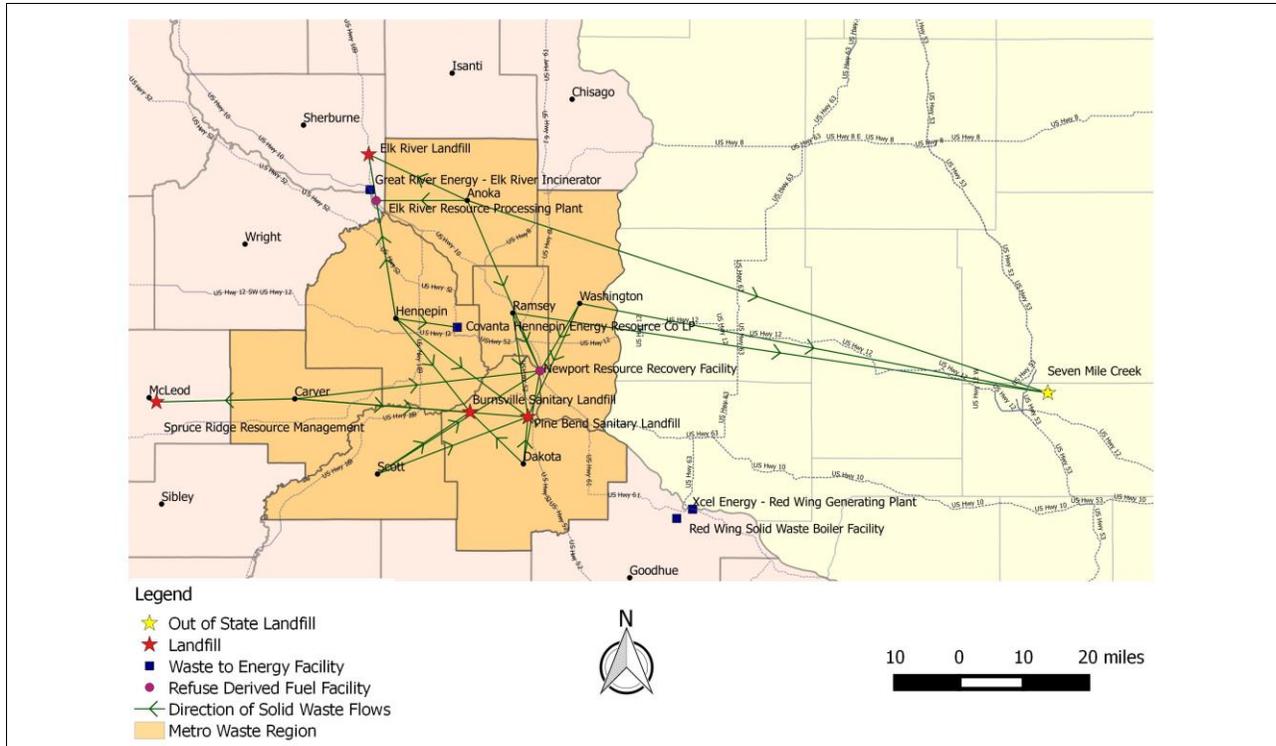


Table H-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and disposal facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

**Table H-1
Waste Flow Data for Counties in the Metro Waste Region (2013)**

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Anoka County	SKB Transfer Station/Blaine Environmental Campus	21,786	Elk River Resource Processing Plant	112,429
Anoka County	Advanced Disposal	21,018	Elk River Landfill	67,705
Anoka County	Walters Recycling & Refuse	8,608	Pine Bend Landfill	19,651
Anoka County	SRC, Incorporated	2,191	Seven Mile Creek Landfill (Eau Claire, WI)	8,544
Anoka County	ECSWC Cambridge Transfer Station	1,998	East Central Solid Waste Commission	1,763

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Anoka County	Waste Management - Maple Grove Transfer	1,364	Spruce Ridge Resource Management, Inc.	432
Anoka County	Malcolm Avenue Recycling & Transfer	1,142	Burnsville Sanitary Landfill	24
Anoka County	Shamrock Recycling & Transfer LLC	228		
Anoka County	Brooklyn Park Recycling Center and Transfer Station	105		
Anoka County	Randy's Sanitation, Inc.	37		
Anoka County	RRT - NRG Empire Processing	27		
Anoka County	J & J Recycling	26		
Anoka County	Ray Anderson & Sons Companies, Inc	15		
Anoka County	TUBS, Inc. Transfer Station	7		
Anoka County	Lloyd's Construction Services, Inc. Transfer	3		
Anoka County	Veit St.Paul- Pierce Butler Transfer	<1		
Carver County	Dem-Con Recovery & Recycling, LLC	19,506	Newport Resource Recovery Facility	11,044
Carver County	BFI Fying Cloud transfer	10,087	Spruce Ridge Resource Management, Inc.	7,405
Carver County	Advanced Disposal	4,204	Burnsville Sanitary Landfill	5,968
Carver County	Randy's Sanitation, Inc.	3,244	Seven Mile Creek Landfill (Eau Claire, WI)	1,709
Carver County	Waste Management - Carver Transfer	1,583	Elk River Landfill	24
Carver County	Malcolm Avenue Recycling & Transfer	88		
Carver County	Mankato Transfer Station	84		
Carver County	SKB Transfer Station/Blaine Environmental Campus	41		
Carver County	RRT - NRG Empire Processing	7		
Carver County	Lloyd's Construction Services, Inc. Transfer	2		
Carver County	TUBS, Inc. Transfer Station	1		
Carver County	Veit St.Paul- Pierce Butler Transfer	<1		
Dakota County	Advanced Disposal	14,012	Burnsville Sanitary Landfill	101,690
Dakota County	Dem-Con Recovery & Recycling, LLC	3,901	Newport Resource Recovery Facility	39,389
Dakota County	RRT - NRG Empire Processing	3,515	Pine Bend Landfill	35,372
Dakota County	Malcolm Avenue Recycling & Transfer	879	Seven Mile Creek Landfill (Eau Claire, WI)	5,696
Dakota County	Twin City Refuse Recycling and Transfer Station	359	Spruce Ridge Resource Management, Inc.	805

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Dakota County	SKB Transfer Station/Blaine Environmental Campus	206	Red Wing Solid Waste Boiler Facility	78
Dakota County	J & J Recycling	104	Elk River Landfill	24
Dakota County	TUBS, Inc. Transfer Station	26		
Dakota County	Lloyd's Construction Services, Inc. Transfer	21		
Dakota County	Ray Anderson & Sons Companies, Inc	15		
Dakota County	Brooklyn Park Recycling Center and Transfer Station	13		
Dakota County	Dan's Container Service	12		
Dakota County	Randy's Sanitation, Inc.	11		
Dakota County	Shamrock Recycling & Transfer LLC	10		
Dakota County	Keith Krupenny & Son Disposal Service, Inc.	2		
Dakota County	Veit St.Paul- Pierce Butler Transfer	<1		
Hennepin County	Brooklyn Park Recycling Center and Transfer Station	131,460	Covanta Hennepin Energy Resource Company L.P.	337,787
Hennepin County	BFI Fying Cloud transfer	85,742	Elk River Resource Processing Plant	133,016
Hennepin County	Waste Management - Maple Grove Transfer	65,480	Pine Bend Landfill	101,401
Hennepin County	Randy's Sanitation, Inc.	35,367	Burnsville Sanitary Landfill	100,973
Hennepin County	Malcolm Avenue Recycling & Transfer	29,521	Elk River Landfill	69,655
Hennepin County	Advanced Disposal	14,012	Spruce Ridge Resource Management, Inc.	6,735
Hennepin County	Walters Recycling & Refuse	9,125	Seven Mile Creek Landfill (Eau Claire, WI)	5,696
Hennepin County	RRT - NRG Empire Processing	5,476	Newport Resource Recovery Facility	4,418
Hennepin County	SKB Transfer Station/Blaine Environmental Campus	5,426		
Hennepin County	Dem-Con Recovery & Recycling, LLC	1,951		
Hennepin County	Waste Managment - Carver Transfer	1,055		
Hennepin County	LJP Recycling Transfer Station	914		
Hennepin County	TUBS, Inc. Transfer Station	272		
Hennepin County	Twin City Refuse Recycling and Transfer Station	269		
Hennepin County	Shamrock Recycling & Transfer LLC	186		
Hennepin County	Ray Anderson & Sons Companies, Inc	75		

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Hennepin County	Lloyd's Construction Services, Inc. Transfer	56		
Hennepin County	J & J Recycling	52		
Hennepin County	Keith Krupenny & Son Disposal Service, Inc.	7		
Hennepin County	Veit St.Paul- Pierce Butler Transfer	2		
Hennepin County	Dan's Container Service	2		
Ramsey County	Advanced Disposal	56,049	Newport Resource Recovery Facility	210,936
Ramsey County	Walters Recycling & Refuse	15,630	Pine Bend Landfill	23,844
Ramsey County	Malcolm Avenue Recycling & Transfer	10,895	Seven Mile Creek Landfill (Eau Claire, WI)	22,378
Ramsey County	SKB Transfer Station/Blaine Environmental Campus	7,769	Burnsville Sanitary Landfill	2,864
Ramsey County	Twin City Refuse Recycling and Transfer Station	988	Elk River Landfill	1,665
Ramsey County	RRT - NRG Empire Processing	656	Spruce Ridge Resource Management, Inc.	1,043
Ramsey County	LJP Recycling Transfer Station	607		
Ramsey County	Waste Management - Maple Grove Transfer	341		
Ramsey County	GENE'S TRANSFER	320		
Ramsey County	J & J Recycling	313		
Ramsey County	Ray Anderson & Sons Companies, Inc	135		
Ramsey County	TUBS, Inc. Transfer Station	59		
Ramsey County	Shamrock Recycling & Transfer LLC	47		
Ramsey County	Lloyd's Construction Services, Inc. Transfer	12		
Ramsey County	Randy's Sanitation, Inc.	11		
Ramsey County	Keith Krupenny & Son Disposal Service, Inc.	7		
Ramsey County	Veit St.Paul- Pierce Butler Transfer	4		
Ramsey County	Dan's Container Service	2		
Scott County	Dem-Con Recovery & Recycling, LLC	39,013	Pine Bend Landfill	36,158
Scott County	BFI Fying Cloud transfer	5,044	Burnsville Sanitary Landfill	17,664
Scott County	Advanced Disposal	2,802	Newport Resource Recovery Facility	2,577
Scott County	Waste Management - Carver Transfer	528	Seven Mile Creek Landfill (Eau Claire, WI)	1,139
Scott County	Waste Management - Le Sueur	309	Spruce Ridge Resource Management, Inc.	805
Scott County	Malcolm Avenue Recycling & Transfer	88		

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Scott County	SKB Transfer Station/Blaine Environmental Campus	82		
Scott County	RRT - NRG Empire Processing	55		
Scott County	Lloyd's Construction Services, Inc. Transfer	15		
Scott County	Randy's Sanitation, Inc.	11		
Scott County	Shamrock Recycling & Transfer LLC	3		
Scott County	TUBS, Inc. Transfer Station	3		
Scott County	Keith Krupenny & Son Disposal Service, Inc.	<1		
Scott County	Veit St.Paul- Pierce Butler Transfer	<1		
Washington County	Advanced Disposal	21,018	Newport Resource Recovery Facility	78,411
Washington County	SRC, Incorporated	9,361	Pine Bend Landfill	33,014
Washington County	SKB Transfer Station/Blaine Environmental Campus	3,330	Seven Mile Creek Landfill (Eau Claire, WI)	8,544
Washington County	Malcolm Avenue Recycling & Transfer	923	Burnsville Sanitary Landfill	8,116
Washington County	Waste Management - Maple Grove Transfer	273	Elk River Landfill	690
Washington County	Twin City Refuse Recycling and Transfer Station	180	Spruce Ridge Resource Management, Inc.	596
Washington County	GENE'S TRANSFER	80	Xcel - Wilmarth Generating Plant	147
Washington County	Ray Anderson & Sons Companies, Inc	45	Xcel Energy - Red Wing Generating Plant	96
Washington County	RRT - NRG Empire Processing	29	Ponderosa Sanitary Landfill	29
Washington County	J & J Recycling	26		
Washington County	Shamrock Recycling & Transfer LLC	26		
Washington County	Dan's Container Service	7		
Washington County	Minden Transfer Station	3		
Washington County	Lloyd's Construction Services, Inc. Transfer	3		
Washington County	Keith Krupenny & Son Disposal Service, Inc.	1		
Washington County	Veit St.Paul- Pierce Butler Transfer	<1		
Washington County	TUBS, Inc. Transfer Station	<1		

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and disposal facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and disposal facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix I Polk Region

Figure I-1 shows the principal MMSW flows for the Polk region.

**Figure I-1
Mixed Municipal Solid Waste Flow – Polk Waste Region**

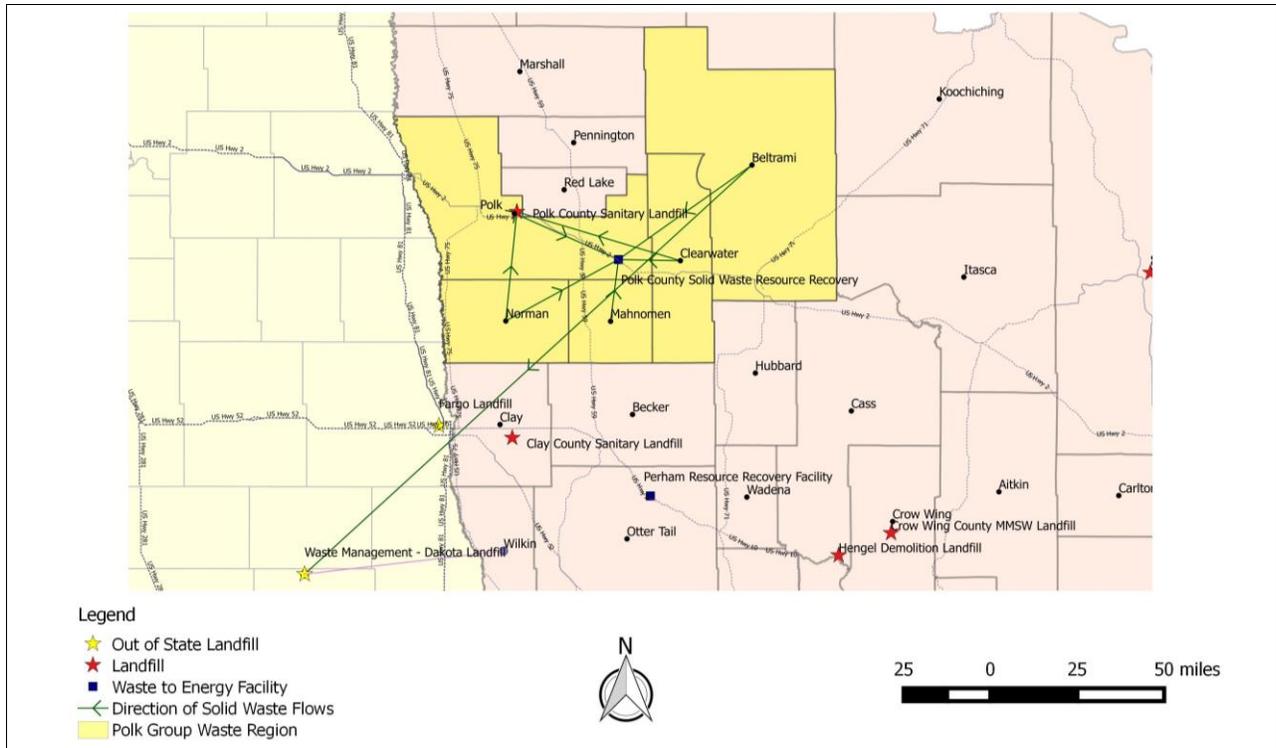


Table I-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and MMSW facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

**Table I-1
Waste Flow Data for Counties in the Polk Waste Region (2013)**

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Beltrami County	Waste Management - Bemidji Transfer Station	22,245	WM Dakota Landfill (Gwinner, ND)	10,549
Beltrami County	Waste Management - Blackduck Transfer Station	1,006	Polk County Solid Waste Resource Recovery	9,883
Beltrami County	Hubbard County North Transfer Station	35	MAR-KIT Sanitary Landfill	3,344
Beltrami County			Polk County Landfill	2,560
Clearwater County	Waste Management - Bemidji Transfer Station	229	Polk County Solid Waste Resource Recovery	2,994

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Clearwater County			Polk County Landfill	774
Mahnomen County			Polk County Solid Waste Resource Recovery	1,193
Mahnomen County			Polk County Landfill	298
Norman County			Polk County Solid Waste Resource Recovery	2,094
Norman County			Polk County Landfill	536
Polk County	Polk County Transfer Station	6,639	Polk County Solid Waste Resource Recovery	6,349
Polk County	RRT - NRG Empire Processing	1	Polk County Landfill	1,786
Polk County	Lloyd's Construction Services, Inc. Transfer	<1		

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and MMSW facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix J Pope Douglas Region

Figure J-1 shows the principal MMSW flows for the Pope Douglas waste region. The figure also shows that Grant and Stevens Counties could be considered for addition to the existing two county group because large portions of their waste goes to the Pope Douglas Waste-to-Energy plant, even though those two counties were not part of the Pope Douglas group at the time of this report.

Figure J-1
Mixed Municipal Solid Waste Flow – Pope Douglas Waste Region

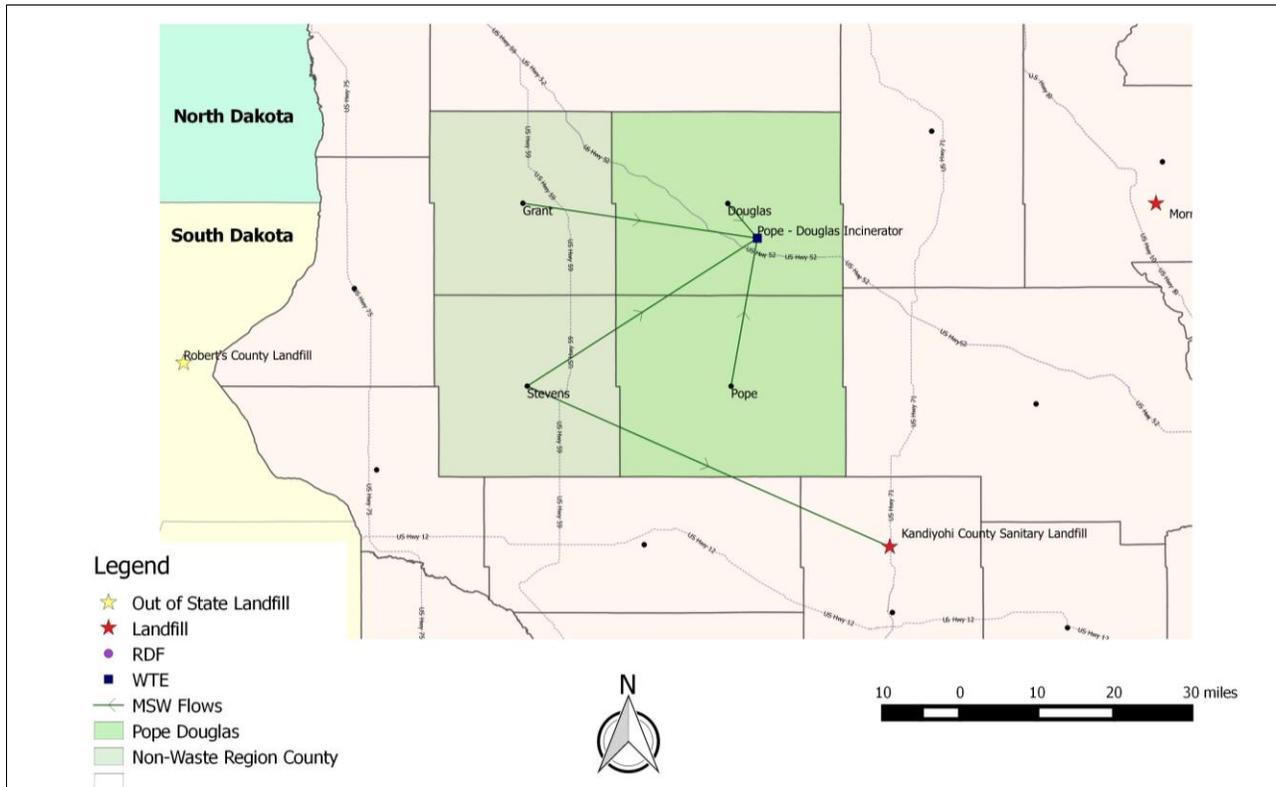


Table J-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and MMSW facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

Table J-1
Waste Flow Data for Counties in the Pope Douglas Waste Region (2013)

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Douglas County	Douglas County Demo Landfill, LLC	2,690	Pope Douglas Solid Waste Management	22,331
Douglas County	Stevens County Demolition Debris Landfill and Solid Waste Transfer Station	61	Morrison County Solid Waste Management Facility	1,159

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Douglas County	West Central Sanitation - Sauk Centre Transfer Station	49	Spruce Ridge Resource Management, Inc.	209
Grant County			Pope Douglas Solid Waste Management	2,153
Pope County	Bueckers City Sanitation SW-335	499	Pope Douglas Solid Waste Management	4,785
Pope County	Stevens County Demolition Debris Landfill and Solid Waste Transfer Station	152	Spruce Ridge Resource Management, Inc.	15
Stevens County	Stevens County Demolition Debris Landfill and Solid Waste Transfer Station	5,770	Kandiyohi County Sanitary Landfill	3,312
Stevens County			Pope Douglas Solid Waste Management	2,632

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW disposal facility from each county. Side-by-side presentation of transfer station data (if any) and disposal facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix K Prairie Lakes Region

Figure K-1 shows the principal MMSW flows for the Prairie Lakes region. The figure also shows that Hubbard, Clay, and Wilkin Counties could be considered for addition to the existing four county group, even though those three counties were not part of the Prairie Lakes group at the time of this report. This suggestion is only being made due to their close proximity to Becker, Otter Tail, Todd, and Wadena counties, not because they share common disposal facilities.

**Figure K-1
Mixed Municipal Solid Waste Flow – Prairie Lakes Waste Region**

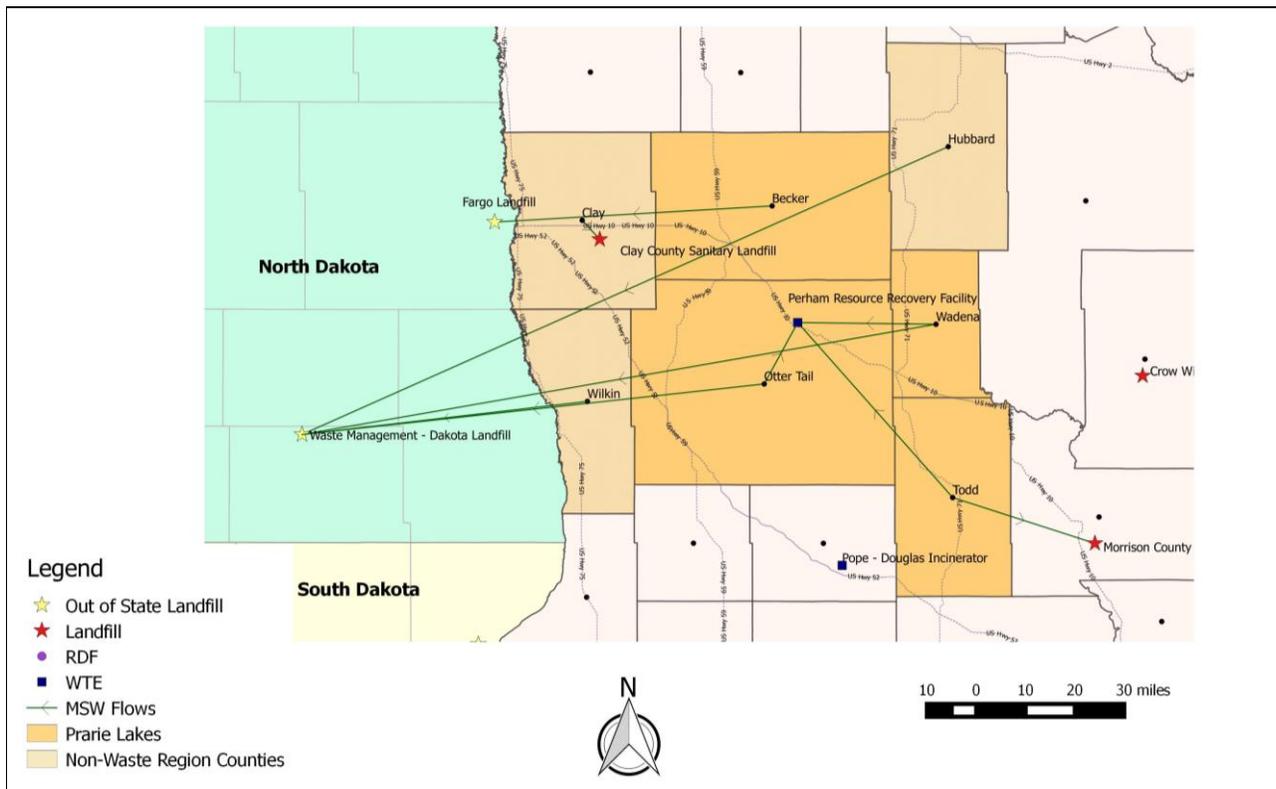


Table K-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and MMSW facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

**Table K-1
Waste Flow Data for Counties in the Prairie Lakes Waste Region (2013)**

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Becker County	Becker County Transfer Station and Demolition Landfill	17,402	Fargo Landfill (Fargo, ND)	17,402

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Becker County	Becker County Highway Outshop & Waste PBR	302		
Becker County	Waste Management - Bemidji Transfer Station	229		
Becker County	Hubbard County South Transfer Station	100		
Clay County	Moorhead Transfer Station	23,163	Clay County Sanitary Landfill	33,251
Clay County			Spruce Ridge Resource Management, Inc.	417
Hubbard County	Hubbard County South Transfer Station	9,844	WM Dakota Landfill (Gwinner, ND)	13,582
Hubbard County	Hubbard County North Transfer Station	3,502	Elk River Landfill	71
Otter Tail County	Fergus Falls Transfer Station	17,710	Perham Resource Recovery Facility	14,669
Otter Tail County	Henning Transfer Station/Demolition Landfill	2,611	WM Dakota Landfill (Gwinner, ND)	14,248
Otter Tail County	NE Otter Tail Phase II Ash and Demolition Landfill	691	Spruce Ridge Resource Management, Inc.	179
Otter Tail County	Fergus Falls Solid Waste Disposal Facility	504		
Otter Tail County	Battle Lake Transfer Station	214		
Otter Tail County	Pelican Rapids Transfer Station	91		
Otter Tail County	Parkers Prairie Transfer Station	6		
Todd County	Todd County Solid Waste	10,023	Perham Resource Recovery Facility	4,126
Todd County	Bueckers City Sanitation SW-335	499	Morrison County Solid Waste Management Facility	5,994
Todd County	Tom's Refuse	80	Spruce Ridge Resource Management, Inc.	30
Todd County	Hengel Ready Mix and Construction, Inc.	77		
Todd County	West Central Sanitation - Sauk Centre Transfer Station	49		
Wadena County	Wadena County Transfer Station	2,093	Perham Resource Recovery Facility	4,126
Wadena County	Hubbard County South Transfer Station	100		
Wilkin County			WM Dakota Landfill (Gwinner, ND)	946

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and disposal facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix L Prairieland Region

Figure L-1 shows the principal MMSW flows for the Prairieland waste region. The figure also shows that Brown, Watonwan, and Blue Earth Counties could be considered for addition to the existing two county group, even though those three counties were not part of the Prairieland group at the time of this report. This suggestion is only being made because a minor part of the waste from Martin and Fairbault counties goes to the Ponderosa landfill in Blue Earth County, as well as some refuse derived fuel produced by the Prairieland MMSW Compost Facility. Furthermore, the Prairieland Compost facility could serve as a regional organics processing facility.

**Figure L-1
Minnesota Municipal Solid Waste Flow – Prairieland Waste Region**

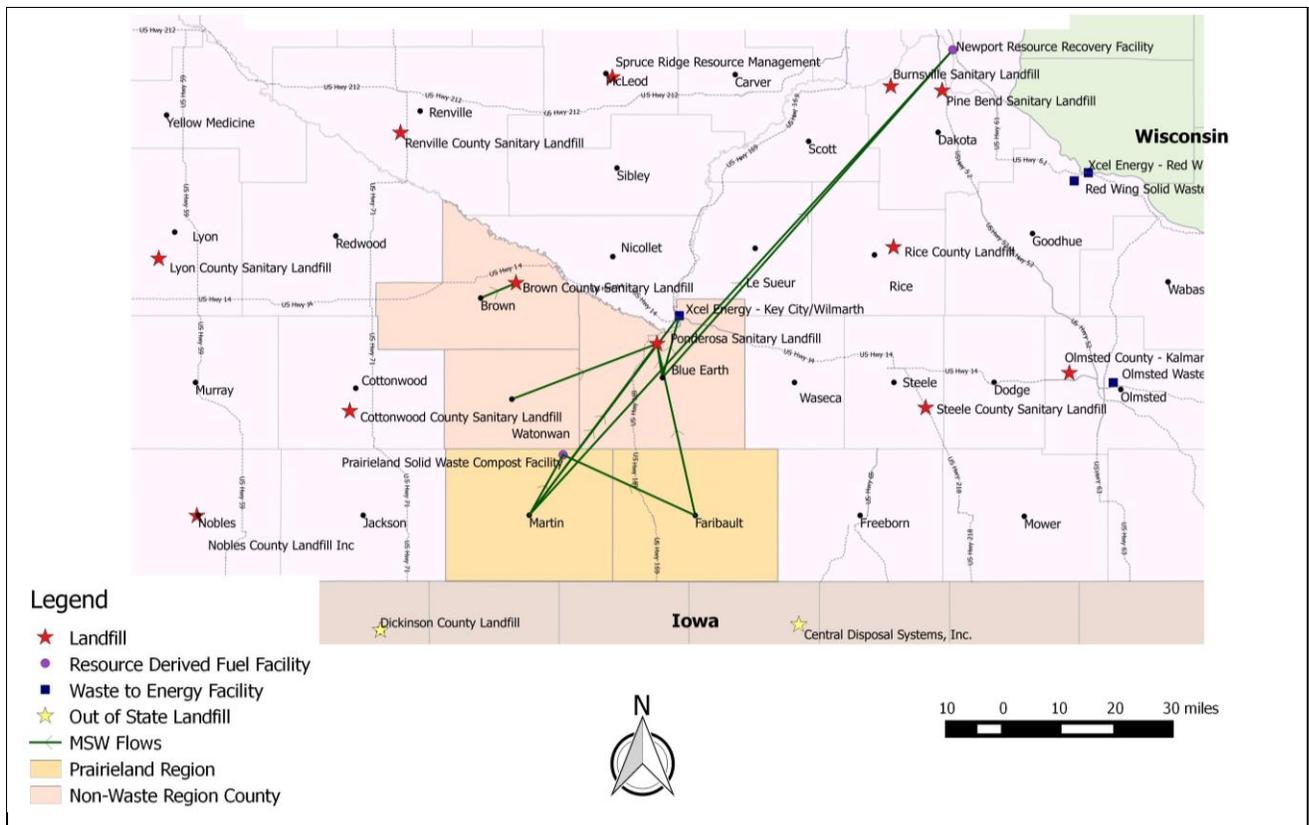


Table L-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and MMSW facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

**Table L-1
Waste Flow Data for Counties in the Prairieland Waste Region (2013)**

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Blue Earth County	Mankato Transfer Station	17,756	Newport Resource Recovery Facility	21,351
Blue Earth County	Waste Management - Le Sueur	8,503	Ponderosa Sanitary Landfill	17,646
Blue Earth County	LJP Recycling Transfer Station	3,611	Spruce Ridge Resource Management, Inc.	715
Blue Earth County			Xcel - Wilmarth Generating Plant	22
Brown County	Mankato Transfer Station	545	Brown County Sanitary Landfill	14,036
Brown County	LJP Recycling Transfer Station	278	Ponderosa Sanitary Landfill	50
Brown County	Waste Management - Le Sueur	2	Spruce Ridge Resource Management, Inc.	45
Faribault County	Waste Management - Clarks Grove Transfer	300	Prairieland Solid Waste Compost Facility	4,700
Faribault County	LJP Recycling Transfer Station	82	Ponderosa Sanitary Landfill	1,977
Faribault County	Lloyd's Construction Services, Inc. Transfer	0		
Martin County	LJP Recycling Transfer Station	251	Prairieland Solid Waste Compost Facility	8,500
Martin County	Mankato Transfer Station	4	Ponderosa Sanitary Landfill	1,022
Martin County			Xcel - Wilmarth Generating Plant	11
Watonwan County	Mankato Transfer Station	232	Ponderosa Sanitary Landfill	2,274
Watonwan County	LJP Recycling Transfer Station	50	Spruce Ridge Resource Management, Inc.	45
Watonwan County	Waste Management - Le Sueur	14		

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and MMSW facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix M Southeast, Dodge Olmstead, and Wabasha Houston Regions

Figure M-1 shows the southeastern Minnesota counties. Currently, Dodge Olmstead and Wabasha Houston compose two separate planning regions. The other counties around them are not currently part of any group planning region. Based on current waste flows, the figure shows that Goodhue County could be aligned with Wabasha and Houston Counties since they all rely heavily on the same set of waste-to-energy plants for MMSW management. Dodge and Olmstead Counties appear unified in their two-county group. All the rest of the counties, including Rice, Waseca, Steele, Freeborn, Mower, Fillmore, and Houston could form a new Southeast Group that could reduce the need of those counties to rely on out-of-state MMSW management capacity.

Figure M-1
Mixed Municipal Solid Waste Flow – Southeast, Dodge Olmstead, and Wabash Houston Waste Regions

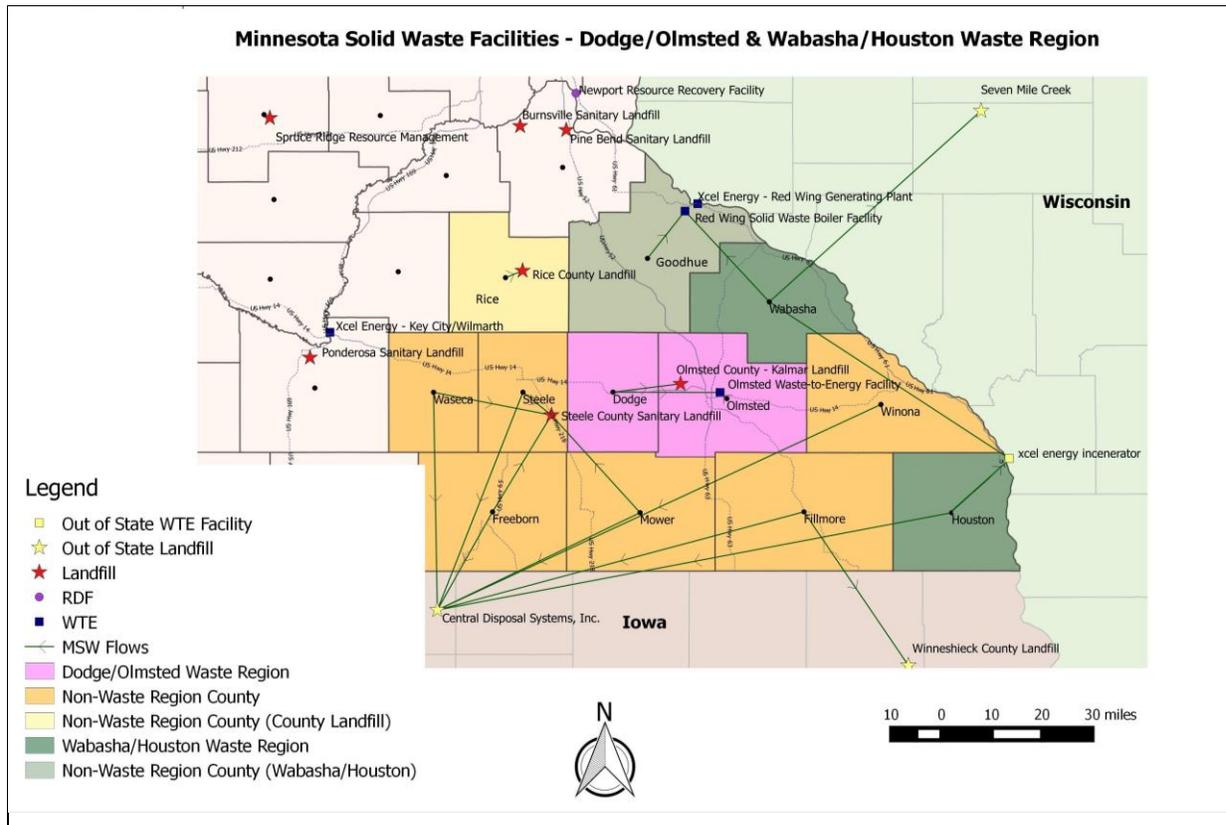


Table M-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and MMSW facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Table M-1
Waste Flow Data for Counties in the Southeast, Dodge Olmsted, and Wabash Houston Waste Regions (2013)

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Dodge County	Dodge County Transfer Station	7,332	Olmsted Waste-to-Energy Facility	4,802
Dodge County	Waste Management of Rochester	238	Steele County Sanitary Landfill	1,912
Dodge County	Kellner Recycling Center	8	Olmsted County Kalmar Landfill	788
Fillmore County	Fillmore County Resource Recovery Center	4,761	Central Disposal Systems, Inc. Landfill (Lake Mills, IA)	6,899
Fillmore County	Waste Management of Rochester	3,732	Winneshieck County Landfill (Decorah, IA)	1,839
Fillmore County	Winona Transfer Station	418		
Fillmore County	Matejka Recycling	18		
Fillmore County	Kellner Recycling Center	6		
Freeborn County	Waste Management - Clarks Grove Transfer	11,225	Central Disposal Systems, Inc. Landfill (Lake Mills, IA)	10,200
Freeborn County	Albert Lea Transfer Station	1,655	Steele County Sanitary Landfill	2,677
Freeborn County	Austin Waste Transfer Station	81		
Goodhue County	Waste Management of Rochester	2,382	Red Wing Solid Waste Boiler Facility	13,826
Goodhue County	Advanced Disposal	2,522	Seven Mile Creek Landfill (Eau Claire, WI)	2,522
Goodhue County	Lake City Recycling & Disposal	675	Olmsted Waste-to-Energy Facility	98
Goodhue County	Red Wing Integrated Solid Waste Management Campus	156	Burnsville Sanitary Landfill	24
Goodhue County	RRT - NRG Empire Processing	3	Olmsted County Kalmar Landfill	17
Goodhue County	Kellner Recycling Center	3	Xcel Energy - Red Wing Generating Plant	4
Goodhue County	Lloyd's Construction Services, Inc. Transfer	1		
Houston County	Winona Transfer Station	418	Xcel Energy – French Island Generating (La Crosse WI)	6,200
Houston County	Austin Waste Transfer Station	15,982	Central Disposal Systems, Inc. Landfill (Lake Mills, IA)	418
Mower County	Waste Management - Clarks Grove Transfer	1,986	Central Disposal Systems, Inc. Landfill (Lake Mills, IA)	17,968
Mower County	Waste Management of Rochester	318	Steele County Sanitary Landfill	5,736
Mower County	Kellner Recycling Center	8	Olmsted Waste-to-Energy Facility	196
Mower County			Olmsted County Kalmar Landfill	35
Olmsted County	Waste Management of Rochester	318	Olmsted Waste-to-Energy Facility	92,798

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Olmsted County	Veit - Rochester Transfer Station	217	Olmsted County Kalmar Landfill	7,812
Olmsted County	Kellner Recycling Center	25	Spruce Ridge Resource Management, Inc.	194
Rice County	LJP Recycling Transfer Station	1,156	Rice County Solid Waste Facility	40,006
Rice County	Dem-Con Recovery & Recycling, LLC	650	Burnsville Sanitary Landfill	1,337
Rice County	RRT - NRG Empire Processing	156	Ponderosa Sanitary Landfill	658
Rice County	Mankato Transfer Station	59	Steele County Sanitary Landfill	382
Rice County	Lloyd's Construction Services, Inc. Transfer	1		
Steele County	Waste Management - Clarks Grove Transfer	5,866	Steele County Sanitary Landfill	21,033
Steele County	Austin Waste Transfer Station	81	Central Disposal Systems, Inc. Landfill (Lake Mills, IA)	5,946
Steele County	Mankato Transfer Station	34	Burnsville Sanitary Landfill	24
Steele County	LJP Recycling Transfer Station	2	Spruce Ridge Resource Management, Inc.	15
Steele County	Lloyd's Construction Services, Inc. Transfer	<1	Ponderosa Sanitary Landfill	4
Wabasha County	Lake City Recycling & Disposal	3,826	Seven Mile Creek Landfill (Eau Claire, WI)	3,826
Wabasha County	Dankwart Feed	1,120	Red Wing Solid Waste Boiler Facility	1,553
Wabasha County	Waste Management of Rochester	953	Spruce Ridge Resource Management, Inc.	30
Wabasha County	Kellner Recycling Center	3		
Waseca County	Waste Management - Clarks Grove Transfer	3,603	Steele County Sanitary Landfill	6,501
Waseca County	LJP Recycling Transfer Station	1,054	Central Disposal Systems, Inc. Landfill (Lake Mills, IA)	3,603
Waseca County	Mankato Transfer Station	697	Ponderosa Sanitary Landfill	209
Waseca County	Lloyd's Construction Services, Inc. Transfer	<1	Spruce Ridge Resource Management, Inc.	45
Winona County	Winona Transfer Station	12,553	Central Disposal Systems, Inc. Landfill (Lake Mills, IA)	12,553
Winona County	Matejka Recycling	218	Xcel Energy – French Island Generating (La Crosse WI)	400
Winona County	Kellner Recycling Center	3	Olmsted Waste-to-Energy Facility	98
Winona County			Spruce Ridge Resource Management, Inc.	15
Winona County			Olmsted County Kalmar Landfill	9

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and MMSW facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix N Southwest Region

Figure N-1 shows the principal MMSW flows for the twelve counties that compose the Southwest waste region.

**Figure N-1
Mixed Municipal Solid Waste Flow –Southwest Waste Region**

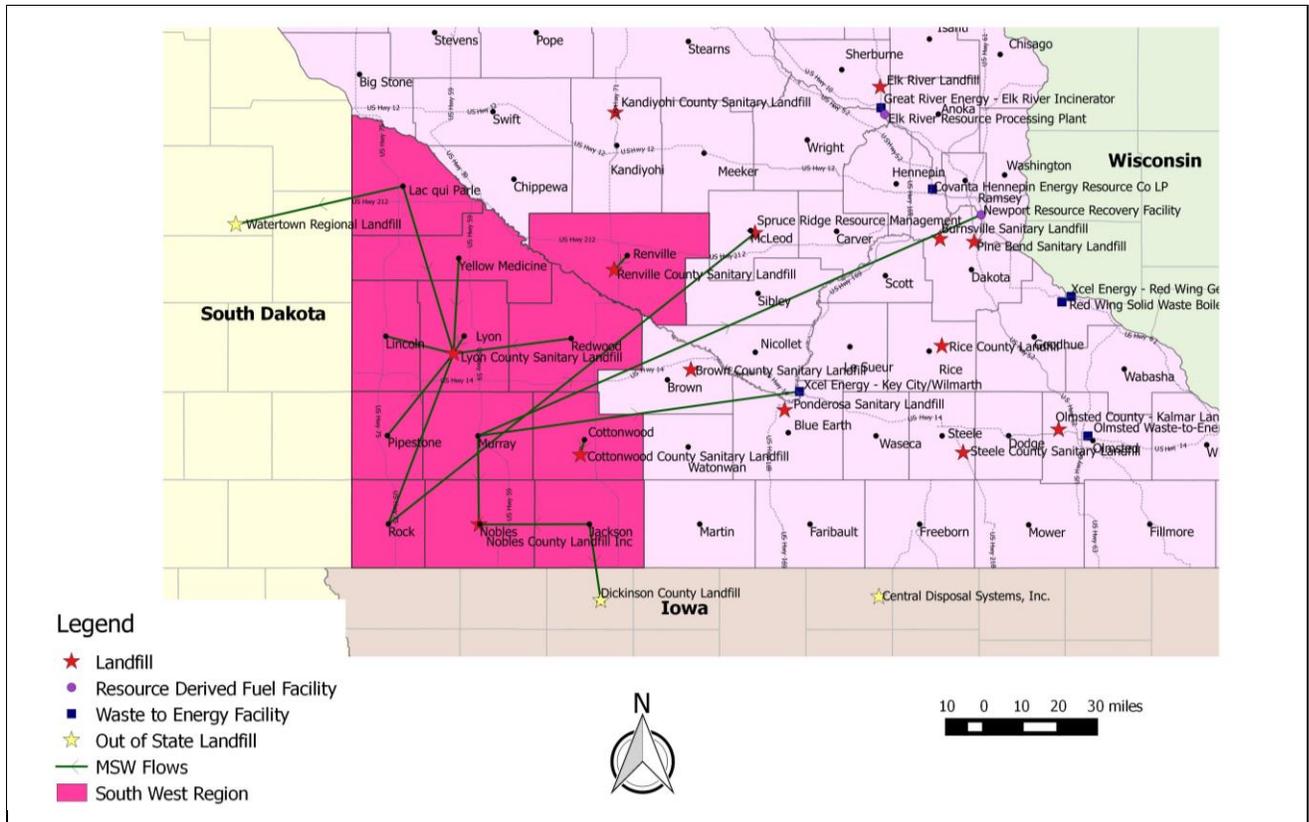


Table N-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and MMSW facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

**Table N-1
Waste Flow Data for Counties in the Southwest Waste Region (2013)**

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Cottonwood County	Waste Management - Le Sueur	35	Cottonwood County Landfill	7,915
Cottonwood County	LJP Recycling Transfer Station	16		
Cottonwood County	Mankato Transfer Station	4		

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Jackson County			WM Dickinson County Landfill (Spirit Lake, IA)	4,000
Jackson County			Nobles County Landfill	1,858
Lac qui Parle County	Olson Sanitation Inc	5,314	Lyon County Regional Landfill	5,164
Lac qui Parle County			Watertown Regional Landfill, SD	150
Lac qui Parle County			Spruce Ridge Resource Management, Inc.	149
Lincoln County			Lyon County Regional Landfill	1,404
Lyon County			Lyon County Regional Landfill	16,557
Lyon County			Spruce Ridge Resource Management, Inc.	15
Murray County	Mankato Transfer Station	570	Nobles County Landfill	1,858
Murray County	LJP Recycling Transfer Station	65	Xcel Energy	308
Murray County			Newport Resource Recovery Facility	262
Murray County			Ponderosa Sanitary Landfill	25
Murray County			Spruce Ridge Resource Management, Inc.	15
Nobles County			Nobles County Landfill	7,307
Pipestone County			Lyon County Regional Landfill	3,728
Pipestone County			Nobles County Landfill	124
Redwood County	Lloyd's Construction Services, Inc. Transfer	<1	Lyon County Regional Landfill	6,361
Redwood County			Spruce Ridge Resource Management, Inc.	45
Renville County	Mankato Transfer Station	30	Renville County Landfill	6,733
Renville County			Spruce Ridge Resource Management, Inc.	1,475
Rock County	Rock County Transfer Station	3,556	Lyon County Regional Landfill	2,659
Rock County			Spruce Ridge Resource Management, Inc.	1,296
Rock County			Nobles County Landfill	495
Yellow Medicine County	Olson Sanitation Inc	2,861	Lyon County Regional Landfill	3,031
Yellow Medicine County			Spruce Ridge Resource Management, Inc.	387

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. Disposal facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and MMSW facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix O St. Louis Region

Figure O-1 shows the principal disposed MMSW flows for the St. Louis region. The four counties shown in Figure O-1 are not currently part of a planning group, but have been grouped by the Project Team due to their common disposed waste flows. Although the map below does not show it, there is currently the Western Lake Superior Sanitary District, which coordinates waste MMSW management for Duluth and parts of St. Louis and Carlton Counties.

Figure O-1
Mixed Municipal Solid Waste Flow – St. Louis Waste Region

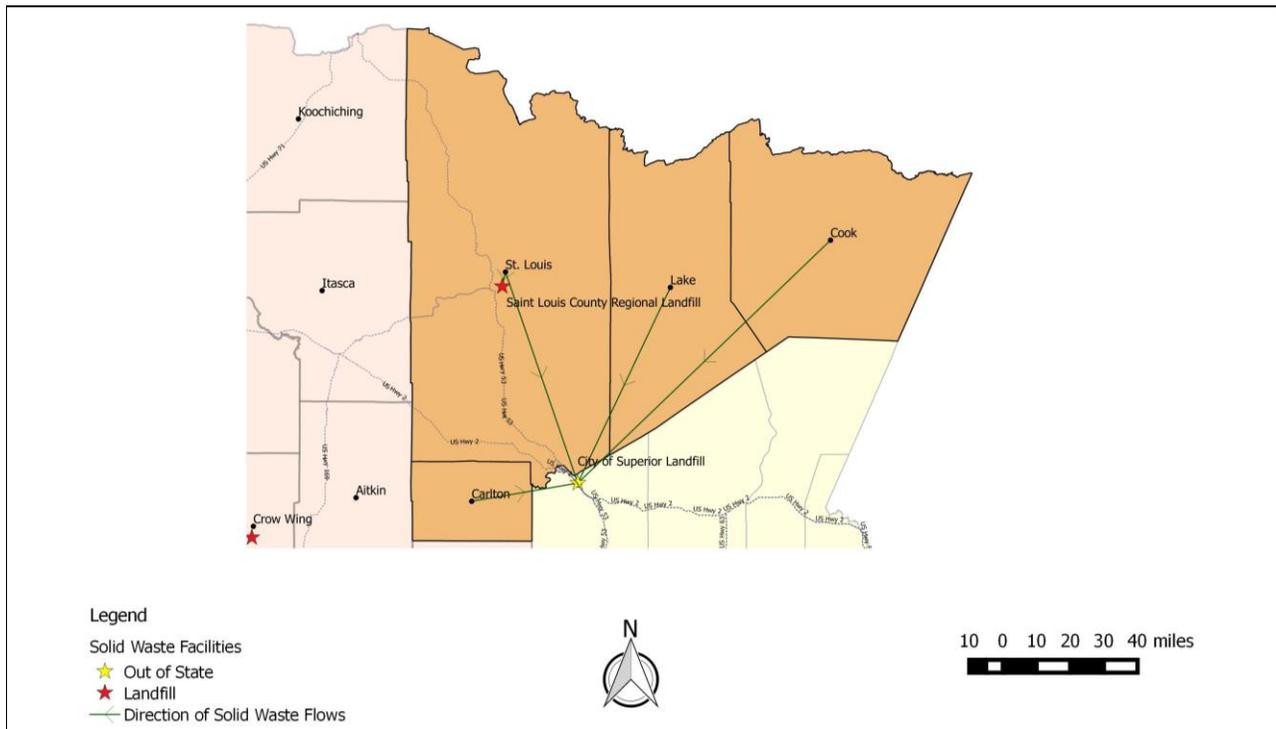


Table O-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and MMSW facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

Table O-1
Waste Flow Data for Counties in the St. Louis Waste Region (2013)

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Carlton County	Carlton County Transfer Station	11,065	City of Superior Landfill (Superior WI)	11,407
Carlton County	Demolicious Transfer Station	36		
Carlton County	Brookston Transfer Station	27		
Carlton County	WLSSD Materials Recovery Center SW- 591	13		

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Cook County	WLSSD Transfer Station SW-558	3,309	City of Superior Landfill (Superior WI)	3,309
Cook County	Tofte Solid Waste Transfer Station	1,618		
Cook County	WLSSD Materials Recovery Center SW- 591	13		
Cook County	Arrowhead Recycle Center	3		
Lake County	WLSSD Transfer Station SW-558	5,956	City of Superior Landfill (Superior WI)	5,956
Lake County	Arrowhead Recycle Center	285	Spruce Ridge Resource Management, Inc.	194
Lake County	Northwoods Transfer Station	187		
Lake County	WLSSD Materials Recovery Center SW- 591	50		
Lake County	Tofte Solid Waste Transfer Station	33		
Lake County	Demolicious Transfer Station	24		
St. Louis County	WLSSD Transfer Station SW-558	46,325	St Louis County Regional Landfill	51,573
St. Louis County	St. Louis County Canister Sites	5,749		
St. Louis County	Hudson (Aurora) Transfer Station	3,118		
St. Louis County	Northwoods Transfer Station	2,925		
St. Louis County	Cook Transfer Station	2,921		
St. Louis County	WLSSD Materials Recovery Center SW- 591	2,419		
St. Louis County	Hibbing Transfer Station	1,342		
St. Louis County	Brookston Transfer Station	1,328		
St. Louis County	Demolicious Transfer Station	1,131		
St. Louis County	Carlton County Transfer Station	114		
St. Louis County	Hartel's / DBJ Disposal Companies	47		
St. Louis County	Arrowhead Recycle Center	29		

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and MMSW facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix P Traverse-Big Stone Region

Figure P-1 shows the principal disposed MMSW flows for Traverse and Big Stone Counties. The two counties shown in Figure P-1 are not currently part of a planning group, but have been grouped by the Project Team due to their common challenges that include small populations and remote location in the state. Despite the similar challenges they face, Big Stone County provides more comprehensive recycling opportunities than does Traverse County. Cooperative planning and procurement of recycling transfer and processing services would allow Traverse to expand past a sole drop-off location for collection of the County’s recyclables. Disposed waste flows out-of-state for both these counties, although to different landfills, due to different contractual arrangements. Because of the small size of the two counties, it would not be cost-effective or needed for them to develop a shared MMSW facility.

Figure P-1
Mixed Municipal Solid Waste Flow – Traverse and Big Stone Waste Region

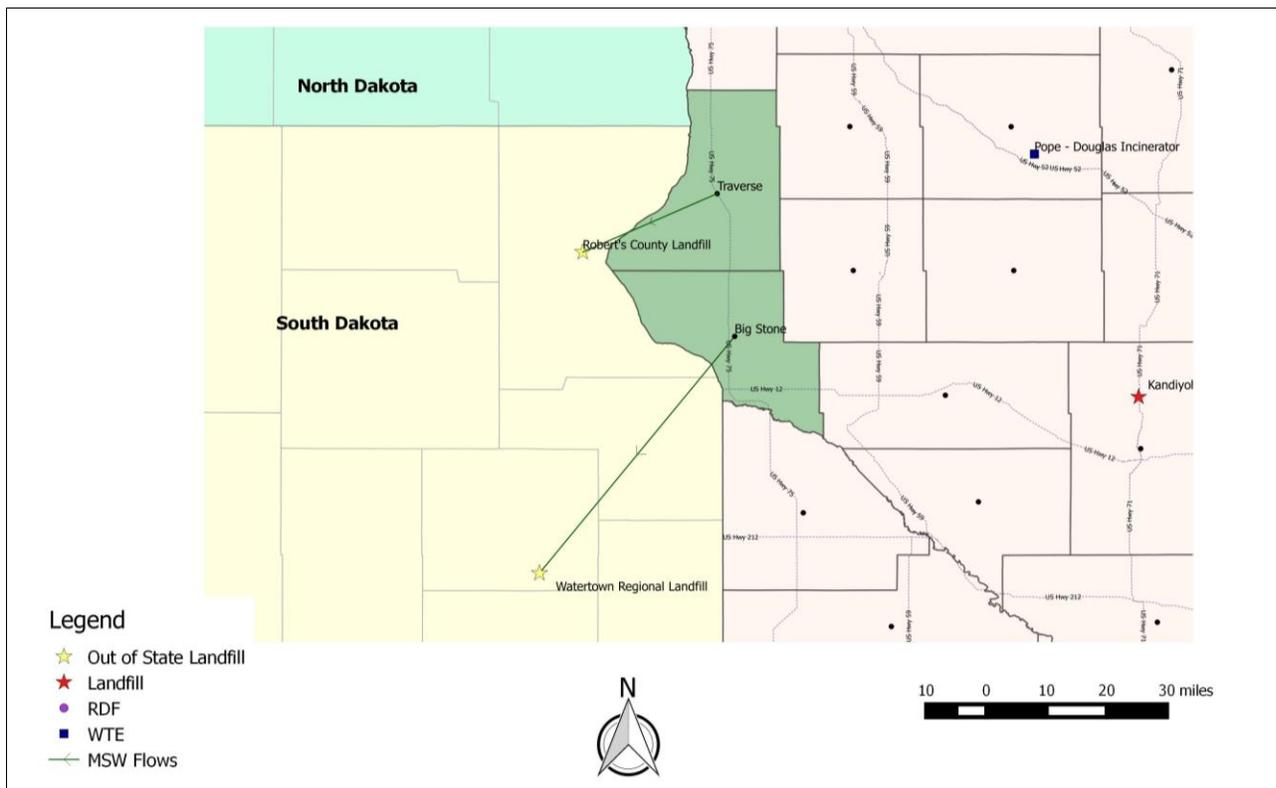


Table P-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and MMSW facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

**Table P-1
Waste Flow Data for Traverse and Big Stone Counties (2013)**

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Big Stone County	Waste Management - Ortonville Transfer	936	Watertown Regional Landfill (Watertown, SD)	936
Big Stone County	Stevens County Demolition Debris Landfill and Solid Waste Transfer Station	91	Spruce Ridge Resource Management, Inc.	30
Traverse County			Roberts County Landfill (Sisseton, SD)	1,078

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and MMSW facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix Q Tri-county North Region

Figure Q-1 shows the principal disposed MMSW flows for the three counties that compose the Tri-county North waste region.

**Figure Q-1
Mixed Municipal Solid Waste Flow – Tri-county North Waste Region**

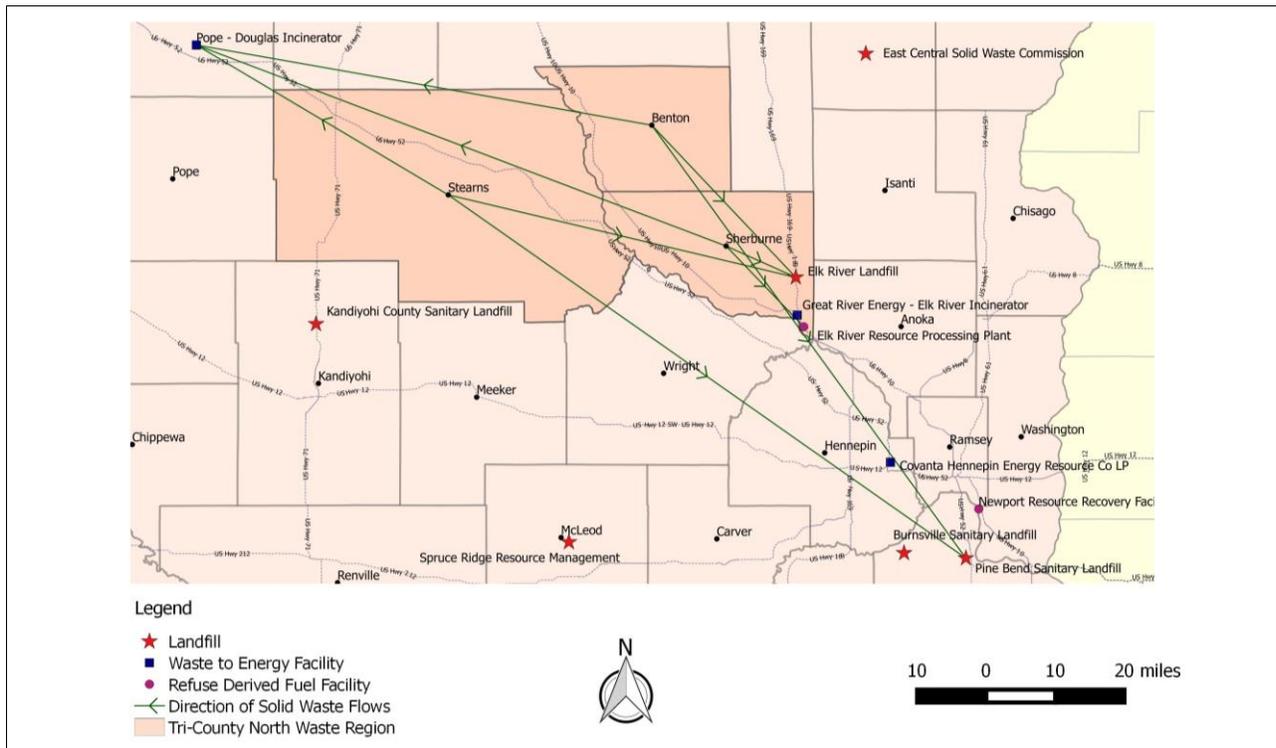


Table Q-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and MMSW facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

**Table Q-1
Waste Flow Data for Counties in the Tri-county North Waste Region (2013)**

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Benton County	Waste Management of St. Cloud	15,629	Pine Bend Landfill	12,577
Benton County	Minden Transfer Station	8,097	Pope Douglas Solid Waste Management	7,178

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Benton County	West Central Sanitation - Willmar Transfer Station	476	Elk River Landfill	832
Benton County	Reliable Rolloff & Transfer	116	Spruce Ridge Resource Management, Inc.	134
Sherburne County	Waste Management of St. Cloud	5,210	Elk River Landfill	24,518
Sherburne County	Minden Transfer Station	1,039	Elk River Resource Processing Plant	13,101
Sherburne County	Waste Management - Maple Grove Transfer	341	Pope Douglas Solid Waste Management	5,583
Sherburne County	West Central Sanitation - Willmar Transfer Station	317	Spruce Ridge Resource Management, Inc.	74
Sherburne County	SKB Transfer Station/Blaine Environmental Campus	247	Xcel - Wilmarth Generating Plant	2
Sherburne County	Randy's Sanitation, Inc.	58		
Sherburne County	Malcolm Avenue Recycling & Transfer	44		
Sherburne County	Reliable Rolloff & Transfer	33		
Sherburne County	Shamrock Recycling & Transfer LLC	5		
Sherburne County	Lloyd's Construction Services, Inc. Transfer	<1		
Stearns County	Waste Management of St. Cloud	31,258	Pope Douglas Solid Waste Management	35,092
Stearns County	Minden Transfer Station	20,183	Elk River Landfill	21,284
Stearns County	Bueckers City Sanitation SW-335	8,977	Spruce Ridge Resource Management, Inc.	3,740
Stearns County	West Central Sanitation - Willmar Transfer Station	3,172	Kandiyohi County Sanitary Landfill	1,656
Stearns County	Meeker County Transfer Station	1,186	Morrison County Solid Waste Management Facility	360
Stearns County	West Central Sanitation - Sauk Centre Transfer Station	391		
Stearns County	Reliable Rolloff & Transfer	166		
Stearns County	Bueckers Recycling PBR000492	70		
Stearns County	Tom's Refuse	60		
Stearns County	Shamrock Recycling & Transfer LLC	3		

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and MMSW facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix R Tri-county South Region

Figure R-1 shows the principal disposed MMSW flows for the three counties that compose the Tri-county South waste region.

**Figure R-1
Mixed Municipal Solid Waste Flow – Tri-county South Waste Region**

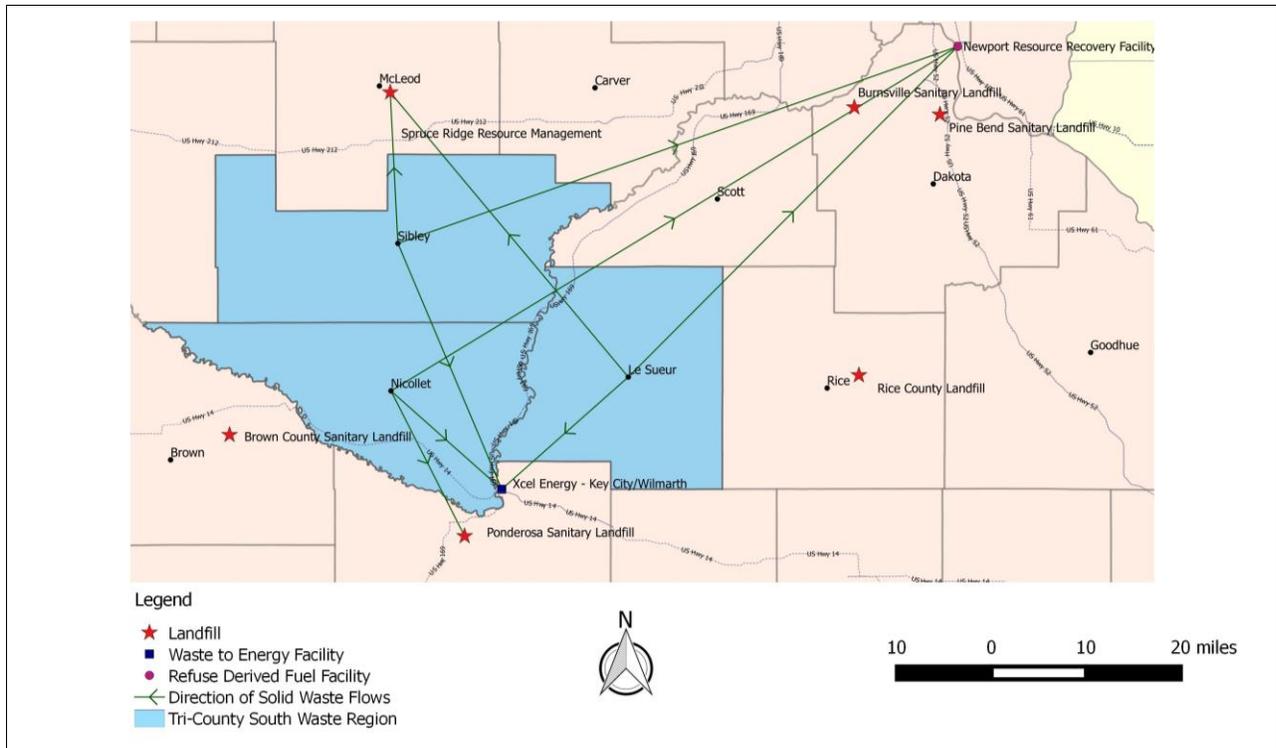


Table R-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and MMSW facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

**Table R-1
Waste Flow Data for Counties in the Tri-county South Waste Region (2013)**

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Le Sueur County	Waste Management - Le Sueur	5,000	Spruce Ridge Resource Management, Inc.	5,000
Le Sueur County	Mankato Transfer Station	3,434	Xcel Energy	1,820
Le Sueur County	LJP Recycling Transfer Station	305	Newport Resource Recovery Facility	1,545
Le Sueur County	Lloyd's Construction Services, Inc. Transfer	<1	Ponderosa Sanitary Landfill	69

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Le Sueur County			Burnsville Sanitary Landfill	24
Nicollet County	Mankato Transfer Station	17,722	Xcel Energy	9,570
Nicollet County	LJP Recycling Transfer Station	6,867	Newport Resource Recovery Facility	8,152
Nicollet County	Waste Management - Le Sueur	1,588	Spruce Ridge Resource Management, Inc.	1,588
Nicollet County	Lloyd's Construction Services, Inc. Transfer	<1	Brown County Sanitary Landfill	739
Sibley County	Mankato Transfer Station	1,022	Spruce Ridge Resource Management, Inc.	5,468
Sibley County	Waste Management - Carver Transfer	791	Ponderosa Sanitary Landfill	21
Sibley County	Waste Management - Le Sueur	458		
Sibley County	LJP Recycling Transfer Station	2		

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and MMSW facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.

Appendix S West Central Region

Figure S-1 shows the principal disposed MMSW flows for six west central counties. The six counties shown in Figure S-1 are not currently part of a planning group, but have been grouped by the Project Team due to their common disposed waste flows and geographic proximity to each other. Furthermore, McLeod County is converting its MRF to be able to process single-stream recyclables, which also includes a capacity expansion. With this expansion, McLeod needs additional tonnages of recyclables to process, and coordinated waste and recyclables planning would benefit all the counties in the West Central part of the state.

Figure S-1
Mixed Municipal Solid Waste Flow – West Central Waste Region

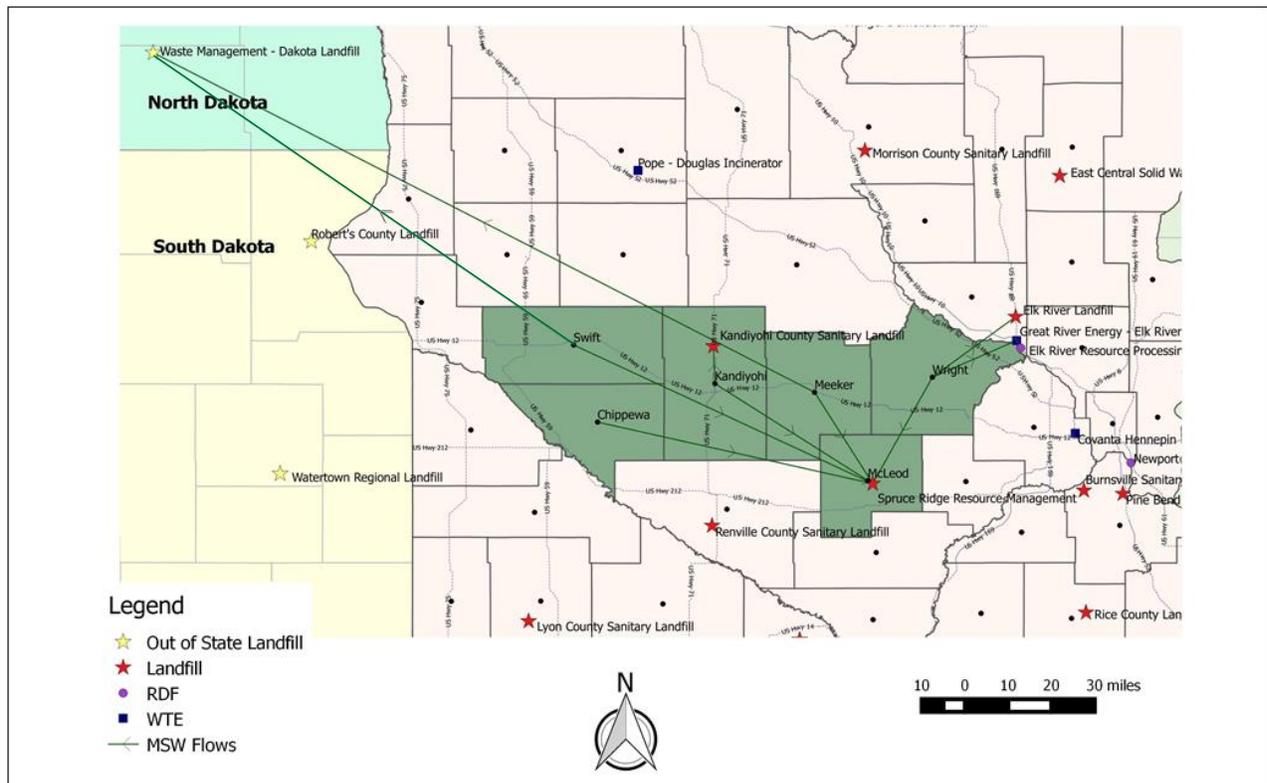


Table S-1 presents 2013 waste flow data reported to MPCA from permitted waste facilities. Where necessary, data have been adjusted by the Project Team to correct for conflicts between county-of-origin as reported by transfer stations and MMSW facilities, and to account for MMSW that is direct-delivered to out-of-state landfills.

Table S-1
Waste Flow Data for West Central Counties (2013)

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Chippewa County			Spruce Ridge Resource Management, Inc.	5,543

RECYCLING AND SOLID WASTE INFRASTRUCTURE ANALYSIS

Generating County	Transfer Station		MMSW Facility	
	Name	Tons	Name	Tons
Kandiyohi County	West Central Sanitation - Willmar Transfer Station	9,515	Kandiyohi County Sanitary Landfill	22,632
Kandiyohi County	Mankato Transfer Station	17	Spruce Ridge Resource Management, Inc.	14,319
McLeod County	West Central Sanitation - Willmar Transfer Station	1,586	Spruce Ridge Resource Management, Inc.	32,139
McLeod County	Meeker County Transfer Station	1,279		
McLeod County	LJP Recycling Transfer Station	1,150		
McLeod County	Randy's Sanitation, Inc.	26		
Meeker County	Meeker County Transfer Station	7,169	Spruce Ridge Resource Management, Inc.	4,497
Meeker County	West Central Sanitation - Willmar Transfer Station	793	WM Dakota Landfill (Gwinner, ND)	1,371
Meeker County	Randy's Sanitation, Inc.	5	Elk River Landfill	1,070
Meeker County			Nobles County Landfill	743
Swift County			WM Dakota Landfill (Gwinner, ND)	3,500
Swift County			Spruce Ridge Resource Management, Inc.	283
Wright County	Randy's Sanitation, Inc.	14,151	Spruce Ridge Resource Management, Inc.	40,900
Wright County	Meeker County Transfer Station	5,188	Elk River Landfill	14,721
Wright County	Waste Management - Carver Transfer	1,319		
Wright County	Minden Transfer Station	842		
Wright County	SKB Transfer Station/Blaine Environmental Campus	452		
Wright County	Waste Management - Maple Grove Transfer	273		
Wright County	Malcolm Avenue Recycling & Transfer	88		
Wright County	Reliable Roloff & Transfer	17		
Wright County	Shamrock Recycling & Transfer LLC	5		
Wright County	RRT - NRG Empire Processing	2		
Wright County	Lloyd's Construction Services, Inc. Transfer	<1		

Note: Data in this table is sorted first by county name alphabetically. Within each county, transfer station and MMSW facility columns are then sorted in descending order, respectively. MMSW facility tonnages are the sum of all direct delivery and transfer flows that go to each MMSW facility from each county. Side-by-side presentation of transfer station data (if any) and MMSW facilities tonnages is not intended to imply that the individual transfer station tons listed go to the MMSW facility that happens to be on the same row to the right, after sorting.