ITEM NO. 26

To: Mayor and Council

From: Bill Schmitt, Resource Recovery Plant Superintendent; Merry Rankin, Sustainability Coordinator; and Susan Gwiasda, Public Relations Officer

Date: January 22, 2019

Subject: SCS Engineers Waste Diversion Enhancement and Recommendation Report

The attached final report from SCS Engineers identifies five specific tasks that were completed to produce recommendations on how to improve the efficiency of the Resource Recovery Plant, a facility that has been processing area trash into refuse derived fuel (RDF) for the Ames Power Plant for more than 40 years.

As part of an effort to improve RDF quality and reduce non-beneficial waste at the Resource Recovery System, the City of Ames applied for a forgivable loan from Iowa Department of Natural Resources (IDNR) Solid Waste Alternatives Program (SWAP). The City was awarded $20,000 with a required $5,000 cash match to contract with a consultant to develop and implement a study leading to enhanced waste diversion, increased efficiency of the RRP, and increased awareness and understanding of citizen value and interest in additional waste reduction/diversion management related services.

The five basic components of the report include:

- Identification of RRP suitable materials
- Assessment of reuse, recycling/diversion, and composting opportunities
- Engagement of the business community and citizens of Story County
- Program and services audit of similar communities
- Analytic and strategic recommendations report

The report recommendations are varied and include investing in mechanical changes to the RRP processing system; developing a “last chance” opportunity for usable items dropped off at RRP; exploring a mattress and/or carpeting recycling program; collaborating with stakeholders to strengthen organics diversion programs; and continue to evaluate City-supported recycling/diversion programs to benefit Resource Recovery and meet the needs of citizens.

Since receiving the report, Resource Recovery Plant staff have been evaluating the recommendations and focusing on the options that are feasible to implement immediately, as well as continuing to research suggestions that may be viable in the near future.

SCS ENGINEERS






Waste Diversion Enhancement & Recommendation Report

City of Ames
Ames, Iowa

Presented to:

CITY OF ames™

110 Center Avenue
Ames, Iowa 50010

Presented by:

SCS ENGINEERS
8450 Hickman Road, Suite 20
Clive, Iowa 50325
(515) 631-6160

December 2018
File No. 27217245.00

Waste Diversion Enhancement and Recommendation Report

City of Ames
Ames, Iowa

Presented to:

CITY OF Ames™

110 Center Avenue
Ames, Iowa 50010

Presented by:

SCS ENGINEERS
8450 Hickman Road, Suite 20
Clive, Iowa 50325
(515) 631-6160

December 2018
File No. 27217245.00

This report was prepared with the support of the Iowa Department of Natural Resources Agreement Number 16-G550-07FL. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the IDNR.

TABLE OF CONTENTS

1.0 Executive Summary 1

1.1 Waste Management Background 1

1.2 Waste Diversion Enhancement and Recommendation Results 2

2.0 RRP Suitable Materials Identification 4

2.1 Assumptions 4

2.2 Model 5

2.3 Results 6

3.0 Recycling and Composting Opportunity Assessment 9

3.1 Organics 9

3.2 Bulky Items 12

3.2.1 Furniture 12

3.2.2 Mattresses 13

3.2.3 Cursory Economic Evaluation 13

3.3 Textiles 15

3.4 Undesirable Others 16

3.5 Metals 16

3.6 Grit 16

3.7 Glass 17

3.8 Existing Alternatives Summary 17

4.0 Community Engagement 18

4.1 Business Community EngagemenT Through Survey 18

4.1.1Survey Preparation 18

4.1.2 Survey Implementation 18

4.1.3 Survey Results 19

4.2 Business Community Engagement Through Interviews 20

4.3 RESIDENTIAL COMMUNITY INTEREST 21

4.3.1 Glass, Deposit Cans/Bottles, Paper, Cardboard 21

4.3.2 Organics 21

4.3.3 Bulky Items 22

4.3.4 Other Handling Methods 22

4.3.5 Interest in Additional Recycling 22

5.0 Program/Services Audit 23

6.0 Recommendations 27

6.1 Opportunities For Enhancement 27

6.1.1 Mechanical Changes to the Processing System 27

6.1.2 Education/Outreach Materials 30

6.1.3 Business Recycling 30

6.1.4 Last Chance Re-Use Center 31

6.1.5 Mattress Recycling 32

6.1.6 Expand Glass Collection Points 32

6.1.7 Community-Driven Diversion 33

6.1.8 Complete Pilot Project for Food Waste Collection from Restaurants 33

6.1.9 Offer Food Waste Collection from Residents 34
6.1.10 Evaluate Anaerobic Digestion in Conjunction with the Wastewater Treatment Plant 34
6.1.11 Continue Rummage RAMPage 34
6.1.12 Support Food Rescue Programs 34
7.0 Summary and Next Steps 36

APPENDICES

Appendix A RRP Material Handling Effect Model
Appendix B Business Survey Questionnaire
Appendix C Summary of Business Survey Results
Appendix D Evaluation of Cost Savings Potential from Decreasing Rejects
Appendix E Ames Pay it Forward Database Information Sample

1.0 EXECUTIVE SUMMARY

The purpose of the Waste Diversion Enhancement and Recommendation Report was to provide the City of Ames (COA) and COA Resource Recovery Plant (RRP) staff with information regarding suitable and unsuitable materials received at the RRP, to evaluate the perceived value and interest in additional services within the Story County business community, and to evaluate the programs and services other similar communities have. The results of these initial tasks were then aggregated with the 2016 Ames Resident and Story County Resident Satisfaction Surveys to develop recommendations to both enhance existing programs and to potentially initiate new solid waste management programs. The goal of these activities is to improve the efficiencies and economics of the RRP operations.

1.1 WASTE MANAGEMENT BACKGROUND

Waste management is necessary for all populations. Various forms of management have evolved over time and exist today. The United States Environmental Protection Agency (EPA) developed a Non-Hazardous Materials and Waste Management Hierarchy as shown in Figure 1. It is important to note the EPA recognizes that there is not a single waste management approach suitable for managing all materials and waste streams in all circumstances. This hierarchy provides a ranking from top down of the most to least environmentally friendly methods for handling materials. While most facilities within the State of Iowa utilize landfilling for their last option for solid waste, Story County does have a unique solution available with the RRP and the ability to provide Refuse-Derived Fuel (RDF), Energy Recovery on the Waste Management Hierarchy above, to the Ames Municipal Electric Services (AMES) power plant.

Figure 1 – EPA Waste Management Hierarchy

The COA opened the first municipally owned and operated waste-to-energy (WTE) facility in the nation in 1975. This facility takes municipal solid waste (MSW) from the COA and surrounding communities within Story County. Waste materials are processed, and burnable materials are sorted into RDF, which is then pneumatically piped to the AMES power plant. Portions of the waste that are unable to be burned are hauled to the Boone County Landfill. The COA power plant is permitted to burn up to 30% (by weight) of RDF, which is possible due to the availability of material but not always achieved due to processing challenges. Story County, through the RRP, is continually looking for process improvements to increase the energy generated and to maximize material diverted from the landfill both through enhancing existing programs and through new programs where beneficial.

As part of this continual improvement process, the COA applied for Iowa Department of Natural Resources (IDNR) Solid Waste Alternatives Program (SWAP) financial assistance in the form of a forgivable loan in 2015. They were awarded a $20,000 forgivable loan with a $5,000 cash match to contract with a consultant to develop and implement a two-part study leading to enhanced waste diversion, increased efficiency of the RRP, and increased awareness and understanding of citizen value and interest in additional waste reduction/diversion management related services. Five tasks were associated with the SWAP grant. These included:

1. Identification of RRP Suitable Materials
2. Assessment of Reuse, Recycling and Composting Opportunities
3. Engagement of the Business Community and Citizens of Story County
4. Program/Services Audit of Similar Communities
5. Analytic and Strategic Recommendation Report

This report completes Task 5 and provides a summary of Tasks 1-4 in addition to recommendations for next steps. Throughout these steps, SCS Engineers (SCS) met with and was provided input and guidance from the Waste Diversion Enhancement and Recommendation Team (Team) which consisted of:

Bill Schmitt	City of Ames
Mark Peebler	City of Ames
Lorrie Hanson	City of Ames
Susan Gwiasda	City of Ames
Merry Rankin	City of Ames/Iowa State University (ISU)

1.2 WASTE DIVERSION ENHANCEMENT AND RECOMMENDATION RESULTS

The model developed and discussed in detail in Section 2.0 provides the RRP with a tool to utilize to determine which materials are most beneficial for power generation and which are beneficial to remove from the process. The model allows the RRP to evaluate the effect on the overall British thermal units (Btu's) generated based on the specific incoming waste stream and the subsequent effect of increasing or decreasing specific materials. Ash generation is also evaluated in the model to allow for an understanding of material generated on the back end of power plant operations.

Review of existing markets and options for materials identified as unsuitable for RDF generation reveals that there are existing programs for materials that could be enhanced to increase the removal of unsuitable materials. As is common within trash and recycling businesses, education is a key component to diverting and/or reusing materials.

A survey of Story County businesses showed that there is an interest in additional recycling and reuse opportunities dependent on the cost and convenience of such opportunities. Enthusiasm ranged from high with business entities the RRP already recognize as partners in enhancing

programs, to businesses who have potentially not had a reason to focus on waste reduction, recycling, and/or reuse.

WTE plants utilizing RDF are not as common as mass burn facilities throughout the United States. While looking for a WTE plant operating in an area with a mixed residential makeup similar to Story County with Iowa State University and a similar population (97,502 people) did not generate an exact match, three mass burn and one modular facility with planning areas in the 42,000 – 100,000 people range were contacted, in addition to an RDF facility serving a population of 250,000, to obtain information on their process, recycling/reuse, and education. Based on interviews with these areas, it was found that there are programs such as curbside recycling, curbside organics collection, and residential organics drop-offs being implemented.

A number of recommendations were made that will allow the COA and RRP to select those that will provide the largest immediate impact and allow for continued reassessment of the effect on the RDF being produced.

2.0 RRP SUITABLE MATERIALS IDENTIFICATION

The first task of this project was to determine which materials that are being received from Story County to the RRP are suitable for producing RDF. In preparation of this task, a one-day waste sort was conducted at the RRP on June 13, 2016 by the COA with the assistance of the Iowa Department of Natural Resources (IDNR) Iowa Waste Exchange (IWE) Area 2 Resource Specialist Shelly Codner. Through this waste sort, a total of 1,622.6 pounds were sorted and classified into 12 categories. Samples were collected from a combination of residential collection vehicles from the north Ames Bloomington Heights area (199.5 pounds), commercial collection vehicles from the South Duff area (259.5 pounds), individual residential vehicles utilizing the facility (476.30 pounds), and a combination of three composite samples collected from material on the tip floor (687.3 pounds).

The data gathered in the waste sort was then utilized to prepare a model to determine the effect adding or removing categories determined in the waste sort would have on the overall Btu value of the generated RDF. A baseline model was first developed to understand current conditions. Upon completion of the baseline, a model for estimating the effects on specific energy content of the RDF, from modifying the quantities of materials processed through the system, was developed. These models are further discussed below.

2.1 ASSUMPTIONS

In order to generate the baseline and the waste input modification model, several assumptions were utilized. These assumptions are summarized below.

- RRP staff noted that the material sorted was representative of the material received throughout the year at the facility.
- RRP staff determined the percentage of incoming waste utilized in generating RDF is 51%.
- The materials included in Table 1 below, while received at the RRP, are removed in part at a point or points in the process prior to becoming RDF and are therefore not contributing 100% of the available incoming energy content to the RDF. RRP staff provided the following estimates of incoming waste contribution that could be utilized for the RDF generation.

Table 1 Waste Contributing to RDF (%)	
Material	Waste Contributing to RDF (%)
Paper	98%
Plastic	98%
Wood	10%
C&D	7%
Organic	15%
Bulky	65%
Glass	1%
Metals	1%
Textiles	40%
Desirable Other	98%
Undesirable Other	40%
Grit	5%

It should be noted that with items such as paper, despite an estimated 98% of the incoming material being processed as RDF, the contamination of the paper (moisture, etc.) often causes it to clump together and therefore be disposed of as rejects rather than processed for RDF. If these materials are processed, additional Btu's are expended by AMES to burn the wet materials.

2.2 MODEL

Two models were constructed (see **Appendix A**). First, the baseline was looked at for materials currently coming in to the facility and being utilized for RDF generation. Based on information provided by RRP staff, of the total tonnage of material accepted, a portion of each of the 12 categories is not utilized toward RDF generation due to presorting, processing, or removal through the RDF generation process. The removal of these items was factored in to the overall material available for RDF production.

Once a modified material input weight was determined, assumed moisture contents were then utilized to calculate the dry weight of the material. Assumed average heat values in Btu/pound dry weight were then used to calculate the Btu each material provides. The individual components were then combined to calculate the specific energy content of the waste sort material. Ash generated for the waste characterization sample was then determined based on published values of the percent of ash generated per dry weight of the given materials.

The baseline model was then utilized to construct the waste input modification model. The overall percent waste composition from the baseline model was applied to a user input total annual tonnage to determine the total tons of each category entering the system. The same factors were applied from the baseline model in regards to the percent of incoming material contributing to the production of the RDF. In order to examine the effects of decreasing (or increasing) the amount of material through the process, user inputs were created to adjust the throughput. The

total energy content per material and the overall specific energy content are then computed. Estimated ash generation in the waste input modification model is called out in the Ash Generation Model table within the model.

2.3 RESULTS

The baseline table calculated specific energy content of the RDF to be approximately 8,642 Btu/pound based on the June 13, 2016 waste sort and COA estimate of materials contributing to the RDF. The RDF Credit Calculation spreadsheet also provided by the COA showed an RDF Effective Heat Input of 6,004 Btu/pound for June 2016. There are several factors potentially causing the 44% difference between the two specific energy contents. Foremost, the calculated **model value is on a dry weight basis** while the **numbers provided by the COA are on a wet weight basis**. Additionally, if available, the actual moisture content and average dry heat value of the materials can greatly impact the values. Utilizing the baseline model to evaluate ash generated from the waste included in the waste sort, it is estimated that there was 72 pounds of ash generated.

The model was then utilized to determine the effect of removing the items noted in the project kick-off meeting to be either detrimental or non-beneficial to the RDF production process. The items called out in the meeting are listed below (in no particular order).

- Food waste
- Food contaminated paper
- Glass
- Wood
- Carpet
- Mattresses
- Furniture
- Textiles
- Construction & Demolition
- HHW
- Appliances
- Lithium batteries
- Large plastic items

Several assumptions were made in this process. First, wood waste and C&D waste were not considered to be removed from the waste flow based on input from the COA. Second, it was assumed that 100% removal of any one material is not achievable. Lastly, it was assumed that materials could be removed by redirection, pre-processing, or addition of equipment in the RDF generation process.

Based on the assumptions above, quantities of waste materials were targeted for removal. It is likely not realistic to assume that 100% of these materials could be removed. Therefore, the specific energy content was calculated with removing the following percentages and equivalent tons of the undesirable materials (Table 2).

Table 2 Potential Materials Targeted For Removal from RDF Process		
Material	Change to RDF Process Material (%)	Change to Materials Contributing to RDF (tons)
Paper	0%	0
Plastic	0%	0
Wood	0%	0
C&D	0%	0
Organic	-75%	-780
Bulky	-80%	-1,690
Glass	-76%	-3.3
Metals	-50%	-13
Textiles	-80%	-460
Desirable Other	0%	0
Undesirable Other	-50%	-385
Grit	-25%	-30

Under this scenario, the revised specific energy content is calculated to be approximately 9,243Btu/pound and the ash generated is estimated to be 1,614 tons/year, or 8% of the RDF material. It should be noted that the removal of an item may affect other items. For example, removing organics will positively affect beneficial fuels such as paper by causing less contamination of the paper material and therefore additional paper will be utilized as fuel.

As noted previously, not all materials received at the RRP are going through the process to become RDF. Therefore, there are two areas where diversion is considered – both pre-processed material and the material that is put through the RDF processing line. The quantities from both areas that have been discussed as available for potential diversion are shown in Table 3. This table illustrates materials that should initially be evaluated for one of several forms of diversion. Note the quantities are based on an average annual processed tonnage of 44,000 tons.

Table 3 Potential Diversion					
Material	Pre-Processed Material (tons)	Material Targeted for Removal from RDF Process (tons)	Total Potential Material for Diversion (tons)	Targeted Materials for Diversion (%)	Targeted Materials for Diversion (tons)
Paper	195	0	195	0%	0
Plastic	142	0	142	0%	0
Wood	4,817	0	4,817	0%	0
C&D	2,020	0	2,020	0%	0
Organic	5,859	780	6,639	70%	4,647
Bulky	1,139	1,690	2,829	50%	1,414
Glass	430	3	433	50%	216
Metals	2,480	13	2,493	10%	249
Textiles	866	460	1,326	80%	1,060
Desirable Other	15	0	15	0%	0
Undesirable Other	1,147	385	1,532	50%	766
Grit	2,290	30	2,320	10%	232
Total	**21,400**	**3,361**	**24,761**		**8,586**

As seen in the table above, the major categories targeted for diversion are organics (food wastes), bulky items, glass, metals, textiles, undesirable others, and grit. Based on discussion at the August 28, 2017 project meeting, a large emphasis is not being placed on metals and grit at this time since these are currently removed during processing at RRP.

3.0 RECYCLING AND COMPOSTING OPPORTUNITY ASSESSMENT

The next step entailed looking at potential existing regional outlets for the materials targeted for diversion. A cursory economic analysis for transporting and processing these materials at the identified recycling and compost facilities has also been included. Several materials came to the forefront as potentially viable materials to divert from the RRP either because they do not contribute to the specific energy of the RDF or because they are problematic within the process. Table 4 below summarizes the outcome of Task 1 relating to the materials deemed most beneficial to target for diversion, in descending order, based on estimated tons targeted for diversion.

Table 4
Targeted Materials for Diversion

Material	Material Not Processed for RDF (tons)	Material Targeted for Removal from RDF Process (tons)	Total Potential Material for Diversion (tons)	Targeted Materials for Diversion (%)	Targeted Materials for Diversion (tons)
Organic	5,859	780	6,639	70%	4,647
Bulky	1,139	1,690	2,829	50%	1,414
Textiles	866	460	1,326	80%	1,060
Undesirable Other	1,147	385	1,532	50%	766
Metals	2,480	13	2,493	10%	249
Grit	2,290	30	2,320	10%	232
Glass	430	3	433	50%	216
Total	**14,211**	**3,361**	**17,572**		**8,584**

Materials identified and potential existing regional opportunities are further evaluated below.

3.1 ORGANICS

The RRP does not accept yard waste, therefore, the majority of targeted organics considered for diversion consist of food wastes. An important point with food is that whenever possible, the Food Recovery Hierarchy from the EPA, shown in Figure 2 on the following page, should be followed. This means that reducing the generation of excess food is the most ideal option. Feeding hungry people and then hungry animals are next on the list. From there, industrial users for digestion to recover energy and composting to create a nutrient-rich soil amendment are the next preferred options. Last on this list for food waste management options are landfill/incineration.

Based on the EPA hierarchy, two food waste management options above landfill/incineration are currently available in the Story County area. The effort to use food that may otherwise have ended up in the garbage to feed hungry people is utilized in Ames and Story County. Food at First is a free meal program and perishable food pantry that utilizes food from local restaurants and grocery stores that would otherwise have been thrown away because of store/restaurant policies, while it is still safe for human consumption. Several entities participate in this program, with regular pickups from volunteers occurring including: Walmart, Sam's Club, ISU Dining, Memorial Union Food Court, Hy-Vee, Aldi, Wheatsfield, Panera, Chipotle, Red Lobster, and Pizza Hut.

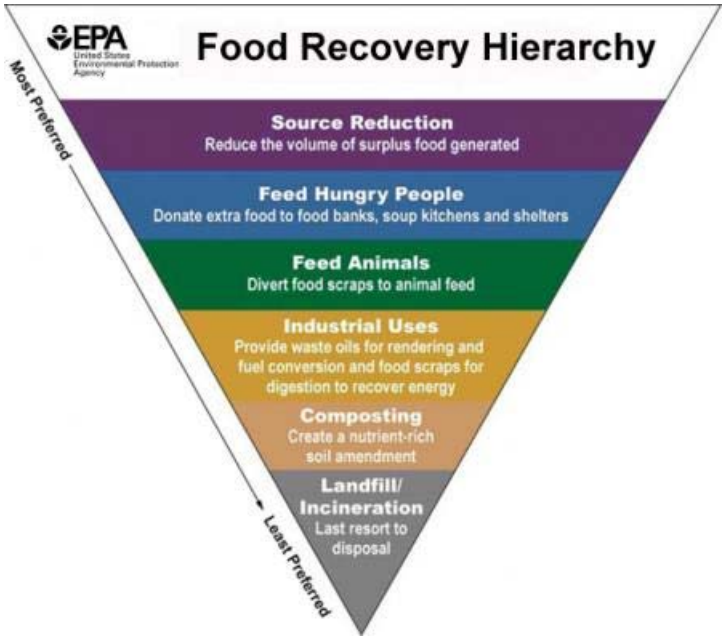


Figure 2 – EPA Food Recovery Hierarchy

Further along the hierarchy is composting. Yard wastes, which are not accepted at the RRP, are handled by three facilities within Ames – Chamness Technology, Steenhoek Environmental and ISU. Chamness Technology and Steenhoek Environmental provide services to residents and businesses within Story County while ISU handles material generated on ISU property and in ISU facilities. In addition to the yard waste, Chamness Technology, through their GreenRU division, and ISU each manage food wastes (ISU handles only their own food waste). Steenhoek does not accept food waste at their compost location.

GreenRU is currently contracted with several commercial businesses within Ames to pick up food wastes for composting at their facility in Eddyville, Iowa. Contracts are held with medical facilities and grocery stores within Story County including Mary Greeley Medical Center, Wheatsfield Cooperative, and Hy-Vee. Conversations with GreenRU have indicated that they are open to expanding their program within the Story County area.

The ISU Compost Facility, located southwest of Ames at 52274 260th Street, was established in 2008 to accept organic waste materials from ISU facilities including the Animal Science Teaching Farms, BioCentury Research Farm, Dining Services, and the Dairy Farm. Materials include dairy manure, dairy solids, dairy pack, yard waste from campus and greenhouse waste, dining hall and kitchen food scraps, and biomass research wastes (corn stalks, switch grass, corncobs, etc.). Based on discussion with Dr. Mark Honeyman, Director of Iowa State Research Farms, there are several challenges that have arisen at the ISU Compost Facility since taking in food wastes. Dr. Honeyman noted that there are more management challenges and variability in the feedstock. The process also takes longer in the winter due to the colder temperatures. He did note that odors have not been an issue thus far but it is also a small amount of food waste that is received. From the 2017 Annual Report, of the 8,110 tons of material received at the facility, a

total of 411 tons (5%) were from dining (compostable dining hall and kitchen food wastes). Several challenges exist when looking at taking food wastes beyond ISU facilities. These include:

- Considerably more staff time, resources and infrastructure requirements would be necessary. Additional IDNR permitting of the existing compost facility would be required if the facility received a cumulative total of more than two tons per week of yard waste and food residuals. This would include the original permit application and reapplication/updates every three years, in addition to meeting the financial assurance regulations if more than 5,000 tons of feedstock are received annually, bulking agent excluded.
- Physical space within the current compost operations area. Eight hoop buildings are currently being utilized for the process; additional capacity does not exist without expanding.
- The ISU Composting Facility targets a compost blend of carbon-nitrogen ration of 25-30:1 and a moisture of 45-50 percent. Adding additional food waste (nitrogen) without available carbon could throw off the mix.
- Contamination in food waste composting is an on-going challenge. Education, training, and reminders must be a constant. Working with ISU Dining, there are times the Compost Facility has to request staff to remove excessive contamination. If the program is expanded to the Story County service area, contamination handling would need to be addressed.

Photo 1 – Organic Waste at ISU Compost Facility

Photo 2 – Finished compost product from ISU Compost Facility

In between feeding hungry people/animals and composting is anaerobic digestion (AD). While this is a potential solution, a separate feasibility study is needed to determine quantities and types of feedstock needed and available, location, partnerships, etc. The City of Muscatine is one known location within Iowa exploring the options with de-packaging food and utilizing AD to generate compressed natural gas (CNG) fuel for vehicles. Within an EPA listing from 2016 showing three different types of projects (waste water treatment plants, stand-alone, and farms with AD that accept food waste or fats-oil-grease), there were two AD projects in Iowa and four

total in EPA Region 7. However, there were over 100 projects listed across the United States and there is continued interest and drive to see AD facilities in operation.

For the purpose of this report, food donation and organic waste composting are the two existing methods to handle a portion of the organic fraction through existing programs that will be evaluated. The current cost of handling the organic fraction of waste is summarized in Table 5. A gate fee of $55 per ton is collected on the material when it enters the RRP facility. Assuming that of the 100% targeted material, 70% is rejected for processing, there is a labor amount associated with handling the material through the process. For estimating purposes SCS has assumed a $35/ton handling rate of non-beneficial materials. In addition, the material requires hauling to the Boone County Landfill at $13.66 per ton in addition to disposal at $48.00 per ton. The net effect of this process is a loss of $62,177. With the programs that are in place in Story County, if diversion was increased to the goal level of 4,647 tons (or 70% of the current amount of the material received at the RRP), the RRP would not be required to handle the material at all. While there would be a loss of the $255,585 in tip fees, there would no longer be the deficit from the handling, hauling, and disposal of the materials received and subsequently rejected. Removing this organic fraction of the waste would also decrease the moisture content of the incoming waste, potentially leading to less contamination of the desirable materials such as paper and therefore increasing the Btu value of RDF supplied to the AMES power plant.

Table 5
Cursory Economic Analysis: Food Wastes Current

Income/Expense	Unit Rate	Units	Volume	Sub-Total
Income				
Waste tip fee	$55.00	per ton	4,647	$255,585
Expense				
Handling Rate	$35.00	per ton	4,647	$162,645
Hauling Fee	$13.66	per ton	4,647	$63,478
Disposal Fee	$48.00	per ton	4,647	$223,056
Total				**($193,594)**

3.2 BULKY ITEMS

Bulky items are the next highest item on the targeted items for diversion list. This category includes furniture and mattresses. While appliances could fall under bulky items, once they are demanufactured, if required, they fall in the Metals category and will therefore be discussed in the metals section. Commercial and residential bulky items are considered here.

3.2.1 Furniture

There are a number of organizations and programs currently in place to accept bulky items in good shape. Secondhand or thrift stores in Story County include the Salvation Army, Overflow

Thrift Store, Goodwill, and Habitat for Humanity. In addition, there are a number of consignment stores available for rehoming furniture. Several of the programs have options for pick-up of furniture.
In addition to retail stores, there are other options including online sales of furniture through sites like Craigslist, Facebook, or smartphone apps such as letgo. These options are more suited to furniture sales than websites like eBay as they are geared towards the local area.

The other option that is now in place in the COA is Rummage RAMPage. This program began in 2016 and is a partnership between the COA and the ISU Office of Sustainability. It is held the end of July/beginning of August during the time when apartment leases end and new leases begin, mostly for the ISU student population. Items accepted for donation include: couches, futons, bed frames, chairs, tables, desks, coffee tables, small electronics, lamps, toasters, microwaves, blenders, fans, plates, silverware, glasses, pots/pans, baking sheets, miscellaneous utensils, and other housewares. Beginning in 2017, linens, bedding, clothing, books, non-perishable unexpired food, and school supplies were accepted on behalf of other organizations and distributed to local agencies including the Ames Animal Shelter, Goodwill, and the Ames Public Library. This program has grown in success over its three years with the third event held July 27 through August 2, 2018 at the Ames Intermodal Facility, 129 Hayward Ave. Items diverted from the waste stream have increased from 44,000 pounds of furniture and housewares in 2016 to 77, 520 pounds diverted in 2017 to 102,550 pounds in 2018, representing an increase of 133% from 2016 to 2018.

3.2.2 Mattresses

There are not mattress recyclers located in Story County, nor in the State of Iowa. The nearest recycling option found is in La Crosse, Wisconsin at 7 Rivers Recycling, LLC. Secondhand stores and reuse programs do not typically accept used mattresses due to the unknown condition and sanitary state, although the Salvation Army will take them if they are clean with no rips, stains, or bugs. Based on a conversation with Brian Tippets, part owner of 7 Rivers Recycling, LLC, they would take mattresses from the COA. A collection area would be needed and will be discussed in the Recommendations section. For purposes of the cursory economic review, it has been assumed that a facility is available/has been constructed to hold a semi-trailer to store mattresses until it is full to haul up to La Crosse. A total of 185-190 mattresses could fit in the trailer, but to be conservative a total of 175 mattresses per trailer was assumed. The current standard price for mattresses deconstruction and recycling by 7 Rivers Recycling, LLC is $13.50/mattress. However, with a bulk quantity, pricing per piece would drop to $12.50/mattress. Transportation costs can be highly variable. At the time it was discussed, Mr. Tippets was seeing a cost of $1.64/mile round trip. It is approximately 500 miles round trip. Mattresses would need to be accepted and hauled on a frequency that would keep them from being soiled, wet, infested, crushed, etc.

3.2.3 Cursory Economic Evaluation

Similar to Table 5, Table 6a below summarizes the basic components of the current handling costs for bulky items. Table 6b summarizes the effect of removing the bulky items from the RRP tip floor. There are two components to this cursory economic evaluation. The first is the furniture component, which has alternate disposal options that do not require COA financial input other

than efforts put towards Rummage RAMPage. Therefore, fees for the furniture component are only present in Table 6a. There are several options for mattress recycling. Evaluated herein is the option of collecting and hauling the mattresses to 7 Rivers Recycling in La Crosse. Other avenues should be evaluated such as RRP staff processing the mattresses, recycling the metal, and using the fabric in the RDF process (with the use of a shredder) or the establishment of a mattress recycling facility located in Iowa (not currently existing). The scenario being evaluated would require at a minimum a semi-trailer on site to store the mattresses until at least 175 are collected for transport. For Table 6b it has been assumed that the trailer would be located at the existing RRP facility. A general rule of thumb shared by Mr. Tippets is that there is one mattress disposed of for every 15 people per year. The United States Census Bureau estimated as of July 1, 2017 a population of 97,502 in Story County, which would be approximately 6,500 mattresses per year. Two sources cited the same weights for mattresses; twin – 45 pounds, full – 56 pounds, queen – 71 pounds, and king – 90 pounds. Assuming an equal disposal rate of all types, the average bed weight is 66 pounds. At an average of 66 pounds per mattress, there would be 429,000 pounds of mattresses or 215 tons of mattresses. Therefore, of the 1,414 tons targeted for diversion it is assumed that there is approximately 1,199 tons of furniture to 215 tons of mattresses or a 85% furniture to 15% mattresses split. Per RRP personnel, it is further assumed that 20% of the furniture is brought in by residents through the carline while 80% is brought in by commercial haulers at $55/ton. Tables 6a and 6b below also utilize the following assumptions:

- 80% of the furniture items are brought in by commercial haulers at $55/ton, while 20% arrive through the carline at $25/truck.
- 80% of the mattresses are brought in by commercial haulers at $55/ton, while 20% arrive through the carline at $25/truck.
- Haul trip is 500 miles round trip at $1.64/mile. This rate can fluctuate greatly. (Table 6b)

Table 6a
Cursory Economic Analysis: Bulky Items Current

Income/Expense	Unit Rate	Units	Volume	Sub-Total
Income - Furniture				
Waste tip fee[(1)]	$55.00	per ton	959	$52,756
Waste tip fee[(2)]	$25.00	per pickup	799	$19,983
Income - Mattresses				
Waste tip fee[(3)]	$55.00	per ton	172	$9,438
Waste tip fee[(4)]	$25.00	per pickup	650	$16,250
Expense				
Handling Rate[(5)]	$35.00	per ton	1,414	$49,490
Hauling Fee	$13.66	per ton	1,414	$19,315
Disposal Fee	$48.00	per ton	1,414	$67,872
Total				**($38,250)**

Notes:
(1) Assumes 80% of the 1,199 tons of furniture are brought in by commercial haulers at $55/ton.
(2) Assumes 20% of the 1,199 tons of furniture are brought in through the carline at $25/pickup load. Further assumed that each item averages 150 pounds and each load averages 4 items.
(3) Assumes 80% of the 215 tons of mattresses are brought in by commercial haulers at $55/ton.
(4) Assumes 20% of the 215 tons of mattresses are brought in through the carline at $25/pickup load. Further assumes that each unit weighs 66 pounds and each load averages 2 items.
(5) Assumes a rate of $35/hour for handling materials and further that 1 ton is handled per hour.

Table 6b
Cursory Economic Analysis: Bulky Items (Mattresses) Utilizing Existing Programs[1]

Income/Expense	Unit Rate	Units	Volume	Sub-Total
Income				
Waste tip fee[2]	$25.00	per pickup	650	$16,250
Waste tip fee[3]	$55.00	per ton	172	$9,438
Expense				
Handling Effort[4]	$175.00	per trailer	37	$6,500
Hauling Fee[5]	$820.00	per trailer	37	$30,457
Disposal Fee[6]	$12.50	per mattress	6,500	$81,250
Total				**($92,519)**

Notes:
(1) Cost for furniture diversion programs not included as under existing programs furniture pieces would go directly to other endpoints (Goodwill, Salvation Army, etc.) and not be an income or cost to the RRP.
(2) Assumes 80% of the 215 tons of mattresses are brought in by commercial haulers.
(3) Assumes 20% of the 215 tons of mattresses are brought in through the carline. Further assumes that each unit weighs 66 pounds and each load averages 2 items.
(4) Assumes RRP staff would have an average of 5 hours per trailer at $35/hour in loading/arranging mattresses and managing pickup and that 175 mattresses fit per trailer.
(5) Assumes a $1.64/mile cost for hauling with a 500 mile round trip distance.
(6) Assumes the RRP would receive the bulk rate of $12.50 per mattress.

It should be noted that under this scenario in order to break even approximately $18.50 per mattress component (mattress, box spring, etc.) would need to be charged. It is also important to note that this evaluation does not account for wear and tear on equipment. Other entities currently utilizing 7 Rivers Recycling include the City of La Crosse and La Crosse County, both in Wisconsin, and Houston County in Minnesota.

3.3 TEXTILES

Based on the completed evaluation and modeling in Task 1, there are approximately 1,060 tons of textiles that would ideally be routed away from the RRP process. This is a challenge as it has been seen that even with the number of secondhand stores and charitable donation options available, clothing items with the tags still on will end up in the disposal pile. Within the Story

County area, as noted under Bulky Items, there are a number of second hand stores, in addition to charities and Rummage RAMPage that collect these materials free of charge. Since programs are already in place, it does not appear that for textiles other alternatives or new solutions need to be found. Rather, the current options need to be utilized more fully. This will be further discussed in the Recommendations section.

3.4 UNDESIRABLE OTHERS

The category of undesirable others contains approximately 765 tons of material that would ideally be redirected away from the RRP. This category includes a wide range of materials that are hard on the RRP system and also difficult to rehome, in part due to the varying nature. Items in this category include shoes, soles of shoes, garden hoses, hard plastics, plastic picture frames, plates, porcelain, ceramic tiles, clay pots, rocks, planters, etc. The existing markets for these items are the secondhand stores throughout Story County or donating appropriate items to charities (shoes in good shape, plates, etc.). The amount of material in the waste stream suggests that since there are alternatives available, and they are not being fully utilized, a change in the method to get the items from the resident to an alternative end source might be needed. Please note that once items are placed in with garbage, they typically become unusable due to breakage and contamination, even if they did have remaining life prior to being thrown away. This is further discussed in the Recommendations section.

3.5 METALS

There are several outlets for metal within the Story County area. The RRP will accept appliances including but not limited to: dishwashers, stoves, washers, dryers, furnaces, air conditioners, refrigerators, water heaters, freezers, microwaves, and dehumidifiers for a $20 charge. There is also a salvage yard (Bell Salvage) that will take appliances currently at no fee.

RRP staff does pull metal out of the tipping floor pile as they are able, prior to it being processed. However, due to several constraints, they are not able to make a large impact with this approach and once the metal is processed, it decreases in value. This material was not identified as a high priority, however, a recommendation will be provided in the Recommendations section.

3.6 GRIT

There are not currently existing alternatives for grit disposal due to the nature of the material and how it is created. While the GreenRU website does include on their list of acceptable items vacuum bag wastes, dust/lint, tobacco wastes, granite dust, sawdust, etc., the process for source-separating these items for collection, especially where there is not already a source-separated organics collection program, would be cost prohibitive. However, based on conversations with the RRP staff, it is believed that within the grit material is product that could be beneficial. This is further discussed in the Recommendations section.

3.7 GLASS

Two alternatives currently exist to handle glass. Iowa is a redemption state so all beer, wine, alcoholic liquor, mineral water, soda water and similar carbonated soft drink containers (other than exempt containers) sold or offered for sale in Iowa by a dealer are required to have a $0.05 deposit on the container, including glass. This has assisted commercial food establishments in having a program set up with their vendors for return of glass bottles with a deposit. Residents are also able to return applicable glass beverage containers at point-of-sale to receive the return of the nickel deposit.

The COA also offers multiple glass recycling containers throughout the county, which are collected and brought to the RRP where Ripple Glass from Kansas City collects the material and reprocesses it. There are currently 18 locations for residents and businesses to deposit glass containers:

- Both Ames Fareways
- Both Ames Hy-Vees at or near the gas stations
- Fresh Thyme Market
- Aldi
- Wheatsfield Cooperative
- Green Hills North Side
- Huxley City Hall
- Fareway in Nevada
- Story City Market
- Roland at North Main and East Ash
- Prairie Moon Winery
- Slater Elementary School
- Maxwell at BJ's behind Casey's
- North side of the Resource Recovery Plant
- ISU
- USDA

Visual observation of the glass recycling bin by the Fareway at 619 Burnett Ave showed that the bins were being utilized with little contamination. Several deposit bottles were noted; however, this is not a concern as the deposit material is acceptable in the COA yellow bins.

There are no other known handling methods for glass at this time.

3.8 EXISTING ALTERNATIVES SUMMARY

Existing alternatives for each material desired for reduction have been discussed, where present. Please note that this is not intended to be an exhaustive list and any particular strategy warrants additional review and analysis.

4.0 COMMUNITY ENGAGEMENT

Several surveys have been initiated by the COA to determine both the business community and residents current recycling and waste reduction practices and interest in expanding programs. These are briefly summarized below.

4.1 BUSINESS COMMUNITY ENGAGEMENT THROUGH SURVEY

The COA wanted to determine the perceived value and interest in additional services (such as community drop-off or curbside collection) for materials not suitable for use by the RRP, including organic waste streams. Recycling is currently available to the business community on a subscription basis with several of the multiple haulers servicing the City.

4.1.1 Survey Preparation

The SCS team worked with City staff to develop a comprehensive and efficient survey structure which included various components, including: the business name and address for those targeted for the survey; questions designed to be easy to answer but to provide insightful responses; and a survey tool that was designed to receive survey information as well as tabulate the information. Those activities are described below in further detail.

Creating a dynamic survey enhances the probability that respondents will complete the survey and will give more thoughtful, accurate responses. SCS developed questions that were quantitative and designed to produce numerical measures of responses. Attitudinal questions were also included, asking businesses their level of interest in recycling to determine their belief in keeping items out of the waste stream. Questions were straightforward and focused on the end result of understanding the materials generated by businesses and their opinions about recycling in the COA. Overall, Questions 1 – 3 provided general information (name of business, address, and business type), Questions 4 -16 focused on the target waste streams generated, and Questions 17 – 22 focused on the interest/emphasis placed on recycling.

An introduction letter was also developed to accompany the survey, explaining why it was being distributed, the due date a response was needed, and included the link to SurveyMonkey™, the survey tool chosen for this project.

The survey questionnaire can be found in **Appendix B.**

4.1.2 Survey Implementation

SCS worked with COA staff and the Ames Chamber of Commerce for the initial distribution of the survey. There are currently 700 members of the Ames Chamber of Commerce throughout Story County who receive their eblasts. The first survey was sent out on November 12, 2017 by the Ames Chamber of Commerce. A follow up request was then sent in the Chamber Weekly Email Update on December 19, 2017. In addition, a request to businesses was included in the ISU Research Park newsletter on December 13, 2017. In order to obtain input from additional sources, a list was compiled from non-Ames Story County cities who are members of the RRP's

service area and who have businesses listed on their chamber websites. A list of 139 emails was obtained through this method. Email requests to complete the survey were sent out with an introduction to the survey December 14, 2017, January 3, 2018, and January 11, 2018. Since organics are a primary target, a list of 26 additional businesses that had not yet responded was compiled January 3, 2018; January 8, 2018; and January 11, 2018. This list included grocery stores and restaurants. Phone calls were placed between January 9 and 10, 2018 to an additional 10 restaurants, convenience stores, and grocery stores. In total, surveys were sent to or phone calls were made to over 875 business entities. As noted below, 97 surveys were initiated through SurveyMonkey™ for an 11% response rate.

4.1.3 Survey Results

The survey results were compiled after the survey closed on February 13, 2018. There were 97 surveys initiated through SurveyMonkey™. Of those, 85 were qualified survey responses, including both completed and partially completed surveys. The 12 non-qualified responses included businesses not generating material in the target categories. The entire survey was open for 13 weeks, including three major holidays. A detailed summary of the qualified results is provided in **Appendix C**. The following discussion provides the attitudinal response by businesses in Story County for recycling efforts.

When respondents were asked how important recycling and diversion is to them, 99% of the respondents said it was either very important and they would always recycle or that it was somewhat important, depending on cost. Written comments included that respondents recycled cardboard locally for free, do not like sorting, but believing in sustaining environment that it is more efficient to burn for energy than to pay to ship things off to recycle, that they would love to recycle at no cost to business, and that it is difficult to get tenants to comply.

When questioned about the economic value of recycling and diversion to businesses – how much they are willing to pay compared to their current fees – 34% of the respondents said they are not willing to pay additional fees. The largest responding group at 45% indicated they are willing to increase their monthly fees by 1-5%. Only 5% were willing to increase monthly fees by the 10-20% range. Additional comments varied including they were willing to pay for the use of service and that they were personally willing to increase 15-20% but they cannot make that call for the business. Others felt they were already recycling by sending their waste to the RRP and that fees are already high for small businesses. It was also suggested to develop a program for both residential and commercial entities where there is a lower fee if you participate in recycling. Benefits were noted if another company could benefit financially and if recyclables could stay local so as to not generate more fossil fuel use by vehicles.

Recycling and diversion efforts by the business community require resources beyond financial support. Respondents were asked if they were willing to make modifications to their operation and train employees to increase recycling and diversion through specific tasks; answers could be provided for more than one option. A total of 65% of the respondents were willing to provide both initial and on-going training to employees. An employee championing the effort would be supported by 36% of the respondents. Modifications to operations would be supported by 53% of the respondents and 9% of the respondents were not willing to support employee training or modification of operations. Written responses included that a business did not have any

employees or it was not applicable to the business. It was also noted that it is difficult to have tenants comply/enforce recycling and diversion. The business is willing to do what they can but unsure of the results.

In the final questions, 58% of the respondents indicated they would be interested in learning more about methods to divert the targeted materials (e.g. food scraps, bulky items, textiles, hard to recycle materials, grit, glass). A total of 16 additional comments were received with 44% asking for a form of single stream recycling, recycling and/or redemption center in Ames, and a recycling program run by the City of Ames with fees charged on the utility bill. Twenty-five percent of the comments were related to an interest in organics and food waste options. Nineteen percent of the comments related to the RRP and appreciation that it was being operated. The final 12% of the comments related to specific materials (paper and pallets).

4.2 BUSINESS COMMUNITY ENGAGEMENT THROUGH INTERVIEWS

Based on the results of the survey and general knowledge of the businesses within the COA Community, eleven businesses were selected for a phone interview. The businesses contacted, along with the business type and potential diversion material, are provided in Table 7 below.

Table 7
Targeted Materials for Diversion

Category	Material	Business
Grocery Stores	Organics	Fareway
		Wheatsfield Cooperative
Hospitals/Medical Clinics	Organics, Bulky Items, Glass	Mary Greeley Medical Center
Restaurants	Organics, Glass	Arcadia
		Applebees
		Hickory Park
		Red Lobster
Hotel/Food Industry	Organics, Textiles, Bulky Items	Gateway Hotel & Conference Center
Institutions	Organics, Textiles, Bulky Items	Ames Community Schools
Multi-Unit Residence	Organics, Textiles, Bulky Items	Hunziker Property Management
Other	Bulky Items, Textiles, Undesirable Other	Peterson Floors

The following questions were used as a general guideline during the discussions.

- Confirm amount/type generated
- Confirm any recycling currently being done
- Ask if they have looked into other options
    - If so, what has kept them from moving forward

- Ask what challenges they see with recycling
- Ask level of willingness to try solutions/overcome challenges

The input provided by businesses was beneficial. Overall, it appears that there are a number of businesses and entities that are open to recycling and that have room to improve as they are doing little to none currently. Takeaways/impressions noted are summarized below.

- Businesses, and also the residents from the conversations with several of the businesses, are interested in establishing a recycling program. One entity noted that their customers do not know what to do with recycling.
- At least one mentioned that costs need to align with what they are already paying or even be less if possible.
- At least one mentioned the desire to have locally produced compost available.
- Several mentioned that they provide food to Food at First.
- One mentioned a desire to expand on-site glass collection.
- Space is an issue for several of the businesses – whether in the kitchen or outside for collection.
- No recycling is being done in the Ames community schools. Resources were identified as a barrier to this occurring and being successful.
- One hotel was interviewed and was very interested in recycling.

4.3 RESIDENTIAL COMMUNITY INTEREST

The COA included questions regarding waste reduction on the 2016 Ames Resident Satisfaction Survey. As a supplement to this information, ISU Institute for Design Research and Outreach (IDRO), in partnership with the COA City Manager's Office, completed a Waste Reduction Survey for Story County. Reports with detailed results are available for both surveys. The COA/IDRO Story County survey, however, provided a comparison to both. Pertinent points extracted from the COA/IDRO report are included here, with a focus on the materials identified for diversion.

4.3.1 Glass, Deposit Cans/Bottles, Paper, Cardboard

Survey respondents were asked if they were aware that glass food containers could be recycled. Only 49% of the respondents indicated they were. Of those, 61% indicated that they participate in glass recycling. The top reasons given for not participating in glass recycling were not knowing about it, inconvenience, not generating glass, garbage company handles, and no time. Other items noted that were being recycled included deposit bottles and cans, paper, and cardboard. Redemption centers were the most common location noted for recycling, with others to include the grocery store, locations on the ISU campus, recycling bin, and recycling center.

4.3.2 Organics

Methods of handling organics (food wastes) were surveyed with 79% of the respondents noting that they disposed of them in the garbage. Only 15% of the respondents currently do backyard composting, with those not composting citing reasons such as space, need, convenience, cost,

and mess for reasons to not compost. Additionally, only 24% responded with a willingness to bring their food waste to a local compost site and 34% responded with a willingness to subscribe to a pick-up service for food scraps.

4.3.3 Bulky Items

Bulky items were identified in the survey as furniture, mattresses, box springs, couches, vinyl flooring, and carpet. When asked if the option were available to take these items to a local site since they are difficult to process at the RRP, 75% of the respondents indicated they would for an average fee of $18.66 per item/pick-up load. Values for those that responded ranged from $2 to $100 per item/pick-up load.

4.3.4 Other Handling Methods

When asked if respondents took part in other waste reduction practices and opportunities, the most common of the three listed was to donate items rather than putting them in the trash, followed closely by using reusable instead of disposable items.

4.3.5 Interest in Additional Recycling

Respondents were asked if they were interested in additional options for recycling; Seventy-four percent of respondents indicated they were interested. Services noted that would help them recycle more frequently included curbside pickup (separate from trash can), having recycling bins at apartments, free recycling, additional information, and a recycling center. In regards to cost, 58% of respondents were willing to pay additional fees for recycling services. Reasons provided for not being willing to pay extra included that they were already paying for it, that it would depend on how much more and if it's affordable, and that tax money should be used for this purpose.

5.0 PROGRAM/SERVICES AUDIT

SCS conducted a program/services audit of five communities that are similar to the COA and handle waste using similar methods. The 2014 and 2016 Energy Recovery Council (ERC) Directory of Waste-To-Energy Facilities was reviewed to determine facilities and communities with similar characteristics. Mass burn facilities are more common than the COA's RDF system. Of the 77 facilities listed in the 2016 edition, 60 are mass burn, 4 are modular, and 13 are RDF. Population was considered from there, looking for a community that was in the range of the Story County 2016 population of 97,502 people. Reviewing the populations served by the RDF facilities, 11 of them were 400,000 people or greater, with the majority over 1 million people. The next closest to COA was the Xcel Energy French Island Generating Station in La Crosse, Wisconsin. Therefore, Xcel was added to the list of 5 communities. The others selected (including Xcel) are listed in Table 8. Initial review did look for a similar student/permanent resident population as seen in Ames with the ISU student mix; however, upon review, there was not a comparable facility/community.

Table 8 Community Audit Selection*

Facility	State	Technology	Population Served
1) Pope/Douglas Waste-to-Energy Facility (Alexandria)	Minnesota	Mass Burn	42,000
2) Red Wing Resource Recovery Facility (Red Wing)	Minnesota	Modular	44,000
3) Perham Resource Recovery Facility (Perham)	Minnesota	Mass Burn	75,000
4) Susquehanna Resource Management Complex (Harrisburg)	Pennsylvania	Mass Burn	100,000
5) Xcel Energy French Island Generating Station (LaCrosse)	Wisconsin	RDF (co-fired with coal)	250,000

*Information obtained from the 2014 and 2016 ERC Directory of Waste-To-Energy Facilities

Internet research was conducted and phone calls were made to each facility with information assembled where available/provided. Key findings, including an assessment of programs, services, and educational outreach offered in communities of similar size and demographics to COA and Story County, related to waste management, diversion options and RDF processing systems for materials not suitable for RRP, are summarized below.

Pope/Douglas Waste-to-Energy Facility

- The Minnesota Pollution Control Authority requires a waste characterization to be completed every five years for their air permits.

- Pope/Douglas Solid Waste Management (PDSWM) does not accept C&D materials or glass from doors, glassware/dishes, mirrors, or windows, among other items.
- In 2016, PDSWM received a Greater Minnesota Recycling Grant to establish an organics recycling program in both partner counties (Pope and Douglas). Per the January 2018 Minnesota Report on 2016 Governor's Select Committee on Recycling and Environment (SCORE) Programs, the grant project has established organics recycling programs at over 15 schools and utilizes recycling stations. PDSWM has also purchased a rear-load garbage truck that is dedicated to organics collection, which is operated under contract by a local hauler. These programs have been so successful that PDSWM is working towards constructing an organics processing facility that will serve PDWSM as well as the surrounding area.
- PDSWM began an organics recycling drop site on July 2, 2018. Organics drop off is available Monday – Friday from 8-5 and Saturday from 9-2 at the Pope/Douglas Solid Waste Recycling Center. They are looking to expand to additional communities as people indicate interest. Organics are taken to Tri-County Organics composting facility near St. Cloud as PDSWM is exploring development of an organics composting site that is closer to reduce cost.
- Two towns (Osakis and Glenwood) are beginning "free" curbside organics recycling programs as of July 1 and August 1, 2018, respectively. This program is being funded through SCORE funds.
- Per the January 2018 Minnesota Report on 2016 SCORE Programs, PDSWM is also working on developing updated waste and recycling ordinances to mandate commercial single sort recycling.

Red Wing Resource Recovery Facility

- The City of Red Wing Resource Recovery Facility (RRF) had a fire at the MRF on June 7, 2017. They were in the process of rebuilding/repairing and making several modifications. They will have a dirty (collecting/sorting all incoming solid wastes) and a clean (collecting/sorting already source separated recyclable comingled materials) MRF when completed.
- The City of Red Wing RRF stated that their 2013 Doppstadt 3060D was their most valuable piece of equipment. It has a simple design with a simple single shaft. They lost it in the fire and the manufacturer had a new one on site in three days.
- City of Red Wing RRF does mattress recycling on site. They use an angle grinder to go around the perimeter. They take the springs to the metal recycle pile and the rest to shred for RDF. This takes them approximately five minutes per mattress and brings in the tip fee for disposal and income from the metal.
- City of Red Wing has curbside recycling in addition to drop off at the Solid Waste Campus. They market some of the materials and some are shipped to the Twin Cities.
- A company out of Germany has set up a process at the Red Wing Xcel ash landfill to recover ferrous, non-ferrous, and precious metals from the ash. Initial estimates are 4-6% metals recovery out of the approximately 55 tons of ash generated per year (4,400 – 6,600 pounds of metal).

Perham Resource Recovery Facility

- The Perham Resource Recovery Facility has been in operation since 1986, supplying steam to Tuffy's Pet Foods and Land O'Lakes. The company running the facility closed the doors in July 1998 due to being unable to meet the permit requirements for the air emissions. The original owners then donated the facility to the City of Perham in December 1998 and the City of Perham, Otter Tail County, and three additional surrounding counties (Becker, Todd, and Wadena) applied for state grant funding to complete the necessary upgrades to reopen the facility. The reopened facility has been operating since 2002. Clay County later began using the facility.
- Nearby Tuffy's Pet Foods and Bongard's Creameries currently purchase the steam as an energy source.
- Improvements were again completed in 2013/2014, increasing the facility by 68,000 square feet, updating the air emissions equipment, adding a material recovery facility, a new tipping floor, updates to the building, new office spaces, re-done control room, observation deck for classroom and community tours, conference room, and a break room. This work was expected to increase steam generation from 25 pounds per hour to 50 pounds per hour, allowing the facility to meet 90 percent of the steam demand rather than only 60 percent.
- Facility receives on average 170 tons per day and 62,000 tons per year.
- The purpose of the MRF is not to replace a recycling program; rather to remove items that affect air quality or are abrasive on equipment.
- Incoming material is first sorted in the MRF prior to it going to the WTE facility. This gives them the opportunity to remove items that do not burn well and are recyclable. However, this process is only for cleaning up the material to be burned and the facility is not considered a recycling center. Each of the five counties have a recycling program and a recycling coordinator.
- Six personnel are utilized on the sort line to remove bulky items, old corrugated cardboard (OCC), metal, and electronics. Remaining material then goes through the trommel where knives open the bags and material is sorted based on size. An eddy current is used to sort aluminum. This, in combination with all material going under two magnets, limits the amount of metal that passes through the system.
- Paper, plastic, and other burnable items are then routed back to the tip floor where it is fed in to one of two chutes for burning at 1,800 degrees F. This process reduces incoming volume by 80%.
- Over 1,500 tons of recyclable material is pulled each year.

Susquehanna Resource Management Complex

- Susquehanna Resource Management Complex (SRMC) is permitted to take up to 985 tons per day on an average annual basis. Approximately 44% of the material is recycled prior to coming to the facility. Over 8,000 tons of metals are recovered through the process per year. The SMRC processes approximately 290,000 tons per year, 62% of which is from Dauphin County. Approximately 30% of the total processed is landfilled as ash.

- Modifications have not been made to the SRMC as it is the oldest system in the United States and most problems are unique to the facility. In terms of the most valuable piece of equipment, cranes and storage capacity are undersized so any downtime can cause significant disruption in overall services.

Xcel Energy French Island Generating Station

- The La Crosse County Landfill and Xcel Energy French Island Generating Station are somewhat similar to Ames in that they both process MSW to make RDF. However, French Island uses a much different design of combustion by utilizing a fluidized bed boiler versus a pulverized coal boiler, in addition to co-combusting with waste wood and railroad ties.
- The La Crosse County Landfill has a contract with Xcel to deliver 73,000 tons per year for RDF generation. Xcel's goal is to have a targeted burn rate of 50/50 (waste to wood).
- According to Jadd Stilwell, La Crosse County Landfill Deputy Director, all residential waste is diverted to Xcel (73,000 tons/year) versus MSW direct, C&D, and special wastes (approximately 70,000 tons per year) which is received at the La Crosse County Landfill.
- Xcel does not accept, or removes from the waste stream, bulky items over 4 feet long or over 100 pounds. They also do not accept items unable to be processed such as industrial type rolls of plastic, large quantities of magnetic tape, shrink wrap used to wrap pallets, and green baling strap.
- Materials that are most problematic for Xcel include large silage tarps, carpet, magnetic tape, and large quantities of plastics delivered at one time.
- Xcel reported that in 2017 of the 73,713 tons of acceptable waste received, 54,811 tons were turned in to RDF, 1,498 tons were recycled metal and 17,403 tons were residues that were landfilled. Hauler and community education on acceptable materials, in addition to identifying the hauler delivering unacceptable materials, are the greatest challenges.
- Xcel noted that the only piece of equipment change that may have improved RDF quality was the install of their eddy current system, which helped remove aluminum which can cause issues in their fluidized bed boilers.
- The most valuable piece of equipment for Xcel is the shredder, which gives them the proper fuel size by being ground through sized grates. Next in line is the proper operation of their sizing screen as the sizing screen spacing is important to ensure proper size fuel goes to storage.

6.0 RECOMMENDATIONS

A significant amount of information has been assembled to complete this report. In addition to evaluating the effect of removal of several items currently being processed through the RRP, existing and potential avenues for further diversion or recycling options have been discussed. The business community involved with generating the targeted diversion materials has been surveyed, results of residential surveys completed throughout Story County were reviewed, and five representative communities have been looked at to determine other approaches to materials management, diversion, and recycling for similar areas with WTE plants. With consideration of the EPA Waste Hierarchy for the methods the COA could utilize throughout Story County to minimize landfilling, several key recommendations have stood out, as discussed in Section 6.1 below.

6.1 OPPORTUNITIES FOR ENHANCEMENT

The recommendations made here are opportunities to expand on the success of the program that is currently in place. Discussions with the Waste Diversion Enhancement and Recommendation Team have highlighted the pride team members have in the COA and its programs – and the desire to have improvement where possible. Discussions with members of the business community – as both business members and residents – has reinforced that community pride and desire to help the environment where economically feasible and reasonable to do so. There are a number of recommendations provided herein with varying degrees of effect from a volume standpoint (i.e. diversion from the RRP) as well as a wide range of costs to implement. Therefore, as these recommendations are considered, COA and RRP staff will need to further evaluate and prioritize recommendations to be implemented moving forward.

6.1.1 Mechanical Changes to the Processing System

One of the issues noted are the amount of rejects that are generated through the RDF process. As the RRP staff have noted and as visually observed on-site, a significant portion of the rejects is not only suitable but also desirable material for the creation of RDF. In the current process the challenge is that the material gets clumped together and comes out as rejects. In order to understand the value associated with sending desirable material to the landfill, the table in **Appendix D** was generated. This table evaluates the cost savings potential from decreasing the rejects currently generated. This table looks at historical total tonnage and reject amounts from 2002 through 2016, in addition to providing a historic average and an average over the last five years. Of note is that included in the loss from rejects generation is the loss of revenue paid to the RRP by the Ames Municipal Electric System (AMES) for the RDF. For the purpose of this analysis, the Landfill Tip Fee, Haul Fee, and RDF Income have been assumed constant at the 2018 rates. The table allows for adjusting the percent of rejects diverted with the additional processing. A conservative number of 35% is currently in the table. Under this scenario, with a 35% bump in rejects processed rather than landfilled, over the last five years an average annual cost recovered is $502,939 with a remaining disposal cost of $934,029. Several other percent

diverted scenarios are shown in Table 9 (below) based on the five-year average numbers. This provides a high level understanding of the value gained by reducing the amount of rejects handled through landfilling.

Table 9 Reject Reduction Scenarios				
Percent Reduction of Rejects				
Variables	25%	35%	55%	75%
Total Tonnage (tons)	53,913	53,913	53,913	53,913
Reject Totals (tons)	16,589	16,589	16,589	16,589
% Rejects	31%	31%	31%	31%
Landfill Tip Fee (per ton)*	$ 48.00	$ 48.00	$ 48.00	$ 48.00
Haul Fee (per ton)*	$ 13.66	$ 13.66	$ 13.66	$ 13.66
RDF Income (per ton)*	$ 25.00	$ 25.00	$ 25.00	$ 25.00
Annual Expense	$ 1,022,234	$ 1,022,234	$ 1,022,234	$ 1,022,234
Lost RDF Sale Income	$ 414,733	$ 414,733	$ 414,733	$ 414,733
Net Annual Cost to Landfilling Rejects	$ 1,437,631	$ 1,437,631	$ 1,437,631	$ 1,437,631
Percent Diverted with Addt'l Processing	25%	35%	55%	75%
Annual Cost Recovered	$ 359,408	$ 503,171	$ 790,697	$ 1,078,223
Remaining Disposal Cost	$ 1,078,223	$ 934,460	$ 646,934	$ 359,408

In order to address the rejects, there are three potential solutions briefly provided. Least expensive and most easily implemented is to add additional air knife recovery systems to the current process. The addition of air knife recovery systems at multiple points through the process would allow for additional RDF to be sent to the AMES power plant and would divert material from the Boone County Landfill. This could be implemented for a cost between $30,000 to $40,000.

A mid-range solution would be to add an optical scanner and disc spreader to the system. In looking at a mid-range solution, SCS obtained a sample of the reject material and consulted with the CP Group to determine a viable solution to the quantity of rejects. The CP Group has proposed a high speed accelerator spreader conveyor and optical sorter that picks plastic and paper. The unit's conveyor is 112 inches wide in order to reduce the burden depth to a manageable one inch height. Fitting the unit into the plant could be a challenge and needs to be confirmed early on to assess the best position and modifications. A drawing SCS created of a typical optical scanner is below (Figure 3) in addition to a 3-D version (Figure 4). CP Group is also potentially recommending a disc spreader (Figure 5). Once the target materials are ejected they fall into either temporary storage containers or could be managed with take-away conveyors. The key there is to have vertical clearance for the containers. The disc spreader is typically used if the target materials are moist and clumped together, as experienced in the RRP.

The discs fling the materials across the belt liberating them from clumps and facilitating better removal efficiency.

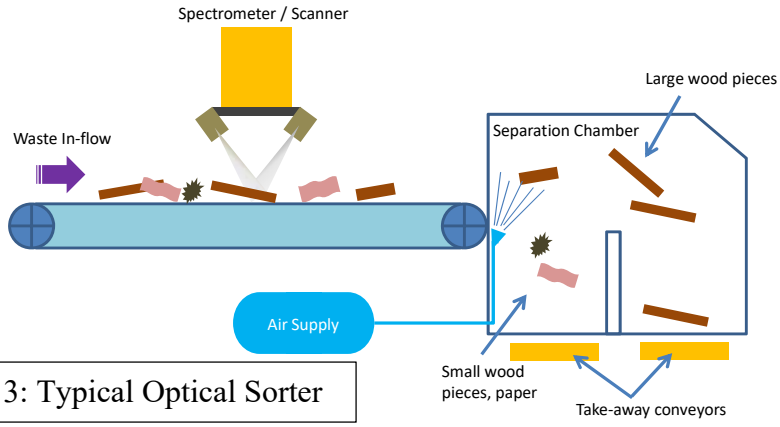


Figure 3: Typical Optical Sorter

Figure 4: 3-D Typical Optical Sorter

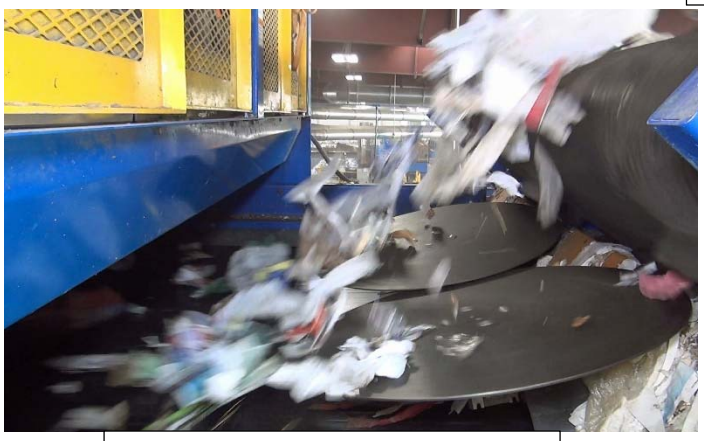


Figure 5: Disc Spreader

This equipment would both reduce the clumps of material and sort additional plastic and paper, allowing for an increase in RDF sent to the AMES power plant and a decrease in the material sent to the Boone County Landfill. Prior to implementing the optical scanner and disc spreader, further review would need to be completed to ensure the equipment will physically fit in to the RRP process. The unit cost is approximately $350,000 (including the disc spreader) and the installed cost in a retrofit situation could run from approximately $700,000 to $1.1

million. Based on the projected savings from removing this material, it appears the unit could pay for itself in less than two years, even at a relatively low (conservative) 35% removal efficiency. Based on the potential reduction of rejects and additional desirable RDF material, consideration should be given to further evaluating the feasibility of integrating this equipment in to the RRP system.

The high-level solution would be to completely remodel or construct a new combustion system that would be able to combust more of the waste stream, i.e. going to a mass burn facility. This is by far the most expensive option, and affects not only the RRP process but also the AMES power plant. This would allow a portion of the material that is currently not suitable for the RRP to be utilized for power generation. This option requires input from multiple entities and a separate in-depth feasibility study.

6.1.2 Education/Outreach Materials

Both the COA and ISU have a strong belief in the RRP and sustainability system in Ames and Story County. Through websites and flyers this information is available to the public. Because Ames is a college town with a revolving population, education is an ongoing process. Residents and students alike are coming from other towns/cities, both within Iowa and out, that have different recycling systems. It is critical that a clear, simple message be made often. There are recycling programs in place in Ames and throughout Story County, it just may not look like the program in other areas. Combining this with one joint message between ISU and the COA would be beneficial so whether one is a student in ISU housing or a student or resident in residential housing the message is consistent and located in the same place. ISU developed a Pay It Forward Database, with a prototype of the online interactive database being developed. Material included in the database is seen in the spreadsheet in **Appendix E**. The intent is to provide an easy source for students and residents to determine where unwanted/no longer needed materials that may have a beneficial reuse could be diverted. Through collaboration with the COA, placing this information within the same single reference location for Story County and maintaining it will provide a reliable resource for the community to use. Use of flyers, radio ads, etc. that drive traffic to one location (community webpage) makes it realistic to continually update/maintain the site.

6.1.3 Business Recycling

Based on the completed surveys and phone calls made to businesses within the Story County area, businesses, in general, do have a desire to recycle with 51% of respondents saying that they will always recycle and 48% saying that it was somewhat important, depending on cost. The fee for recycling does come in to play as 34% of respondents were not willing to pay additional money to recycle, while 45% were willing to pay an additional 1-5% in fees and 21% were willing to pay in the 5-20% additional fee range. Due to the varied nature of wastes that businesses generate, a one-size fits all solution does not necessarily fit. A concentrated effort by the COA to provide assistance to businesses indicating an interest in beginning or increasing their recycling efforts but needing a knowledgeable resource would be beneficial. There are

already resources in place for this – the COA's EcoSmart programs, Smart Business Challenge, and the IDNR's Iowa Waste Exchange (IWE). Through the COA Smart Business Challenge, participating businesses can work with COA and RRP staff to reduce their waste stream. Several businesses have taken advantage of this program. The IDNR through the IWE has also been a long-time provider of this service – and at no cost to the COA or the business itself. Shelly Codner is the Area 2 representative, covering all of Story County. In conversation with her, she would work with the COA to ensure the COA's message is distributed and could collaborate with the COA to develop a focused set of businesses to begin with.

6.1.4 Last Chance Re-Use Center

The north side of the tip floor at the Resource Recovery Plant is currently the drive-through for the non-commercial haulers utilizing the RRP. RRP staff refer to this traffic as the "carline." Cars or pickup trucks, typically, drive through this area where they can drop off American flags and sharps for proper disposal, appliances, batteries, used oil, and the unwanted materials (garbage) that they have. A number of the materials deposited in the last category (garbage) could have value for either reuse or recycling. Those materials are also ones that are not beneficial to the RRP and, in fact, cost the RRP to have them hauled to Boone County Landfill. While there is not space in the facility as it sits at this point, it is recommended to provide a drive through building as close to the current RRP as possible (for easy of staffing, shared resources, etc.) where residents and potentially small haulers can sort the material they are bringing in that still has life for beneficial reuse or recycling. Furniture, mattresses, carpet, textiles, undesirable other (ceramic pots and plates, shoes, etc.), metal, and glass could all be sorted and only the actual MSW would be disposed of and processed into RDF. Once materials are dropped off, partnerships with secondhand stores could be utilized to have the items, acceptable for reuse picked up. This could be coordinated with more than one store so if one is at capacity or not accepting donations, there are others to work with. These items would include furniture, textiles, and usable undesirable other (shoes, plastic picture frames, porcelain, ceramic tiles, clay pots, etc.). The handling of mattresses is discussed in the next section. Glass handling would continue with Ripple Glass out of Missouri. As previously mentioned, due to the space, equipment, and time limitations the RRP staff are not able to remove all metal prior to going through the RDF process. Once metal is sent through the resource recovery process it has a lower value due to contamination. With a last chance drop off facility, a greater portion of metal could be diverted and sold by RRP for a higher value. The size of this facility should allow room to be flexible to add materials as markets change. Among materials that have found value at other sites either in Iowa or across the country are clean asphalt shingles, carpet/padding, and clean wood waste. It must be understood

that these markets can be driven by a number of factors and the demand for materials can change so flexibility is key. When there is a demand for materials, if the RRP has the ability to manage them separately, there are multiple benefits, including the RRP receiving the tip fee, that otherwise goes to the landfill, contractors do not have to haul to the west side of Boone, a beneficial use material is kept out of the landfill, and there could potentially be income for selling the end product.

6.1.5 Mattress Recycling

Mattresses are not beneficial at the RRP and are hauled to the Boone County Landfill at the expense of RRP staff time and hauling and disposal costs. There is currently not a valid mattress recycling option to be found in Iowa. Surrounding states do have a variety of programs, some open to accepting additional material and some already at capacity. Ultimately it would be beneficial to have a mattress recycling facility located in Central Iowa for the RRP service area to utilize. Until/unless that happens, the RRP would have the ability to ship mattresses to 7 Rivers Recycling, LLC in La Crosse, Wisconsin. A trailer could be stationed at the previously mentioned last chance recycle center to collect mattresses from businesses and residents. As previously mentioned, a total of 185-190 mattresses could fit in the trailer, but to be conservative a total of 175 mattresses per trailer should be assumed. The normal price for mattresses is $13.50/mattress. However, with a bulk quantity it drops to $12.50/mattress. Transportation costs can be highly variable. At the time it was discussed, Brian Tippets, part owner of 7 Rivers Recycling, LLC, was seeing a cost of $1.64/mile round trip. It is approximately 500 miles round trip. Mattresses would need to be accepted and hauled on a frequency that would keep them from being soiled, wet, infested, crushed, etc. The pricing structure for receiving the mattresses should be reviewed if this is implemented as the cost for transportation and disposal per mattress would be approximately $18.25 at $2.00/mile round trip with 175 mattresses on a trailer at $12.50 per mattress.

6.1.6 Expand Glass Collection Points

Based on the 2016 waste sort data provided by the RRP staff, approximately 1% of the incoming material by weight is glass, or 433 tons per year. While that does not sound like much, it is a material that should be relatively easy to reduce in the waste stream. And at a population base of 97,502 people, that is approximately nine pounds of glass per person per year that is thrown away. Iowa is a deposit law state, which means that certain glass containers have deposit charge on them when they are sold and the consumer can be refunded that

deposit when they are returned. The $0.05 deposit, while not always effective, does aid the increase of glass returned. Remaining glass with the exception of window glass, mirrors, and cookware can be placed in the yellow bins found around town. While there are currently yellow bins at a number of locations throughout towns in Story County (multiple throughout Ames, one each in Huxley, Nevada, Story City, Slater, and Maxwell), and those residents subscribing to curbside recycling can recycle glass in their carts, it would be beneficial to increase access whether through additional yellow bins and/or exploring options with multi-family dwellings.

6.1.7 Community-Driven Diversion

The COA and its service area are different and unique. A diversion program in Story County is not going to look the same as other service areas in Iowa. Many items typically recycled in curbside or drop-off collection such as papers and plastics are positive materials for the COA electricity generation process. In addition, several items with high specific energy – wood, organics, bulky items, and textiles – are just not compatible in the RRP/AMES process. Many residents – 74% of the respondents of the community survey – indicate that they are interested in additional recycling/diversion. Therefore, it is recommended to reinvigorate the local message and provide/enhance collection or drop-off locations for organics, bulky items, glass, metals, textiles, and undesirable other materials. Community-driven diversion should look to include multi-family unit housing, even if it is started on a pilot project basis to develop the best method for success. Taking this approach provides beneficial recycling/diversion that fits the parameters for the facilities in Story County rather than simply doing "feel-good" recycling. The materials that would be targeted for diversion cause issues with the RRP/AMES and add cost to transport and dispose of at the Boone County Landfill. A vital component to community-driven diversion is the educational messaging to ensure support of the COA and Story County waste reduction and diversion goals.

6.1.8 Complete Pilot Project for Food Waste Collection from Restaurants

Yard waste is prohibited by state law at the COA Resource Recovery Plant. While small amounts may show up, the majority of organics in the waste stream will be food wastes. Based on the commercial population of Ames, a majority of food wastes likely come from the restaurant sector. In an ideal situation, perhaps, all compostable material from restaurants would be collected separately and composted, saving the RRP from the unwanted organic waste and in turn generating a product to assist with new plant growth (compost). However, there are several challenges that would benefit from being worked through prior to even contemplating going that route. If these challenges could be worked through with a smaller subset of representative businesses, the local groups such as the Campustown Action Association, Ames Downtown, and the South Duff group of businesses could, through their networking events, share the positive outcomes and lessons learned from implementing organics collections. Therefore, it is recommended that a pilot project for compostable material collection be developed and implemented using 15-20 businesses from at least Main Street, Welch Avenue, and South Duff.

It should be noted that it is likely that in order to achieve a high level of participation of such a program in the future, regulations or mandates could be needed although 99% of the business survey respondents, when asked how important recycling and diversion is to them, responded it was either very important and they would always recycle or that it was somewhat important, depending on cost..

6.1.9 Offer Food Waste Collection from Residents

Yard waste is prohibited at the COA Resource Recovery Plant. While small amounts may show up, the majority of organics in the waste stream will be food wastes. There are several communities throughout Iowa including the City of Iowa City and the City of Dubuque who have begun curbside food waste collection through a residential program. There are also several cities in the Pope/Douglas Solid Waste Management Area (northwest of Minneapolis) who began organics curbside collection in summer 2018 in addition to having a drop-off site at the Pope/Douglas Solid Waste Management Complex. It should be explored with current compost facilities to expand the yard waste collection to allow for food waste to be added. Based on the current yard waste acceptance facilities it needs to be noted that not all facilities are equipped to handle food waste. It could also be discussed with a vendor to allow for food waste drop-off at a specific location(s) in town for residents to use.

6.1.10 Evaluate Anaerobic Digestion in Conjunction with the Wastewater Treatment Plant

Anaerobic digestion is a potential solution to managing a portion of the organics that requires a separate feasibility study to determine quantities and types of feedstock needed and available, location, partnerships, and other details to ensure a cost-effective organics management system.

6.1.11 Continue Rummage RAMPage

The COA and ISU have done a phenomenal job with initiating and expanding on Rummage RAMPage. This program has had tremendous success in removing a large seasonal tonnage from the waste stream, providing an excellent publicity event for the COA, and furnishing Ames students and residents with an economical option for purchasing furniture and housewares. This also provides an opportunity to donate items to community thrift stores, the library, and food banks. The event has grown from its inception in 2016 to more than tripling revenues and more than doubling the tonnage diverted from the landfill in 2018. Supporting staff and organizations should be given acclaims for their efforts here and the program should continue with an open mind as to ways to expand it each year.

6.1.12 Support Food Rescue Programs

Food rescue provides a double benefit – feeding the hungry and keeping organic material out of the RRP. Based on information obtained, it seems that there is room to expand this program with ISU Dining and other catering programs within the service area. Several obstacles seem to come up repeatedly; namely, liability, required short time-frames for pickup, and availability of

containers. Based on the work of the Iowa Food Waste Stakeholder Group and area food recovery groups, there is a strong network of organizations and individuals interested in furthering this effort. To assist in addressing these obstacles, the following steps can be completed:

- Support the efforts of ISU Dining and other caterers willing to provide leftover edible food to local groups in need.
- Work with the Iowa Department of Inspections & Appeals, ISU Extension and Outreach, and the Iowa Restaurant Association to develop firm guidelines for caterers and restaurants to follow in order to donate leftover food with a comfort level that by staying in those guidelines they will not have liability.
- Support the coordination of a service-area wide application such as Chow Bank to facilitate the communication needed to match donors with those in need of prepared food.
- Provide support for food rescue organizations through availability of funds for food transport containers. This could be through considering funding purchase of containers if requested through the City of Ames Fall Grant Program.

It is recognized that there are a number of recommendations presented herein. Again, it is commendable to both the COA and ISU for both the use of an unwanted resource – garbage – in generating a valued commodity in electricity and the number of initiatives that are already present. The recommendations presented herein are potential tools to specifically address the items identified as either unsuitable, unacceptable, or not beneficial to the production of refuse derived fuel.

7.0 SUMMARY AND NEXT STEPS

The COA has a long history of beneficially using waste generated within the service area as a source of fuel to create electricity for Ames residents. In fact, this was the first municipally-owned and operated plant of its kind when it came online in 1975 and remains a point of pride and unique attribute of the COA / ISU community. Supporting this effort in the COA and Story County are a number of great programs and opportunities for managing resources. As is in many cases, there are opportunities to expand on and develop new programs. A methodical approach to new programs to ensure success is critical, especially with potential programs such as the business organics recycling recommendation. Feedback from surveys and phone calls was quite favorable to expanding programs available; resources (or lack thereof) being a key deterrent, whether the resources be knowledge, programs, economics, or manpower. Reviewing the materials for diversion (organic, bulky, textiles, undesirable other, metals, grit, and glass), Table 10 below shows the materials the recommended programs have the potential to affect.

Table 10
Recommendation Effects Summary

Material	Organic	Bulky	Textiles	Undesirable Other	Metals	Grit	Glass
Goal Tonnage Diversion (tons)	4,647	1,414	1,060	766	249	249	249
#1 Mechanical Changes						X(Rejects)	
#2 Education/Outreach	X	X	X	X	X	X	X
#3 Business Recycling	X	X	X	X	X	X	X
#4 Last Chance Re-Use Center	X	X	X	X	X	X	X
#5 Mattress Recycling		X					
#6 Expand Glass Collection Points							X
#7 Community-Driven Diversion	X	X	X	X	X	X	X
#8 Pilot Project Restaurant Food Waste Collection	X						
#9 Food Waste Collection from Residents	X						
#10 AD in Conjunction with WWTP	X						
#11 Continue Rummage RAMPage	X	X	X	X	X	X	X
#12 Support Food Rescue Programs	X						

Note: #8, #9, #10 and #12 also will contribute to lowering the amount of rejects generated as these recommendations will remove material from the waste stream that causes the contamination to waste that puts it in the reject category. This will also provide an overall cleaner more beneficial fuel.

SCS has experience in further evaluating and implementing recycling programs. We offer our support with implementing recommendations based on the priority determined by the COA and

RRP. Based on our evaluation of the current system and direction for future programs, we would offer the following suggestions for next steps.

1) Further evaluate the feasibility of the recommended mechanical changes to the system. For the period from 2002 through 2016 there was an average of 15,650 tons of rejects generated. A decent portion of this material provides good Btu value, along with the revenue generated ($25/ton) from the sale of the RDF. In addition, any rejects handled currently cost the RRP $60/ton for hauling and disposal.
2) Evaluate the potential location, layout, and cost (capital and operation/maintenance) of a Last Chance Re-Use Center. The current RRP facility does not allow the space for enhancing reuse/recycling programs and does not allow for fluctuation as markets change. Having the space and the facility allows potential for impact in the seven target areas.
3) Explore the potential for a mattress and/or carpet recycling program. This could either simply be a collection and shipment program (with consideration of available space) or for mattresses could expand in to a service RRP staff complete themselves. Should the former be the case, current manpower levels would need to be included in the evaluation.
4) Work with select businesses (restaurants) to develop a pilot organics collection program.
5) Evaluate the current COA driven recycling/diversion programs and determine if changes could be made to the system to benefit the RRP and meet the desire of the residents/community to recycle.

APPENDIX A

RRP Material Handling Effect Model

Arnold P. Chantland Resource Recovery Plant
City of Ames
Waste Variation Model

Instructions for using this model:

-Cells shaded in green are user input.
-Cells shaded in light green are tied to user input.

Baseline Model

Material	June 13, 2016 Waste Sort [1]		Waste Contributing to RDF (%) [1]	Materials Contributing to RDF (lbs) [2]	Recalculated Waste Distribution (%)	Moisture Content (%) [3]	Dry Weight (lbs)	Average Heat Value (Btu/lb Dry Weight) [4]	Total Energy Content (Btu)	Specific Energy Content (Btu/lb)	Ash % Dry Weight [5]	Ash Generated (lbs)
	Sample Weight (lbs)	Sample Composition (%)										
Paper	359.6	22%	98%	352.4	42%	6%	331.3	7,571	2,507,996	7,117	6.0%	20
Plastic	262.3	16%	98%	257.1	31%	2%	251.9	14,390	3,625,027	14,102	10.0%	25
Wood	197.4	12%	10%	19.7	2%	20%	15.8	8,316	131,326	6,653	1.5%	0
C&D	80.1	5%	7%	5.6	1%	6%	5.3	1,500	7,906	1,410	10.0%	1
Organic	254.2	16%	15%	38.1	5%	70%	11.4	5,983	68,440	1,795	5.0%	1
Bulky	120.0	7%	65%	78.0	9%	15%	66.3	8,600	570,180	7,310	2.0%	1
Glass	16.0	1%	1%	0.2	0%	2%	0.2	86	13	84	98.9%	0
Metals	92.4	6%	1%	0.9	0%	3%	0.9	0	0	0	90.5%	1
Textiles	53.2	3%	40%	21.3	3%	10%	19.2	8,844	169,380	7,960	3.2%	1
Desirable Other	28.1	2%	98%	27.5	3%	15%	23.4	5,000	117,037	4,250	5.0%	1
Undesirable Other	70.5	4%	40%	28.2	3%	10%	25.4	200	5,076	180	75.0%	19
Grit	88.9	5%	5%	4.4	1%	8%	4.1	200	818	184	68.0%	3
Total	**1,622.7**	**100%**		**833.5**	**100%**				**7,203,199**	**8,642**		**72**

Assumptions:
(1) Provided by RRP staff.
(2) Percentage of accepted waste utilized for RDF production is 51% based on information provided by the RRP. Percent based on model is: 51%
(3) % Moisture Content values obtained from Table 4-1, page 70-71 of Integrated Solid Waste Management Engineering Principles and Management Issues. McGraw-Hill. 1993. Values were estimatec when exact value was not provided.
(4) Average Heat Value, Btu/lb Dry Weight obtained from Table 4-2, page 78-79 of Integrated Solid Waste Management Engineering Principles and Management Issues. McGraw-Hill. 1993. Values were estimated when exact value was not provided.
(5) Ash % Dry Weight obtained from Table 4-3, page 80 of Integrated Solid Waste Management Engineering Principles and Management Issues. McGraw-Hill. 1993. Values were estimated when exact value was not provided.

Model Output Highlights

Baseline

Specific Engergy Content:	8,642	Btu/lb
Incoming Waste Utilized for RDF:	51%	Incoming Waste

Waste Input Modification Model

Specific Engergy Content:	9,243	Btu/lb
Proposed Change to Input Materials:	-3,361	tons
Incoming Waste Utilized for RDF:	44%	Incoming Waste
Ash Generation:	1,614	lbs/year

Waste Input Modification Model

Total CY Annual Tonnage: 44,000 tons

Material	Distribution of Waste Materials (%)	Annual Estimated Material (tons)	Waste Contributing to RDF (%) [1]	Materials Contributing to RDF (tons) [2]	Change to Materials Contributing to RDF (tons)	Change to RDF Process Material (%)	Modified Material Contributing (tons)	Modified Material Contributing (lbs)	Recalculated Total Percent	% Moisture Content	Dry Weight (lbs)	Average Heat Value (Btu/lb Dry Weight) [4]	Total Energy Content (Btu)	Specific Energy Content (Btu/lb)
Paper	22%	9,751	98%	9,556	0	0	9,556	19,111,298	50%	6%	17,964,621	7,571	136,010,142,154	7,117
Plastic	16%	7,112	98%	6,970	0	0	6,970	13,940,194	36%	2%	13,661,390	14,390	196,587,396,841	14,102
Wood	12%	5,353	10%	535	0	0	535	1,070,512	3%	20%	856,410	8,316	7,121,902,962	6,653
C&D	5%	2,172	7%	152	0	0	152	304,071	1%	6%	285,827	1,500	428,740,100	1,410
Organic	16%	6,893	15%	1,034	-780	-75%	254	507,813	1%	70%	152,344	5,983	911,473,382	1,795
Bulky	7%	3,254	65%	2,115	-1,690	-80%	425	849,987	2%	15%	722,489	8,600	6,213,405,398	7,310
Glass	1%	434	1%	4	-3	-76%	1	2,077	0%	2%	2,035	86	175,041	84
Metals	6%	2,505	1%	25	-13	-50%	13	25,109	0%	3%	24,356	0	0	0
Textiles	3%	1,443	40%	577	-460	-80%	117	234,027	1%	10%	210,625	8,844	1,862,763,208	7,960
Desirable Other	2%	762	98%	747	0	0	747	1,493,402	4%	15%	1,269,392	5,000	6,346,960,005	4,250
Undesirable Other	4%	1,912	40%	765	-385	-50%	380	759,303	2%	10%	683,373	200	136,674,542	180
Grit	5%	2,411	5%	121	-30	-25%	91	181,055	0%	8%	166,571	200	33,314,126	184
Total	**100**	**44,000**		**22,600**	**-3,361**		**19,239**	**38,478,849**	**100%**				**355,652,947,759**	**9,243**

Assumptions:
(1) Provided by RRP staff.
(2) Percentage of accepted waste utilized for RDF production is 51% based on information provided by the RRP. Percent based on model is: 51%
Percentage of accepted waste utilized for RDF production with proposed materials modified is: 44%
(3) % Moisture Content values obtained from Table 4-1, page 70-71 of Integrated Solid Waste Management Engineering Principles and Management Issues. McGraw-Hill. 1993. Values were estimated when exact value was not provided.
(4) Average Heat Value, Btu/lb Dry Weight obtained from Table 4-2, page 78-79 of Integrated Solid Waste Management Engineering Principles and Management Issues. McGraw-Hill. 1993. Values were estimated when exact value was not provided.
(5) Ash % Dry Weight obtained from Table 4-3, page 80 of Integrated Solid Waste Management Engineering Principles and Management Issues. McGraw-Hill. 1993. Values were estimated when exact value was not provided.

Arnold P. Chantland Resource Recovery Plant
City of Ames
Waste Variation Model

Ash Generation Model

Material	Ash % Dry Weight [5]	Ash Generated (lbs)	Ash Generated (tons)
Paper	6.0%	1,077,877	538.9
Plastic	10.0%	1,366,139	683.1
Wood	1.5%	12,846	6.4
C&D	10.0%	28,583	14.3
Organic	5.0%	7,617	3.8
Bulky	2.0%	14,450	7.2
Glass	98.9%	2,013	1.0
Metals	90.5%	22,042	11.0
Textiles	3.2%	6,740	3.4
Desirable Other	5.0%	63,470	31.7
Undesirable Other	75.0%	512,530	256.3
Grit	68.0%	113,268	56.6
Total		**3,227,574**	**1,613.8**
			8.39%

Potential Material For Diversion

Total CY Annual Tonnage: **44,000** **tons**

Material	Material Not Processed For RDF (tons)	Material Targeted for Removal from RDF Process (tons)	Total Potential Material for Diversion (tons)	Targeted Materials for Diversion (%)	Targeted Materials for Diversion (tons)
Paper	195	0	195	0%	0
Plastic	142	0	142	0%	0
Wood	4,817	0	4,817	0%	0
C&D	2,020	0	2,020	0%	0
Organic	5,859	780	6,639	70%	4,647
Bulky	1,139	1,690	2,829	50%	1,414
Glass	430	3	433	50%	216
Metals	2,480	13	2,493	10%	249
Textiles	866	460	1,326	80%	1,060
Desirable Other	15	0	15	0%	0
Undesirable Other	1,147	385	1,532	50%	766
Grit	2,290	30	2,320	10%	232
Total	**21,400**	**3,361**	**24,761**		**8,586**

APPENDIX B

Business Survey Questionnaire

City of Ames Waste Diversion Enhancement Survey

Introduction

The City of Ames is conducting a study of the waste that is processed at the Resource Recovery Plant (RRP) in order to identify materials best suited for conversion to energy, and alternative outlets for materials that are unsuited for the RRP. Your feedback is important to the success of the City's management of our solid waste. This survey, which should take less than 5 minutes, will be a big help. Thank you!

Should you have any questions, please contact Bill Schmitt with the City of Ames at 515-239-5238.

1. Name of Business (Optional)

2. Address (Optional)

* 3. What kind of business do you own/manage?

- ◯ Agriculture
- ◯ Arts, Entertainment, & Recreation (golf courses, fitness centers, bowling alley, conference centers, etc.)
- ◯ Food and Beverage Stores (convenience stores)
- ◯ Grocery Stores
- ◯ Hospital / Medical Center
- ◯ Hotel/Motel
- ◯ Institution / School
- ◯ Other (please specify)
- ◯ Manufacturing – Food
- ◯ Manufacturing – All Other
- ◯ Multi-Family Dwelling (5 units or more)
- ◯ Restaurant / Bars
- ◯ Retail (all)
- ◯ Services – Professional, Technical and Financial
- ◯ Services – Auto body, repair, personal (barber, massage, etc.)

Food Scraps

* 4. Does your business generate food scraps? If so, how much do you generate per day?

- ◯ No
- ◯ Yes (less than 1 small bag a day)
- ◯ Yes (1 small bag a day)
- ◯ Other (please specify)
- ◯ Yes (1 large bag a day)
- ◯ Yes (more than 1 dumpster a day)
- ◯ Yes (unknown quantity)

Food Scraps

5. What do you do with your food scraps?

- ◯ Put in trash container
- ◯ Have garbage company pick up separately to compost
- ◯ Take home to backyard compost
- ◯ Take to compost facility
- ◯ Other (please specify)

Bulky Items

* 6. Does your business generate bulky items, such as mattresses, couches, appliances, furniture, etc.? If so, how often?

- ◯ No
- ◯ Yes (less than 1 item every year)
- ◯ Yes (1 item every 6 months)
- ◯ Yes (1 item every 3 months)
- ◯ Other (please specify)
- ◯ Yes (1 item per month)
- ◯ Yes (2 items per month)
- ◯ Yes (more than 2 items per month)
- ◯ Yes (not sure how many items)

Bulky Items

7. How do you dispose of bulky items?

- ◯ Put in trash container
- ◯ Have garbage company pick up separately from regular trash
- ◯ Take to a reuse location like Goodwill
- ◯ Other (please specify)

Textiles

* 8. Does your business generate textiles, such as clothing, fabric, or other such material? If so, how often?

- ◯ No
- ◯ Yes (less than 1 small bag a day)
- ◯ Yes (1 small bag a day)
- ◯ Other (please specify)
- ◯ Yes (1 large bag a day)
- ◯ Yes (more than 1 dumpster a day)
- ◯ Yes (not sure how much)

Textiles

9. How do you dispose of textile materials?

- [ ] Put in trash container
- [ ] Have a textile company pick up to recycle
- [ ] Take to a reuse location like Goodwill
- [ ] Other (please specify)

Undesirable Materials

* 10. Does your business generate shoes, soles of shoes, garden hoses, hard plastics, plastic picture frames, plates, porcelain, ceramic tiles, clay pots, etc.? If so, how often?

- ◯ No
- ◯ Yes (less than 1 small bag a day)
- ◯ Yes (1 small bag a day)
- ◯ Other (please specify)
- ◯ Yes (1 large bag a day)
- ◯ Yes (more than 1 dumpster a day)
- ◯ Yes (unsure how much)

Undesirable Materials

11. Which materials do you generate (mark all those that apply)?

- [ ] Shoes / soles of shoes
- [ ] Garden Hoses
- [ ] Hard Plastics
- [ ] Plastic Picture Frames
- [ ] Plates
- [ ] Porcelain or ceramic tiles
- [ ] Clay pots
- [ ] Other (please specify)

12. How do you dispose of these materials?

- [ ] Put in trash container
- [ ] Have a recycling company pick them up
- [ ] Take to a reuse location such as a thrift store
- [ ] Other (please specify)

Grit Material

* 13. Does your business generate “grit” type items, such as full vacuum cleaner bags, soil, or pots full of soil, etc.? If so, how often?

- ◯ No
- ◯ Yes (less than 1 small bag a day)
- ◯ Yes (1 small bag a day)
- ◯ Other (please specify)
- ◯ Yes (1 large bag a day)
- ◯ Yes (more than 1 dumpster a day)
- ◯ Yes (unsure how much)

Grit Material

14. How do you dispose of these materials?

- ◯ Put in trash container
- ◯ Have a recycling company pick them up
- ◯ Other (please specify)

Glass

* 15. Does your business generate glass such as food or beverage containers, windows, etc.? If so, how much do you generate a day?

- ◯ No
- ◯ Yes (less than 1 small bag a day)
- ◯ Yes (1 small bag a day)
- ◯ Other (please specify)
- ◯ Yes (1 large bag a day)
- ◯ Yes (more than 1 dumpster a day)
- ◯ Yes (not sure how much)

Glass

16. How do you dispose of or recycle your glass?

- [ ] Separate deposit glass for redemption
- [ ] Use the City provided yellow glass recycling containers placed by grocery stores and other locations
- [ ] Have a recycling company pick up glass
- [ ] Put in trash container
- [ ] Other (please specify)

Recycling Questions

* 17. How important is recycling and diversion to you?

- ◯ Very important, would always recycle
- ◯ Somewhat important, depends on cost
- ◯ Not important, would never recycle

Other (please specify)

* 18. What is the economic value of recycling and diversion to you – how much are you willing to pay?

- ◯ Not willing to pay any additional fees
- ◯ Willing to increase monthly billing by 1-5%
- ◯ Willing to increase monthly billing by 5-10%
- ◯ Willing to increase monthly billing by 10-15%
- ◯ Willing to increase monthly billing by 15-20%

Other (please specify)

* 19. Are you willing to make modifications to your operation and train employees to increase recycling and diversion (mark all those that apply)?

- ☐ Willing to provide initial training to employees
- ☐ Willing to provide on-going training to employees
- ☐ Willing to support an employee championing the efforts
- ☐ Willing to modify operations to have materials stored separately for collection
- ☐ Not willing to make any additional effort

If willing not to make additional effort, please explain why.

* 20. Would you be interested in learning more about methods to divert these materials (e.g. food scraps, bulky items, textiles, hard to recycle materials, grit, glass)?

- ◯ Yes
- ◯ No

21. Do you have any questions or comments?

22. If you would like to be contacted, please place your name and phone number below and a representative will call you.

End of Survey

Thank you for your feedback! Should you have any questions, please contact Bill Schmitt at 515-239-5238 or at bschmitt@city.ames.ia.us.

APPENDIX C

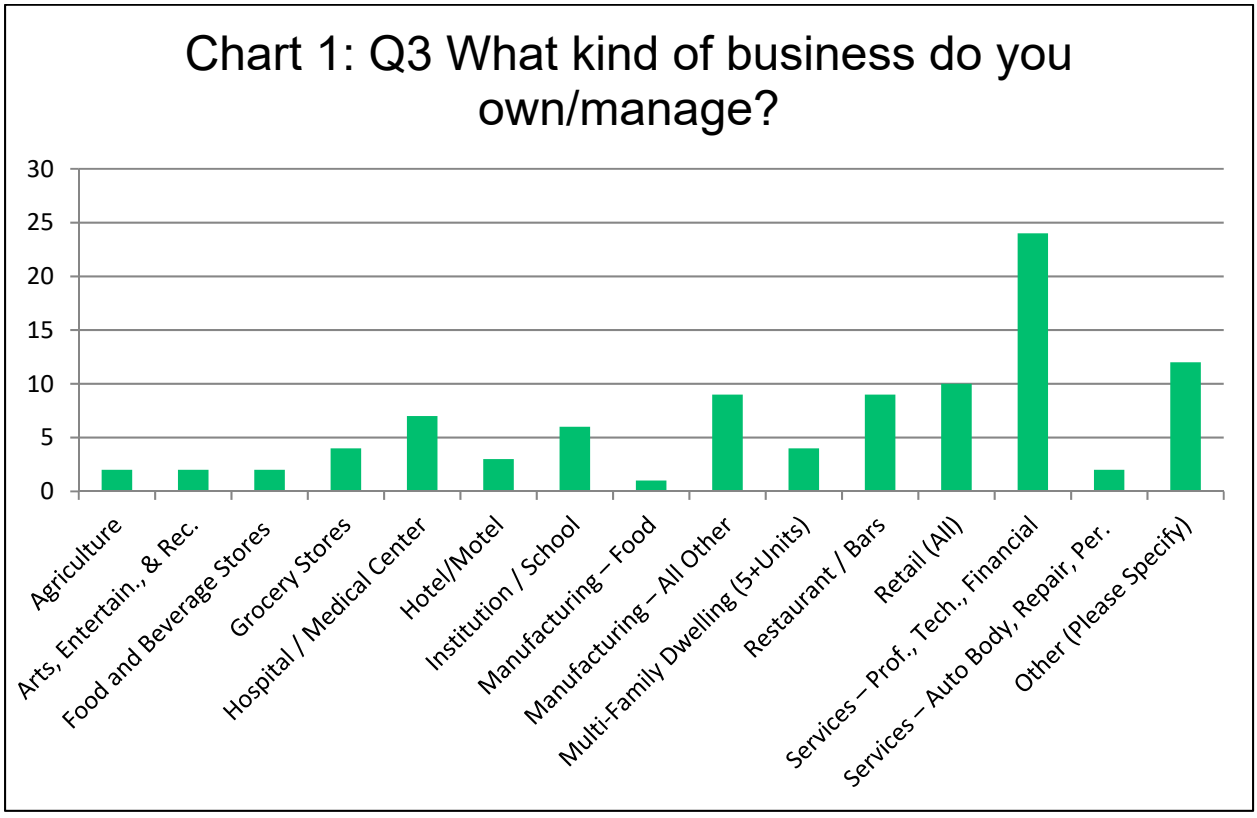
Summary of Business Survey Results

Appendix C Summary of Business Survey Results

The business survey results were compiled after the survey closed on February 13, 2018. There were 97 surveys initiated through SurveyMonkey™. Of those, 85 were qualified survey responses, including both completed and partially completed surveys. The 12 non-qualified responses included businesses not generating material in the target categories. The entire survey was open for 13 weeks, including through 3 major holidays. Following is a summary of responses provided by respondents.

General Questions 1 – 3

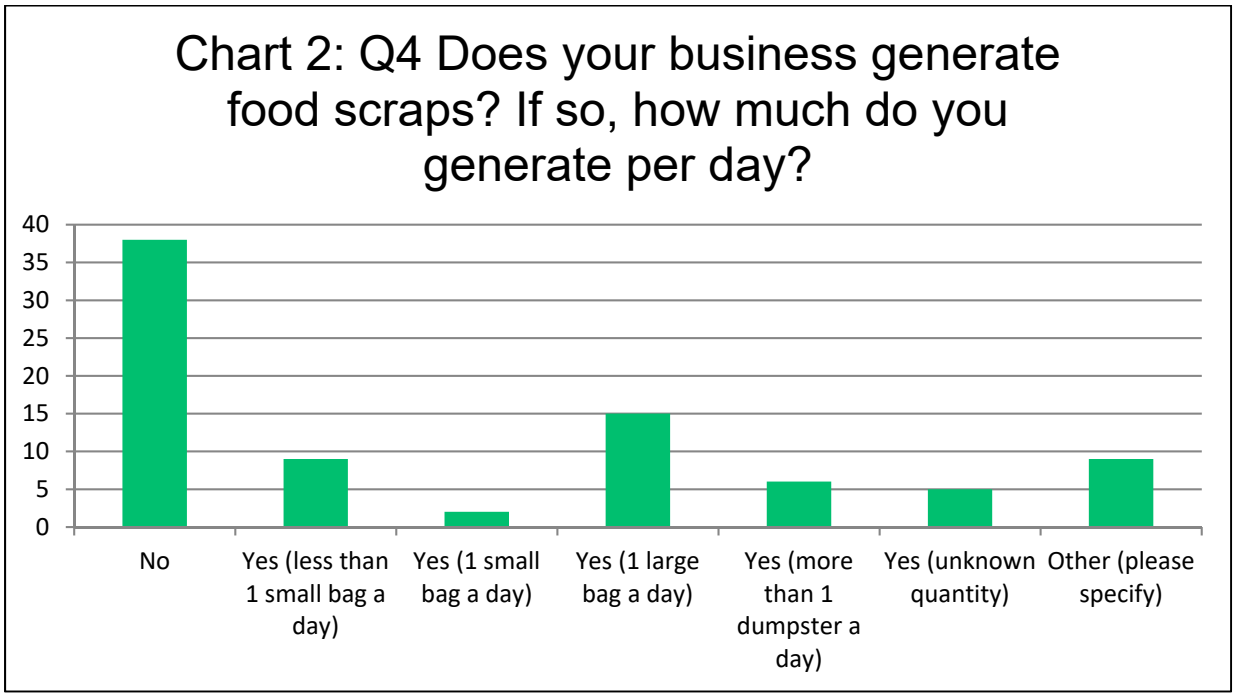
The first two questions of the survey were an option to provide the respondent's business name and address. A total of 61 respondents provided their business name, with 49 providing their address. The third question provided options on the type of business the respondent was associated with. The breakdown is provided in **Chart 1** below.



A total of 12 respondents were classified as "Other." Those businesses included construction (four), government (four), newspaper (one), non-profit (two), and daycare provider (one). These twelve respondents are not within the North American Industry Classification System (NAICS) codes that were of interest for this survey and are therefore not considered in the remaining analysis.

Food Scraps Questions 4 – 5

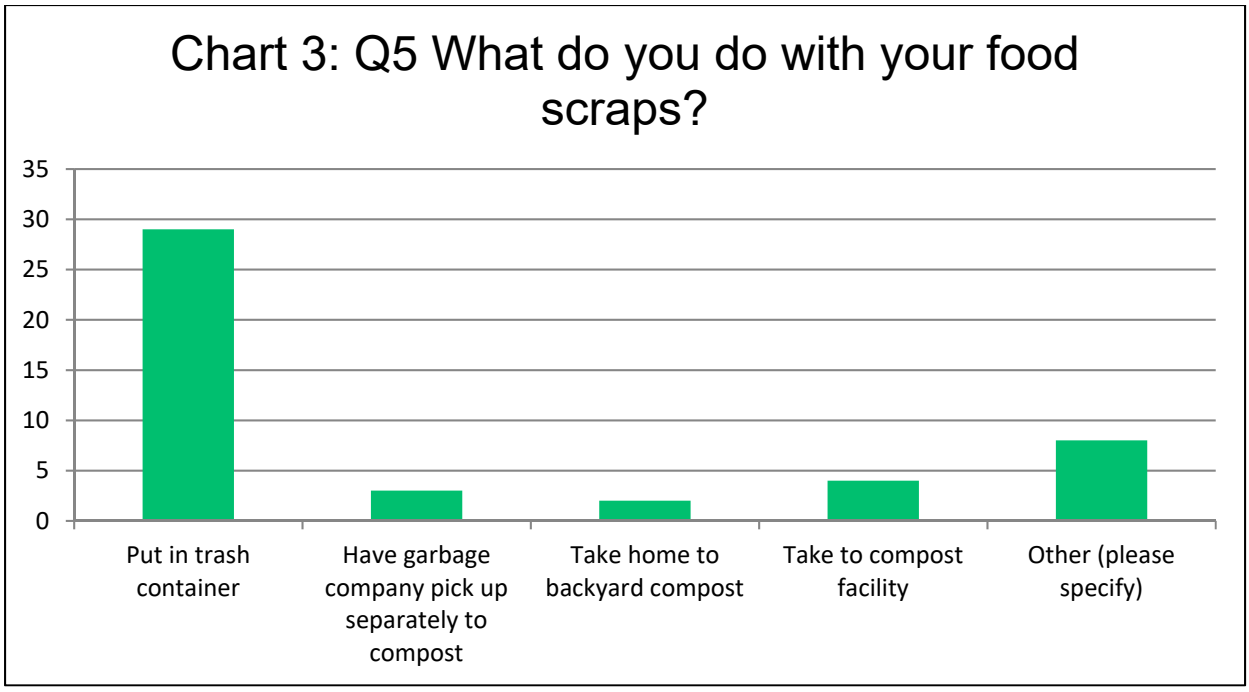
A total of 84 respondents answered the fourth question. While 38 respondents noted that they do not generate food scraps, 15 indicated they generated one large bag a day and six indicated they generated more than one dumpster per day.



Of interest are the nine "Other" responses, which actually increase the quantity of food waste generated:

- We do not offer food service however, people do order in and extras could be thrown. Home bought in items could be pitched as well. Estimate a very low quantity but not quantified.
- Only on special occasions
- Three large bags a day from kitchen unknown post-consumer
- Three times a week one dumpster mixed with cardboard
- No- donates unsold food
- Depends on the day. One to three large bags a day
- Yes but we recycle all food through a reclaim company
- Yes, we have multiple, large bags of food scraps per day, that can take up to 1/4 to 1/2 a dumpster.
- Between a large bag and a dumpster

A total of 46 respondents completed the fifth question. The majority of the respondents (29) put their food scraps in the garbage while nine incorporate food scraps into residential or commercial compost.

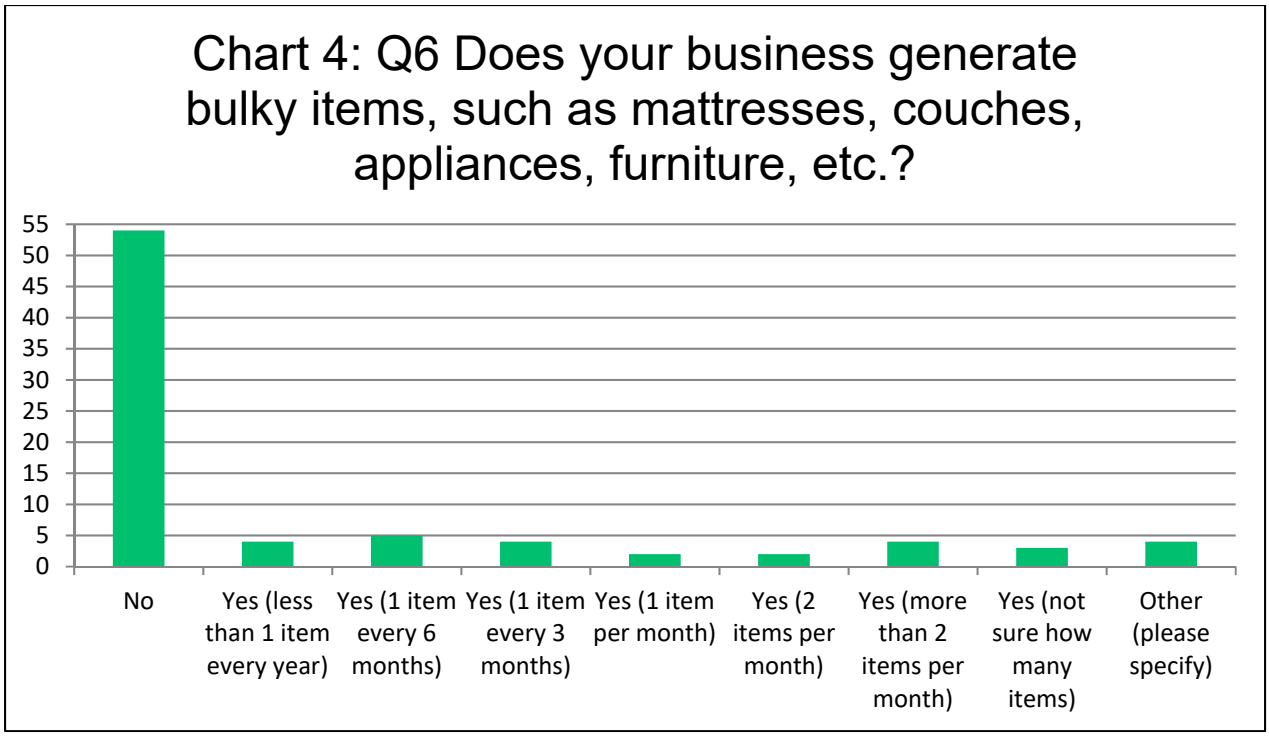


Additional food scrap composting does occur within the eight that responded "Other", as noted in their responses below.

- Trash post-consumer and scraps, unsold food gets donated
- Donates
- Feed to chickens
- Customer take coffee grounds home to compost except during winter months
- Darling International
- Green RU picks up
- No idea
- ¾ goes in trash ¼ goes in compost

Bulky Items Questions 6 – 7

There were a total of 82 qualified responses to Question 6. Of those, 54 respondents noted that they do not generate bulky items. Of the 28 that do, only four responded to having two or more per month while four noted having one or two items per month.



Those that responded "Other" noted the following:

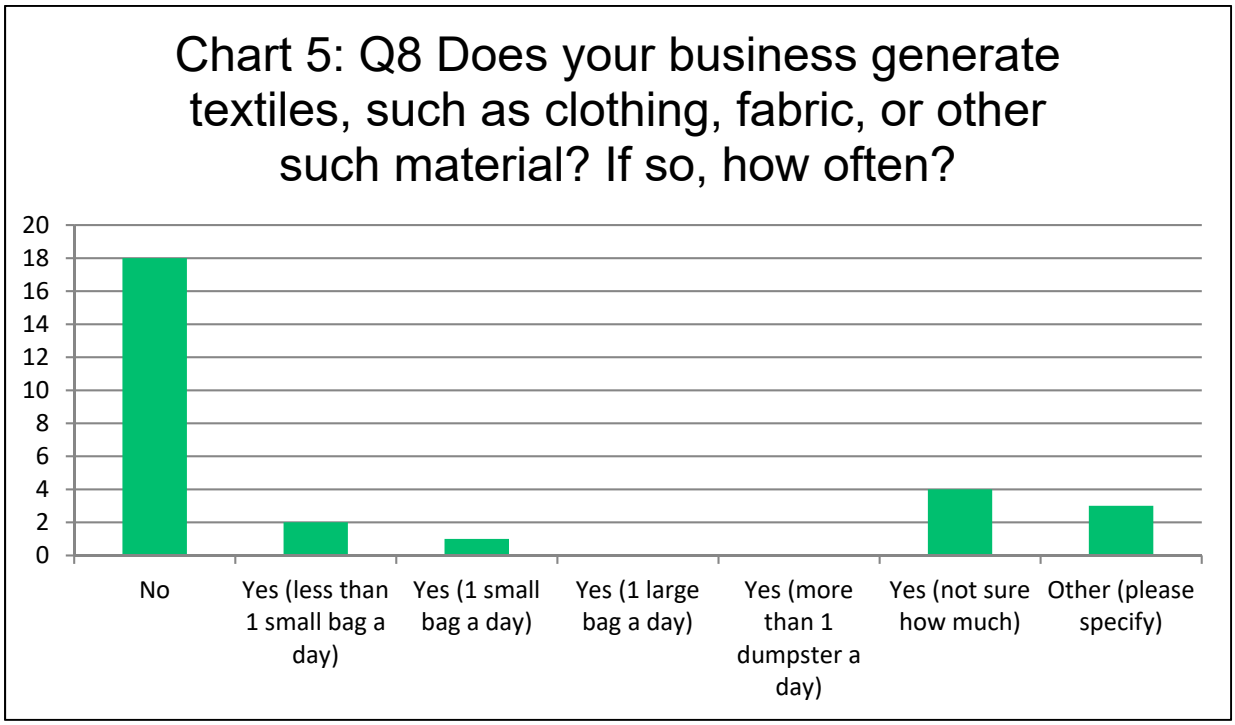
- We have flooring products that we dispose of
- Yes, but only when building new or renovating existing facilities
- Numerous items during a renovation. Otherwise - occasional.
- Danfoss utilizes a compactor

Of the 28 respondents that do generate bulky items, six noted they put the items in the trash container, eight indicated they had a garbage company pick up separately from regular trash, and four noted they take the items to a reuse location like Goodwill. The 10 respondents who noted "Other" provided the following responses:

- Deliver to recycling center
- Corporate take back program
- Contact City or dumpster
- We use a dumpster on our location
- At times we will put in the trash dumpster if we cannot donate to an employee or re-purpose organization
- Unknown
- Garage sale or disposal company for items not sold
- Try to find a charity to pick up
- 3/4 goes to reuse, 1/4 goes to landfill
- Chitty will remove (for fee) if alot of items we will haul to resource recovery on a dump trailer of our own.

Textiles Questions 8 – 9

Of the 85 qualified respondents, only 28 answered the question regarding textile generation.



The three respondents that noted "Other" provided the following detail:

- A few bags a quarter
- Unsold items are sent back to corporate for disposal
- If carpet is considered textile yes we do

Of the 10 responses on how textiles materials are disposed of, two responded they put it in the trash container, four take to a reuse location like Goodwill, and four indicated "Other" including shipped to Corporate office, dumpster pick up twice per week, re-purpose as much as possible with times they are put in the trash, and unknown.

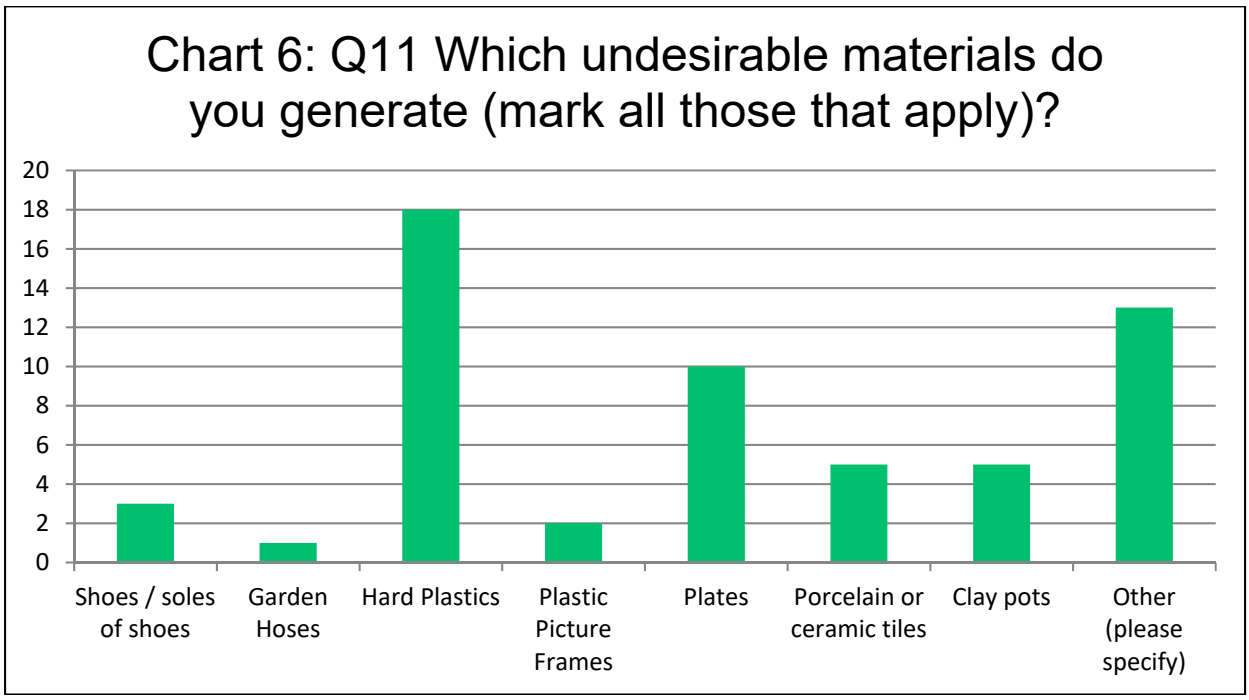
Undesirable Materials Questions 10 – 12

A total of 63 respondents answered Question 10. Of those responding, 42 do not generate undesirable materials including shoes, soles of shoes, garden hoses, hard plastics, plastic picture frames, plates, porcelain, ceramic tiles, clay pots, etc. Another 12 respondents generate less than one small bag a day. One respondent each had one small bag a day, one large bag per day, and one more than one dumpster per day. Two respondents were unsure how much they had. The four respondents who cited "Other" included:

- Several boxes a quarter.
- Tile

- We put items of this nature 1 large bag, quarterly
- Rarely are these items thrown out one or two bags/yr

While only 21 respondents indicated that they generated undesirable materials, 32 respondents provided the undesirable materials that they generate.

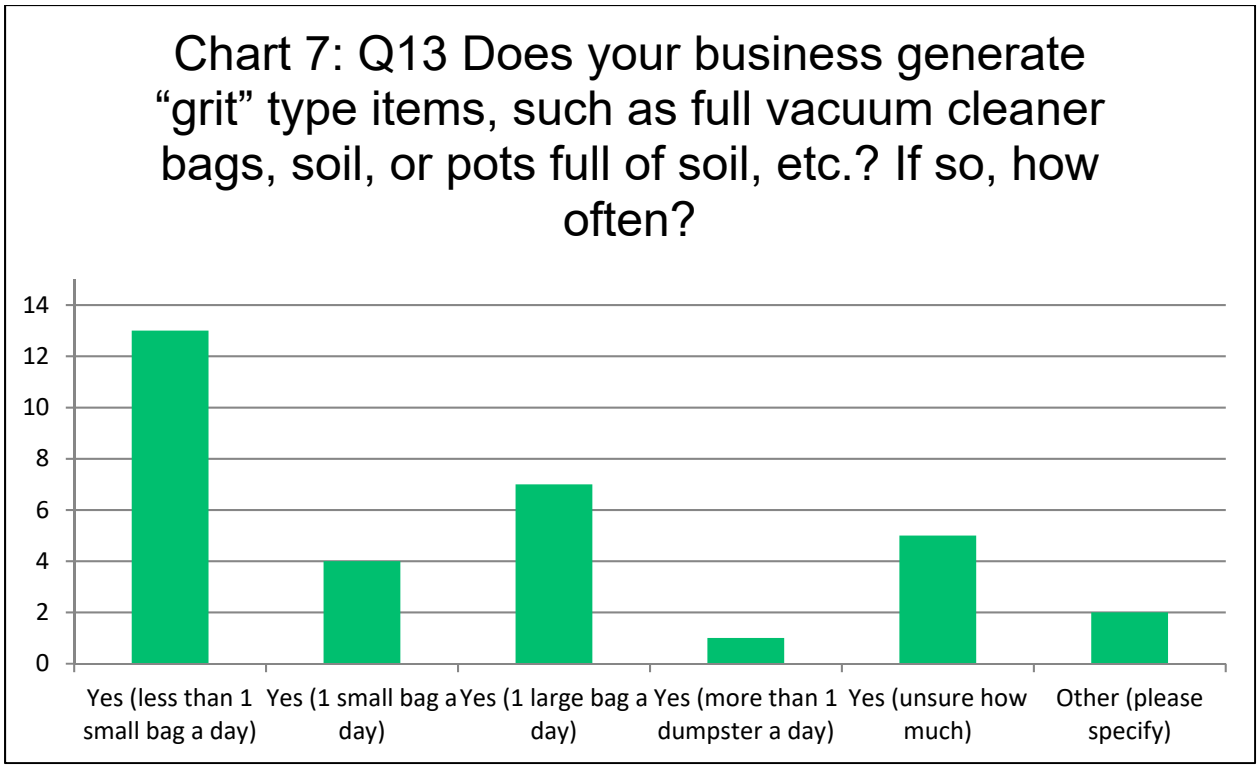


The majority of respondents (25) put these materials in the waste stream. Three respondents indicated they have a recycling company pick them up, seven take to a reuse location such as a thrift store, and three provided "Other" responses including:

- Unsold items are sent to corporate. Broken items put in trash
- Recycle boxes
- Unknown

Grit Material Questions 13 – 14

A total of 80 respondents answered Question 13 related to grit material generation. Of the respondents, 48 noted they do not generate grit materials. The breakdown of the remaining 32 is shown on Chart 7 below.



The two respondents who indicated "Other" noted:

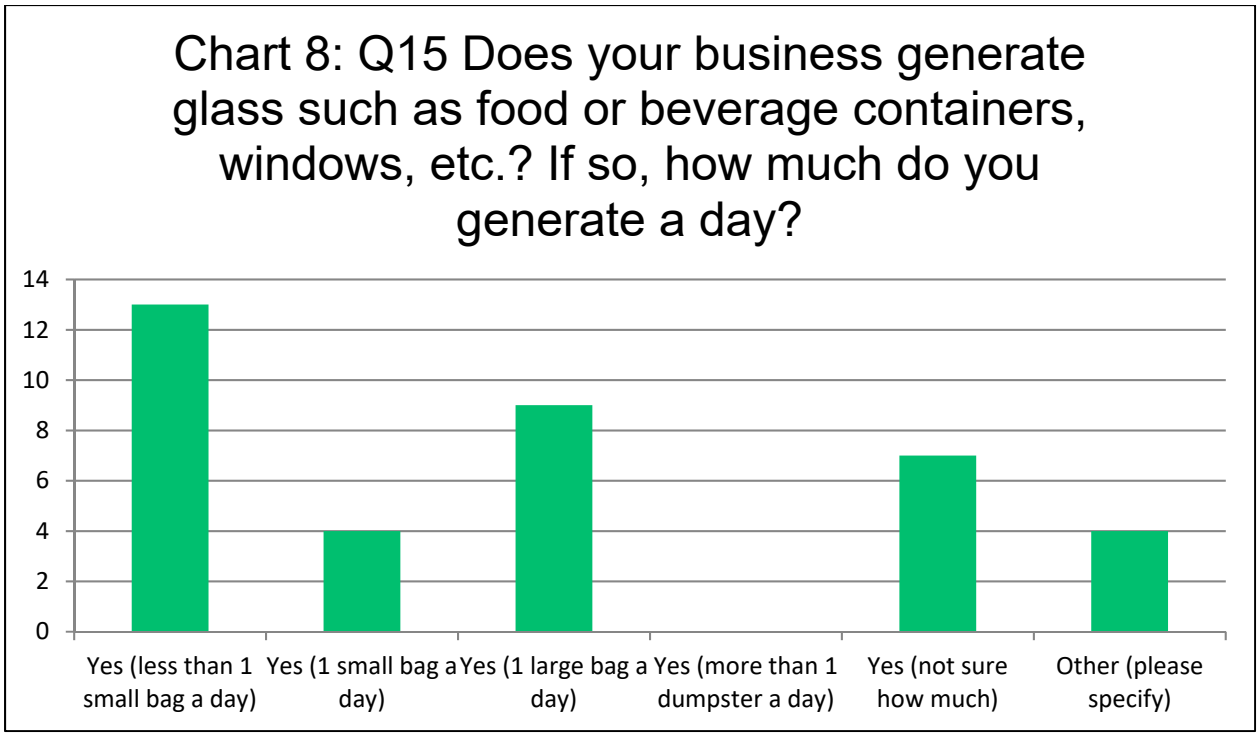
- Coffee grounds make up 98% of our organic waste
- Sweep the floor several times a day. Lots of cig butts outside

Of the 32 respondents generating grit materials, 26 noted they put the materials in the trash container. A recycling company picks up the material from one respondent. The remaining five "Other" answers included:

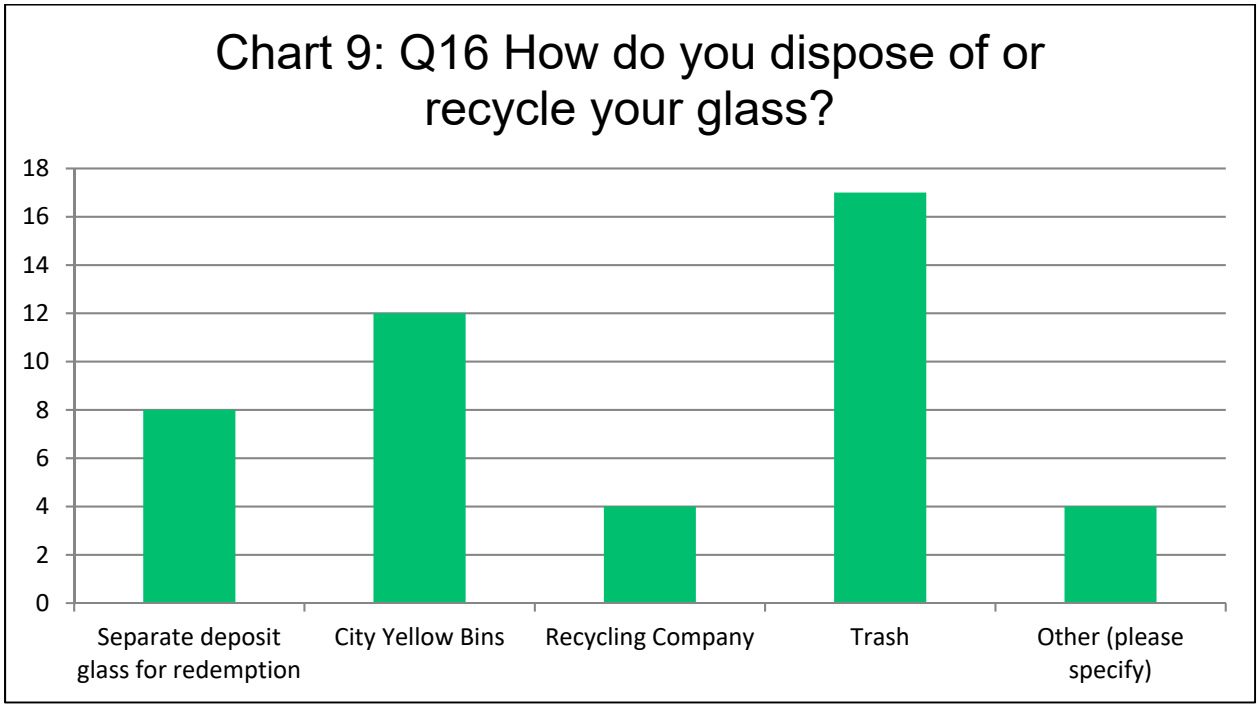
- Backyard style composting
- Most go in the trash, but we will also take a truck load per week to organic waste facility
- Mix in with compost
- Grit/sand recycled on-site
- Unknown

Glass Questions 15 – 16

A total of 81 respondents answered Question 15 related to glass generation. Of the respondents, 44 noted they do not generate glass materials. The breakdown of the remaining 37 is shown on Chart 8 below.



The handling method for glass of the 37 respondents is shown in Chart 9 below.

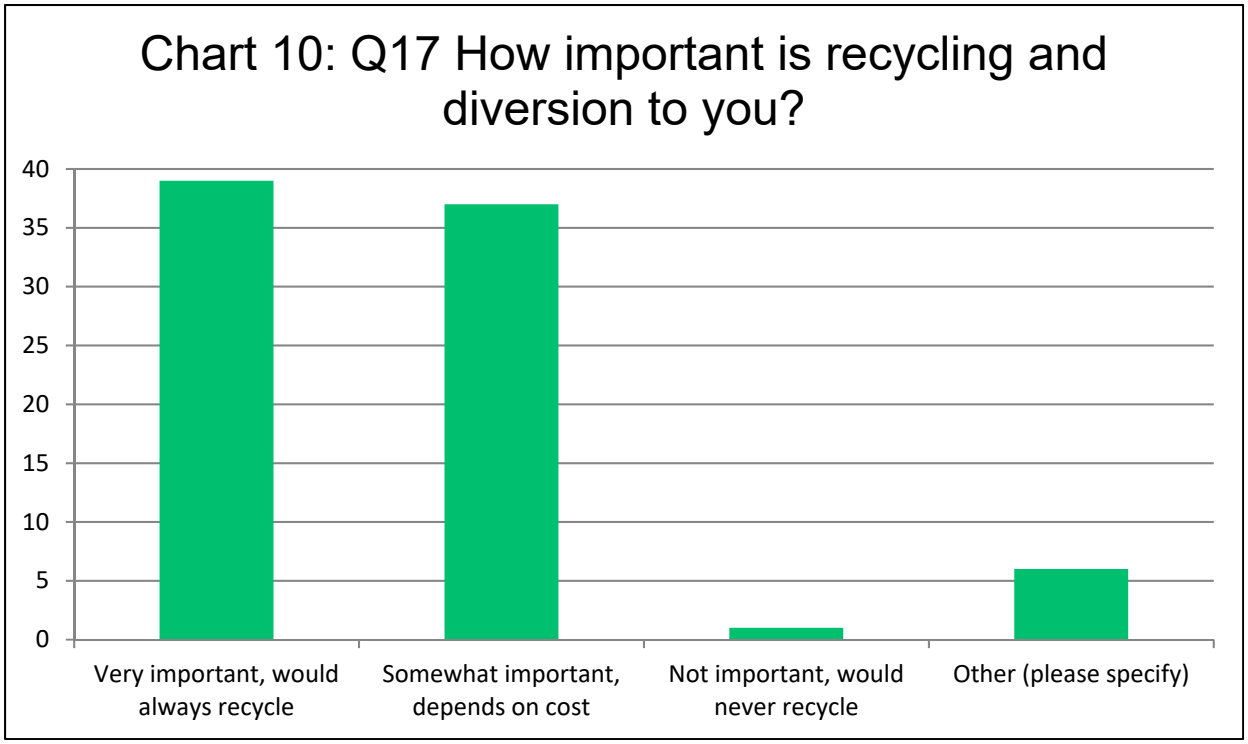


The four "Other" responses included the following:

- Nevada company picks up
- We pay to have light bulbs disposed of, and return wine, beer, and liquor bottles to vendor for redemption
- Take home to send to recycling
- Unknown

Recycling Attitude Questions 17 – 22

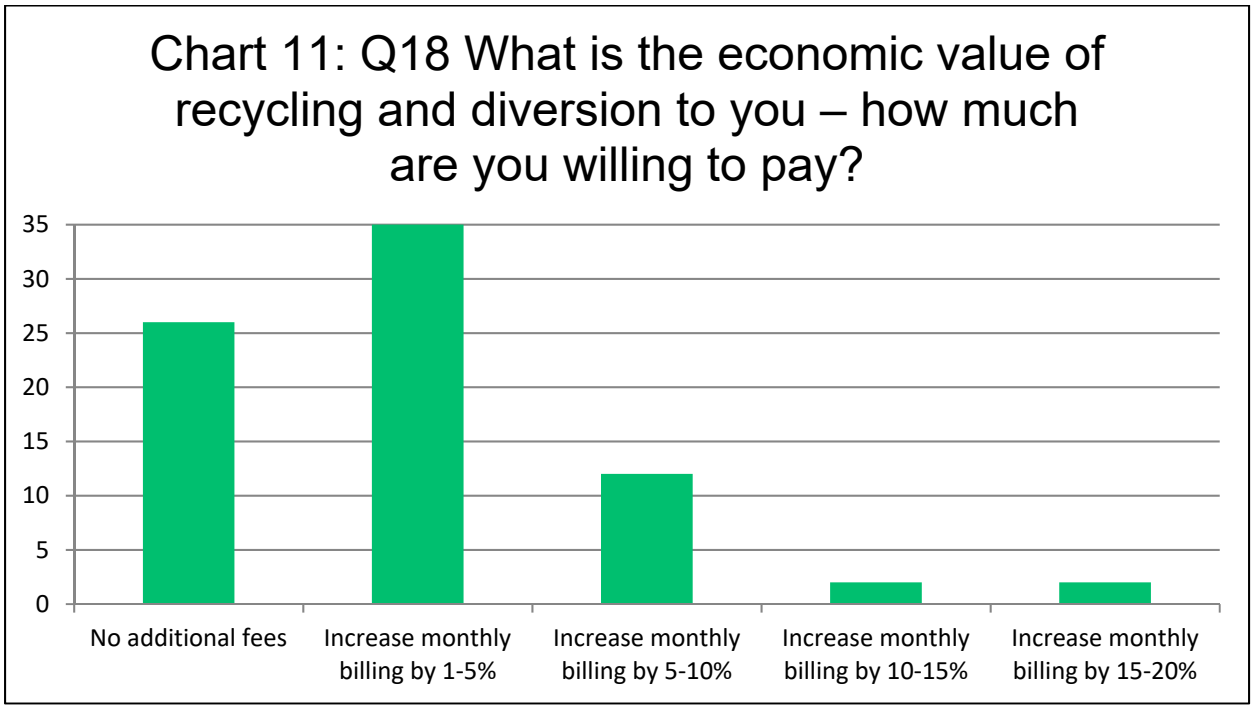
After the questions on specific materials, a series of questions were asked to determine the "feel" of and for recycling within the Ames service are. The first of these questions was how important recycling is to the respondent. There were 76 responses and nine skips to this question.



The comments provided with this question are noted below:

- Does not want to answer
- We recycle cardboard locally for free
- Don't like sorting, but believe in sustaining environment. More efficient to burn for energy than to pay to ship things off to recycle.
- When possible
- Would love to recycle at no cost to business.
- Difficult to get tenants to comply. Having to not separate on the front end is a big advantage.

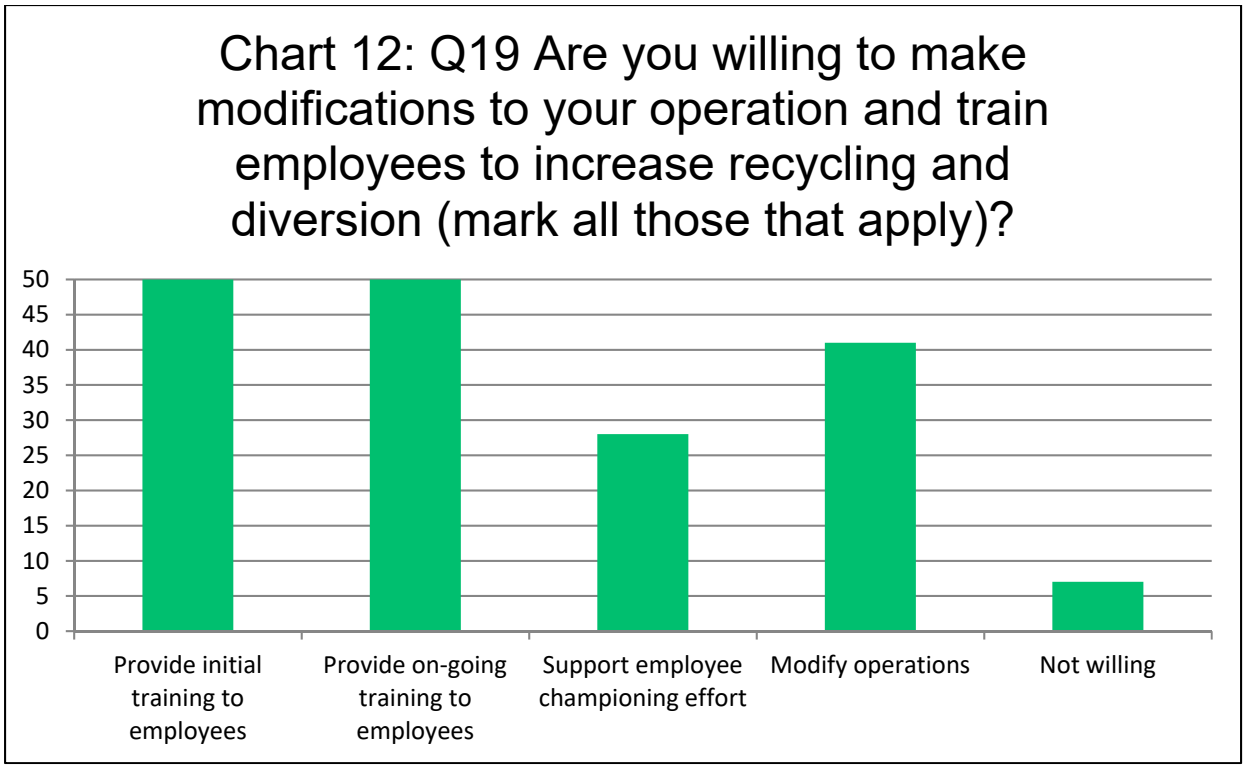
Question 18 then focused on the fees respondents are willing to pay in order to recycle. There were 76 responses and nine skips to this question.



A total of 26 respondents are not willing to pay any additional fees while 51 respondents are willing to pay some additional amount. A total of 10 respondents provided additional comments including:

- Willing to pay for use of service
- Put a program together to see how it benefits everyone including businesses. Then offer all residents a lower cost if they participate and higher rate if they don't. Business should have same guidelines.
- Part of why we pay to send our trash to a story county facility is so that it will go to the resource recovery plant, fees are already high for small businesses
- Does not want to answer
- Not sure
- Not sure
- Willing to pay a per service fee when i use the services
- Would like our recyclables to benefit another company financially
- Depend on budget
- Don't want to pay to ship across country, generating more fossil fuels from vehicles.
- Personally willing to increase 15-20% but I can't make that call for the business

Question 19 focused on the effort the respondent was willing to put in to modifying operations and training employees. There were 77 responses and nine skips to this question. Respondents were asked to mark all that apply.



There were six additional comments provided by respondents, as noted below:

- I don't have any employees
- Does not want to answer
- Not applicable to this business
- not producing the recyclable materials you are inquiring about
- to reduce the amount of materials sent to landfills
- It is difficult to have tenants comply/enforce recycling and diversion. We'd do what we can but I'm not sure if we'd get good / consistent / satisfactory results.

Question 20 asked if respondents would be interested in learning more about methods to divert these materials (e.g. food scraps, bulky items, textiles, hard to recycle materials, grit, glass). Of the 77 respondents, 45 indicated that they would be interested in learning more.
Question 21 asked if the respondent had any questions or comments. A total of 32 responses were provided, although 16 of them simply indicated "No." Other responses included:

- I think it would be great to have a facility to use for pay that would be a drop off area that could be a place to separate (would save business costs of area to store separated materials, maybe could save items from landfill as we haul to Boone due to lack of services to dispose of the items we generate
- We separate recyclables but they stack up because there isn't any easy way to discard. We end up putting in the trash. If there was a separate container that was picked up weekly, then we would separate and discard in that container.
- We need recycling and redemption collections places in Ames. People have found it to be too much of a hassle to redeem cans and glass and simply are dumping into the trash

containers increasing load at the city refuse plant. You have cost there running it so divert this junk to a recycling program saving money their but funding that program. It should be run by the city and collections can occur on utility billing so all residence pay for this service.

- Can you burn wood pallets
- I would prefer to utilize the resource recovery plant and not have to keep recyclables separate; I feel if this was the standard less would get recycled
- Our office I should located in a mix use development. Most of the garbage in our dumpster is contributed by local residence. As a software company our foot print for waste is small. Employee's desire recycling but there is no clear economic way to do so in Ames. My other businesses have separate containers in the office and at the disposal pickup spot.
- We only operate one day a week, but would be happy to recycle what little we do generate.
- Did pilot recycling for compost. Not sure if they will proceed.
- We already do a lot of this and pay extra for recycling and composting services. We would love the city to do a recycling program.
- For restaurants - we generate used oil as well. Options?
- Interested in Food Waste Recycling
- Would love to see composting!
- Not at this time, we are so fortunate to have our Resource Recovery Plant in Ames!
- Glad that Power Plant converted from coal to nat'l gas but question it's overall effectiveness.
- Most of the waste is paper which may contain confidential information. It is destroyed through a pick up and shredding service.
- Glad to see the COA taking another look at this. Seems like there is some good opportunity to improve recycling.

Question 22, the final question of the survey, provided respondents the opportunity to leave their contact information if they chose to. A total of 11 respondents left a name and/or phone number.

APPENDIX D

Evaluation of Cost Savings Potential from Decreasing Rejects

Appendix D: Evaluation of Cost Savings Potential from Decreasing Rejects																	
Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Historic Average	Last 5 Years Average
Total Tonnage (tons)	50,268	51,908	53,785	54,494	55,500	57,333	57,470	53,395	58,756	55,270	53,106	54,159	55,698	54,393	52,210	54,516	53,913
Reject Totals (tons)	12,320	12,612	14,360	18,695	18,468	16,538	14,379	13,593	17,216	13,754	15,380	13,686	16,018	20,584	17,279	15,659	16,589
% Rejects	25%	24%	27%	34%	33%	29%	25%	25%	29%	25%	29%	25%	29%	38%	33%	29%	31%
Landfill Tip Fee (per ton)*	$ 48.00	$ 48.00	$ 48.00	$ 48.00	$ 48.00	$ 48.00	$ 48.00	$ 48.00	$ 48.00	$ 48.00	$ 48.00	$ 48.00	$ 48.00	$ 48.00	$ 48.00		
Haul Fee (per ton)*	$ 13.66	$ 13.66	$ 13.66	$ 13.66	$ 13.66	$ 13.66	$ 13.66	$ 13.66	$ 13.66	$ 13.66	$ 13.66	$ 13.66	$ 13.66	$ 13.66	$ 13.66		
RDF Income (per ton)*	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00	$ 25.00		
Annual Expense	$ 759,649	$ 777,653	$ 885,439	$ 1,152,760	$ 1,138,739	$ 1,019,733	$ 886,601	$ 838,144	$ 1,061,539	$ 848,072	$ 948,334	$ 843,852	$ 987,695	$ 1,269,200	$ 1,065,408	$ 965,521	$ 1,022,898
Lost RDF Sale Income	$ 307,999	$ 315,299	$ 359,001	$ 467,386	$ 461,701	$ 413,450	$ 359,472	$ 339,825	$ 430,400	$ 343,850	$ 384,502	$ 342,139	$ 400,460	$ 514,596	$ 431,969	$ 391,470	$ 414,733
Net Annual Cost to Landfilling Rejects	$ 1,067,648	$ 1,092,952	$ 1,244,439	$ 1,620,146	$ 1,600,440	$ 1,433,183	$ 1,246,072	$ 1,177,969	$ 1,491,939	$ 1,191,922	$ 1,332,836	$ 1,185,991	$ 1,388,155	$ 1,783,796	$ 1,497,376	$ 1,356,991	$ 1,437,631
Percent Diverted with Addtl Processing	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Annual Cost Recovered	$ 373,677	$ 382,533	$ 435,554	$ 567,051	$ 560,154	$ 501,614	$ 436,125	$ 412,289	$ 522,178	$ 417,173	$ 466,493	$ 415,097	$ 485,854	$ 624,329	$ 524,082	$ 474,947	$ 503,171
Remaining Disposal Cost	$ 693,971	$ 710,419	$ 808,886	$ 1,053,095	$ 1,040,286	$ 931,569	$ 809,947	$ 765,680	$ 969,760	$ 774,749	$ 866,343	$ 770,894	$ 902,301	$ 1,159,468	$ 973,295	$ 882,044	$ 934,460

*Assumes rates constant over time to compare variable quantities of rejects.

APPENDIX E

Ames Pay it Forward Database Information Sample

Ames Pay It Forward *-a reuse & recycle database for the Ames community*

	Applicences	Books (Textbooks, magazines, etc.)	Children (Clothing, toys, stuffed animals, etc.)	Clothing	Electronics & Supplies (working only)	Food (Please check expiration dates)	Furniture/ Housewares	Household Hazardous Materials/ Cleaning Products	Household Items (sheets, towels, plates, etc.)	Packing Supplies (boxes, packing peanuts, bubble wrap, etc.)	School/Office/Craft Supplies	Sporting Goods/Recreational (bikes, skates, etc.)	Tools & Home Improvement	Vehicles (working or not)	Misc.
Iowa State University Clubs & Organizations		**Parks Library** *Sunday: 12:30pm-2am* *Monday-Friday: 7:30am-2am* *Saturday: 10am-8pm* www.lib.iastate.edu/info/6644 **Browsing Library** (magazines) Iowa State Memorial Union 2229 Lincoln Way Ames, IA 50011 *Monday-Thursday: 8am-8pm* *Friday: 8am-5pm* www.sac.iastate.edu/en/browsing_library/				**SHOP (Students Helping Our Peers)** 2616 Food Sciences Building, ISU *Tuesday: 3pm-6pm* *Wednesday: 11am-2 pm, 3pm-6pm* *Thursday: 3pm-6pm* www.theshop.stuorg.iastate.edu/				**The Memorial Union Workspace** Iowa State Memorial Union 2229 Lincoln Way Ames, IA 50011 *Fall & Spring - Monday-Thursday: 2pm-10pm* *Friday: 5pm-8pm (Closed Fridays in December)* *Saturday: 10am-4pm* *Sunday: 1pm-4pm* www.sac.iastate.edu/en/arts_entertainment/workspace/				**Department of Sustainibility** (tidy cats containers) Merry Rankin: (515)294-5052
Ames, IA	**Best Buy** 1220 S. Duff Avenue Ames, IA 50010 *Monday-Friday: 10am-9pm* *Saturday: 9am-9pm* *Sunday: 10am-8pm* BestBuy.com/Tradein **Overflow Thrift Store** 202 S. Duff, Ames, IA 50010 *Monday, Tuesday, Saturday: 10am-4pm* www.overflowthriftstore.org/faq.html **Goodwill Industries** 3718 Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-9pm* *Saturday: 9am-6pm* *Sunday: noon-5pm* www.goodwill.org/ **Habitat for Humanity of Central Iowa** 401 Clark Ave. Ames, IA 50010 *Tuesday: 9am-noon* www.hfhoci.org/ - our-mission **Salvation Army Thrift Store** 701 E. Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-4pm* www.salvationarmyusa.org/usn/	**Firehouse Books** 213 Lincoln Way, Kellogg Ave, Ames, IA 50010 Monday-Friday: 8 am - 6pm Saturday: 10am-5pm Sunday: 11am-3pm http://www.firehousebooks.org/ **Raising Readers** P.O Box 2374 Ames, Iowa 50010-2373 (515)520-8686 www.raising-readers.org **Goodwill Industries** 3718 Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-9pm* *Saturday: 9am-6pm* *Sunday: noon-5pm* www.goodwill.org/ **Ames Public Library** (books, magazines) 515 Douglas Ave. Ames, IA 50010 *Monday-Thursday: 9am-9pm* *Friday: 9am-6pm* *Saturday: 9am-6pm* *Sunday: 1pm-5pm* www.amespubliclibrary.org/outreachServices/Donations.asp **Overflow Thrift Store** 202 S. Duff, Ames, IA 50010 *Monday, Tuesday, Saturday: 10am-4pm* www.overflowthriftstore.org/faq.html **Youth and Shelter Services** P.O. Box 1628 Ames, IA 50010 *Monday-Thursday: 9am-6pm* *Friday: 9am-4:30pm* www.yss.ames.ia.us/	**Goodwill Industries** 3718 Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-9pm* *Saturday: 9am-6pm* *Sunday: noon-5pm* www.goodwill.org/ **Duckworth Wearing** (maternity & childrens) 232 Main Street Ames, IA 50010 *Monday-Wednesday, Friday: 10am-7pm* *Thursday: 10am-8pm* Saturday: 10am-5pm Sunday: 1pm-5pm www.duckworthwearing.com/ **Duckworth Wearing** 232 Main Street Ames, IA 50010 *Monday-Wednesday, Friday: 10am-7pm* *Thursday: 10am-8pm* Saturday: 10am-5pm Sunday: 1pm-5pm www.duckworthwearing.com/ **Overflow Thrift Store** 202 S. Duff, Ames, IA 50010 *Monday, Tuesday, Saturday: 10am-4pm* www.overflowthriftstore.org/faq.html **Assault Care Center Extending Shelter and Support (ACCESS)** PO Box 1439, Ames, IA 50014 www.assaultcarecenter.org/index.cfm?nodeID=69623&audienceID=1 **Ames Community School District** High School - 1921 Ames High Dr. *High School – Monday-Friday: 7am-4pm* Middle School – 3915 Mortensen Rd Ames, IA 50014 *Middle School - Monday-Friday: 7:30am-4pm* www.ames.k12.ia.us **Mary Greeley Medical Center** 1111 Duff Ave. Ames, IA 50010 www.mgmc.org	**Salvation Army Thrift Store** 701 E. Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-4pm* www.salvationarmyusa.org/usn/ **Goodwill Industries** 3718 Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-9pm* *Saturday: 9am-6pm* *Sunday: noon-5pm* www.goodwill.org/ **Overflow Thrift Store** 202 S. Duff, Ames, IA 50010 *Monday, Tuesday, Saturday: 10am-4pm* www.overflowthriftstore.org/faq.html **Random Goods** 330 Main Street Ames, IA 50014 *515-292-2420* *Monday-Saturday: 11am-7pm* Sunday: 1pm-5pm www.randomgoodsames.com **Miss Meyer's Clothing Consignment** 432 5th Street Ames, IA 50010 *Tuesday, Wednesday, Friday, Saturday: 10am-5pm* *Thursday: 10am-7pm* *Sunday: call to check* www.missmeyersconsignment.com/default.aspx **Overflow Thrift Store** 202 S. Duff, Ames, IA 50010 *Monday, Tuesday, Saturday: 10am-4pm* www.overflowthriftstore.org/faq.html **The Loft** 233 Main Street Ames, IA 50010 Monday-Wednesday, Friday: 10am-7pm *Thursday: 10am-8pm* *Saturday: 10am-5pm* *Sunday: 1pm-5pm* www.theloftatdww.com/ **Assault Care Center Extending Shelter and Support (ACCESS)** PO Box 1439, Ames, IA 50014 www.assaultcarecenter.org/index.cfm?n **Youth and Shelter Services** P.O. Box 1628 Ames, IA 50010 *Monday-Thursday: 9am-6pm* *Friday: 9am-4:30pm* www.yss.ames.ia.us/ **Clothing That Works** 130 S. Sheldon Suite 308 Ames, IA 50010 *Wednesday: 2pm-6pm* www.cwames.org/ctw/ **Ames Community School District** High School - 1921 Ames High Dr. *High School – Monday-Friday: 7am-4pm* Middle School – 3915 Mortensen Rd Ames, IA 50014 *Middle School - Monday-Friday: 7:30am-4pm* www.ames.k12.ia.us	**Best Buy** 1220 S. Duff Avenue Ames, IA 50010 *Monday-Friday: 10am-9pm* *Saturday: 9am-9pm* *Sunday: 10am-8pm* BestBuy.com/Tradein **Staples** 1333 Buckeye Road Ames, IA 50010 *Monday-Friday: 8am-9pm* *Saturday: 9am-9pm* *Sunday: 10am-6pm* www.staples.com/ **Overflow Thrift Store** 202 S. Duff, Ames, IA 50010 *Monday, Tuesday, Saturday: 10am-4pm* www.overflowthriftstore.org/faq.html **Goodwill Industries** 3718 Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-9pm* *Saturday: 9am-6pm* *Sunday: noon-5pm* www.goodwill.org/ **Youth and Shelter Services** P.O. Box 1628 Ames, IA 50010 *Monday-Thursday: 9am-6pm* *Friday: 9am-4:30pm* www.yss.ames.ia.us/ **Iowa Wildlife Center** 328 Main St., Suite 208, Ames, IA 50010 *Monday-Friday: 8:30am-5pm* www.iowawildlifecenter.org/default.aspx	**Bethesda Lutheran Church Food Pantry** 1517 Northwestern Ave. Ames, IA 50010 *Monday: 9:00am-11:00am* *Tuesday: 1:00pm-3:00pm, 6:30pm-8:00pm* *Wednesday: 9:00am-11:00am* *Thursday: 1:00pm-3:00pm* www.bethesdanet.org/site/resources/community-food-pantry/ **Calvary United Methodist Church Food Shelf** 1403 24th St. Ames, IA 50010 *Tuesday: 2pm-3:30pm* www.methodistsites.com/calvary/ **Emergency Residence Project** 225 South Kellogg Ames, IA 50010 www.amesshelter.org/ **Food at First** 516 Kellogg Avenue Ames, IA 50010 112 Washington Ames, IA 50010 *Monday & Thursday: 5pm-5:30pm (Washington location)* *Saturday: 10am-10:30am (Both locations)* foodatfirst.wordpress.com/ **First Evangelical Free Church** 2008 24th Street, Ames, IA 50010 *Tuesday: 2pm-4pm* *Thursday: 9am-12pm* www.amesefc.org **Mid-Iowa Community Action (MICA)** 230 S. 16th Street, Ames, IA *Monday – Friday: 8:30am – 4:30pm* www.micaonline.org/ **Assault Care Center Extending Shelter and Support (ACCESS)** PO Box 1439, Ames, IA 50014 www.assaultcarecenter.org/index.cfm?nodeID=69623&audienceID=1 **Youth and Shelter Services** P.O. Box 1628 Ames, IA 50010 *Monday-Thursday: 9am-6pm* *Friday: 9am-4:30pm* www.yss.ames.ia.us/ **Ames Community School District** High School - 1921 Ames High Dr. Ames, IA 50010 *High School – Monday-Friday: 7am-4pm* Middle School – 3915 Mortensen Rd Ames, IA 50014 *Middle School - Monday-Friday: 7:30am-4pm* www.ames.k12.ia.us	**Great Stuff Ltd. Selective Consignment Store** 312 Main Street Ames, IA 50010 *Monday – Friday: 10am-5:30pm* *Thursday: until 7pm April-December* *Saturday: 10am-5pm* www.greatstuffconsignment.com/policies.html **Volunteer Center of Story County** 132 S Sheldon Ave #201 Ames, IA 50014 www.vcstory.org/ **Overflow Thrift Store** 202 S. Duff, Ames, IA 50010 *Monday, Tuesday, Saturday: 10am-4pm* www.overflowthriftstore.org/faq.html **Emergency Residence Project** 225 South Kellogg Ames, IA 50010 www.amesshelter.org/ **Goodwill Industries** 3718 Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-9pm* *Saturday: 9am-6pm* *Sunday: noon-5pm* www.goodwill.org/ **Assault Care Center Extending Shelter and Support (ACCESS)** PO Box 1439, Ames, IA 50014 www.assaultcarecenter.org/index.cfm?nodeID=69623&audienceID=1 **Salvation Army Thrift Store** 701 E. Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-4pm* www.salvationarmyusa.org/usn/ **Habitat for Humanity of Central Iowa** 401 Clark Ave. Ames, IA 50010 *Tuesday: 9am-noon* www.hfhoci.org/ - our-mission	**Ames Resource Recovery** 110 Center Ave., Ames, IA 50010 *Monday-Friday: 7am-3:30pm* *Saturday: 8am-noon* www.cityofames.org/index.aspx?page=864 **Youth and Shelter Services** P.O. Box 1628 Ames, IA 50010 *Monday-Thursday: 9am-6pm* *Friday: 9am-4:30pm* www.yss.ames.ia.us/ **Ames Animal Shelter** 325 Billy Sunday Rd Ames, IA 50010 *Tuesday-Friday: Noon-5:30pm* *Monday & Saturday: Noon-4:00pm* www.cityofames.org/index.aspx?page=1128 **Emergency Residence Project** 225 South Kellogg Ames, IA 50010 www.amesshelter.org/ **Assault Care Center Extending Shelter and Support (ACCESS)** PO Box 1439, Ames, IA 50014 www.assaultcarecenter.org/index.cfm?nodeID=69623&audienceID=1	**Ames Animal Shelter** 325 Billy Sunday Rd Ames, IA 50010 *Tuesday-Friday: Noon-5:30pm* *Monday & Saturday: Noon-4:00pm* www.cityofames.org/index.aspx?page=1128 **Great Stuff Ltd.** 312 Main Street Ames, IA 50010 *Monday – Friday: 10am-5:30pm* *Thursday: until 7pm April-December* *Saturday: 10am-5pm* www.greatstuffconsignment.com/policies.html **Volunteer Center of Story County** 130 S Sheldon Ave #201 Ames, IA 50014 www.vcstory.org/ **Emergency Residence Project** 225 South Kellogg Ames, IA 50010 www.amesshelter.org/ **Goodwill Industries** 3718 Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-9pm* *Saturday: 9am-6pm* *Sunday: noon-5pm* www.goodwill.org/ **Octagon Center For the Arts** 427 Douglas Avenue, Ames, IA 50010 Monday – Friday: 10:00am - 5:30pm Thursday: 10:00am - 7:00pm Saturday: 10:00am - 5:00pm www.octagonarts.org/ **Overflow Thrift Store** 202 S. Duff, Ames, IA 50010 *Monday, Tuesday, Saturday: 10am-4pm* www.overflowthriftstore.org/faq.html **Assault Care Center Extending Shelter and Support (ACCESS)** PO Box 1439, Ames, IA 50014 www.assaultcarecenter.org/index.cfm?nodeID=69623&audienceID=1 **Youth and Shelter Services** P.O. Box 1628 Ames, IA 50010 *Monday-Thursday: 9am-6pm* *Friday: 9am-4:30pm* www.yss.ames.ia.us/ **Food at First** 516 Kellogg Avenue Ames, IA 50010 112 Washington Ames, IA 50010 *Monday & Thursday: 5pm-5:30pm (Washington location)* *Saturday: 10am-10:30am (Both locations)* foodatfirst.wordpress.com/ **Habitat for Humanity of Central Iowa** 401 Clark Ave. Ames, IA 50010 *Tuesday: 9am-noon* www.hfhoci.org/ - our-mission **Ames Community School District** High School - 1921 Ames High Dr. Ames, IA 50010 *High School – Monday-Friday: 7am-4pm* Middle School – 3915 Mortensen Rd Ames, IA 50014 *Middle School - Monday-Friday: 7:30am-4pm* www.ames.k12.ia.us **Iowa Wildlife Center** 328 Main St., Suite 208, Ames, IA 50010 *Monday-Friday: 8:30am-5pm* www.iowawildlifecenter.org/default.aspx	**Octagon Center For the Arts** 427 Douglas Avenue, Ames, IA 50010 *Monday – Friday: 10:00am - 5:30pm* *Thursday: 10:00am - 7:00pm* *Saturday: 10:00am - 5:00pm* https://www.octagonarts.org/ **Worldly Goods** 223 Main St. Ames, IA 50010 *Monday-Wednesday, Friday: 10am-6pm* *Thursday: 10am-8pm* *Saturday: 10am-5pm* www.worldlygoods.org/	**Ames Animal Shelter** 325 Billy Sunday Rd Ames, IA 50010 *Tuesday-Friday: Noon-5:30pm* *Monday & Saturday: Noon-4:00pm* www.cityofames.org/index.aspx?page=1128 **Volunteer Center of Story County** 130 S Sheldon Ave #201 Ames, IA 50014 www.vcstory.org/ **Octagon Center For the Arts** 427 Douglas Avenue, Ames, IA 50010 Monday – Friday: 10:00am - 5:30pm Thursday: 10:00am - 7:00pm Saturday: 10:00am - 5:00pm https://www.octagonarts.org/ **Assault Care Center Extending Shelter and Support (ACCESS)** PO Box 1439, Ames, IA 50014 www.assaultcarecenter.org/index.cfm?nodeID=69623&audienceID=1 **Goodwill Industries** 3718 Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-9pm* *Saturday: 9am-6pm* *Sunday: noon-5pm* www.goodwill.org/ **Youth and Shelter Services** P.O. Box 1628 Ames, IA 50010 *Monday-Thursday: 9am-6pm* *Friday: 9am-4:30pm* www.yss.ames.ia.us/ **Food at First** 516 Kellogg Avenue Ames, IA 50010 112 Washington Ames, IA 50010 *Monday & Thursday: 5pm-5:30pm (Washington location)* *Saturday: 10am-10:30am (Both locations)* foodatfirst.wordpress.com/ **Ames Community School District** High School - 1921 Ames High Dr. Ames, IA 50010 *High School – Monday-Friday: 7am-4pm* Middle School – 3915 Mortensen Rd Ames, IA 50014 *Middle School - Monday-Friday: 7:30am-4pm* www.ames.k12.ia.us **Iowa Wildlife Center** 328 Main St., Suite 208, Ames, IA 50010 *Monday-Friday: 8:30am-5pm* www.iowawildlifecenter.org/default.aspx	**American Red Cross** 1-855-92RC CAR (855-927-2227) www.redcross.org/support/donating-fundraising/donations/vehicle-donation-program **Salvation Army Thrift Store** 701 E. Lincoln Way Ames, IA 50010 *Monday-Friday: 9am-4pm* www.salvationarmyusa.org/usn/ **Youth and Shelter Services** P.O. Box 1628 Ames, IA 50010 *Monday-Thursday: 9am-6pm* *Friday: 9am-4:30pm* www.yss.ames.ia.us/	Cy Swap (coming soon) (iastate website) **Tangerine Zebra (Antiques)** 219 Main St, Ames, Iowa 50010 *Monday-Wednesday:10am-5pm* *Thursday: 10am-7pm* *Friday-Saturday: 10am-5pm* www.facebook.com/TangerineZebra/info?tab=page_info **Iowa Wildlife Center** 328 Main St., Suite 208, Ames, IA 50010 *Monday-Friday: 8:30am-5pm* www.iowawildlifecenter.org/default.aspx There are also many online sources that are avaliable through websites and social media.

Click on an organization's name to see more information.

$ = may pay for items or offer store credit

= recycles items

all none labeled stores/organizations will accept donations and reuse or resell them

=Iowa State University Club or Oranization