MECKLENBURG COUNTY NC

FOOD WASTE DIVERSION STUDY

FINAL REPORT

MARCH 2012

Prepared for:

Mecklenburg County Solid Waste
Waste Reduction/Composting
700 North Tryon Street
Charlotte, NC 28202

Prepared by:

Kessler Consulting, Inc.
innovative waste solutions
14620 N. Nebraska Ave., Bldg. D
Tampa, FL 33613
813-971-8333

Printed on recycled paper

Mecklenburg County Food Waste Diversion Study

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EXECUTIVE SUMMARY

INTRODUCTION

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study as part of the County's efforts to better understand the quantities, distributions, markets and infrastructures of food waste diversion in the commercial and residential sectors. The study's goal is to establish baseline information needed to evaluate the feasibility of a future food waste recovery pilot program and subsequent comprehensive countywide recovery program. The information obtained from this study will also be used by the County in its Solid Waste Master Plan revisions. The study addresses both commercial and residential food waste.

For the commercial sector, KCI work activities included:

- Identify major commercial food waste generators and quantities of food waste (Subtask 1.1)
- Identify and profile existing food waste recovery programs and recycling facilities and determine capacity or additional capacity needed (Subtask 1.2)
- Estimate current food waste diversion and management practices at major generators (Subtask 1.3)
- Profile successful food waste diversion program components in other jurisdictions (Subtask 1.4)
- Assess potential food waste collection and transport options (Subtask 1.5)
- Identify economic, environmental and policy drivers for food waste diversion (Subtask 1.6)
- Identify local barriers to food waste diversion (Subtask 1.7)

For the residential sector, KCI work activities included:

- Estimate the amount of residential food waste created per household (Subtask 2.1)
- Review existing residential curbside collection programs and potential to include food waste diversion (Subtask 2.2)
- Identify program implementation gaps and opportunities for bridging gaps (Subtask 2.3)

This document presents a summary of the information obtained and the analysis performed for these tasks. The Food Waste Diversion Study final report includes an Executive Summary, Report, all Subtask write-ups and recommendations for the commercial and residential sectors.

BACKGROUND

This study followed the EPA Food Recovery hierarchy by identifying 1) food for people 2) food for animals, 3) food for the earth (composting), and 4) food for disposal. The study will help the County to benchmark generation data, identify the gaps and opportunities in local food waste recovery, and determine the feasibility of a future countywide food waste diversion program.

METHODOLOGY

KCI followed a systematic and thorough process to gather and analyze information, including that provided by County staff. Primary research was gathered through informal email surveys, telephone surveys, and individual meetings with key community contacts (Municipalities, businesses, haulers, etc.), organizations, and appropriate County staff for Subtasks 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 2.2 and 2.3. KCI staff also used food waste estimates based on research and studies conducted by KCI, the County endorsed BusinessWise database, and the LUESA residential survey for the food waste generation components in Subtask 1.1 and 2.1. Secondary research was gathered through existing County documents such as ordinances, program materials of other jurisdictions' food waste diversion programs, using standard forms to gather information that could be comparable and loaded into spreadsheets, tables or matrices to support all Subtasks.

MAJOR FINDINGS AND RECOMMENDATIONS

Based on the information gathered and analyzed, KCI made the following findings and makes these recommendations:

Commercial Food Waste Key Findings and Recommendations

- The six (6) largest food waste generating sectors are food manufacturers, food stores, restaurants, hotels/lodging, medical/health services, and education. KCI estimates that the commercial sector in the County generates approximately 143,000 tons per year of food waste, and that the top 300 businesses in the six (6) largest food waste generating sectors generate 49,300 tons or 35% of the total annually. KCI estimates that the County

could realistically recover up to 30,000 tons per year of food waste, utilizing a 60% projected recovery rate for the largest generator categories.

  - Consider conducting waste audits and/or waste characterization analyses targeted at sectors that are major potential sources of food waste.

- Composting operations in the Charlotte region already handle over 36,000 tons per year of food waste, and currently have an estimated 30,400 tons per year of unused capacity.
  - Continue to monitor development of two private anaerobic digestion facilities.
  - Undertake a site feasibility study of County properties to determine if any are potentially suitable to move Compost Central to a new location.
- Food banks/soup kitchens surveyed distributed an estimated 2,100 tons of food donated by businesses; approximately 40 tons of the donated food that was leftover or unusable food was disposed or composted in a community garden annually.
  - Consider conducting an informal focus group or convening a committee of local food banks and corporate donors to explore ways to improve the existing food waste exchange program and to address any corporate liability concerns.
- Oyster shells are unsuitable for composting due to the labor intensive preprocessing requirements.
  - Work with the Division of Marine Fisheries to implement an oyster shell diversion program for the County.
- There is an unmet need for commercial food waste recovery in the County, as well as a strong willingness among major commercial food waste generators to consider food waste recovery options.
  - Develop a voluntary commercial food waste diversion program. Include a pilot implementation in the plan.
  - Convene with interested businesses to establish a voluntary group (possibly through an existing sustainable business alliance) interested in providing the critical mass necessary to make food waste collection cost effective, as well as publicize the initiative.
- The major factors contributing to the success of commercial food waste recovery programs are outreach, public education, and technical assistance provided by local governments. High levels of commercial food waste recovery can be achieved by focusing the program on those businesses that are major food waste generators rather than adopting a broad-based program affecting all business establishments.
  - Develop an awareness campaign, educational materials and technical resources to be tested during the pilot program.
- Five (5) private haulers expressed interest in building food waste collection into their operations; three indicated they could mobilize within six (6) months.

  - Convene an individual meeting with each hauler to narrow down the pilot collection partner for a collection route targeting large generators in a concentrated area (i.e. City of Charlotte).
  - During these same meetings discuss which hauler partner may be able to partner with the County to pilot a small business food waste drop-off program at your full-service drop-off centers.
- Economic drivers in the organics recycling industry relate to the balance of available material, the cost to collect and transport the material and the relationship between disposal and process fees for recovery. Environmental policy drivers for businesses relate to increased waste reduction and zero waste goals, increasing local governments presence in food waste composting within its own borders help to keep pollution down by reducing transport to long-distance organics facilities; compost, soil quality, water quality and resource protection are all linked; and compost has water conservation benefits and helps reduce irrigation requirements. Policy drivers relate to generator perception, goals and plans, disposal bans, mandatory versus voluntary programs, market development, technical assistance, incentives, and funding.
  - Evaluate economic, environmental, and policy drivers through a commercial pilot program (collection and drop-off); survey businesses on whether or not they would support adding food waste to the Source Separation Ordinance; create an awareness program on the link between the environmental pollution message to the *Eat Local, Buy Local, Farm to Tabl*e economic message; and develop a technical assistance program that includes education material, organics recycling kits, and integrate organics recycling assessment into the existing business assessment program for follow-up by compost staff.
- For all 10 local barriers identified (generators, collectors, processors, existing programs, economic, policy and environmental drivers, organics recycling awareness, education and outreach, and pilot a program), they each have opportunities that allow actions to bridge the gap.

Residential Food Waste Key Findings and Recommendations

- Mecklenburg County's residential sector generates approximately 38,900 to 60,100 tons per year of residential food waste of which an estimated 2% - 5% (800 – 2,900 tons per year) is being recovered through home composting. A comprehensive residential food waste recovery program would capture another estimated 13,900 – 27,800 tpy of food waste recovery (36% - 46% of food waste generated).
  - Consider conducting a residential waste characterization study in order to more accurately determine the quantities of residential food waste in the County.

  - Consider modifying the annual survey to include questions that capture detail regarding home composting practices.
  - Consider implementing a residential food waste recovery pilot study.
- Based on existing collection infrastructure, Huntersville may be the Municipality best suited for a pilot program.
  - Consider adding a question(s) about residential interest in and willingness to utilize curbside and drop-off food waste recycling in the next LUESA residential survey.
  - Continue dialogue to secure meetings with Charlotte, Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville management staff to confirm the best possible Municipal partner for a residential food waste collection pilot program.
- For all four (4) local barriers identified (food waste generation quantities, LUESA survey, pilot partners, residential awareness and perception), they each have opportunities that allow actions to bridge the gap.

Countywide Food Waste Program Key Findings and Recommendations

- Existing processing capacity exists to perform either a commercial and/or residential pilot program.
- There is not enough food waste processing capacity for the County to roll-out a countywide program as depicted in Figure 3.
- It is important to note that the total permitted capacity at existing food waste recovery facilities includes Wallace Farms. If Wallace Farms is unable to relocate its food waste composting activity, the total existing capacity would be reduced to approximately 50,700 tons per year, further exacerbating the shortage of capacity to handle a full-scale County program. Therefore, the County should closely monitor the various private sector efforts to expand food waste processing capacity. And if a full-scale program is envisioned, the County should then consider taking a direct role in ensuring sufficient capacity exists through some type of public-private partnership.

Executive Summary Figure 1
Current Food Waste Mass Balance

	Residential & Commercial	
	Low	***High***
County FW Generation	175,100	210,600
County FW Recovery	11,000	23,300
Current FW Handled by Recovery Facilities	40,700	
Recovery Facility Capacity Used for Non-County FW	29,700	17,400

Note: numbers rounded to nearest 100.
FW = food waste.

Executive Summary Figure 2
Potential Food Waste Mass Balance – Limited County Program

	Residential & Commercial	
	Low	***High***
County FW Generation	175,100	210,600
County FW Recovery	20,600	32,500
Total Permitted Capacity at Existing Recovery Facilities	71,100	
Surplus Capacity for Non-County FW	50,500	38,600

Note: County program limited to Top 300 establishments in major generating sectors.
Note: numbers rounded to nearest 100.

Executive Summary Figure 3
Potential Food Waste Mass Balance – Comprehensive County Program

	Residential & Commercial	
	Low	***High***
County FW Generation	175,100	210,600
County FW Recovery	54,800	89,100
Total Permitted Capacity at Existing Recovery Facilities	71,100	
Surplus Capacity for Non-County FW	16,300	-18,000

Note: comprehensive residential and commercial program.
Note: numbers rounded to nearest 100.

ACKNOWLEDGEMENTS

The authors of this study would like to thank the following companies and government organizations for allowing us to visit facilities and/or for participating in surveys, and freely sharing information to make this report possible.

- Mecklenburg County Solid Waste

- Local Municipalities
  - Charlotte
  - Cornelius
  - Davidson
  - Huntersville
  - Matthews
  - Mint Hill
  - Pineville

- Compost Facilities or Programs
  - Earth Farms
  - Compost Central
  - UNC Charlotte
  - Davidson College
  - Foster Caviness
  - Wallace Farms
  - W2E Organic Power

- Food Banks/Soup Kitchens
  - Angels & Sparrows
  - Charlotte Rescue Mission
  - Dilworth Soup Kitchen
  - Friendship Trays
  - Loaves and Fishes
  - Second Harvest
  - Urban Ministry

- Keep Mecklenburg Beautiful

- Local Collection Haulers
  - Advanced Disposal
  - Hawk Sanitation & Recycling
  - Inland Service Corp.
  - O'Leary Group
  - RCS
  - Republic
  - Select Sanitation
  - Signature Waste Systems
  - Waste Management

- Major Commercial Food Waste Generators
  - Art Institute of Charlotte
  - Bi-Lo
  - Carolinas Rehabilitation
  - Chili's Grill & Bar
  - Compare Foods
  - Davidson College
  - Del Frisco's Double Eagle Steak House
  - DoubleTree Guest Suites
  - Flatiron Kitchen & Tap House
  - Food Lion
  - Harris Teeter
  - Hilton Charlotte Center City
  - Johnson & Wales University
  - Johnson C. Smith University
  - K&W Cafeteria
  - Sheraton Airport
  - Levine Children's Hospital

  - Marriott City Center
  - Queens University of Charlotte
  - UNC Charlotte

- National Food Waste Recovery Programs
  - Charleston, SC
  - King County, WA
  - Oakland, CA
  - Orange County, NC
  - Portland, OR
  - San Francisco, CA

SECTION 1.0
FINAL REPORT

INTRODUCTION

Mecklenburg County (County) is a progressive leader known both nationwide and within the state for its innovative and successful waste reduction and recycling education programs of its residents and businesses through an integrative solid waste management system. The County's 2009 Solid Waste Management Plan (2009 Plan) includes a 35% waste reduction goal by 2018. The County recognizes that increased food waste diversion is essential to reaching the goals of that plan. According to data submitted to the state for 2010/2011, the County generated an estimated 1.2 million tons per year of municipal solid waste (MSW), with 1.0 million tons of it disposed, which translates to a 14% diversion rate.

The County seeks to better understand the quantities, distributions, markets and infrastructures of food waste diversion in the commercial and residential sectors. Kessler Consulting, Inc (KCI) was retained by the County in October 2011 to complete a Food Waste Diversion Study. The study's goal is to establish baseline information needed to evaluate the feasibility of a future pilot program and subsequent comprehensive countywide food waste recovery program. The information obtained from this study will also be used by the County in its Solid Waste Management Plan revisions. The study addresses both commercial and residential food waste.

For the commercial sector, KCI work activities include:

- Identify major commercial generators and quantities of food waste (Subtask 1.1)
- Identify and profile existing food waste recovery programs and recycling facilities and determine capacity or additional capacity needed (Subtask 1.2)
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- Profile successful food waste diversion program components in other jurisdictions (Subtask 1.4)
- Assess potential food waste collection and transport options (Subtask 1.5)
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For the residential sector, KCI work activities include:

- Estimate the amount of residential food waste created per household (Subtask 2.1)
- Review existing residential curbside collection programs and potential to include food waste diversion (Subtask 2.2)
- Identify program implementation gaps and opportunities for bridging gaps (Subtask 2.3)

This document presents a summary of the information obtained and the analysis performed for these tasks.

BACKGROUND

Food waste programs present more challenges than other targeted materials, and these programs are often more difficult to plan for recovery. The goal of any food waste program is to divert more tons in the most effective and efficient manner both economically and environmentally for processing and producing a valuable marketable material. The County study is gathering and assessing information following the EPA Food Recovery hierarchy by identifying 1) food for people 2) food for animals, 3) food for the earth (composting), and 4) food for disposal. The study will help the County to benchmark generation and identify the gaps and opportunities towards establishing the feasibility of a future countywide food waste diversion program.

METHODOLOGY

KCI follows a systematic and thorough process to gather information for analysis provided by County staff. Primary research was gathered through informal email surveys, telephone surveys, and individual meetings with key community contacts, organizations and appropriate County staff for Subtasks 1.2, 1.3, 1.4, 1.5, 1.6, and 1.7. KCI staff also used food waste estimates based on per employee coefficients, the County endorsed BusinessWise database, and the LUESA residential survey for the food waste generation components in Subtask 1.1 and 2.1. Secondary research was gathered through existing County documents such as ordinances, program materials of other jurisdictions' food waste diversion programs using standard forms to gather information that could be comparable and loaded into spreadsheets, tables or matrices to support all Subtasks.

COMMERCIAL FOOD WASTE

Who are the largest potential food waste generators in the County?

Mecklenburg County is home to seven (7) municipalities, the largest being the City of Charlotte (Charlotte). Charlotte is a major metropolitan area and a thriving downtown commercial business sector of high rises and major corporations.

Profile of the Commercial Sector

According to the data provided by BusinessWise, Mecklenburg County has approximately 20,300 businesses, employing an estimated 426,000 people (see Figures 1.0 and 2.0). The major business sectors are Services and Retail Trade, which together account for 65% of businesses and 59% of employment in the County.

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Figure 1 – Number of Business Establishments by Business Sector

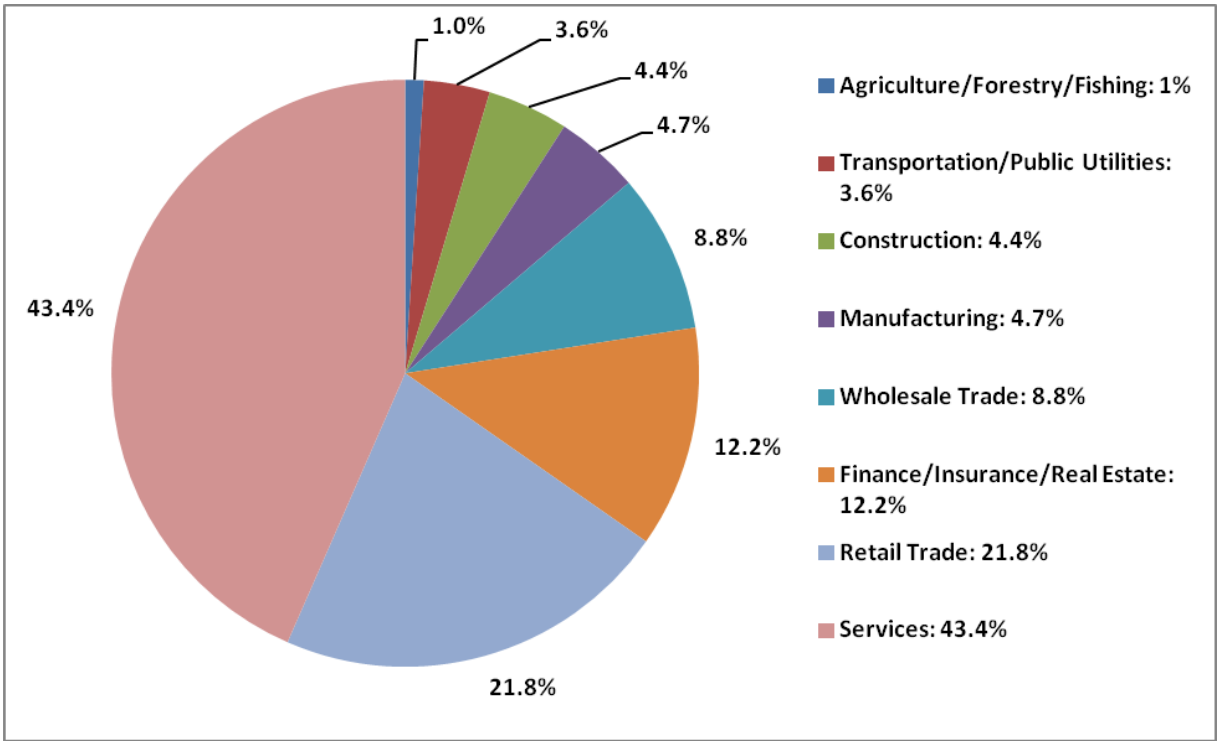

Figure 2 – Commercial Employment by Business Sector

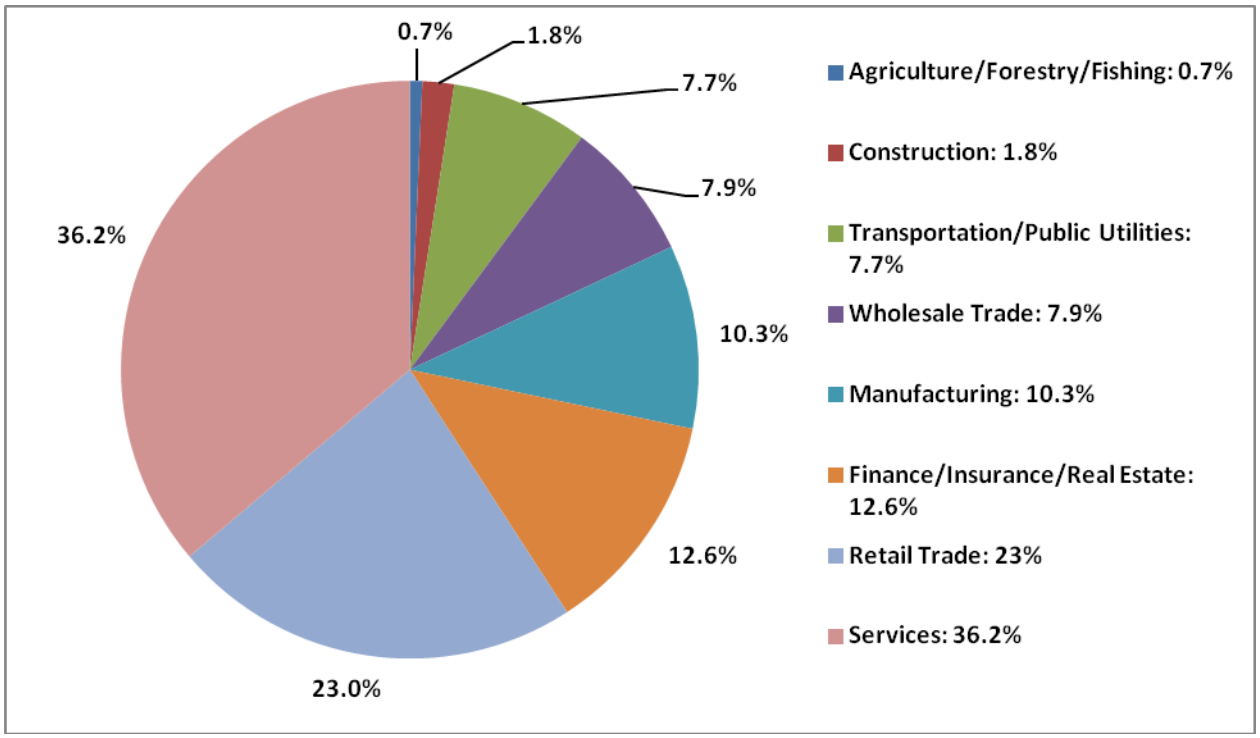

Table 1 (below) provides another perspective on the County's business sector by showing the number of business establishments by size of the business (employees). Across all business sectors, the vast majority (86%) are small businesses with less than 25 employees.

Table 1 – Number of Business Establishments by Sector and Size

	Number of Employees								
Business Sector	**1-3**	**4-9**	**10- 24**	**25-49**	**50-99**	**100-249**	**250-499**	**>500**	**Total**
Agriculture, Forestry, and Fishing	76	66	42	17	4	0	0	1	206
Mining	1	0	2	1	0	0	0	0	4
Construction	359	348	149	37	7	2	0	0	902
Transportation and Public Utilities	292	181	141	55	31	19	6	10	735
Manufacturing	152	259	240	122	80	64	17	9	943
Wholesale Trade	454	619	420	161	83	34	3	2	1,776
Retail Trade	1,128	1,328	1,133	445	257	114	14	6	4,425
Finance, Insurance, and Real Estate	967	918	385	112	59	20	6	12	2,479
Services	3,513	2,769	1,533	562	240	129	39	24	8,809
Total	**6,942**	**6,488**	**4,045**	**1,512**	**761**	**382**	**85**	**64**	**20,279**

Food Waste Generation Estimates

As noted previously, detailed commercial waste characterization data do not exist for Mecklenburg County. Similarly, waste composition data for all the various different categories of businesses in the County do not exist, and further, there are very few sources of such data anywhere in the U.S. This lack of data was noted in the previous commercial waste study conducted in the County (*2006 Commercial Waste Characterization Study*). That study estimated commercial waste disposal at approximately 608,000 tons per year based on sector-specific coefficients from a 1999 California Integrated Waste Management Board (CIWMB) report combined with employment data obtained from InfoUSA. The commercial waste estimates in the 2006 study differ from KCI's estimates presented in this report because the two reports rely on different sources of data.

KCI utilized a different methodology to estimate commercial food waste generation (note that KCI estimated *generation* versus *disposal*). In addition to the 1999 CIWMB report that provides waste disposal coefficients and composition for 39 categories of business, KCI derived generation data from a 2006 CIWMB report that characterized diversion and disposal from 14 business categories. KCI compiled these data into waste generation coefficients (pounds/employee/year) and composition (percent) assumptions for 37 relevant business categories. KCI then applied these assumptions to BusinessWise employment data for Mecklenburg County.

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Table 2 – Estimated Waste Generation by Business Category

SIC Code Business Category	Waste Generation (tpy) Food Waste	Total MSW
Agriculture / Fisheries	29	1,850
Mining	10	122
Construction Companies	381	9,209
Manufacturing--Food / Kindred Products	2,389	9,821
Manufacturing--Apparel / Textile	46	2,563
Manufacturing--Lumber and Wood Products	148	6,371
Manufacturing--Furniture / Fixtures	2	559
Manufacturing--Paper / Allied	137	1,845
Manufacturing--Printing / Publishing	233	6,343
Manufacturing--Chemical / Allied	115	3,349
Manufacturing--Primary / Fabricated Metal	132	3,354
Manufacturing--Industrial Machinery	202	5,915
Manufacturing--Electronic Equipment	166	2,292
Manufacturing--Transportation Equipment	70	1,280
Manufacturing--Instruments / Related	80	1,271
Manufacturing--Other	95	5,944
Trucking and Warehousing	69	4,299
Transportation--Air	988	10,624
Communications	611	8,135
Utilities	76	731
Wholesale Trade--Durable Goods	824	37,016
Wholesale Trade--Nondurable Goods	4,610	22,200
Retail Trade--Building Material and Garden	364	7,424
Retail Trade--General Merchandise Stores	3,327	49,640
Retail Trade--Food Store	26,597	90,513
Retail Trade--Automotive Dealers & Service Station	900	12,761
Retail Trade--Restaurants	58,277	127,338
Retail Trade--Other	1,153	17,198
Finance / Insurance / Real Estate / Legal	9,132	49,253
Services--Hotels / Lodging	7,123	17,237
Services--Business Services	3,817	20,587
Services--Motion Pictures	190	1,026
Services--Medical / Health	5,596	30,184
Services--Education	2,201	11,869
Services--Other Professional	6,612	35,663
Services--Other Misc.	6,669	35,972
Public Administration	0	0
Total	**143,371**	**651,758**

Note: Total MSW estimate does not include C&D debris. Zero is noted for Public Administration because BusinessWise is private sector information only and does not include public sector data, and the focus of this study is commercial businesses. The results of this study would be applied to the public sector, for example, Charlotte-Mecklenburg schools.

A limitation of KCI's methodology is that it relies on waste generation and composition data derived from businesses in California which may differ from those in Mecklenburg County in ways that cannot be quantified. Nevertheless, KCI believes that waste characteristics are relatively similar within any given business category due to their homogenous organizational structure and employee work activity, regardless of geographical location. Therefore, the estimates presented in this report are considered to be reasonably accurate and sufficient at this stage of County planning.

KCI estimates that the commercial sector in the County generates approximately 143,000 tons per year of food waste and 652,000 tons per year of MSW (see Table 2). By comparison, in its annual report to the state Department of Environment and Natural Resources (DENR), Mecklenburg County reported disposing approximately 513,000 tons of commercial waste in FY2010-2011. Given the fact that KCI's is a *generation* estimate and the County's is a *disposal* number, these numbers are comparable and indicate that KCI's estimates are good for the purposes of this project.

Food Waste Recovery Potential

Based on analysis of the food waste generation data and our knowledge of commercial food waste programs in other communities, KCI identified six (6) business categories as primary targets for commercial food waste recovery in the County. Then utilizing the BusinessWise database and the Book of Lists from the Charlotte Business Journal, KCI identified the number of businesses and employment for the targeted business categories based on criteria for each business category to identify larger establishments that would be the largest food waste generators in each category (see Table 3). The criteria were based on typical waste generation coefficients in order to identify businesses that would likely be subject to County's Source Separation Ordinance (16 cubic yards or more of waste service per week).

Table 3 – Major Food Waste Generation Sectors

Business Category	Criteria	Estimated Establishments	Estimated Employment
Food Manufacturing	>25 Employees	12	3,994
Retail Trade--Food Store	>25 Employees	101	9,437
Retail Trade--Restaurants	>50 Employees	147	13,452
Services--Hotels / Lodging	>50 Employees, with restaurant	24	3,788
Services--Medical / Health	>100 Employees, Inpatient facilities	10	8,170
Services--Education	University/College, Residential Campus	6	5,460
Total		**300**	**44,301**

KCI then estimated food waste recovery based on recovery rates ranging from 20% to 60% of the food waste generated by the target businesses in Mecklenburg County. Table 4 presents these results. These recovery rates are reasonable assumptions at this early stage of program assessment and planning. For example, in projecting potential food waste recovery for its program development, Portland, Oregon established the goal that 75% of major food waste generating businesses would participate and those businesses would recover 40% to 60% of the food waste they generate.

Table 4 – Food Waste Generation and Potential Recovery by Major Generators

Business Category	Estimated FW Generation	Projected FW Recovery (tons/year)		
		Low 20%	Medium 40%	High 60%
Food Manufacturing	1,606	321	643	964
Retail Trade--Food Store	21,854	4,371	8,742	13,113
Retail Trade--Restaurants	19,798	3,960	7,919	11,879
Services--Hotels / Lodging	3,756	751	1,502	2,253
Services--Medical / Health	1,395	279	558	837
Services--Education	932	186	373	559
Total	**49,341**	**9,868**	**19,737**	**29,605**

In conclusion, KCI estimates that a well-planned and implemented commercial food waste recovery program targeting major generators in Mecklenburg County could realistically recover up to 30,000 tons per year of food waste. As will be detailed in subsequent task reports, a significant amount of the County's commercial food waste is already being recovered through food banks and composting activities. Figures 3 and Figure 4 reflect these results.

Figure 3 - Amount of Food Waste Generated by Largest 300 Generators

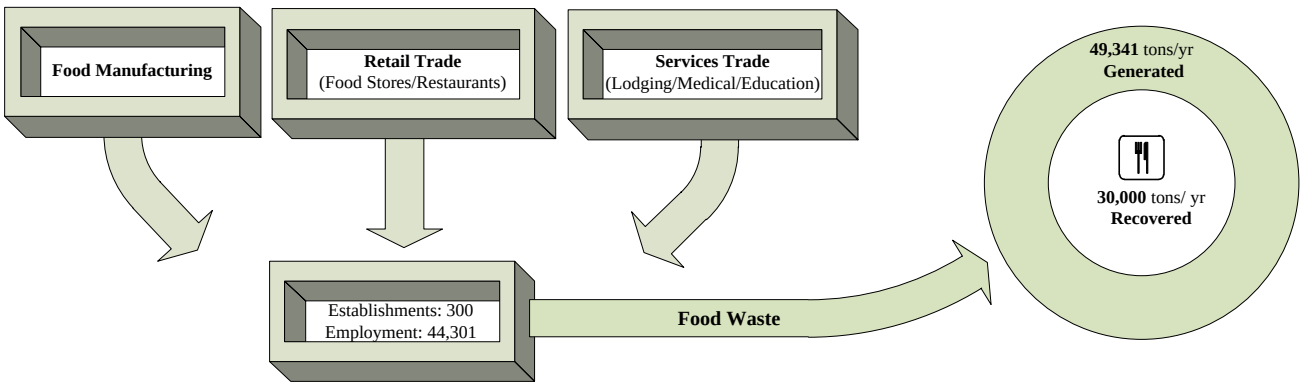

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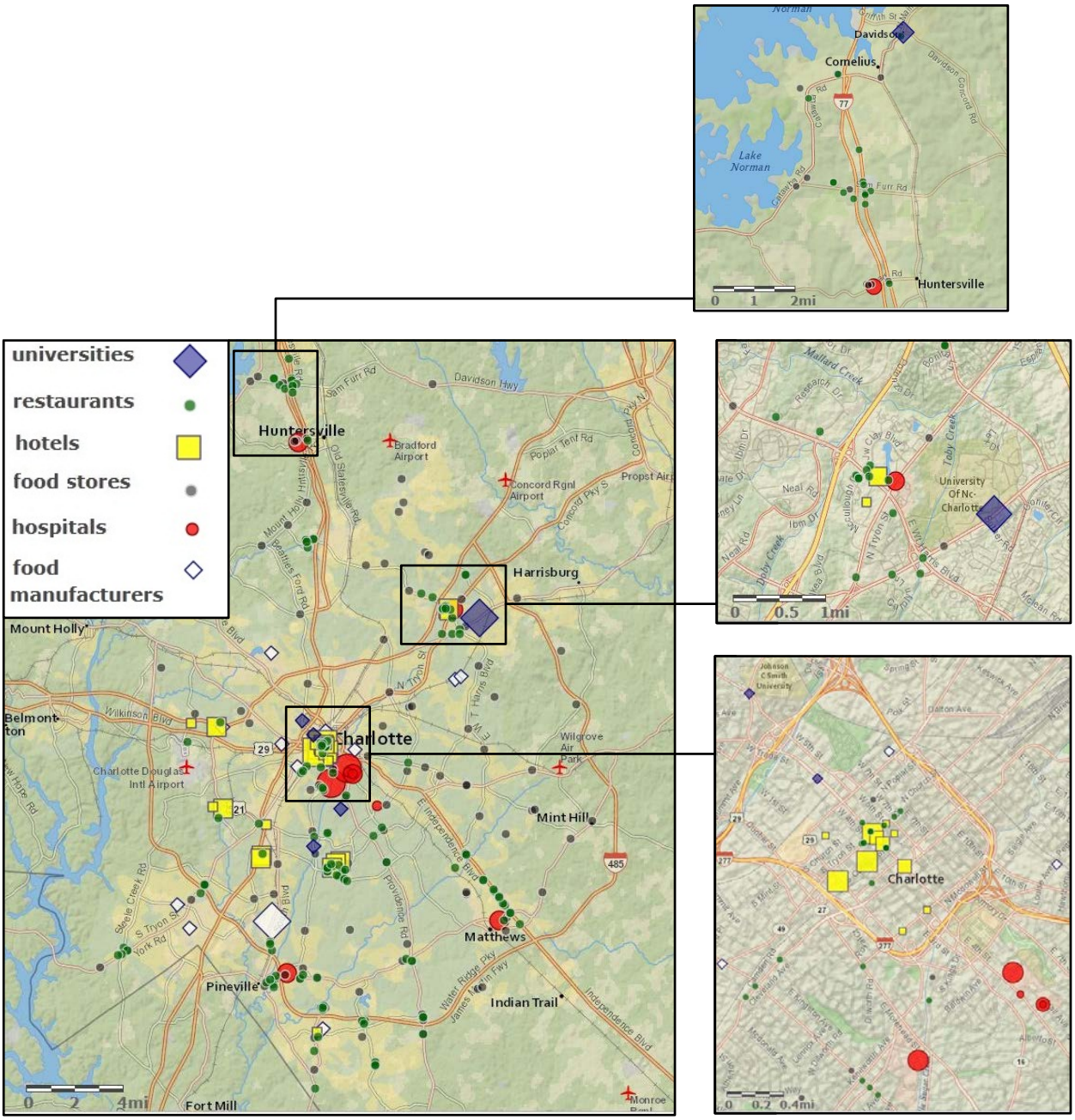
Figure 4 - Largest Commercial Generators Clustered Locations



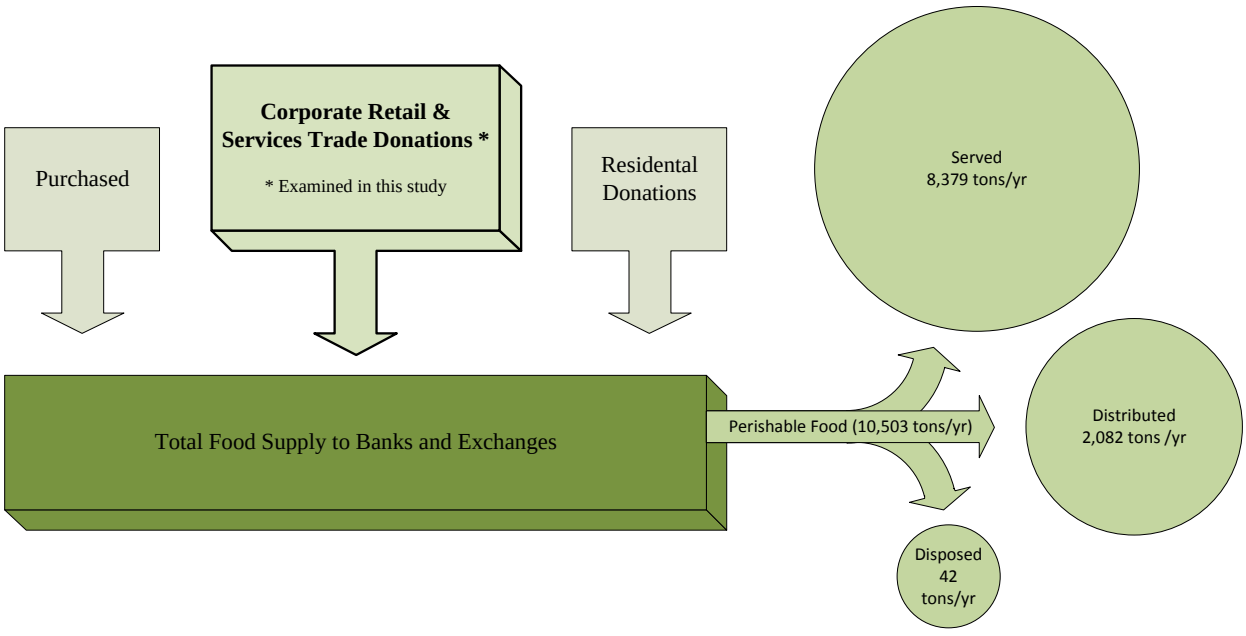
How is the commercial sector currently diverting food waste?

KCI then set out to identify and profile the existing food waste recovery programs for food going to swine and food banks/soup kitchens. After obtaining information from the North Carolina Department of Agriculture and the U.S. Department of Agriculture Animal and Plant Health

Inspection Services (APHIS), KCI determined that while APHIS does maintain a list of licensed garbage feeder operations (garbage to swine) in NC, it cannot provide the list due to privacy concerns. It does not have information about quantities of garbage. They did disclose that there are approximately 40 garbage feeders in the state and only one is located in the Mecklenburg metropolitan area (in Catawba County).

Additionally, KCI identified twelve (12) food banks/exchanges and soup kitchens located within the County receiving perishable donated food from business donations. Seven (7) responded to the survey in some manner. Survey respondents serve approximately 418,300 meals annually in Mecklenburg County. Respondents received an estimated 2,124 tons of donated perishable food and distributed an estimated 2,082 tons through meals within the community, with approximately 42.1 tons of leftovers or unusable scrap disposed or composted in a community garden annually. Figure 5 depicts these results.

Figure 5 - Food Banks/Soup Kitchens Diversion Programs

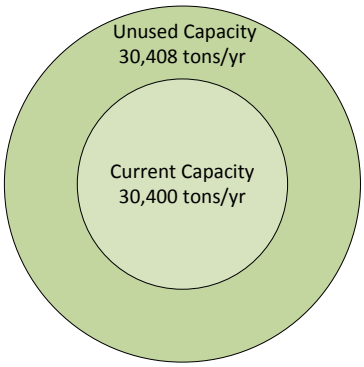


What is the existing and future potential processing capacity in the County?

KCI then moved to identify and profile the organic recycling facilities located in the Charlotte metropolitan area to estimate available processing capacity. Ten (10) programs or facilities were identified with seven (7) responding to the survey and information gathered on the other three (3) either via phone calls or from the internet or County staff if they could not be reached directly. The seven (7) entities have the capacity to process over 176,000 tons per year of organic material (i.e., vegetative materials, animal by products, manure, and yard trash) and handle an estimated 37,000 tons per year of food waste. Four (4) of the facilities indicated that they were interested in receiving new sources of food waste and four (4) stated they have the ability to expand their operations for this purpose. This did not include the County facility, Compost Central.

According to KCI's research, these facilities currently have an estimated 30,408 tons per year of unused capacity which would provide enough capacity for a pilot program and/or additional food waste from generators. Figure 6 depicts these results.

Figure 6 - Unused and Current Permitted Capacity



Earth Farms and Wallace Farms account for essentially all of this total potential capacity (46,600 and 20,800 tons per year, respectively). Importantly, Wallace Farms' entire food waste capacity after 2015 is uncertain due to a legal settlement and their need to find a new location for food waste composting. Table 5 on the next page depicts this overview.

Table 5 - Current and Potential Food Waste Capacity at Permitted Facilities (tons/year)

Facility	Current	Current Unused Capacity	Total Potential (Permitted) Capacity
County Facilities	0	0	0
Earth Farms	26,600	20,000	46,600
Wallace Farms*	10,000	10,400	20,400
UNC Charlotte**	5	8	13
Total	36,605	30,408	67,013

*Capacity to process food waste after 2015 in question
**Capacity limited to food waste generated on campus

Two (2) private anaerobic digestion venture companies are considering developing commercial scale facilities in the area. If one of these facilities is developed it might consume some 30,000 tons per year of food waste drawn from a wide radius around Mecklenburg County. The County should continue to monitor these proposed projects. The County itself does not have easily developable food waste composting capacity at its existing Full Service Recycling Centers or Compost Central, and in fact the County may need to find a new site for Compost Central. KCI recommends that the County undertake a site and feasibility study of County properties to determine if any are potentially suitable for food waste, yard waste and biosolids composting. The County should evaluate whether a pilot is feasible at the McAlpine Wastewater Treatment Processing Facility. Additionally, the County could look at pretreatment and/or preprocessing options at another location for food waste to deter vectors (birds/animals) or an enclosed facility as a part of its feasibility study and cost-benefit analysis. Figure 7 on the next page depicts the existing facilities with capacity, the expanded capacity facilities, and the potential operational pilot site mentioned.

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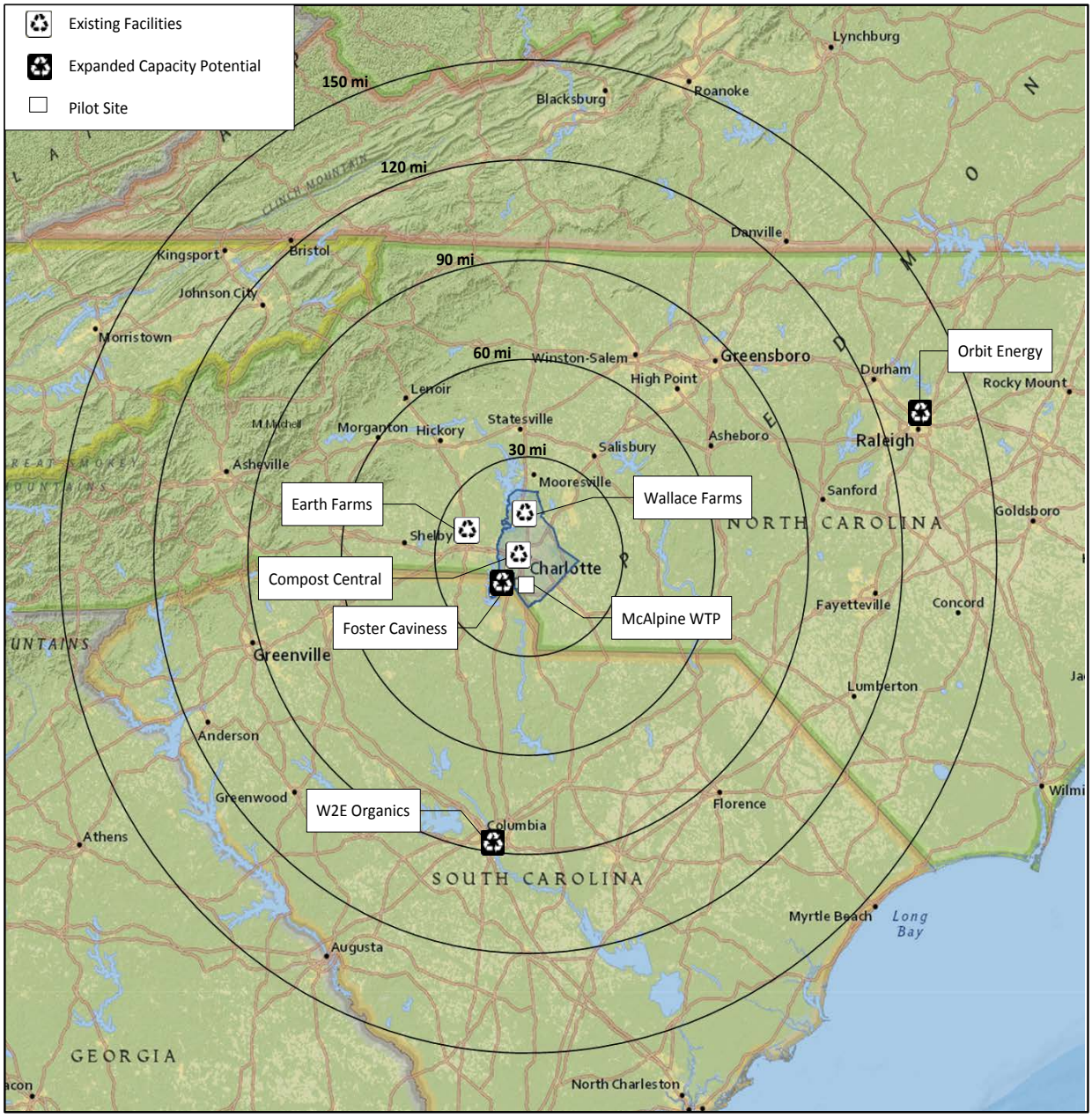
Figure 7 - Existing and Future Capacity



Lastly, the County requested that research be performed regarding Oyster Shell program and composting opportunities. Oyster Shells are included as a part of the items banned from disposal in a landfill since 2009. KCI found there is not an oyster shell recovery program in the County. KCI in-house composting experts reported that oyster shells do not decompose and are not suitable for commercial scale composting. KCI research found information regarding the use of oyster shells for home composting. Although the shells themselves will not break down in the composting process, they can be pulverized and added to compost to provide additional calcium. However, the shells must undergo a rigorous cleaning process prior to use to avoid bad smells, insect infestation, and excess salt that can kill plants. The shells must be soaked in hot soapy water, scrubbed, rinsed, soaked in a bleach solution, rinsed again, soaked again, scrubbed with liquid detergent, then rinsed and soaked a final time. The shells must be pulverized before being added to compost. Therefore, it is unlikely that businesses or residents will go through this tedious process to recycle them. KCI recommends that the County work with the Division of Marine Fisheries to implement an oyster shell diversion program similar to the one in Wake or Orange County, NC.

What Diversion and Management Practices are Major Generators Doing to Divert Food Waste?

In order to estimate the current food waste diversion and management practices at major generators in the County, KCI once again went to the data and business profile information in the BusinessWise database. KCI developed and conducted a telephone survey of 24 businesses from the top six (6) food waste generating sectors with 20 businesses responding to the survey as of December 23, 2011. Eighty-five percent were able to provide trash container and pull frequency information. Seventy percent of survey respondents were able to provide an estimate of the food waste component of their total trash composition. Estimates ranged from five percent (grocery) to seventy-five percent (hotel/lodging) and the disparity was attributed to whether or not there was a tight portion of inventory control in the kitchen/food prep areas for these business sectors. Fifty percent of all respondents stated that they currently have a food waste diversion program as a part of their operations and 70 percent of those programs donate to food banks. Thirty percent divert fat and grease. Lastly, 20 percent send their food waste to a composting facility and 10 percent send to a garbage feeder or return food to the manufacturer.

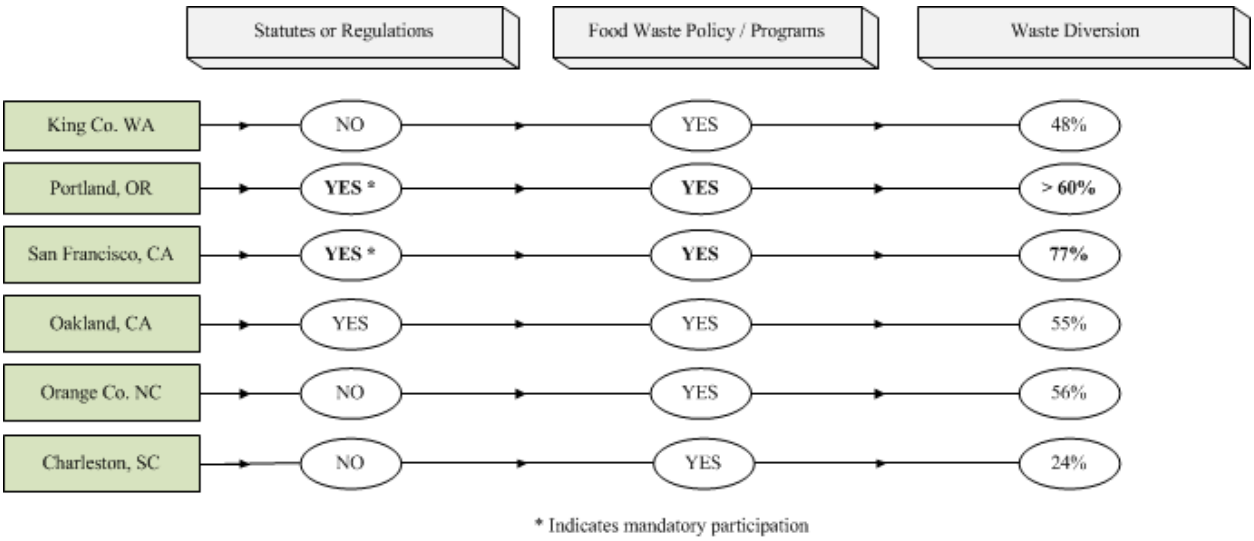
Comments by survey respondents suggest that five (5) of the six (6) sectors are generally supportive of (if not already participating in) food waste recovery. Restaurants were the one (1) sector that most consistently raised concerns about food waste recovery and this appears to be

due to a lack of awareness in understanding the potential diversion, recovery options, and possible economic benefits of a food waste diversion program. Based on the comments received, it is also clear that businesses need to see a strong value proposition in order to implement food waste recovery. County efforts to implement and expand commercial food waste recovery will need to address businesses' concerns about economic viability, sanitation and odor, and food waste storage and handling, among other concerns and perceived barriers. KCI suggests workshops, guides and/or education kits to educate the commercial sector. Conversely, the comments received clearly demonstrate that there is an unmet need for commercial food waste recovery in the County, as well as a strong willingness among major commercial food waste generators to consider food waste recovery options.

What's happening nationally regarding commercial food waste diversion programs?

In order to compare how other jurisdictions across the country have implemented successful food waste diversion programs, components from six (6) other local governments across the country and applicable to the County were assessed and contacted. Telephone surveys were performed and follow-up communication occurred for King County, WA; Portland, OR; San Francisco, CA Oakland, CA; Orange Co, NC; and Charleston Co, SC. It is clear from information gathered that successful food waste composting programs cannot be started without a government involvement to develop the collection, processing and marketing infrastructure**.** Figure 8 depicts these programs.

Figure 8 - National Commercial Food Waste Diversion Programs



Successful commercial food waste programs share several general characteristics. First, they generally are implemented in jurisdictions that have broad-based recycling efforts, with commercial food waste being the next logical expansion of commercial recycling programs after traditional programs targeting containers and fiber recycling. It is not always necessary to make food waste recycling mandatory to businesses or packaging generators or to ban it from disposal; however, two of the six programs profiled have mandated commercial recycling. Based on our research, the major factor contributing to success of commercial food waste recovery programs is outreach, public education, and technical assistance. It is also interesting to note that while the public jurisdictions are initiating and promoting commercial food waste recovery, they rely almost entirely on the private sector to provide collection and composting services through franchise agreements and long-term contracts. Program performance data suggest that high levels of commercial food waste recovery can be achieved by focusing the program on those businesses that are major food waste generators rather than adopting a broad-based program affecting all business establishments.

What Collection and Transportation Options Exist from the Public Sector?

An assessment was performed in an attempt to describe the collection and transportation methods available in the County to move the food waste to any existing or proposed processing facilities. A survey was designed and sent out to the seven (7) municipalities in Mecklenburg County, they included, City of Charlotte and the Towns of Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville. The data from this survey was expected to identify and assess potential opportunities in utilizing existing Municipal waste collection and transportation infrastructure within the County. Each city/town was contacted via e-mail and sent a solid waste collection survey. All cities/towns responded. Additionally, KCI obtained each local government's Solid Waste and Materials Management Annual Report from the NCDENR to gather additional information about their programs.

In addition, a meeting was held with the Town of Huntersville since the local government was the only one with automated collection and cart service for garbage, recyclables, and yard waste through Advanced Waste Disposal. According to County staff, this community seems to be the most conducive to further discussions regarding a potential future food waste pilot for residents due to its collection and transportation infrastructure pending further discussions with Town staff, its collection hauler and the identification of a close delivery point for processing the food waste. Huntersville staff stated that they may be able to do a pilot, but it would depend on their contractor's view of such a proposal.

Commercial garbage and recyclables collection is an open market throughout the unincorporated county and no Municipality provides collection service to businesses. None of the jurisdictions control collection through franchise or contract. The exception to the rule, is that four (4) Municipalities, Charlotte, Cornelius, Huntersville, and Matthews, include some small businesses under their residential collection services program, and Davidson provides a central business district drop-off center (DOC) that services about 36 small businesses.

The County's commercial recycling source-separation ordinance (SSO), along with significant outreach, technical assistance and enforcement effort by County staff has helped to establish widespread commercial recycling being provided by private haulers and through the County's 14 full and self-service DOCs. The SSO requires all business establishments with 16 or more cubic yards per week of waste to separate and recycle cardboard and office paper. Prior studies have estimated that approximately 4,900 establishments are subject to the SSO; and that if the County were to reduce the threshold to 8 cubic yards of weekly service then 1,700 more businesses would be subject to the SSO. Interestingly enough, surveys found that approximately 50 percent of these additional businesses already recycle to some degree.

Additionally, North Carolina currently bans yard waste, aluminum cans, lead acid batteries, tires, used oil, antifreeze, and white goods from landfills. State law also requires all establishments that serve alcohol (e.g., bars and restaurants) to separate, store, and provided for the collection for recycling of all recyclable beverage containers sold at retail on the premises – including aluminum, plastic and glass beverage containers. Under this same House Bill in October 2009, the state landfill disposal ban was expanded to include motor vehicle oil filters, rigid plastic containers, wooden pallets and oyster shells. As previously stated, significant outreach, technical assistance, and enforcement effort by County staff has helped to establish widespread recycling programs for these materials by private haulers and through the County's DOCs. Those commercial generators (i.e., restaurants and bars) most impacted by these laws are possibly more adept at adding a food waste recovery program. Figure 9 depicts these results.

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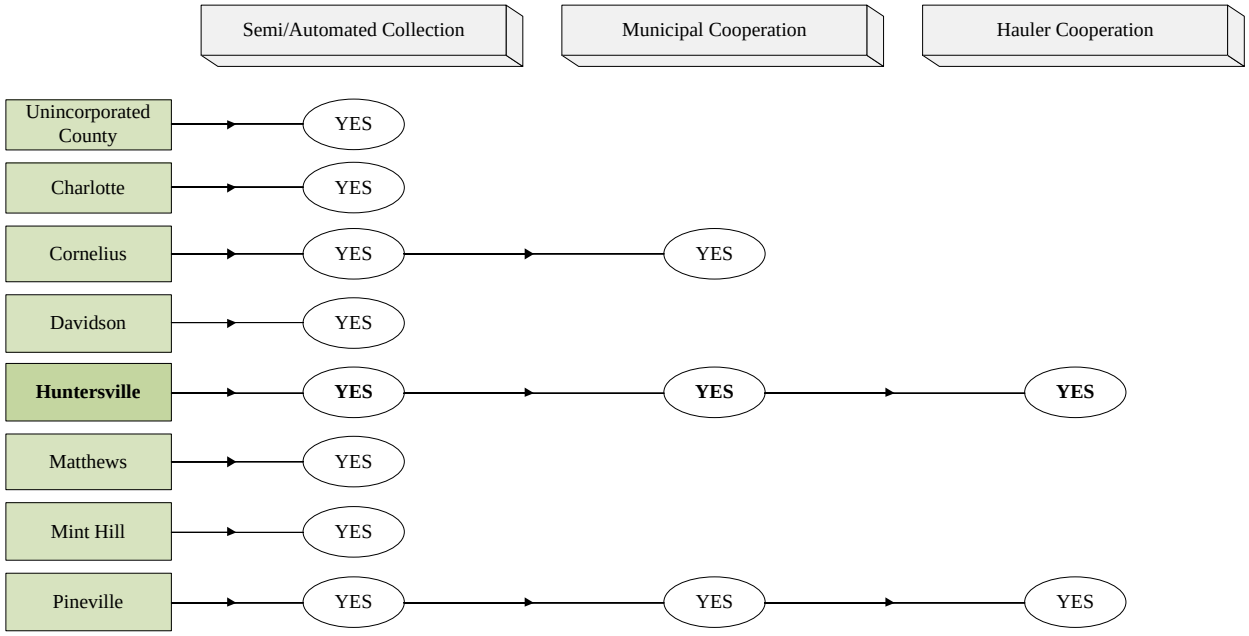
Figure 9 - Possible Municipal Partners



What Collection and Transportation Options Exist from the Private Sector?

Secondly, KCI designed and conducted a survey of major private haulers handling commercial waste in the County in order to assess their activities, interests and concerns regarding commercial food waste collection. A master list was prepared and each private hauler was contacted by phone to identify the decision maker within the company, and then sent a private hauler collection survey either via fax or e-mail depending on the collector's preference. Twenty-eight private haulers were identified, 14 responded, 8 were non-responsive, and one had disconnected phone service. In addition, the County identified five (5) one-vehicle haulers that would likely be too small to play a significant role in a food waste collection system. Consequently, KCI did not survey them.

Of the 14 responses received, only one organization currently has a food waste collection program. This organization (Foster Caviness) is not a solid waste/recyclables collector/hauler, but a fruit and vegetable produce distributor. According to their website, they see themselves as a dependable and trusted liaison between the farmers that grow the high quality produce that they deliver, and the chefs and foodservice professionals that prepare it for consumers. Foster Caviness recently established a pilot scale reverse distribution system to collect food waste from

existing customers, which they bring back to a vermicomposting operation. If successful, the company is interested in offering the service to other customers and potentially expanding outside their current customer base.

Of the 13 haulers that responded, seven said that they were interested in adding a food waste collection program to their business. Of those who expressed interest, four have previous organics food waste collection experience along with access to expertise, two do not have previous experience but have access to expertise through their regional or national food waste program contacts, and one has neither experience nor access to expertise.

Two of the seven haulers who expressed interest did not know when they would be able to mobilize food waste collections, two felt three to six months were adequate, two felt six months to a year was adequate, and one felt they could mobilize in less than a month. Of the six haulers that have no interest in adding a food waste collection program, two expressed that they collect/haul scrap metal only, one reported that they are in the residential garbage collection only, one reported that they do not have the knowledge nor the manpower, and two did not provide a reason.

Haulers were asked "What opportunities or barriers exist for expanding food waste recovery?" Responses ranged from "unlimited" to "none," as well as "not familiar enough to answer." Cost was the primary barrier cited including, but not limited to, cost of transportation due to lack of processing infrastructure in close proximity, cost of vehicle/equipment required and increased taxes for heavier trucks. Existing building design at commercial establishments was cited as a barrier because many commercial locations do not have enough room for collection containers or existing enclosure laws make it difficult to add space for carts. Also cited was volume of food waste required to make a program profitable, flow control issues, weight of collected food waste, and odor were also cited. Haulers are looking for collection markets where solid waste tipping fees are high, food waste processing fees are low, and for local processing facilities within the County's jurisdictions to make it economically feasible for them and their customers.

Of the seven interested private haulers, four have experience with food waste collection and six have access to food waste collection expertise (via parent company). Only one (Advanced Disposal) has no food waste collection experience or access to food waste collection expertise, but they are interested in adding food waste collection. Three responded that they could mobilize

in less than six (6) months: 1) Advanced Disposal, 2) Hawk Sanitation & Recycling, Inc., and 3) Waste Management.

If a countywide program is rolled out, the County could provide technical support to the private haulers for developing food waste diversion programs by conducting informal focus groups with collectors to follow-up and sign up program partners; providing education training workshop(s); providing information regarding North Carolina's tax exemption on equipment and facilities used exclusively for recycling and resource recovery; producing a customer and collection hauler food waste education kit with resources to help implement a food waste diversion program (to include, but not be limited to, frequently asked questions, bilingual education materials, promotional fliers, and list of compost facilities and/or collection providers); provide bilingual education material to provide to commercial customers, including, but not limited to, pictorial posters for reducing contamination and proper recovery of food waste; work with interested haulers to identify customers who are major food waste generators, and offer to provide technical support and facilitation to establish food waste collection demonstration programs; provide a food waste composting "meet-up' event between haulers and commercial customers at Chamber events or local business tradeshows or expos, etc.; updating the Resource Guide for Commercial Waste Reduction and Recycling when the program is rolled out countywide by adding composting to the title and a section about the commercial food waste composting program – proper inventory reduction based on proper incoming food procurement, food bank donation, and collection providers; updating the County's website when the program is rolled out countywide; identify and provide locations of and contact information for food waste processors that make it economically viable to collect and transport this material.

KCI staff convened a follow-up call with Waste Management staff based on their response to provide further information on their responses and their interest for commercial food waste recovery. A national staff member (Director of Strategic Materials, Organics Sourcing) stated that they have an innovative collection program in place with large generators of food waste across the country, predominately grocery stores. They have a reverse distribution program in place working with these large generators to backhaul food waste to their central distribution centers/warehouses where these locations are within a 100 mile radius of an organics composting or digesting facility. They have a company policy not to deliver to programs that are direct animal feed. They are willing to participate in commercial pilot programs where a mature market exists to collect and transport to a facility where a favorable tipping fee exists (high solid waste disposal tip fees and lower composting processing facility tip fees). They would be

interested in participating in a focus group or planning committee if the County was going to invest in a food waste program.

Signature Waste System is also interested in participating in any focus groups or committee meetings in the future planning stages.

What Drives the Commercial Generator to Want to Participate?

KCI staff has had multiple conversations with County staff, attended committee meetings with key commercial stakeholders and utilized information gathered during the large business generator surveys to identify and assess the economic, environmental and policy drivers to food waste diversion in the County.

Economic Drivers

Economic drivers in the recycling industry relate to the balance of available material, the cost to collect and transport the material and the relationship between disposal and processing fees for recovery.

Generators – For businesses to want to participate in a food waste composting program, they not only need to be dedicated to sustainable "green" practices, many need an economic incentive to recycle any material, and that includes organics. Mecklenburg County's commercial tipping fees are high enough to warrant businesses to perform or have a waste assessment performed for the addition of food waste recovery to their recycling program. Mecklenburg's tipping fees for commercial waste are $55/ton. Typically, solid waste tipping fees greater than $45/ton allow for a favorable economic condition to start an organics recycling program. Food waste or organic waste often make up a significant enough portion by weight of a business' waste stream to warrant an assessment and evaluation of the cost benefit. Table 6 reflects the County's tipping fees for all types of waste.

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Table 6 - Mecklenburg County Tipping Fees by Waste Type

Mecklenburg County Tipping Fees	
Type of Waste	**Estimated Tipping Fees**
Residential Waste	$ 27.50
Commercial Waste	**$ 55.00**
Construction & Demolition Debris	$ 39.00
Clean Wood Waste	$ 18.00
Clean Drywall	$ 29.00

Moving local government economic and planning models from a disposal to a recovery model also looks at the long term environmental benefits that come with investing in recovery programs that may cost more upfront. Over time, assessing the long-term benefits includes taking into account people, planet, and profits. The key for commercial programs is to analyze the unbundled fees a commercial business pays for disposal (collection, transportation and disposal) against the unbundled fees it pays for a food waste program. Since most businesses will probably already have a recycling program for at least fiber (office paper and cardboard), the diversion of all of these materials from the garbage container to the appropriate recycling container will allow the business to reduce garbage container, collection, and disposal costs through volume reductions and thereby break even or possibly reduce their total solid waste management expense. In some cases, businesses will be willing to pay more for their recovery and waste reduction programs to meet company/corporate environmental goals.

Collectors – Private haulers are the predominant provider of commercial food waste collection services across the U.S. They are motivated to move in this direction based on their customer demand to expand programs and local governments' efforts to develop food waste recovery programs to meet higher recycling and waste reduction goals. During the hauler surveys performed under Subtask 1.5, every hauler who responded said they would invest in the Mecklenburg area for commercial food waste collection service as long as the distance to travel was no more than 25 miles for a collection route or within 100 miles for a reverse distribution route. Providing technical support to haulers will help them to offer these services, including meetings and hauler kits that provide information for them and their customers.

Processors – Both public sector and private sector organics facilities are being sited and designed as the need for an organics processing infrastructure grows. It is interesting to note that

existing and proposed food waste recycling facilities in the Charlotte region are all "merchant" facilities motivated by economic drivers without public sector involvement up to this point. These organics programs are moving beyond just yard waste, clean woody debris, land clearing debris, storm debris and into pre- and post-consumer food waste, and even biosolids. Various methods of organics processing are in use today, ranging from no or low technology options to comprehensive and technologically advanced systems.

Windrow composting involves piling feedstock materials into elongated rows either outside or in a building, and turning them periodically based on time and temperature factors. This is by far the most common method of composting in the U.S. and Canada for yard waste and source-separated food waste. Windrow composting is fairly flexible and can be accomplished with turning equipment ranging from a front-end loader to specialized windrow turning machines.

The **Modified Static Aerobic Pile (MSAP)** method combines both static pile and windrow composting methods, which minimizes the need for mechanical turning while still maintaining aerobic conditions and excellent pathogen kill. This method accelerates the process with the use of an organic catalyst and creates a high quality compost product. The MSAP method was developed by Harvest Quest International, Inc., and is currently being applied in yard waste/food waste composting operations in South Carolina, Florida, and several other states in the U.S.

Aerated static pile composting involves placing air blowers and ducts under a pile of organic materials in order to maintain aerobic conditions. The pile is capped with an insulating blanket of wood chips or other material and not disturbed until the active composting process is complete.

In-vessel composting refers to enclosed systems such as large rotating tubes or elongated bays with mechanical turning machines and forced aeration systems. In-vessel systems tend to be more technologically advanced and therefore have higher capital and operational costs.

Anaerobic digestion (AD) is a biological process that takes place in the absence of oxygen. AD produces methane, which can be recovered for use as a biogas fuel. The solid digestate typically undergoes subsequent aerobic composting. There are numerous different AD technologies available. Historically, it has been used primarily for wastewater treatment and manure. With regard to source-separated organics from MSW, dozens of AD facilities operate in Europe and several are currently under development in the U.S.

Vermicomposting is derived from the Latin term vermis, meaning worms. It is essentially the consumption of organic material by earthworms. This speeds up the process of decomposition and provides a nutrient-rich end product, called vermicompost, in the form of worm castings. For large scale municipal or private facilities, vermicomposting can be conducted all year-round, providing environmental conditions remain within acceptable limits. For increased efficiency, care should be taken to ensure that organic feedstock and conditions allow worms to reproduce successfully and to withstand moisture and climatic fluctuations.

For either the public sector or private sector to embrace a specific processing method the economics have to meet many variables driving the final decision. In Mecklenburg County both the private and public sector have chosen to make investments in some organics processing operations. Other private entities outside of the County and North Carolina have shown an interest in bringing additional capacity to the community.

The costs and complexity of organics management systems increase substantially as the move is made from windrows to in-vessel composting, to anaerobic digestion. In general, aerobic in-vessel systems will cost twice as much as windrows, and anaerobic systems can cost three times as much. Subtask 1.2 identified those existing and potential future processing facilities in the County to determine current capacity and capacity needs.

Growing Power, a nonprofit urban garden and training center in Milwaukee, Wisconsin, was the feature cover story of Biocycle magazine's November 2008 issue. It is located on a two acre lot and provides affordable produce to underserved neighborhoods and processes a variety of organic wastes through composting and anaerobic digestion. Approximately 100,000 pounds of organic produce are grown annually, sold at the on-site retail store, as well as to restaurants and

food co-ops. The innovation with this program is that it was designed to be both productive and educational through classroom demonstrations and a kitchen and can be replicated in other communities. The economics for this closed-loop system translates to $5/square foot of produce annually in their beds and that translates to $200,000/acre.

KCI recommends that if the County moves its compost operation in the future to a site that has the potential to add food waste and biosolids, it should consider using the EPA recognized Modified Static Aerobic Pile (MSAP) method because it has relatively low capital development costs, is easily scalable to accommodate program growth, and utilizes a very flexible process that can adapt to fluctuations in feedstocks. By minimizing mechanical turning, the MSAP method provides economic and environmental benefits, mitigates odors and particulate discharge, and reduces composting time. Once the County rolls-out a pilot, subsequently develops a countywide program, achieves increased participation, and minimizes any contamination, then over time it is recommended that the County possibly look at alternative higher-technologies, such as anaerobic digestion. It is much more costly to develop, but can achieve favorable economics at a large scale of operation.

Additionally, the County could work with the local agricultural extension office or the local University to also use the Green Power model to initiate a similar program in the Charlotte region. A site visit by County management staff to one or more facilities using the technology would provide valuable information to aid in determining the process method that will best fit any expansion needs.

End Markets must be identified and developed to close the loop of yard waste and food diversion for a successful recovery program to be effective and sustainable. In most cases for the existing processing facilities they already have them identified. The volume and quality of the compost produced will impact which end users will be targeted and their acceptance of the product. Traditional users of compost include:

- Municipal public works, facilities, parks, and recreation areas
- Local landscape construction and maintenance contractors
- Soil blenders and landscape material suppliers
- Nearby military bases and related properties
- Traditional farmers
- Sod farms
- Golf courses and resorts

City facilities, parks, and recreation areas use of the compost not only closes the loop, but can offset costs by reducing or eliminating the need to purchase comparable landscaping material. Compost can be offered free or sold to residents for use in home gardens and landscaping. Compost can be offered for bulk pickup or distributed in bags. Sale of compost to commercial landscapers and other end users offsets costs and provides revenue.

New markets for compost material are growing and being driven as community supported agricultural farms, organic farms, farmers markets and community gardens increase in numbers and popularity with residents and businesses. And although these are listed in the market section, they are also a big part of the environmental drivers that can help to foster a sustainable composting program. They also help develop jobs and therefore contribute to the local economy. These markets provide new avenues for sale and partnerships as explained below:

Community Supported Agricultural (CSA) Farms: They are driving the trend in the food to table movement in local restaurants (i.e., Eat Local programs). CSA is a way of purchasing food that helps build a sustainable local food system in the process. By sharing some of the risk, the work, and the commitment with the farmers, local residents are helping in rebuilding that system in the Charlotte region. Know Your Farms, LLC handles the marketing, administration, and delivery of the CSA shares so that the farmers can focus on growing the food. This is being done for a network of CSA farms in the Charlotte region. For more information visit: http://knowyourfarms.com/j/

Organic Farms: There has always been organic farm products grown and sold in health food stores and nutrition stores, but consumer awareness of health and environmental issues have driven the expansion of the production and sale of organic products into traditional grocers and retailers. The Carolina Farm Stewardship Association (CFSA) is the driving force behind the organic farm movement in the Carolinas. CFSA's mission is to advocate, educate and build connections to create sustainable food systems centered on local and organic agriculture that is good for the farmer, the consumer and the land. It is a membership-based 501(c)(3) non-profit organization of more than 2,300 farmers, gardeners, consumers and businesses in North and South Carolina. For more information visit: http://carolinafarmstewards.org/

Farmers Markets: Farmers Markets have been around in many progressive communities for years and they are experiencing a rise in popularity and quantity. There are approximately 12 Farmers Markets in the County. The Farmers Market Association of North Carolina (FMANC) is a statewide, nonprofit organization focused on supporting & promoting local, sustainable food. According to the FMANC, there are more than 200 Farmers Markets in North Carolina that produce millions of dollars in revenue for the local farm economies across the state. The FMANC markets and promotes local, sustainable food and farm products. For more information visit: http://ncfarmersmarkets.org/default.aspx

Community Gardens (CGs): Community gardens are a great way to learn about gardening and staying healthy too. Not only does gardening provide tasty, healthy foods, it teaches responsibility and patience to families and students. There are approximately 25 varieties of CGs located throughout the County. A CG can help to educate students, families and neighborhoods about not only gardening and healthy eating, but also about composting and using compost to grow foods. A closed-loop system model for food waste is Friendship Trays (FT): they receive and buy donated food, prepare nutritional food for special needs diets, have a community garden, produce compost, and grow food that is used by the catering company located next to FT. Connecting CGs to restaurants may be another future alternative end market and support the farm to table program trend growing across the nation.

A program to market the compost to the local public can include branding and logo, a demonstration garden at the facility pickup site, promotion on the County website and at events such as Earth Day. Campaigns to market to other end user segments require the development of targeted messages and methods of delivery. In most cases, the existing permitted facilities either use the material on-site or sell mulch and compost products in bulk or in bags. We included the trends in some of the newer markets that allow the County to create the economic and environmental closed-loop system discussed in this task write-up.

Environmental Drivers

There are many benefits to composting food waste and for the County, targeting the commercial sector provides an opportunity to support the environmental drivers for this sector. They include:

- Meeting corporate and institutional increased waste reduction and zero waste goals for expanding more of their recoverable waste stream (Green Goals).
- Targeting homogenous, pure organic waste streams like commercial and institutional food waste from grocers, restaurants and cafeterias.
- Typically, food waste has less contamination in a commercial establishment with proper education and training on mapping the food waste flow in kitchens and cafeterias to ensure minimal infringement on the existing handling process.
- Driving long distances to deliver food waste is not an environmentally friendly option and adds to Greenhouse Gas emissions, therefore, increasing local government expansion into food waste processing within their own borders to reduce these environmental transport impacts.
- Local governments can help to create an organics closed-loop system through developing and integrating a program that maps out a relationship between – generators, collectors, processors, end markets, local farmers producing local foods using compost, and the food is served in local restaurants or sold at local farmers' markets.
- The recycling of nutrients in food waste back to the soil offsets the demand for synthetic, fossil-fuel based fertilizers, which has the attendant environmental benefits of reduced pollution both in manufacturing and utilization.
- Well operated composting systems generate little if any methane[1] as opposed to organic materials in a landfill which are the major sources of methane emissions, especially food waste.[2]
- Products from organics recycling (e.g., compost, worm casting, and digestate) provide physical, environmental or chemical benefits for erosion and sediment control, therefore, linking compost, soil quality, and water quality and resource protection together.
- These products also have water conservation benefits because they increase soil moisture holding capacity which can help reduce irrigation requirements.

[1] U.S. Composting Council, *Keeping Organics Out of Landfills.*

[2] According to the 2006 IPCC Guidelines for national Greenhouse Gas Inventories, measured efficiency of landfill gas recovery systems range from 9-90%, and the report suggests a default guideline of 20% recovery efficiency.

Policy Drivers

Most efforts across the U.S. to develop pilot, countywide, or statewide commercial food waste diversion programs are being driven by local, regional, or state goals to divert waste from disposal facilities. In Mecklenburg County, the policy driver for performing this study related to revising the Solid Waste Management Plan for the community. The commercial sector is the largest generator of Municipal Solid Waste in most jurisdictions. The key policy drivers for food waste diversion often include eight (8) topic areas for which a local government must develop a strategy over time. Commercial food waste generators are also voters, and are key contributors to policy decisions. The policy driver questions for the County to consider when developing a pilot program include:

1. Generator Perceptions – what role do commercial businesses want local governments to play in a food waste program? What do businesses feel about food waste generation, handling and recovery? How educated are they about it or do they consider it a "yuk" factor issue? Do they understand that most compost facilities have quality standards they must meet to market a high quality finished compost product? What awareness and education program is needed to encourage action to source separate food waste?
2. Goals and Plans – What percentage of businesses or which homogenous generator(s) will the County target under its program? How long will the pilot program last and who will be the program partners?
3. Disposal Bans – North Carolina bans yard waste from disposal, will the County add a ban on food waste locally? Most national programs ban organics from the landfill then the trash and a handful ban plastic bags.[3] Would the County's business community embrace such a localized action at the landfill?
4. Mandatory Versus Voluntary Programs – Will food waste recycling stay a voluntary program? The County's existing Source Separated Ordinance mandates and targets office paper and corrugated cardboard generated by businesses with greater than 16 cy of uncompacted garbage generated per week (exemptions exist). The ordinance's intent is to reduce the amount of waste being sent to the landfills.
5. Market Development – What traditional and non-traditional markets will the County help foster within its local communities and with local partners? What role can the local universities cooperative extension agencies or *Farm to Table - Eat Local* organizations/associations do to help partner with the County to help build or expand markets?

[3] *Beyond Recycling Composting, Food Scraps and Paper*, EPA Region 9, Center for a Competitive Waste Industry

6. Technical Assistance – What technical support and technical support staff (the County's existing Senior Environmental Specialist/Compost) will the County provide businesses, collection haulers, and existing and potential food waste processors?
7. Incentives – What type of innovative incentives will the County develop for businesses, collection haulers, and existing and potential food waste processors to participate and maximize recovery?
8. Funding – What resources will be needed to help support a commercial food waste composting pilot program and a countywide roll-out to businesses?

A national survey determined that approximately 267 food waste composting projects are operating in the U.S., including 39 municipally owned facilities, 93 college/university projects, 92 privately run commercial facilities, and 43 on-farm composting operations.[4] All of these programs were driven in most part by policy decisions made by local governments to meet recycling and/or diversion goals.

What are the Local Barriers and Opportunities for the Commercial Sector?

KCI staff reviewed, visited and interviewed various key points of contact, as well as gathered data and information from various sources to assess local barriers/gaps and opportunities for commercial waste diversion. Those key actions are listed here, but are not limited to: held meetings and phone calls with staff; participated in two committee meetings, Solid Waste Advisory Board and Keep Mecklenburg Beautiful Board; made primary site visits to appropriate Municipal collection contacts; surveyed businesses, processors, public and private haulers; toured and interviewed private and public processing locations; researched various jurisdictions programs; reviewed existing commercial education material; and reviewed various industry periodicals, data and articles, including, but not limited to, Resource Recycling, Biocycle, KCI Resource Center, USCC Compost News, and the Internet. Matrix 1 provides the summary of the gaps and opportunities and action(s) recommended to attempt to bridge the gap.

[4] Cristina Olivares, et. al., *Food Composting Infrastructure*, Biocycle, December 2008.

Matrix 1 - Local Barriers and Opportunities for the Commercial Sector

Commercial Program	Barriers	Opportunities	Action(s) Recommended
(1) **Target Audience - Generators - Large (300)**	Lack of commercial food waste collection service for all generators.	Survey indicates that some major generators are interested in implementing or expanding food waste diversion. They are the largest generators of food waste and there is an immediate opportunity to create awareness of the existing programs and a potential to develop a pilot program for this sector to role out a countywide program.	Using the information in this study staff develop a voluntary pilot recycling program using a dual-pilot approach as listed in the opportunities section.
Target Audience - Generators - Small/Medium	Lack of specific information on food waste generation rates.	Develop a pilot drop-off program for Small/Medium Businesses.	Conduct targeted waste audits of major food waste generating sectors to quantify food waste generation and disposal rates.
(2) **Target Audience - Collectors**	County/Municipalities have no contract or franchise for commercial garbage or recycling collection service; it's all open market; Private haulers do not have an existing collection route in place - need market development information.	Five collection companies (4 haulers and one distribution company) are interested in adding food waste collection program to their current service options. Four of them can mobilize within six months. The lack of solid waste contracts or franchise is an opportunity, collectors can set up food waste routes without impinging on collection of waste that would be controlled by contract/franchise hauler.	Convene a meeting with the private haulers in the community and present the results of this report; invite those haulers who attend to participate in an advisory committee to help develop the collection infrastructure for a dual-pilot.
(3)	Compost Central cannot accept food waste under its current permit and existing location.	Lease has expired and County could use this opportunity to perform a site and cost-benefit analysis to relocate the Compost Central to handle yard and food waste and biosolids through a new possible permit.	Evaluate performing the recommended study and consider any possible locations on the East side of town or at the McAlpine Wastewater Treatment Plant.
Target Audience - Processors	Four facilities are within 25 miles of the center of the City of Charlotte. Three of those facilities can currently accept food waste from outside sources under their permit. One facility is a demonstration pilot and only accepts food waste from its One facility (Wallace Farms) will need to find new site or stop receiving food waste in 2015.	Two of those facilities will and can accept food waste (Earth and Wallace Farms). Continue to monitor the pilot results of the Foster Caviness demonstration program and their expansion opportunities. Continue to monitor the development of the two private anaerobic digesters possibly coming to the Charlotte region. Two private anaerobic digesters are seeking to develop large scale facilities in Charlotte region.	Convene a meeting with the existing four processors in the community and present the results of this report; and invite those that are interested to participate in an advisory committee to help develop the processing infrastructure Continue to monitor the development of private anaerobic digesters. Continue to monitor Wallace Farms' efforts to find a new site for food waste composting.
(4) **Existing Food Waste Diversion Programs**	Not all businesses are aware of the tiered hierarchy for food waste recovery: waste reduction (procurement reduction), food banks/food kitchens, local compost facilities, on-site composting available to them.	Opportunity to develop 1) Awareness Program and 2) Education and Outreach programs for the existing food waste diversion program and test them during the dual-pilot program.	Develop a brochure or flyer for businesses specifically for the current opportunities for diverting food waste: EPP, Food Banks/Food Kitchens, Existing Composting Facilities, On-site programs.
(5) **Economic Drivers**	Although the tipping fee is high enough to potentially warrant participation by businesses because of the potential cost avoidance and waste collection cost reduction at an average of $55/ton for disposal; it could be higher to increase the	Using existing staff (compost and commercial staff), perform waste assessments to gather and document the potential economic information (cost avoidance, reduced garbage volumes for collection services) to use as examples to	Under the proposed SWM goals - reduce per capita waste disposal by 35% by 2018 - using this report County Staff/Consultant integrate the recommendations to help meet this goal.
(6) **Policy Drivers**	The goals set by the County in its Solid Waste Master plan and diversion options to be presented and approved by Council, will drive the other decisions, such as a voluntary or mandatory program (through the Source Separation Ordinance) or	County staff evaluate the possibility and impact of including organics (including food waste) as an additional material under the current SSO.	Decide whether or not this can be achieved and whether businesses will be receptive of it during the next LUESA residential survey or a postcard/SurveyMonkey mailing to businesses.
(7) **Environmental Drivers**	Not enough general or comprehensive awareness about the environmental benefits of composting on a countywide basis and the outcomes it could bring to the community: more jobs, support water quality and solid conservation issues,	Develop material to outline and explain the ties between the economic and environmental barriers to the local community.	Test these materials through the dual-pilot program and expand them from lessons learned.
(8) **Organics Recycling Awareness**	Moderate awareness by the elected officials and majority of the commercial businesses population (large, medium, and small) regarding the various benefits to business waste reduction, community economics, and the environment.	Using the information in this report about Economic, Policy, and Environmental drivers generate an organics awareness program for both the commercial and residential sectors.	Develop an organics awareness program regardless if a dual-pilot program is approved.
(9) **Technical Support - Education and Outreach**	The existing commercial organics recycling program is not promoted in a comprehensive way on the County website, Resource Guide to Waste Reduction and Recycling, or by the commercial waste assessor.	Update the County website, Resource Guide, and distribute and include information to be distributed by staff to businesses.	Develop an education and outreach program to complement the organics awareness program regardless if a dual-pilot program is approved.
(10) **Pilot Program - Countywide Program** **Pilot Program - Small Businesses**	Large businesses currently have no comprehensive collection capacity, and existing processing capacity is not large enough for a countywide roll-out. Small businesses currently only have one avenue to compost and that's through a traditional on site (or backyard building) program.	Integrating the information in this study and the nine opportunities to overcome the barriers listed here, develop a dual-pilot program plan to establish (1) one route and (2) a drop-off program at the full-service drop-off centers.	Seek approval to develop and roll-out a pilot program plan within 18 months to two years.

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MAJOR FINDINGS AND RECOMMENDATIONS

Based on the information gathered and analyzed, KCI made the following findings and makes these recommendations:

Commercial Food Waste Key Findings and Recommendations

- The six (6) largest food waste generating sectors are food manufacturers, food stores, restaurants, hotels/lodging, medical/health services, and education. KCI estimates that the commercial sector in the County generates approximately 143,000 tons per year of food waste, and that the top 300 businesses in the six (6) largest food waste generating sectors generate 49,300 tons or 35% of the total annually. KCI estimates that the County could realistically recover up to 30,000 tons per year of food waste, utilizing a 60% projected recovery rate for the largest generator categories.
    - Consider conducting waste audits and/or waste characterization analyses targeted at sectors that are major potential sources of food waste.
- Composting operations in the Charlotte region already handle over 36,000 tons per year of food waste, and currently have an estimated 30,400 tons per year of unused capacity.
    - Continue to monitor development of two (2) private anaerobic digestion facilities.
    - Undertake a site feasibility study of County properties to determine if any are potentially suitable to move Compost Central to a new location.
- Food banks/soup kitchens surveyed distributed an estimated 2,100 tons of food donated by businesses; approximately 40 tons of the donated food that was leftover or unusable food was disposed or composted in a community garden annually.
    - Consider conducting an informal focus group or convening a committee of local food banks and corporate donors to explore ways to improve the existing food waste exchange program and to address any corporate liability concerns.
- Oyster shells are unsuitable for composting due to the labor intensive preprocessing requirements.
    - Work with the Division of Marine Fisheries to implement an oyster shell diversion program for the County.
- There is an unmet need for commercial food waste recovery in the County, as well as a strong willingness among major commercial food waste generators to consider food waste recovery options.
    - Develop a voluntary commercial food waste diversion program. Include a pilot implementation in the plan.

  - Convene with interested businesses to establish a voluntary group (possibly through an existing sustainable business alliance) interested in providing the critical mass necessary to make food waste collection cost effective, as well as publicize the initiative.

- The major factors contributing to the success of commercial food waste recovery programs are outreach, public education, and technical assistance provided by local governments. High levels of commercial food waste recovery can be achieved by focusing the program on those businesses that are major food waste generators rather than adopting a broad-based program affecting all business establishments.
  - Develop an awareness campaign, educational materials and technical resources to be tested during the pilot program.
- Seven (7) private haulers expressed interest in building food waste collection into their operations; three (3) indicated they could mobilize within six (6) months.
  - Convene an individual meeting with each hauler to narrow down the pilot collection partner for a collection route targeting large generators in a concentrated area (i.e. City of Charlotte).
  - During these same meetings discuss which hauler partner may be able to partner with the County to pilot a small business food waste drop-off program at your full-service drop-off centers.
- Economic drivers in the organics recycling industry relate to the balance of available material, the cost to collect and transport the material and the relationship between disposal and process fees for recovery. Environmental policy drivers for businesses relate to increased waste reduction and zero waste goals, increasing local governments presence in food waste composting within its own borders help to keep pollution down by reducing transport to long-distance organics facilities; compost, soil quality, water quality and resource protection are all linked; and compost has water conservation benefits and help reduce irrigation requirements. Policy drivers relate to generator perception, goals and plans, disposal bans, mandatory versus voluntary programs, market development, technical assistance, incentives, and funding.
  - Evaluate economic, environmental, and policy drivers through a commercial pilot program (collection and drop-off); survey businesses on whether or not they would support adding food waste to the Source Separation Ordinance; create an awareness program on the link between the environmental pollution message to the *Eat Local, Buy Local, Farm to Tabl*e economic message; and develop a technical assistance program that includes education material, organics recycling

kits, and integrate organics recycling assessment into the existing business assessment program for follow-up by compost staff.

- For all 10 local barriers identified (generators, collectors, processors, existing programs, economic, policy and environmental drivers, organics recycling awareness and education and outreach, and pilot a program), they each have opportunities that allow actions to bridge the gap.

RESIDENTIAL FOOD WASTE

What is the Amount of Residential Food Waste Collected Per Household?

In order to estimate food waste generated per household, KCI obtained solid waste disposal data from the County and NCDENR and calculated the annual per capita residential waste disposal rate for the County. Next, KCI utilized residential waste composition data from waste characterization studies performed by KCI as well as those from other jurisdictions in the Southeast comparable to the County.

Successful food waste diversion program components from approximately 13 other local governments across the country and applicable to the County have been assessed and contacted. Although not a requirement of the scope, some telephone surveys were performed for additional jurisdictions in addition to survey information provided by the County for Alameda Co, CA; Austin, TX; Boulder, CO; Chittenden Solid Waste District, VT; Fresno, CA; King County, WA; Oakland, CA; Orange Co, NC; Portland, OR; San Francisco, CA; San Jose, CA; Seattle, WA; and Toronto, Ca. It is clear from information gathered that successful food waste composting programs cannot be started without government involvement in developing the collection, processing and marketing infrastructure.

Profile of the Residential Sector

The 2010 U.S. Census estimated that the County is home to 920,000 residents with a population density of 1,755 persons per square mile. The County's population has grown over 32% from 2000 to 2010, almost twice the state's average 18.5% population growth. Approximately 92% reside in incorporated Municipalities within the County. These Municipalities are the City of Charlotte (77% of residents) and the Towns of Cornelius, Davidson, Huntersville, Matthews, Mint Hill and Pineville (totaling 15 percent of residents). The remaining 8 percent of the population resides in the unincorporated county.

The County contained approximately 398,500 housing units in 2010, of which an estimated 277,800 were single-family households.

Residential Food Waste Generation

Based on KCI's experience conducting numerous waste composition studies, we know that the composition of residential waste is relatively consistent across jurisdictions, and that variability is primarily due to socio-economic factors as well as the performance of residential recycling programs (i.e., when a recycling program captures a large percentage of the paper, plastic, metal and glass, there is a higher percent of food waste remaining in discarded waste).

Waste characterization studies conducted in the Southeastern U.S. indicate that the food waste accounts for approximately 10% - 14% of residential waste. Another material commonly targeted by residential organics recycling programs is soiled and non-recyclable paper. This material comprised another 6% - 14% of the residential waste discards in the studies reviewed by KCI (see Table 7).

Table 7 - Residential Waste Characterization Study Results for Southeastern U.S.

	Percent of Residential MSW	
Local Government	**Food Waste**	**Non-recyclable Paper**
Charleston County, SC	14.4%	13.9%
Polk County, FL	13.1%	9.9%
Pinellas County, FL	10.7%	6.1%
Wake County, NC	12.1%	n/a
Georgia Statewide	13.4%	10.7%
Orange County, NC	20.9%	n/a
Alachua County, FL	14.1%	6.9%
Average	**14.1%**	**9.5%**

Note: n/a = not available

It noted that Orange County reports that food waste represents 21% of its residential discards; however, KCI believes this would not be representative for Mecklenburg County because of Orange County's high recycling rate. KCI also noted in its research that waste composition studies conducted recently in Seattle and San Francisco (two cities with high recycling rates) found that food waste accounted for 27% - 29% of residential waste.

Based on this information, KCI developed the following estimates of the amount of food waste and non-recyclable paper being discarded by the residential sector in Mecklenburg County:

- Food waste in residential waste = 10% - 15%
- Non-recyclable / soiled paper in residential waste = 6% - 14%

KCI applied these assumptions to the amount of residential waste reported in the County's 2011 annual report to NCDENR (see Table 8). KCI estimates that County residents generate approximately 38,100 – 57,100 tons per year of food waste and 61,000 – 110,400 tons per year of food waste and non-recyclable paper combined.

Table 8 - Estimated Quantities of Food Waste and Non-recyclable Paper in Residential Waste

	Low	**High**
Food Waste in Residential Waste	10%	15%
Non-recyclable Paper in Residential Waste	6%	14%
Mecklenburg Residential Waste (tons/year)	380,900	
Food Waste (tons/year)	38,100	57,100
Non-recyclable Paper (tons/year)	22,900	53,300
Total (tons/year)	**61,000**	**110,400**

Note: numbers rounded to nearest 100; numbers may not add due to rounding.

Home Composting Practices

The LUESA Annual Survey of Mecklenburg County Residents asked whether survey participants are home composters. In the 2003 through 2010 surveys, all participants were asked whether they practice home composting. An average of 39% responded "Yes" (See Table 9).
In 2011, the compost-related questions were changed. Participants were first asked whether they use compost at home, and only 21% of households answered "Yes," while 77% said that they do not use compost at home (see Table 10). Then only the 21% that *use* compost were asked whether they *make* compost at home, and 47% of them answered "Yes" (13% of all participants).

The dramatic difference in survey results (an average of 39% of household practicing home composting in 2003 through 2010 versus 13% of households making compost at home in 2011) may be due to the 2011 survey properly "filtering out" home composters by first asking if they use compost. Whatever the reason for the 2011 results, KCI believes that the average of the

2003 through 2010 surveys provides a reliable estimate of how prevalent home composting is among survey respondents.

Table 9 - 2003 through 2010 Average Survey Responses

	Do you compost at home?	Do you have a compost bin?
Yes	39.0%	20.9%
No	60.2%	78.5%
Don't know/Refused	0.8%	0.7%
Total	**100%**	**100%**

Table 10 - 2011 Survey Responses

	Do you use compost?	Do you make compost?
Yes	21.4%	13.2%
No	76.9%	8.2%
Don't know/Refused	1.7%	0%
Skipped Question		78.6%
Total	**100%**	**100%**

More important to the objectives of this project, the LUESA survey does not ask how many survey participants compost food waste or how much of their food waste they compost. Results from surveys in Portland, OR of single-family residents home composting practices over the past decade found that 50% - 60% practice home composting and that 26% - 32% of them include food scraps in their compost. Results from a 2005 survey in Alameda County found that 24% of households with yards have some type of compost pile and 34% of them compost the majority of their food waste.

KCI used the results of these surveys in combination with the LUESA results to establish the following assumptions in order to estimate the level of food waste home composting:

- 40% - 50% of single-family households practice composting
- 25% - 35% of those practitioners compost an average of 50% of the food waste they generate

Using these assumptions and the residential food waste generation estimates described previously, KCI estimated the amount of residential food waste currently being recovered through home composting in the County at 800 – 2,900 tons per year (see Table 11.0).

Table 11 - Estimated Food Waste Diverted by Home Composting

	Low	High
County houses that are single family	70%	70%
Single family households that home compost	30%	40%
Home composters that compost food waste	25%	35%
Percent of their food waste composted	40%	50%
Percent of total food waste composted	2%	5%
Food waste discarded (tons/year)	38,100	57,100
Food waste composted at home (tons/year)	800	2,900
Food waste generated (tons/year)	38,900	60,000
Food waste diversion (percent)	2%	5%

Note: numbers rounded to nearest 100; numbers may not add due to rounding.

Current Residential Food Waste Diversion

When compared with the estimate of residential food waste discards above, KCI estimates that 2% - 5% of residential food waste is currently being diverted by home composting activities (see Table 11). Please note that these estimates are calculated using assumptions derived from programs and practices in other jurisdictions because quantitative data on waste composition and home composting activities in Mecklenburg County are not currently available. Nevertheless, the results are in line with KCI expectations and are considered sufficient at this stage of county assessment and planning work.

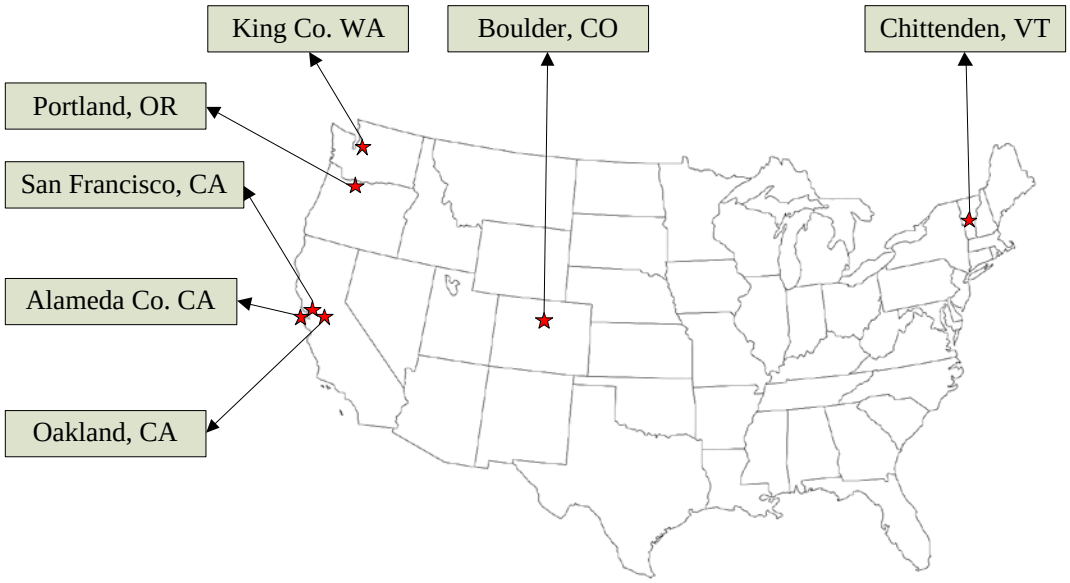
Survey of Residential Food Waste Collection Programs

Portland, OR Program Branding

In order to more fully assess the food waste diversion opportunities for Mecklenburg County, KCI expanded the scope of Subtask 2.1 to include an assessment of existing residential food waste collection programs in other jurisdictions and estimates of potential

recovery in Mecklenburg County. The County provided KCI with comparative information from residential single family curbside collection programs that it had recently surveyed. In addition, KCI identified Municipalities in the U.S. that currently operate residential food waste collection programs to obtain data that could be used to estimate potential diversion rates in Mecklenburg County. The jurisdictions are depicted in Figure 10.

Figure 10 - National Residential Food Waste Diversion Programs



The level of program measurement and evaluation varied among jurisdictions, as well as the methodology for capturing data. County staff provided KCI with some initial residential research data and KCI expanded the County research information. Research conducted by the jurisdictions included waste composition studies, truck ride-alongs, lid-lifting assessments, and tonnage estimates. Reported participation in food waste collection was estimated from a low 33% in Alameda County, CA to 80% in Portland, OR; the estimated average is 52%. Food waste recovery ranged from 91 to 204 pounds per household per year in the Chittenden and San Francisco areas, respectively. The average reported was 136 pounds per household per year in those jurisdictions that measured those results. A table of findings is included as Attachment A.

Potential Residential Food Waste Collection Program Recovery

Based on the performance of programs in other jurisdictions, KCI established the following estimates for how a program in Mecklenburg County may perform:

- 35% - 80% of households will participate in a residential food waste recycling program
- The average food waste recovery rate will range from 100 – 200 pounds per household per year (average for all households, including participants and non-participants)

San Francisco's 3 Cart Program

Based on these assumptions and the County's demographics, KCI estimates that a comprehensive residential food waste recovery program (i.e., one that includes food waste along with yard waste for residential organics collection using dedicated containers) could recover approximately 13,900 – 27,800 tons of food waste, which represents a recovery rate of 36% - 46% of food waste generated (see Table 12).

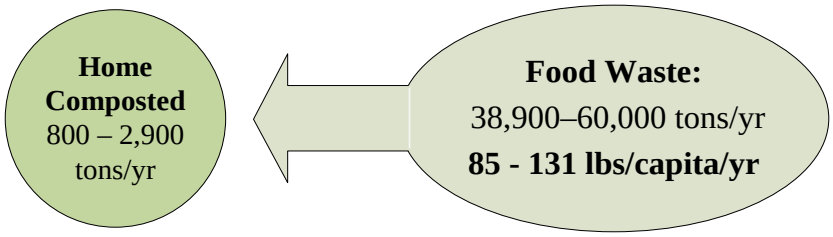
Table 12 - Potential Residential Food Waste Collection Program Recovery

	Low	High
Single family households	277,800	
Food waste recovery (lbs/household/year)	100	200
Food waste recovery (tons/year)	13,900	27,800
Food waste generation (tons/year)	38,900	60,000
Food waste diversion (%)	36%	46%

Note: numbers rounded to nearest 100; numbers may not add due to rounding.

In conclusion, KCI estimates that Mecklenburg County's residential sector generates approximately 38,900 to 60,000 tons per year of residential food waste of which an estimated 2% - 5% (800 – 2,900 tons per year) is being recovered through home composting. Figure 11 depicts these results. A comprehensive residential food waste recovery program would add another estimated 13,900 – 27,800 tpy of food waste recovery (36% - 46% of food waste generated).

Figure 11 - Estimated Residential Food Waste Generated & Recovered - Home Composting



What Collection and Transportation Options Exist from the Public or Private Sector?

A residential Municipal survey instrument was designed to gather information regarding existing residential and collection programs in the Municipalities of Charlotte, Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville, as well as the unincorporated portion of the county. The data from this survey was expected to identify and assess potential opportunities in utilizing existing Municipal waste collection and transportation infrastructure within the County. Each city/town was contacted via e-mail and sent a solid waste collection survey.

County staff recommended that KCI hold a meeting with the Town of Huntersville due to their automated collection program for garbage, recyclables and yard waste. All cities/towns responded and a meeting was held with Town of Huntersville. Table 13 on the next page depicts the contacts.

Table 13 - Countywide Contacts

Jurisdiction	Name	Title/Entity	Phone/Fax	Email
Unincorporated county	Geoffrey Burdick	Project Manager	704-336-4528 704-336-4314 (f)	geoffrey.burdick@mecklenburgcountync.gov
Charlotte	Brian Garrett	Contract Srvcs Division Mgr	(704) 336-3342	bgarrett@charlottenc.gov
Cornelius	Krysti Hawkins-Lowry	Admin. Assistant	704-895-5212	khawkins@cornelius.org
Davidson	Leamon Brice	Town Manager	704-940-9618	lbrice@ci.davidson.nc.us
Huntersville	Bobby Williams Max Buchanan	Director of Eng & PW	(704) 766-2220	bobbyw@huntersville.org
Matthews	Ralph Messera	Public Works Director	(704) 847-3640	rmessera@matthewsnc.com
Mint Hill	Brian Welch	Town Manager	(704) 545-9726	bwelch@admin.minthill.com
Pineville	Eureka Bidgood	Payroll Technician	(704) 889-2291	ebidgood@pinevilledsl.net

All Municipalities within the County provide garbage, recycling, and yard waste collection service. All but one city (Cornelius) provide bulk waste collection. The City of Charlotte is the only municipality that provides its own collection services (garbage and yard waste); all others contract with service providers. These private haulers include Republic Services, Waste Management, Inland Service (recyclables only), Advanced Disposal, RCS, and Signature Waste. The unincorporated area of the county is an open market. These are the Municipal contacts surveyed.

All Municipalities provide weekly automated or semi-automated garbage collection. Two of the cities/towns (Davidson and Mint Hill) provide weekly manual recyclables collection; the rest provide bi-weekly automated or semi-automated recyclables collection. One town (Huntersville) provides carted yard waste collection with weekly automated pickup; the rest of the cities/towns provide semi-automated or manual collection of yard waste via cans, bags and/or piles.

All of the residential collection service providers have five-year contracts ending June 30th, with expiration dates ranging from 2013 to 2016. Additionally, the County has a Solid Waste Interlocal Agreement (ILA) with each of the Municipalities. The ILA outlines the responsibilities of the County (responsible for providing and operating all recycling, yard waste and solid waste management facilities) and those of the Municipalities (separate collection of recyclables, yard waste, and solid waste in the Municipality's corporate limits and delivery of these materials to the designated facilities listed in the ILA Exhibit A). Additionally, if the County's obligation is met through a third party owned and operated facility, the Municipality must consent to the designation of any third party owned and operated facility located outside of

a circle with its center at the Town/City Hall, and having a radius of forty miles. Exhibit A may be amended from time to time as long as it is consistent with the remainder of the ILA and the current Solid Waste Management Plan. This information is important for identifying the generator, collection and processing infrastructure the County would possibly put in place in the future.

KCI met with Huntersville staff and its collection hauler (Advanced Disposal). During this meeting the study was explained along with preliminary dialogue regarding whether the Town would be interested in further discussion with County management staff regarding hosting a residential or commercial pilot in its community. The Town is not interested at this time in hosting a commercial pilot and recommended the County focus on homogenous generators such as schools or commercial establishments such as restaurants countywide. The Town did mention that they would entertain further discussions with County staff and its collection provider regarding the possibility of a residential pilot and what that might entail. The Town's population has significantly grown as many residents have moved to new suburban developments in the community and commute into the City of Charlotte for business. These residents are new to the community and are "transplants" and it will take time for them to fully integrate the same way in which families who have been in the community for years have so buy in and promotion of a food waste program to residents would need to include a general awareness campaign to educate these citizens.

What are the Gaps and Opportunities to Bridge the Gaps for the Residential Sector?

KCI staff reviewed, visited and interviewed various key points of contact, as well as gathered data and information from various sources to assess program gaps and opportunities. Those key actions are listed here, but not limited to: Held meetings and phone calls with staff; Participated in two committee meetings, Solid Waste Advisory Board and Keep Mecklenburg Beautiful Board; Made primary site visits to appropriate Municipal collection contacts; Surveyed businesses, processors, public and private hauler; Toured and interviewed private and public processing locations; researched various jurisdictions programs; reviewed various industry periodicals, data and articles, including, but not limited to, Resource Recycling, Biocycle, KCI Resource Center, USCC Compost News, and the Internet.

Matrix 2 on the next page provides the summary of the gaps and opportunities and action(s) recommended to attempt to bridge the gap.

Matrix 2 - Residential Program Implementation Gaps and Opportunities for Bridging Gaps

Residential Program	Gaps	Opportunities	Next Steps
(1) Residential food waste generation quantities	Data used to estimate the County's food waste generation was derived from study results in the Southeast so the amount is not actual.	Recommend the County perform a residential waste characterization study to include food waste to provide for a more exact calculation and to be used for all other diversion program planning applications to reach a 35% goal by 2018.	Evaluate the future funds available to develop an RFP to perform a residential waste characterization study.
(2) LUESA Annual Survey for 2012+	Currently, the annual residential survey does not ask questions that may better help to measure food waste home composting practices. Or information on residents' attitudes regarding food waste collection are not known.	Add questions that capture a higher level of detail regarding home composting practices and modifying the annual survey to include questions that capture this level of detail.	Use the information in the LUESA survey results to help build a residential pilot program based on residents perceptions and feelings about composting.
(3) Identifying Pilot Partners	Three of the seven Municipalities expressed interest in participating in a residential food waste diversion pilot program. Only two of the three have automated collection for garbage, recycling, and yard waste, but only one of those has automated collecti	Continue discussion with Huntersville, Cornelius and Pineville regarding a residential pilot program. The Town of Huntersville has automated collection for garbage, recycling and yard waste in carts and the best potential for adding food waste to the yar	Convene a more formal meeting between County and Huntersville Management staff and their service provider to discuss the potential for a pilot food waste program within the current yard waste program and any possible operational impacts to the hauler. Co
(4) Residential Awareness and Perceptions Regarding Food Waste Composting	Overcome residents perceptions regarding the "yuk factor" with backyard composting to increase participation and knowledge about this hands-on home and family activity.	Evaluate other avenues to promote backyard composting and the overall environmental and local benefits of composting at home and work.	Staff develop a residential awareness campaign based on the information contained in this report.

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MAJOR FINDINGS AND RECOMMENDATIONS

Based on the information gathered and analyzed, KCI made the following findings and makes these recommendations:

Residential Food Waste Key Findings and Recommendations

- Mecklenburg County's residential sector generates approximately 38,900 to 60,000 tons per year of residential food waste of which an estimated 2% - 5% (800 – 2,900 tons per year) is being recovered through home composting. A comprehensive residential food waste recovery program would capture another estimated 13,900 – 27,800 tpy of food waste recovery (36% - 46% of food waste generated).
    - Consider conducting a residential waste characterization study in order to more accurately determine the quantities of residential food waste in the County.
    - Consider modifying the annual survey to include questions that capture detail regarding home composting practices.
    - Consider implementing a residential food waste recovery pilot study.
- Based on existing collection infrastructure, Huntersville may be the Municipality best suited for a pilot program.
    - Consider adding a question(s) about residential interest in and willingness to utilize curbside and drop-off food waste recycling in the next LUESA residential survey.
    - Continue dialogue to secure meetings with Charlotte, Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville management staff to confirm the best possible Municipal partner for a residential food waste collection pilot program.
- For all four (4) local barriers identified (food waste generation quantities, LUESA survey, pilot partners, residential awareness and perception), they each have opportunities that allow actions to bridge the gap.

Countywide Food Waste Program Key Findings and Recommendations

- Existing processing capacity exists to perform either a commercial and or residential pilot program.
- There is not enough food waste processing capacity for the County to roll-out a countywide program as depicted in Table 16.

- It is important to note that the total permitted capacity at existing food waste recovery facilities include Wallace Farms. If the Farm is unable to relocate its food waste composting activity, the total existing capacity would be reduced to approximately 50,700 tons per year, further exacerbating the shortage of capacity to handle a full-scale County program. Therefore, the County should closely monitor the various private sector efforts to expand food waste processing capacity. And if a full-scale program is envisioned, the County should then consider taking a direct role in ensuring sufficient capacity existing either through some type of public-private partnership.

Table 14 - Current Food Waste Mass Balance

	Residential & Commercial	
	Low	***High***
County FW Generation	175,100	210,600
County FW Recovery	11,000	23,300
Current FW Handled by Recovery Facilities	40,700	
Recovery Facility Capacity Used for Non-County FW	29,700	17,400

Note: numbers rounded to nearest 100.
FW = food waste.

Table 15 - Potential Food Waste Mass Balance – Limited County Program

	Residential & Commercial	
	Low	***High***
County FW Generation	175,100	210,600
County FW Recovery	20,600	32,500
Total Permitted Capacity at Existing Recovery Facilities	71,100	
Surplus Capacity for Non-County FW	50,500	38,600

Note: County program limited to Top 300 establishments in major generating sectors.
Note: numbers rounded to nearest 100.

Table 16 - Potential Food Waste Mass Balance – Comprehensive County Program

	Residential & Commercial	
	Low	***High***
County FW Generation	175,100	210,600
County FW Recovery	54,800	89,100
Total Permitted Capacity at Existing Recovery Facilities	71,100	
Surplus Capacity for Non-County FW	16,300	-18,000

Note: comprehensive residential and commercial program.

Note: numbers rounded to nearest 100.

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SECTION 2.0
COMMERCIAL FOOD WASTE

This Section 2.0 Commercial Food Waste includes all of the write-ups for each subtask in the scope for the commercial food waste component of the study. It provides supportive detail for the Final Report.

Subtask 1.1: Identify Major Commercial Food Waste Generators and Quantities of Food Waste

BACKGROUND

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish the feasibility of a comprehensive countywide food waste recovery program. The study addresses both commercial and residential food waste. For the commercial sector, KCI work activities include:

- **Identify major commercial generators and quantities of food waste (Subtask 1.1)**

This document presents Subtask 1.1 methodology and results regarding three aspects of commercial food waste generation: profile of the commercial sector, food waste generation estimates, and food waste recovery potential.

METHODOLOGY

Profile of the Commercial Sector

Mecklenburg County provided KCI access to the online BusinessWise database, which was the primary data source of basic business information. Prior commercial recycling studies for the County compared BusinessWise to other databases and determined that BusinessWise provides a reliable profile of the commercial sector for the Charlotte region. KCI worked with BusinessWise staff to obtain a customized listing of all businesses in Mecklenburg County that included location, SIC code, and employment. KCI also obtained lists of specific businesses in

sectors known to have high food waste generation rates and/or to be commonly targeted by food waste recovery programs.

Food Waste Generation Estimate

KCI researched and compared commercial waste generation and disposal coefficients from various data sources, including the 2006 *Commercial Waste Characterization Study* prepared for the County. This study, while being the most directly applicable one available, was limited in scope, providing an estimated aggregate commercial waste characterization derived from studies conducted in other jurisdictions.

In fact, KCI's research confirmed that sector-specific commercial waste generation and characterization data are extremely limited; the vast majority of characterization studies look only at *disposal* and aggregate all commercial sectors together. KCI compiled data from two studies conducted in California (a 1999 waste characterization study that broke down the commercial sector into 39 business categories and a 2006 diversion and disposal study of 14 selected industry groups) from which it is possible to derive generation data for specific commercial business sectors. KCI evaluated and compiled data from these and other studies and developed generation coefficients (pounds per employee per year) and composition (e.g., percent of food waste). KCI then applied these data to the commercial sector information obtained from BusinessWise to develop commercial food waste generation estimates for the County.

Food Waste Recovery Potential

KCI reviewed generation estimates in order to identify specific commercial business sectors that are major food waste generators, the reason being that, at least initially, commercial food waste recovery programs typically target high food waste generating sectors. KCI identified six commercial sectors that are major food waste generators for further analysis of food waste recovery potential. For each sector, KCI established specific criteria (e.g. minimum number of employees) in order to identify specific businesses that are likely major generators of food waste, and then estimated potential food waste recovery.

SUMMARY OF FINDINGS

Profile of the Commercial Sector

According to the data provided by BusinessWise, Mecklenburg County has approximately 20,300 businesses, employing an estimated 426,000 people (see Figures 1 and 2). The major business sectors are Services and Retail Trade, which together account for 65% of businesses and 59% of employment in the County.

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Figure 1 – Number of Business Establishments by Business Sector

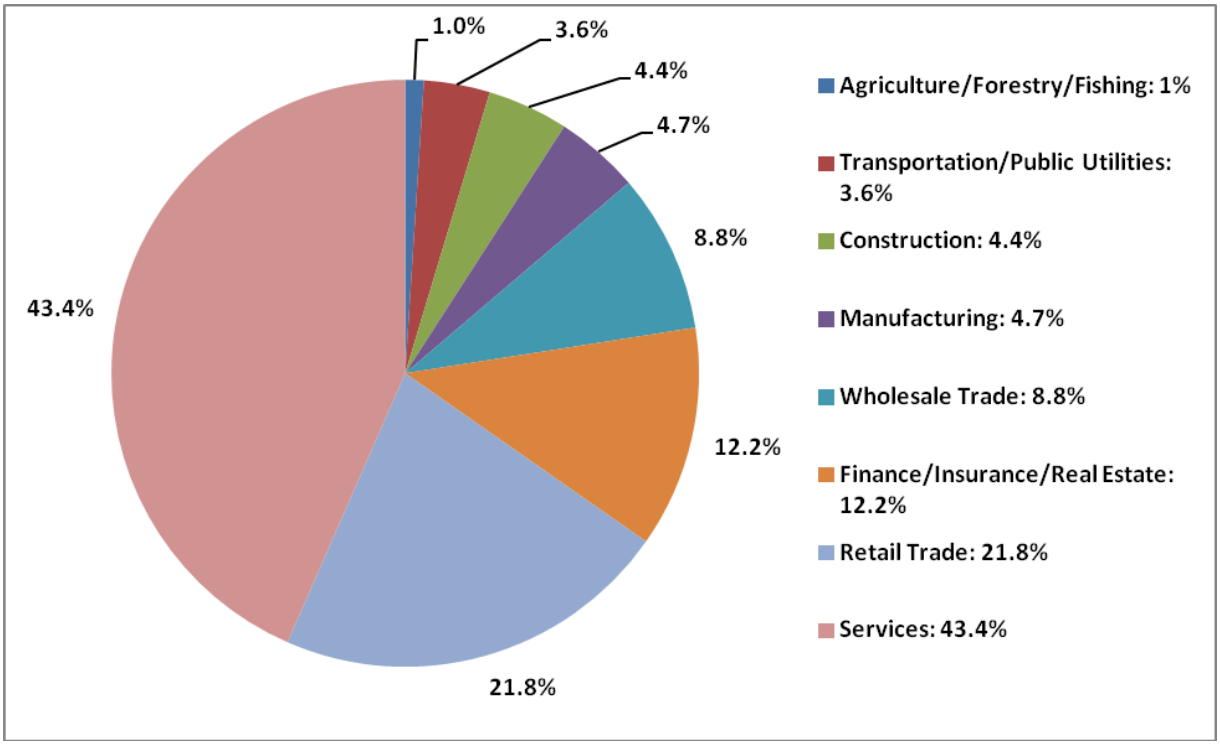

Figure 2 – Commercial Employment by Business Sector

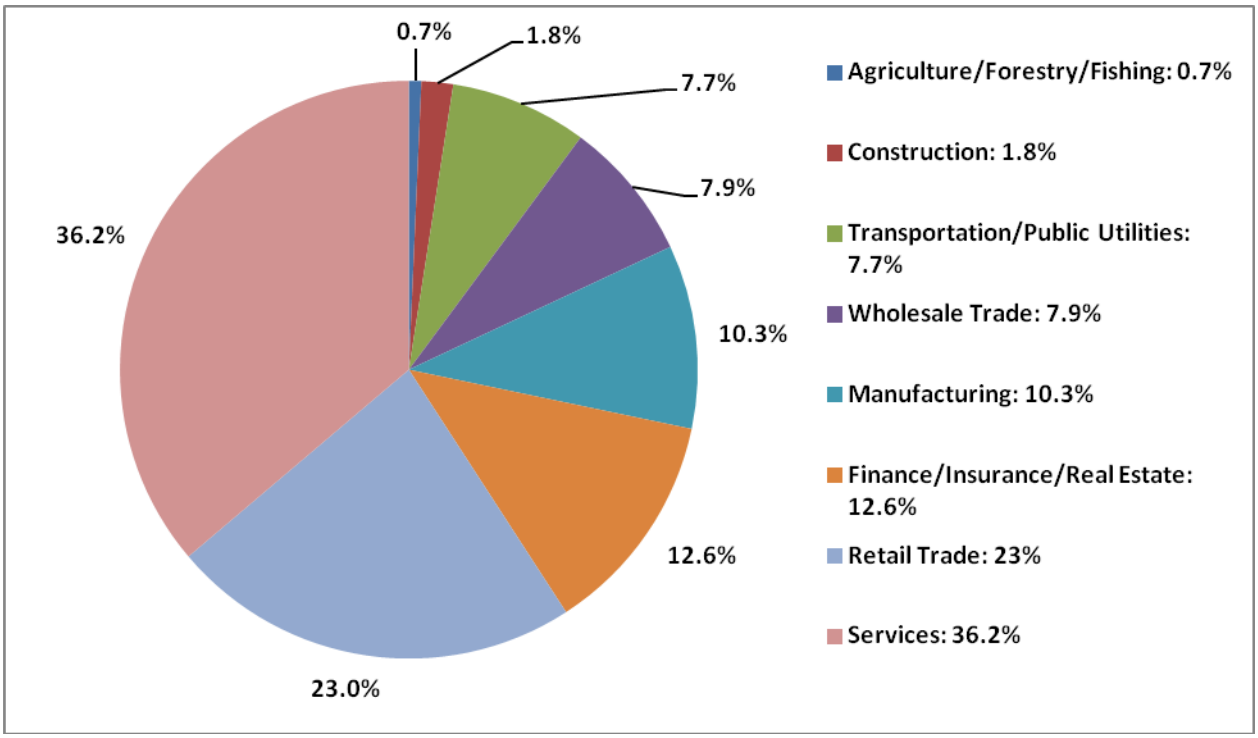

Table 1 provides another perspective on the County's business sector by showing the number of business establishments by size of the business (employees). Across all business sectors, the vast majority (86%) are small businesses with less than 25 employees.

Table 1 – Number of Business Establishments by Sector and Size

	Number of Employees								
Business Sector	**1-3**	**4-9**	**10- 24**	**25-49**	**50-99**	**100-249**	**250-499**	**>500**	**Total**
Agriculture, Forestry, and Fishing	76	66	42	17	4	0	0	1	206
Mining	1	0	2	1	0	0	0	0	4
Construction	359	348	149	37	7	2	0	0	902
Transportation and Public Utilities	292	181	141	55	31	19	6	10	735
Manufacturing	152	259	240	122	80	64	17	9	943
Wholesale Trade	454	619	420	161	83	34	3	2	1,776
Retail Trade	1,128	1,328	1,133	445	257	114	14	6	4,425
Finance, Insurance, and Real Estate	967	918	385	112	59	20	6	12	2,479
Services	3,513	2,769	1,533	562	240	129	39	24	8,809
Total	**6,942**	**6,488**	**4,045**	**1,512**	**761**	**382**	**85**	**64**	**20,279**

Food Waste Generation Estimates

As noted previously, detailed commercial waste characterization data do not exist for Mecklenburg County. Similarly, waste composition data for all the various different categories of businesses in the County do not exist, and further, there are very few sources of such data anywhere in the U.S. This lack of data was noted in the previous commercial waste study conducted in the County (*2006 Commercial Waste Characterization Study*). That study estimated commercial waste disposal at approximately 608,000 tons per year based on sector-specific coefficients from a 1999 California Integrated Waste Management Board (CIWMB) report combined with employment data obtained from InfoUSA. The commercial waste estimates in the 2006 study differ from KCI's estimates presented in this report because the two reports rely on different sources of data.

KCI utilized a different methodology to estimate commercial food waste generation (note that KCI estimated *generation* versus *disposal*). In addition to the 1999 CIWMB report that provides waste disposal coefficients and composition for 39 categories of business, KCI derived generation data from a 2006 CIWMB report that characterized diversion and disposal from 14 business categories. KCI compiled these data into waste generation coefficients (pounds/employee/year) and composition (percent) assumptions for 37 relevant business categories. KCI then applied these assumptions to BusinessWise employment data for Mecklenburg County.

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Table 2 – Estimated Waste Generation by Business Category

SIC Code Business Category	Waste Generation (tpy)	
	Food Waste	Total MSW
Agriculture / Fisheries	29	1,850
Mining	10	122
Construction Companies	381	9,209
Manufacturing--Food / Kindred Products	2,389	9,821
Manufacturing--Apparel / Textile	46	2,563
Manufacturing--Lumber and Wood Products	148	6,371
Manufacturing--Furniture / Fixtures	2	559
Manufacturing--Paper / Allied	137	1,845
Manufacturing--Printing / Publishing	233	6,343
Manufacturing--Chemical / Allied	115	3,349
Manufacturing--Primary / Fabricated Metal	132	3,354
Manufacturing--Industrial Machinery	202	5,915
Manufacturing--Electronic Equipment	166	2,292
Manufacturing--Transportation Equipment	70	1,280
Manufacturing--Instruments / Related	80	1,271
Manufacturing--Other	95	5,944
Trucking and Warehousing	69	4,299
Transportation--Air	988	10,624
Communications	611	8,135
Utilities	76	731
Wholesale Trade--Durable Goods	824	37,016
Wholesale Trade--Nondurable Goods	4,610	22,200
Retail Trade--Building Material and Garden	364	7,424
Retail Trade--General Merchandise Stores	3,327	49,640
Retail Trade--Food Store	26,597	90,513
Retail Trade--Automotive Dealers & Service Station	900	12,761
Retail Trade--Restaurants	58,277	127,338
Retail Trade--Other	1,153	17,198
Finance / Insurance / Real Estate / Legal	9,132	49,253
Services--Hotels / Lodging	7,123	17,237
Services--Business Services	3,817	20,587
Services--Motion Pictures	190	1,026
Services--Medical / Health	5,596	30,184
Services--Education	2,201	11,869
Services--Other Professional	6,612	35,663
Services--Other Misc.	6,669	35,972
Public Administration	0	0
Total	**143,371**	**651,758**

Note: Total MSW estimate does not include C&D debris. Zero is noted for Public Administration because BusinessWise is private sector information only and does not include public sector data, and the focus of this study is commercial businesses. The results of this study would be applied to the public sector, for example, Charlotte-Mecklenburg schools.

A limitation of KCI's methodology is that it relies on waste generation and composition data derived from businesses in California which may differ from those in Mecklenburg County in ways that cannot be quantified. Nevertheless, KCI believes that waste characteristics are relatively similar within any given business category due to their homogenous organizational structure and employee work activity, regardless of geographical location. Therefore, the estimates presented in this report are considered to be reasonably accurate and sufficient at this stage of County planning.

KCI estimates that the commercial sector in the County generates approximately 143,000 tons per year of food waste and 652,000 tons per year of MSW (see Table 2). By comparison, in its annual report to the state Department of Environment and Natural Resources (DENR), Mecklenburg County reported disposing approximately 513,000 tons of commercial waste in FY2010-2011. Given the fact that KCI's is a *generation* estimate and the County's is a *disposal* number, these numbers are comparable and indicate that KCI's estimates are good for the purposes of this project.

Food Waste Recovery Potential

Based on analysis of the food waste generation data and our knowledge of commercial food waste programs in other communities, KCI identified six business categories as primary targets for commercial food waste recovery in the County. Then utilizing the BusinessWise database and the Book of Lists from the Charlotte Business Journal, KCI identified the number of businesses and employment for the targeted business categories based on criteria for each business category to identify larger establishments that would be the largest food waste generators in each category (see Table 3). The criteria were based on typical waste generation coefficients in order to identify businesses that would likely be subject to County's Source Separation Ordinance (16 cubic yards or more of waste service per week).

Table 3 – Major Food Waste Generation Sectors

Business Category	Criteria	Estimated Establishments	Estimated Employment
Food Manufacturing	>25 Employees	12	3,994
Retail Trade--Food Store	>25 Employees	101	9,437
Retail Trade--Restaurants	>50 Employees	147	13,452
Services--Hotels / Lodging	>50 Employees, with restaurant	24	3,788
Services--Medical / Health	>100 Employees, Inpatient facilities	10	8,170
Services--Education	University/College, Residential Campus	6	5,460
Total		**300**	**44,301**

KCI then estimated food waste recovery based on recovery rates ranging from 20% to 60% of the food waste generated by the target businesses. These recovery rates are reasonable assumptions at this early stage of program assessment and planning. For example, in projecting potential food waste recovery for its program development, Portland Oregon established the goal that 75% of major food waste generating businesses would participate and those businesses would recover 40% to 60% of the food waste they generate.

Table 4 – Food Waste Generation and Potential Recovery by Major Generators

Business Category	Estimated FW Generation	Projected FW Recovery (tons/year)		
		Low 20%	Medium 40%	High 60%
Food Manufacturing	1,606	321	643	964
Retail Trade--Food Store	21,854	4,371	8,742	13,113
Retail Trade--Restaurants	19,798	3,960	7,919	11,879
Services--Hotels / Lodging	3,756	751	1,502	2,253
Services--Medical / Health	1,395	279	558	837
Services--Education	932	186	373	559
Total	**49,341**	**9,868**	**19,737**	**29,605**

In conclusion, KCI estimates that a well-planned and implemented commercial food waste recovery program targeting major generators in Mecklenburg County could realistically recover up to 30,000 tons per year of food waste. As will be detailed in subsequent task reports, a significant amount of the County's commercial food waste is already being recovered through food banks and composting activities.

RECOMMENDATIONS

To better understand its commercial waste stream and the potential for food waste recovery, the County should consider conducting waste audits and/or waste characterization analyses targeted at business sectors that are major potential sources of food waste. Such a study would not only refine food waste generation and disposal estimates, but also improve the County's understanding of current food waste recovery practices. It would also provide essential information to be used in program planning and implementation to target business sectors with potential for greatest impact to increase food waste recovery.

Subtask 1.2: Identify and Profile Existing Food Recovery Programs and Food Waste Recycling Facilities, and Determine Capacity to Process All the County Food Waste or Additional Capacity Needed

Subtask 1.2a: Food to Animals - Garbage Feeders

BACKGROUND

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish a comprehensive countywide food waste recovery program. The study addresses both commercial and residential food waste. For the commercial sector, KCI work activities include:

- **Identify and profile existing food waste recovery activities and determine need for additional capacity (Subtask 1.2)**

This document presents a segment of Subtask 1.2 methodology and results regarding food waste recovery that occurs through the farms that feed food waste to livestock (garbage feeders).

METHODOLOGY

KCI obtained information regarding garbage feeding from the North Carolina Department of Agriculture and Consumer Services (DACS) Veterinary Division and the U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS).

SUMMARY OF FINDINGS

Garbage feeding is regulated under Subchapter 52H of the North Carolina Administrative Code, where garbage feed means "to feed garbage to swine, to offer garbage to swine, to make garbage available to swine, to allow swine to have access to garbage and/or similar acts wherein swine may consume or contact garbage, including garbage contaminated equipment and products." Subchapter 52H is included as Attachment A.

The state rules mirror those in the Federal Swine Health Protection Code (9 CFR Part 166) and North Carolina has agreed to enable APHIS as the agency responsible for licensing and inspection of garbage feeding operations in North Carolina.

Federal rules clearly define "garbage" to be waste derived from the meat of any animal or other animal material, and other refuse associated with such material. In other words, the garbage feeder rules apply only to operations feeding animal and animal-derived waste to swine.

The rules are limited to swine for two reasons. First as a practical matter, they are the only type of commercial livestock that generally will eat garbage as covered by the regulations. And second as health matter, swine are particularly vulnerable to human-borne diseases.

Importantly, feeding of vegetative food waste (e.g. fruit, vegetable, bread, etc.) is exempt from Federal and State regulations.

For garbage feeders subject to regulation, licenses must be obtained from APHIS. Licenses require that garbage be kept separate from the animal and sterilized (e.g., cooked or autoclaved) prior to feeding. APHIS also conducts searches for unlicensed garbage feeders.

While APHIS does maintain a list of licensed garbage feeder operations in North Carolina, it cannot provide the list due to privacy concerns. It does not have information about quantities of garbage. APHIS is able to disclose that there are approximately 40 garbage feeders in the state, and only one is located in the Mecklenburg region (in Catawba County).

RECOMMENDATIONS

KCI recommends no action regarding garbage feeders since the APHIS cannot provide a list of the licensed garbage feeders in the State and the one in the Mecklenburg region and, therefore, cannot promote it to businesses as an alternative organics option.

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Attachment A

SUBCHAPTER 52H - GARBAGE FED SWINE

02 NCAC 52H .0101 DEFINITIONS

The following definition is in effect throughout this Subchapter: "Garbage Feeding" means to feed garbage to swine, to offer garbage to swine, to make garbage available to swine, to allow swine to have access to garbage and/or similar acts wherein swine may consume or contact garbage, including garbage-contaminated equipment and products.

History Note: *Authority G.S. 106-405.1; 106-405.8;*
Eff. April 1, 1984;
Amended Eff. October 1, 1987.

02 NCAC 52H .0102 PERMIT FOR FEEDING GARBAGE TO SWINE

(a) No person shall feed garbage to swine without first obtaining a permit therefor from the North Carolina Commissioner of Agriculture; provided that a permit is not required of any individual who feeds only his own household garbage to his own swine. Applications for permits to feed garbage shall be made in writing on forms furnished by the State Veterinarian and shall include the name and address of the applicant, the location of the feeding premises, number of swine usually fed, origin of garbage collected, type of collecting and cooking equipment and similar information. The Commissioner of Agriculture or his authorized agent, the State Veterinarian, may require a survey of the garbage-feeding premises and equipment, by a state or federal inspector, prior to issuing the permit.
(b) It is the policy of the Veterinary Division that in all cases, a survey of garbage feeding premises and equipment is made prior to issuance of a permit.

History Note: *Authority G.S. 106-405.2; 106-405.8;*
Eff. April 1, 1984.

02 NCAC 52H .0103 COLLECTION AND TRANSPORTATION OF GARBAGE

(a) Trucks, vehicles, cans, barrels, vats or other equipment used for the collection and transportation of garbage shall be maintained in a clean and sanitary manner, and such vehicles and equipment shall not be used for any other purposes until cleaned and disinfected. All cans, barrels, vats or other containers shall be leak-proof and fitted with lids or other approved covers necessary to prevent spillage. No garbage, either raw or cooked, originating in any other state shall be fed to swine in North Carolina except upon written authorization by the State Veterinarian. The State Veterinarian is authorized to require processing or reprocessing by heat-treatment of all garbage originating in another state or originating in an area owned or under control of the United States armed forces or other agencies of the United States Government. The owners or agents in charge of vehicles transporting garbage shall furnish any authorized state or federal inspector information as to the origin and destination of the garbage. Upon written or verbal request, any person disposing of garbage shall furnish the State Veterinarian or his authorized agent the name and address of the garbage collector and the approximate hour of collection. Garbage collected and transported for the purpose of feeding to swine in violation of the Garbage Feeding Law (G.S. 106-405.1- 106-405.9) and/or rules and regulations shall be disposed of by burial or other approved methods as directed by authorized state and federal inspectors.
(b) Policy of the veterinary division dictates that the State Veterinarian does not authorize the feeding of garbage originating outside of this state to be fed to swine in North Carolina. No exception is made to the required heat treatment of garbage prior to being fed to swine.
History Note: *Authority G.S. 106-405.8;*
Eff. April 1, 1984.

02 NCAC 52H .0104 SANITATION AND MANAGEMENT

(a) The garbage feeding premises shall be kept in a clean and sanitary manner and properly drained. The holding pens and feed lots shall be well constructed of suitable materials so as to prevent the escape of swine, including baby pigs. The fences and gates shall be kept in good repair and escape proof from bottom to top. Swine shall not have access to the area where raw garbage is transported, unloaded and cooked. The feeding platforms or troughs shall be constructed of concrete, wood or other impervious material and of sufficient size and dimensions to accommodate the swine herd. The troughs shall be secured so as to prevent turning over and contaminating the soil. Raw garbage collected shall be heat-treated within twenty-four hours and kept covered until processed. Effective rodent, vermin and fly control measures shall be practiced. An adequate water supply shall be available on the garbage feeding premises. Containers and other utensils used in transferring cooked garbage to the feeding platforms or troughs shall not be contaminated with raw garbage. The feeding of garbage on the ground is prohibited. Garbage shall not be allowed to accumulate on the platform, in the feed trough or in and around the pens. Spilled garbage and waste garbage shall be buried outside the pens or feed lots. Rubbish, trash, bones, dead animals and other objectionable materials shall be removed from the feed lots and adjacent premises at frequent intervals and disposed of by burning, burial or other approved methods. The garbage feeding of swine shall be separate and apart from other livestock. No garbage feeding operation shall be maintained within 300 feet of non-garbage fed swine unless a specific written permit shall have been obtained first from the State Veterinarian or his authorized representative.
(b) A written permit for the maintenance of a garbage feeding operation of swine within 300 feet of non-garbage fed swine will not be issued by the State Veterinarian or his authorized representative unless a barrier sufficient to prevent the movement of men and animals has been erected and the owner of the non-garbage fed swine has given his approval in writing.

History Note: *Authority G.S. 106-405.5; 106-405.8;*
Eff. April 1, 1984.

02 NCAC 52H .0105 GARBAGE COOKING EQUIPMENT AND OPERATIONS
(a) Garbage cooking equipment shall be located 15 or more feet from the feed lots and so placed that raw garbage may be emptied into the cooker without passing through or contaminating the feed lots. The garbage cooking vats or other equipment shall be fitted with a metal or other approved removable cover. The size of the vat or other cooking equipment shall be determined by the amount of garbage processed and the heating facilities shall be adequate to heat-treat all parts of the garbage at a temperature of 212 degrees F. for 30 minutes or longer.
(b) Vats or other cooking equipment using direct fire for heat-treatment shall be enclosed in a fire box or furnace with a minimum of one and one-half inch direct fire space on each side, each end and extending a minimum of two inches above the top level of the garbage, during cooking operations. Drums if used shall be cut horizontally and enclosed in a fire box or furnace and fitted with a cover as prescribed for vats and other cooking equipment. The cooking equipment shall be provided with a shelter or other suitable covering for proper heat-treatment during all types of weather.
(c) Boilers and steam generating equipment shall be adequate in size and capacity to heat-treat the raw garbage of each processing operation. The steam pipes used in the cooking equipment shall be adequate in size and properly spaced with end valves, if required, and approved by the inspector. Inspectors shall provide a detailed diagram showing proper methods of both steam heat-treatment and open fire heat-treatment of garbage.

History Note: *Authority G.S. 106-405.6; 106-405.8;*
Eff. April 1, 1984.

02 NCAC 52H .0106 CHANGES IN SPECIFICATIONS FOR COOKING EQUIPMENT
Changes in specifications for cooking equipment and methods (as specified in 2 NCAC 7E .0105) may be permitted by the State Veterinarian when it will not affect the efficiency of cooking and operation.

History Note: *Authority G.S. 106-405.8;*
Eff. April 1, 1984.

02 NCAC 52H .0107 MOVEMENT: SALE AND QUARANTINE OF GARBAGE-FED SWINE

(a) Swine which have been fed garbage shall be sold only for direct movement to a slaughtering establishment. They shall not be used for other than immediate slaughter and at the time of sale shall be identified by the garbage feeding permit number on the bill of sale.
(b) No garbage-fed swine shall be moved or transported except in compliance with the federal regulations and with the law and rules and regulations of the state of destination.
(c) Swine fed on raw garbage, improperly cooked garbage and/or fed or held on premises in violation of the Garbage Feeding Law and/or rules and regulations shall be subject to quarantine. The State Veterinarian is authorized to permit the movement of garbage-fed swine to isolated premises and subject to quarantine. The movement and/or sale of garbage-fed swine, including swine fed on individual household garbage and all other swine, shall be subject to the emergency rules and regulations established by the Commissioner of Agriculture for the control and eradication of vesicular diseases.
(d) A permit to move swine under quarantine because of having been fed raw garbage will be issued by the State Veterinarian when movement can be accomplished without risking the exposure of other animals.

History Note: *Authority G.S. 106-405.8;*
Eff. April 1, 1984.

02 NCAC 52H .0108 EXEMPTIONS
The Commissioner of Agriculture or his authorized representative will exempt from the definition of garbage the waste resulting from the processing of seafood when it can be determined that the waste is not contaminated with, or has not been exposed to, other material classified as garbage.

History Note: *Authority G.S. 106-405.1;*
Eff. April 1, 1984.

02 NCAC 52H .0109 BOILING GARBAGE
Boiling garbage for 30 minutes is an acceptable alternate to heating garbage to 212 degrees F. for 30 minutes, provided that all parts of the garbage reach the temperature of boiling for 30 minutes.

History Note: *Authority G.S. 106-405.6;*
Eff. April 1, 1984.

Subtask 1.2b: Food to People – Food Banks

BACKGROUND

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish the feasibility of a comprehensive countywide food waste recovery program. The study addresses both commercial and residential food waste. For the commercial sector, KCI work activities include:

- **Identify and profile existing food waste recovery programs and determine need for additional capacity (Subtask 1.2)**

This document presents Subtask 1.2 - Identify and profile existing food waste recovery programs – Food to People (Food Banks). The purpose of this Subtask is to identify and profile existing food waste recovery programs to determine capacity or additional capacity. Twelve (12) programs in Mecklenburg County were identified that function as food clearing houses, food banks and/or soup kitchens. Complete survey results are included as Attachment C.

METHODOLOGY

A survey instrument was designed to capture current capacity of the existing programs, sources of waste diverted food, how donated food is transported to and from the program, and disposal of waste from the program (Attachment B). The data from the survey was designed to reveal the net tonnage of currently diverted waste, as well as the infrastructure that is utilized.

Communication was initiated to identify and establish a point of contact within each of the 12 programs. Those 12 programs included: Angels & Sparrows Soup Kitchen, Community Food Rescue, Charlotte Rescue Mission, Dilworth Soup Kitchen, Friendship Trays, Harvest Kitchen, Loaves and Fishes, Mallard Creek United House of Prayer Pantry, Mount Olive Presbyterian Church Food Pantry, Salvation Army, Second Harvest, and Urban Ministry. A point of contact was established with seven programs and food waste


Friendship Trays Meals

diversion surveys were administered via e-mail to them. Follow up phone calls were made, as needed, to clarify survey results, gain a fuller understanding of scope of services, and better quantify waste diversion quantities. Of the other five programs, one program was unreachable (disconnected phone service), and four were non-responsive (did not reply to repeated phone messages and e-mails in the initial contact process).

SUMMARY OF FINDINGS

Survey Respondents

Of the seven programs from which completed surveys were received, Second Harvest has the largest capacity and reach. Last year Second Harvest handled over 36 million pounds of food and distributed it to more than 650 agencies within its region; however, only about 40-50 percent of that was received and distributed within Mecklenburg County. Of the in-County donated food, about 4.2 million pounds were perishable. About two percent of the donated perishable food ends up in the dumpster due to damage (84,000 pounds). Second Harvest utilizes their own fleet of trucks to pickup and distribute donated food to agencies such as soup kitchens and food pantries. Two of the programs we surveyed, Urban Ministry and Loaves and Fishes, reported that all of their donated perishable foods come directly from Second Harvest.

Friendship Trays (FT) is the second largest food bank/pantry in the County. It is 100% privately funded. Last year FT handled approximately 432,000 pounds (216 tons/year) of food and served approximately 188,500 individuals. The organization is the only one in Charlotte that serves modified diets to meet special dietary needs as the local Meals-on-Wheels program and also serves several day care programs. Only about two percent of the perishable food used by FT was donated. Approximately 86 pounds of donated perishable food was disposed of as leftovers or unusable, and it was directed to an onsite compost pile and community garden. FT picks up donated food and utilizes an extensive volunteer system with 94 routes and drivers per day to deliver food.

Charlotte Rescue Mission (The Mission) serves about 17,150 meals a month consisting of over 7,560 pounds of food. The Mission estimates that about 12 percent of the food is donated perishables and less than two percent ends up as waste in a dumpster. The Mission picks up about 50 percent of donated food with fleet vehicles; the other 50 percent is delivered by donators. All meals are served on the premises requiring no delivery transportation.

Serving Dinner at Charlotte Rescue Mission

Dilworth Soup Kitchen (Dilworth) handles about 3,000 pounds of food and serves about 1,000 individuals each month. Dilworth reported that 100 percent of their food is donated and that there is almost zero waste. The program goal is to acquire "fresh, wholesome" food and as such reports that as much as 90 percent of their donations are perishable. Dilworth utilizes a dispatch system with volunteers using personal vehicles to collect and distribute food. Dilworth's capacity limitations are based on volunteers to collect, but more importantly groups who are willing to cook and serve the food.

Finally, one program, Angels & Sparrows Soup Kitchen reported that they "do not track food sources/waste" so data was not available from them. Urban Ministry and Loaves and Fishes receive all of their food donations from Second Harvest and referred us to that data and information.

Survey respondents serve approximately 418,300 meals annually in Mecklenburg County. Respondents received an estimated 2,124 tons of donated perishable food and distributed an estimated 2,082 tons through meals within the community, with approximately 42.1 tons of leftovers or unusable scrap disposed or composted in a community garden annually. A summary of food served, distributed, and donated or disposed is included as Attachment B,

RECOMMENDATIONS

There were two programs that wanted to provide feedback and suggestions to County staff regarding food donations, Friendship Trays and Dilworth.

Friendship Trays wants healthy food, and serving healthy diets is important to them. They serve direct to the people they service. The meals are prepared, cooked and delivered by volunteers. They are considered a Model GREEN Meals on Wheels program. They compost through a worm bin; recycle their corrugated cardboard and reduce their collection pulls as a result; use biodegradable and or recyclable food clam shell trays; and are partnering with community and church gardens to teach the community about growing food, composting, and working to have the food grown returned back to their kitchen. Beginning in 2011, solar panels were installed on the building's roof; the energy produced is sold to Duke Energy and helps reduce the Friendship

Trays electric utility bill. Additionally, management staff believes that many corporations are becoming more risk adverse to donating food and are throwing more food away than in the past due to liability concerns. Friendship Trays recommends the County convene an informal focus group of these corporations to discuss their corporate rules and protocol to see if the food bank industry and private companies can work together to find solutions to their fears and protocols to help ensure their donation.

Dilworth reported that its model includes asking for less food in more places, and picking up donations when it is convenient for the donating party, regardless of the day or time. Their limitations in capacity are based on volunteers, many of whom are dispatched on short notice to collect donations. Dilworth's program uses the motto, "ask for what is easy, and only ask for what you need." This means that grocers, restaurants, bars, and others are asked to donate food which those organizations serve or sell, and Dilworth will not accept more than what they can use. For instance, rice is requested from Asian restaurants, while potatoes are requested from steak houses. Dilworth reported that many establishments order extra food (such as rice and potatoes) specifically to donate to the program. In addition, Dilworth states that it works with some grocers to donate food directly from their delivery dock and walk-ins in order to make room for new deliveries. The rationalization is that it saves the grocer time and energy, from having to unload, unpack, stock, pull, and pack donated goods.

Mecklenburg County staff may want to consider:

- Gathering an informal focus group of local food banks and corporate donors to possibly establish a food waste exchange program and to address some of the liability issues expressed by Friendship Trays. This would also provide more information on the needs of the both parties in maximizing recovery, diversion and donation.
- Create a commercial compost webpage and a section in the Resource Guide for Commercial Waste Reduction and Recycling.
- Creating a food bank and soup kitchen interactive map on the County website similar to the drop-off map to give businesses an idea of location for donation options in their areas.

Attachments (provided on the next pages)

Table 5 – Food Bank Survey Results

Mecklenburg County Food Banks/Soup Kitchens Food Donated & Disposed Annually					
Organization Name	**Total Clients/Meals Served Per Year**	**Total Food Served (lbs)**	**Perishable Food Donated (lbs)**	**Perishable Food Donated - Disposed (lbs)**	**Perishable Food Donated - Distributed (lbs)**
Angels & Sparrows Soup Kitchen	Do not track any information.				
Charlotte Rescue Mission	205,800	90,720	22,680	454	22,226
Community Food Rescue	Unreachable - Phone Disconnected				
Dilworth Soup Kitchen	12,000	36,000	32,400	0	32,400
Friendship Trays	188,500	432,000	8,640	86	8,554
Harvest Kitchen	Nonresponsive				
Loaves and Fishes	12,000	Do not track -- All perishable food comes from Second Harvest "as-needed" so it is all distributed			
Mallard Creek United House of Prayer Food	Nonresponsive				
Mount Olive Presbyterian Church	Nonresponsive				
Salvation Army	Nonresponsive				
Second Harvest - Metrolina	650 agencies (don't serve meals/individuals)	16,200,000	4,185,000	83,700	4,101,300
Urban Ministry	Do not Track -- All perishable food comes from Second Harvest				
Total	**418,300**	**16,758,720**	**4,248,720**	**84,240**	**4,164,480**
Total Tons		**8,379**	**2,124**	**42.1**	**2,082**

Note: Second Harvest - Metrolina food quantities are estimates for in County portion of overall operation

Subtask 1.2c: Food to the Land – Compost Facilities

BACKGROUND

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish a comprehensive countywide food waste recovery program. The study addresses both commercial and residential food waste. For the commercial sector, KCI work activities include:

- **Identify and profile existing food waste recovery activities and determine need for additional capacity (Subtask 1.2)**

This document presents a segment of Subtask 1.2 methodology and results regarding food waste recovery through composting facilities.

METHODOLOGY

KCI contacted the North Carolina Department of Environment and Natural Resources (NCDENR) and obtained lists of permit and notification facilities in the Charlotte region. We reviewed the lists and identified facilities that currently accept food waste or potentially may be able to accept food waste from Mecklenburg County in the future. KCI then developed a survey instrument (Attachment B) and contacted composters to obtain information regarding their current operation and ability or potential interest to accept food waste. Attachment C provides a summary of the surveys returned by the existing or potential processing facilities. KCI also conducted site visits to the major composting operations in the area to gather additional information. The County provided in February a copy of the Phase 1 Market Study Report prepared in 2008 for the Compost Central facility.

SUMMARY OF FINDINGS

Per state regulations, composting facilities are categorized based on the type of materials they handle and the size of the operation. The regulatory categories of facilities are as follows:

- Type I facilities are limited to yard and garden waste, silvicultural waste, untreated and unpainted wood waste

- Type II facilities can receive pre-consumer meat free waste, vegetative agricultural waste, and source-separated paper
- Type III facilities can receive meat, post-consumer source-separated waste, and manures
- Type IV facilities can receive mixed solid waste and biosolids
- Small facilities receive <1,000 cubic yards per quarter, or <6,000 cubic yards per quarter if it is a Type I facility
- Large facilities receive ≥1,000 cubic yards per quarter, or ≥6,000 cubic yards per quarter if it is a Type I facility

Small Type I facilities are eligible for annual notification and exempt from other permitting requirements. NCDENR identifies two types of notification facilities: yard waste composting facilities and yard waste treatment and processing (grinding/mulching) facilities. All other facilities must obtain a permit. To summarize permitting requirements, facilities that are larger and handle more organic waste must comply with more siting, design, and operating requirements.

The following subsections present summary information regarding permitted facilities, research and demonstration facilities, and facilities being proposed or under development.

Permitted Compost Facilities

KCI obtained basic information from NCDENR regarding permitted composting facilities in the Charlotte metropolitan area (see Table 6). KCI did not include notifications facilities (Small Type I) in the assessment because they are not allowed to accept food waste, and it would be necessary for them to obtain a permit to do so. Furthermore, the existing Small Type I facilities are all located outside Mecklenburg County and are either municipal/county yard waste sites or private yard waste grinding operations, so the potential for converting them into facilities to handle food waste from Mecklenburg County is low.

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Table 6 - Permitted Composting Facilities in the Charlotte Region

Permit Type	*Name*	*Location*	*Feedstocks*
Large Type I	Compost Central - Mecklenburg County	Charlotte, Mecklenburg County	YW, WW
Large Type I	City of Hickory	Hickory, Catawba County	YW, WW
Large Type III	Earth Farms, LLC	Dallas, Gaston County	M, AB, FW, GTW, YW, WW
Large Type III	Wallace Farms, Inc.	Huntersville, Mecklenburg County	M, FW, GTW, YW, WW
Small Type III	UNC Charlotte	Charlotte, Mecklenburg County	FW
Small Type III	Brown Creek Correctional Institution	Polkton, Anson County	Not specified
Small Type III pending	Davidson College	Charlotte, Mecklenburg County	FW, YW

Feedstock abbreviations: AB = animal bedding, FW = food waste, GTW = grease trap waste, M = manure, WW = wood waste, YW = yard waste

KCI excluded the Hickory and Brown Creek Facilities from the survey because neither one currently, or would potentially in future, handles organics materials from Mecklenburg County. The Hickory facility handles only yard waste and wood waste generated within that city, and the Brown Creek facility handles only materials generated at that institution.

The five other facilities are profiled in the following paragraphs.

Mecklenburg County Compost Central (Windrow Composting)

The County's yard waste facilities are Compost Central, and the North Mecklenburg, Hickory Grove, and Foxhole Full Service Recycling Centers (FSRC). They all accept yard waste from collection companies, residents and businesses. Grinding of yard waste occurs utilizing a mobile tub grinder at the three FSRC locations, while the County's second tub grinder is permanently located at Compost Central. Yard waste materials accepted from these generators include unbagged leaves, brush, grass clippings; limbs less than 5 ft. in diameter; and unpainted and untreated pallets. During the fall season, leaves make up a large part of the County's incoming yard waste debris. At the three FSRCs, unclean yard waste

is sent out as boiler fuel. From a regulatory perspective, the yard waste operations at the FSRCs are covered as part of the sites' NCDENR solid waste permits.

The County's Compost Central facility, located on an 86-acre parcel leased from the Charlotte-Douglas International Airport, handled a total of 75,800 tons of yard waste and wood waste in FY2010-2011. The lease agreement with the Airport expired in July 2011 and the County is currently leasing the site for $2,175 per month on a month-to-month basis while negotiating a new lease with the Airport. The facility utilizes turned windrow composting to produce approximately 2,900 and 3,300 tons per year of compost and mulch, respectively. Staff states that they currently only sell what they produce. The vast majority of incoming material is processed into boiler fuel (approximately 58,800 tons per year). Compost, nuggets and mulch are available for sale and delivery at a fee from Compost Central.

According to staff, in recent years the Airport has reduced the amount of area available for the County operation due to their expansion needs. The facility currently does not have the capacity (land space) to compost the amount of yard waste it receives. Because there is not enough room for the windrowing operation to produce compost and mulch, over 74% of incoming yard waste is converted into boiler fuel. Production capacity is limited due to space. The 2008 Market Study Report concluded that sufficient markets exist for all compost and mulch the County could produce. However, it noted that Compost Central production capacity was constricted by Airport development and expansion, and that ultimately makes the site unviable.

Compost Central is not able to receive food waste since it is not a Type I permitted facility, due to Federal Aviation Administration (FAA) regulations and DENR Requirements that prohibit outdoor handling of waste that attract birds (e.g., food waste) within 10,000 feet of an active runway used for jet aircrafts. In addition, FAA regulations prohibit enclosed waste handling facilities located on airport property or within the runway protection zone.[5]

KCI was requested by staff to review a few additional County properties that could have been conducive for the composting facility. They included land to the North Mecklenburg FSRC and the McAlpine Creek Charlotte Mecklenburg Utility facility. However, neither is a viable location for composting at this time. The North Mecklenburg FSRC site is located in a low lying area with nearby residential developments, including one subdivision within 500 feet of the potential compost area. The McAlpine facility has a large building that was initially designed and built as a biosolids composting facility. Although biosolids are no longer composted there, the building

[5] FAA Advisory Circular 150/5200-33, 5/1/1997

is now used to store dewatered biosolids prior to land application. Future uses of this facility could include composting operations.

Earth Farms (Windrow Composting and Vermicomposting)

Earth Farms (aka Stanley Farms) is a Large Type III facility located in neighboring Gaston County and handles source-separated food waste (vegetative and animal by-products), yard waste and wood waste as well as a number of other materials including agricultural processing residuals, manure, animal bedding, and land clearing debris. The facility's primary sources of food waste are grocery stores and institutions, while municipalities are the primary source of yard waste. Earth Farms offers customized recycling programs for restaurants, hotels, schools, grocery stores, food processors, and caterers as a part of their relationship with local businesses. Components of Earth Farms recycling programs include waste audits to illustrate what types and how much organic waste is produced, container needs assessment, collection scheduling, and employee education and training. By designing recycling plans with specific customer needs in mind, Earth Farms creates an efficient, streamlined food waste diversion process.

Earth Farms was created in 2006 on 100 acres of land in Dallas, North Carolina. Currently, Earth Farms reports handling 26,600 tons of food waste a year, and claims to divert 100,000 tons of waste (vegetative materials, yard waste, and animal byproducts) from landfill disposal each year. The facility utilizes turned windrow composting and had begun to implement vermicomposting as well. The facility currently has the capacity to accept up to 75 tons per day (approximately 20,000 tons per year) of additional food waste provided that it is free of contaminants and has appropriate nutrient content and moisture characteristics to meet their composting requirements. In addition, future plans call for increasing the scale of their vermicomposting operation.

End products sold by the facility include a variety of high quality soil amendments touted as locally sourced and produced ranging from compost, to specialized soil blends. These products provide soil matrix structure, organic content, increased water retention and nutrient content. Specific soil blends with specialized content include iron supplementation and vermicompost. Small amounts of Earth Farm products can be purchased at local landscape suppliers, whereas large amounts can be purchased on location with delivery service provided.

Wallace Farms (Windrow Composting)

Wallace Farms is a Large Type III facility that began operation in the 1960s. The facility handles source-separated vegetative food waste, manure, dairy product waste, and grease trap waste as well as yard waste and wood waste. It does not accept meat. The facility uses turned windrow composting technology. Its primary source of food waste is grocery stores and food manufacturers. Tip fees are less than $20 per ton. Yard waste and wood waste are supplied by several cities and counties.

In 2010, Wallace Farms handled approximately 50,000 tons of feedstocks including approximately 10,000 tons of food waste. The facility is permitted to handle up to 100,000 tons per year. The facility is able to accept up to 40 tons per day (approximately 10,400 tons per year) of additional food waste provided that it is free of contaminants.

Wallace Farms was originally located in a very rural area, but over time the land around the facility has been developed into upscale homes and townhomes. The composting operation's location adjacent to residential areas presents challenges due to residents' concerns and perceptions about odor. The Wallace Farms permit SWC-60-22 expires on April 22, 2015. After that time and according to a legal settlement, the facility will only be allowed to operate a Type I compost facility at their current location. If Wallace Farms wishes to continue compost food waste, the owners will have to move that part of the operation to a new location. The owner is considering whether to keep his operation at the current location or move it, possibly outside of the County. Consequently, Wallace Farms' future ability to handle food waste is uncertain.

UNC Charlotte (In-vessel and Windrow Composting)

The University of North Carolina Charlotte has a small Type III composting operation dedicated to handling a portion of on-campus food waste. Source-separated food waste (including vegetative material and animal by-products) are separated at one of the campus cafeterias. Sawdust is used as a bulking agent and carbon source. The operation consists of two EarthTub composters with a combined volume of 7 cubic yards followed by windrow composting. The campus has the capacity to compost approximately 13 tons per year of food waste; it presently processes approximately 5 tons per year. The compost produced is used in campus landscaping.

University policy limits the operation to on-campus waste only, so it would never take in food waste from other sources.

Davidson College (In-Vessel and Windrow Composting)

Davidson College operates a small Type III (permit pending) composting operation to recover pre- and post consumer food waste generated in the dining halls and student residences on campus. The food waste is mixed with yard waste from the campus landscaping. Currently, College staff state that the facility processes approximately 400 pounds of food waste and 1,800 pounds of yard waste per day. The waste is processed using an in-vessel system housed within a 4,800 square foot building, then is stored outside in windrows for approximately four weeks. The facility is currently operating at full capacity and produces, according to staff, approximately 50 cubic yards of compost annually. All of the compost is used in campus landscaping. The permit applied for will be for campus use only; the school has made a policy decision to not accept waste from outside.

Research and Demonstration Projects

Under NCDENR composting regulations, one can request approval for a research and demonstration (R&D) project for the purpose of evaluating composting feasibility. There is one such facility currently operating in the Charlotte metro area as described below.

Foster Caviness (Vermicomposting Pilot Demonstration)

Foster Caviness, a major food distributor in North Carolina, began a vermicomposting R&D project in September 2011. The operation current handles .25 tons per day of vegetative food waste generated internally by the company's food distribution work. They expect to scale-up operations to 1.5 tons per day (390 tons per year). Initially the company will focus on their own internally generated food waste, although if the composting operation is successful and profitable, Foster Caviness may expand to include other sources of food waste.

Facilities Under Development or Proposed

In addition to existing permitted and R&D composting facilities, KCI is aware of four projects that are either under develop or being proposed in the Charlotte region that would utilize food waste. Two of them would employ a combination of in-vessel and vermicomposting, while the other two plan to utilize high-solids anaerobic digestion (HSAD) technology to convert a combination of food waste, FOG (fats, oil & grease), and yard waste into methane (which is used to generate electricity), soil amendment and liquid fertilizer.

Charlotte Airport (In-vessel Composting and Vermicomposting)

The Charlotte-Douglas International Airport is reportedly in the final stages of developing a vermicomposting operation for organic waste generated at the airport. Airport staff responsible for managing the project did not respond to KCI's requests for an interview. The Airport composting project is scheduled for start-up in Spring 2012 and will reportedly have the capacity to handle over 2 tons per day of feedstocks.

Mixed waste from the Airport will be handled at a mixed waste processing facility where the organic material for composting will be separated. Then the organic material will be partially processed by a rotary drum in-vessel composter to meet pathogen reduction standards, after which it will be vermicomposted. The entire composting operation will be enclosed at a new solid waste management facility being built at the airport in order to control odors and eliminate bird hazards. According to second-hand sources, the operation will only accept waste generated at the airport. KCI was not able to reach a representative from the Airport to gather more detailed information.

Earth ReNew (In-vessel Composting and Vermicomposting)

Earth ReNew is the company supplying the vermicomposting system for the Airport project. Unrelated to that project, the company is working to establish a separate facility under a R&D permit. They hope to handle up to 10 tons per day of total feedstock (food waste combined with wood chips bulking agent). At the time of this report, Earth ReNew had not yet filed its permit application with NCDENR. The technology being considered is the same as the Airport: rotary drum digester for initial composting to achieve pathogen control standards followed by vermicomposting.

W2E Organic Power (Anaerobic Digestion)

W2E Organic Power has obtained a permit and is working to begin development of its first facility in Columbia, SC. Their pro forma facility is designed to handle 40,000 to 50,000 tons per year of feedstock of which food waste will represent approximately 70% or 28,000 to 35,000 tons per year. W2E is in the process of working to secure power purchase agreements necessary for the projects financial viability. The company reports that it has plans to site a similar facility in Charlotte.

Orbit Energy (Anaerobic Digestion)

Orbit Energy currently operates a small HSAD facility in Clinton, NC that handles food waste from major commercial generators such as Wal-Mart. The company reportedly has plans to develop a facility in Charlotte with capacity of generating 3.2 megawatts of electricity from the biogas produced. The company is in the process of negotiating a power purchase agreement with Duke Energy, which is necessary before development can begin. KCI efforts to contact the company for additional information were unanswered.

SUMMARY OF FINDINGS

Table 7 shows the current and potential food waste capacity at permitted facilities.

Table 7 - Current and Potential Food Waste Capacity at Permitted Facilities (tons/year)

Facility	*Current*	*Current Unused Capacity*	*Total Potential (Permitted) Capacity*
County Facilities	0	0	0
Earth Farms	26,600	20,000	46,600
Wallace Farms*	10,000	10,400	20,400
UNC Charlotte**	5	8	13
Total	36,605	30,408	67,013

*Capacity to process food waste after 2015 in question
**Capacity limited to food waste generated on campus

According to KCI's research, composting operations in the Charlotte metro area already handle over 36,000 tons per year of food waste, and currently have an estimated 30,408 tons per year of unused capacity. Earth Farms and Wallace Farms possibly account for essentially all of the total potential capacity (46,600 and 20,400 tons per year, respectively). Importantly, Wallace Farms'

entire food waste capacity after 2015 is uncertain due to a legal settlement and their need to find a new location for food waste composting. It is also important to note that Earth Farms is located approximately 27 miles from the center of Charlotte, which impacts the economic viability of hauling food waste there.

The map on the next page depicts those facilities that have current and future capacity to receive food waste from the County within an estimated 25 mile radius (note no facility on the East Charlotte region).

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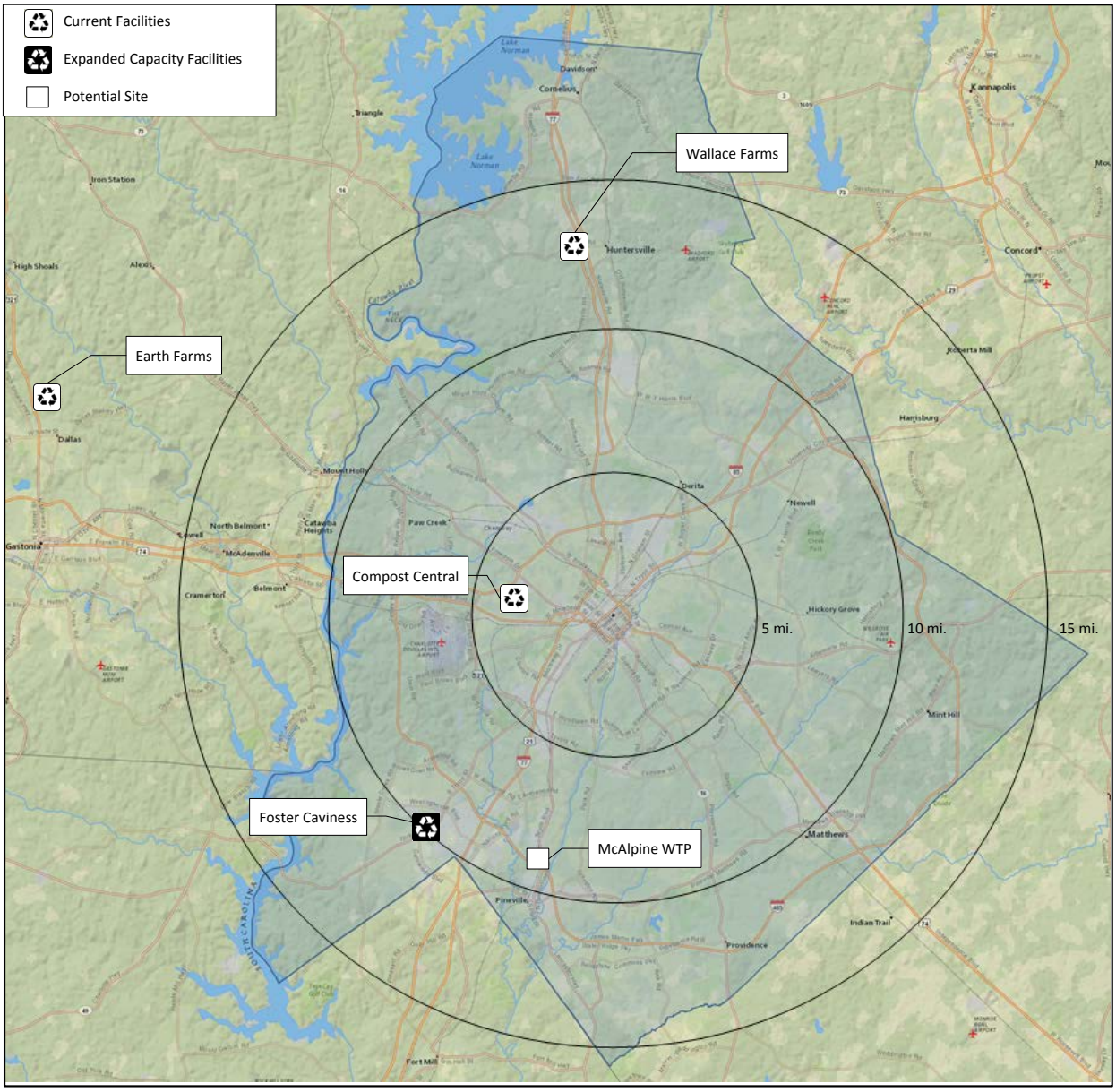

Two private anaerobic digestion venture companies are considering developing commercial scale facilities in the area. If one of these facilities were developed, it might consume some 30,000 tons per year of food waste drawn from a wide radius around Mecklenburg County.

The County itself does not have developable food waste composting capacity at its existing FSRCs or Compost Central, and in fact the County may need to find a new site for Compost Central if it intends to produce yard waste compost and mulch and add food waste to its organics mix. The FSRC were mentioned because they could possibly provide locations for residential food waste drop-off containers and locations. It does not appear that Compost Central would be

a viable location for food waste unless a new location was found off Airport property or if preprocessing occurred before the material got to the location.

RECOMMENDATIONS

Based on the findings of our research, KCI recommends:

- Convene a committee or focus group of those potential processing partners in the area to identify and map a long-term plan for building localized processing capacity within 25 miles of Mecklenburg County to address the collection hauler's direct local transport cost concerns, therefore making it more cost effective for their customers; and within a 100 miles of Mecklenburg County for collection haulers with reverse distribution programs.
- Continue to monitor development of two private anaerobic digestion facilities.
- Continue to monitor Wallace Farms' efforts to re-locate its food waste composting operation.
- Undertake an in-depth site analysis study of County and other potential Municipal properties to determine if any are potentially suitable for food waste and yard waste composting.
- Research pretreatment and/or preprocessing options to reduce volume and size reduction at another location other than Compost Central for food waste liquidation to deter vectors (birds/animals) and bring it in at that point where it is no longer food waste to mix with the yard waste. Also, consider options for using an enzymatic inoculant to speed up the decomposition process so that yard waste can broken down faster and compost made faster and therefore address space constraints at the airport. Using a recognized and tiered-tested inoculant would reduce the finished product process down to two – three months.
- Staff reviews the potential to add small-scale food waste composting at the FSRC and possibly the self-service recycling drop-off centers.
- Continue dialogue with Earth or Wallace Farms' staff to see if they would consider receiving and processing commercial or residential food waste from a pilot residential and/or commercial collection project.
- Utilize Earth Farms waste audit program as a model for other processors.
- Continue dialogue with Foster Caviness staff to see if they would consider receiving and processing commercial food waste from a pilot group through their existing vermicomposting demonstration pilot and their next phase.

Attachment B (Provided on Next Page)

Attachment B
Survey Instrument

COMPOSTING FACILITY/FARM SPOTLIGHT

Facility Name:
Facility Location: Address:
City: County:

Facility Type: **I, II, III, IV (circle one) or other**
Public or Private (*Circle One*)
Additional Contact Information:
Name:
Phone: Fax: Email:
Website:

Hours of Operation:

Feedstock(s) Used:
☐ Source-Separated Vegetative Materials (incl. vegetables, fruits, or breads)
☐ Source-Separated Animal By-products (incl. meats, fats, dairy, eggs)
☐ Manure
☐ Yard Trash ☐ Other: _____

Source of Feedstock(s) (Check all that apply)**:** ☐ Institutions ☐ Restaurant/Grocery
☐ Wastewater Treatment ☐ Municipal Yard Waste ☐ Private Yard Waste
☐ Other:

Process Description-
Turning Method:
Typical C:N Ratio:

Number of full-time Employees**:**

Year Operation Began:

Facility Description: Size (square feet):
Daily Capacity (tons):
Equipment/process used: ☐ Aerated Static Pile ☐ Anaerobic Digestion
☐ In-Vessel ☐ Mechanical Biological Treatment
☐ Tunnel ☐ Vermicomposting ☐ Windrow
☐ Other: _____

Annual Volume or Tonnage Generated:

Target Market for Finished Product:

Marketing Methods & Channels:

Other Products Generated On-Site:

Product Packaging: ☐ Bags ☐ Cubic Yard Box/Bag
☐ Other: bulk

- For Type II, III, & IV facilities, does the facility have ability and/or interest in receiving new sources of food waste?

  If so, what requirements would new sources need to meet?

  What would be the maximum amount of new food waste they might accept at their facility?

- For Type II, III, & IV facilities, does the facility have the ability or interest to expand operations and increase the amount of food waste and other feedstocks composted?

  In either case (yes or no), please provide some explanation of the reasons.

- For Type I facilities, does the facility have the ability or interest to revise its permit and begin to handle food waste?

  In either case (yes or no), please provide some explanation of the reasons.

Additional comments/information:

Attachment C (Provided on Following Pages)

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Attachment C – Food Waste Generator Survey Results

Facility Name Permit	Facility Type	Street	City	Zip	Phone	Fax	Email	Website	Contact	Tip Fee	Feedstocks					Quantity Feedstocks Received	Source(s) of Feedstocks						Process Description		Number Fulltime Employees
											Source Separated Vegetative Materials	Source Separated Animal By-Products	Manure	Yard Trash	Other		Institutions	Restaurant/Grocery	Wastewater Treatment	Municipal Yard Waste	Private Yard Waste	Other	Turning Method	Typical C:N Ratio	
Compost Central 6012 - COMPOST - 1991	Large Type I Public	5631 West Blvd	Charlotte	28208	704-617-5898	NR	steve.elliott@mecklenburgcountync.gov	www.wipeoutwaste.com	Steve Elliott	$ 18.00				x	Clean wood	65,744 tons per year				x			NR	NR	
Wallace Farms 6022 - COMPOST	Large Type III Private	14410 Eastfield Road	Huntersville	28078	704-875-2975	704-875-2394	ericwallfarm@bellsouth.net	www.wallacefarmproducts.com	Eric Wallace	<$20.00	x	x, no meat	x	x	Land clearing debris, clean wood, pallets, sawdust, OCC, bleaching clay, cosmetic production residuals, food processing residuals, starch water	40,377 tons per year		x, grocery only	x	x	x	Pallets/carbon	Backhus, self-propelled turner	20 - 30:1	40
UNC Charlotte 6024 - COMPOST	Small Type III Private	9201 University City Blvd	Charlotte	28223	704-687-5212	704-687-2676	flarnold@uncc.edu	http://facilities.uncc.edu/recycling-housekeeping/recycling/programs/compostin	Forrest Lee Arnold	N/A	x	x			Sawdust	5 tons per year	x					On-site only	NR	44.46:1	NR
Earth Farms 3613 - COMPOST - 2010 (Stanley Farm) (Tri County Environmental)	Large Type III Private	351 Colt Thornburg Road	Dallas (Gaston County)	28134	704-596-3353	704-263-1477	jim@earthfarms.com	www.earthfarms.com	Jim Lanier	$ 27.00	x	x, no meat		x	Grease trap waste, clean wood, cotton, gin trash, land clearing debris	42,353 tons (153 from Mecklenburg Co)	x	x		x			Windrow turner	15.5:1	6
Foster Caviness	Type II Demons-tration Private	10810 Withers Cover Park Road	Charlotte	28273	704-364-8805	NR	rrg8@att.net	http://www.foster-caviness.com/	Roger Grosswald	NR	x					1,500 lbs per day 261 tons per year		x				On-site freight waste	NR	NR	1
W2E Organic Power	N/A	Intersection Shop and Boltline Roads	Columbia (SC)	29201	803-920-9541	NR	info@waste2energynow.com	www.waste2energynow.com	Daniel Rickenmann	NR	x	x		x			x	x		x		Food Manufact-urers	NR	NR	5
Davidson College	Small Type III pending	209 Ridge Road	Charlotte	28217	704-894-2676	NR	NR	http://www3.davidson.edu/cms/x29012.xml	Charles Jolly	N/A	x			x		400 lbs FW per day 1800 lbs YW per day	x						NR	3:1 YW:FW	1
Totals																									

Attachment C – Food Waste Generator Survey Results (continued)

Facility Name Permit	Year Operation Began	Facility Description		Equipment/Process Used								Annual Volume or Tonnage Compost Generated	Target Market for Finished Product	Marketing Methods & Channels	Other Products Generated On Site	Product Packaging			Does the facility have ability and/or interest in receiving new sources of food waste	If yes, what requirements would new sources need to meet?	Maximum Amount New Food Waste Facility Might Accept	Does Facility Have Ability or Interest to Expand Operations?	Provide Explanations and/or Reasons	Does Facility Have Ability or Interest to Revise its Permit and Begin to Process Food Waste?	Provide Explanations and/or Reasons
		Size acres	Annual Capacity (tons)	Aerated Static Pile	Anaerobic Digestion	In-Vessel	Mechanical Biological Treatment	Tunnel	Vermicomposting	Windrow	Other					Bags	Cubic Yard Box/Bag	Other							
Compost Central 6012 - COMPOST - 1991	1991	86	100,000							x		2,904	Public	NR	Mulch 3,346 Boiler Fuel 58,813			Loose	No	N/A	N/A	NR	NR	No	Location at airport
Wallace Farms 6022 - COMPOST	1960's	165	125,000 (permitted for 100,000)							x		45,000	Bag sales to large stores and bulk & bag sales to landscapers, homeowners, NCDOT, etc	Co-packing for other companies, website, yellow pages, word of mouth	All types of mulch - pine bark, cedar, hardwood, colored Top soil blend Potting mix Plants soil Nursery blend Seed & sod	x		Bulk	Yes	No meats, no contamination of plastics, etc	Lots of capacity @ facility. Would be determined when evaluating new food waste.	Yes	NR	NR	NR
UNC Charlotte 6024 - COMPOST	NR	NR	13 tons			x						6.4	On-site landscaping	NR	NR			Bulk	No	N/A	N/A	No	Will never import FW	No	Will never Import FW
Earth Farms 3613 - COMPOST - 2010 (Stanley Farm) (Tri County Environmental)	2004	NR	NR						x	x		40,000	Landscaping, gardeners, agriculture	NR	NR		x		Yes	C:N ratio and free of contaminates	NR	Yes	We are looking at increasing Vermicomposting and possible aerated static pile	NR	NR
Foster Caviness	2005	800 sq ft building	17.5 tons						x			Expecting 17.5 tons	To be determined	To be determined	Worms (red wigglers)			To be determined	Yes	To be determined	1.5 tons per day	Yes	To expand the operation and increase the profit potential	NR	Expect to expand vermiculture over the next few months and again to use additional food waste
W2E Organic Power	2012	3.5	48,000 tons		x	x						12,000	Local agriculture Municipal landscaping Compost facility	Negotiated agreements	3.2 megawatts electricity compost solids Class A liquid Bio-gas Potential for CNG	x		Bulk	Yes	Maximum energy organic makeup	60,000 tons per year	Yes	May consider taking residential food waste in future	NR	NR
Davidson College	2008	4,800 sq ft building	52 tons FW; 234 tons YW			x				x		50 cy	On-site landscaping	NR	NR			Bulk	No	N/A	0	No	Policy decision	N/A	N/A
Totals			176,000									99,910									60000+				

Subtask 1.2d: Oyster Shell Reuse

Although not a scope subtask, Kessler Consulting, Inc. researched Oyster Shell program and composting opportunities at the request of Mecklenburg County staff. The write-up contained here reflects the findings of the research. Effective October 1st, 2009, North Carolina (NC) included oyster shells in the list of items banned from disposal in a landfill under Article 9, Chapter 130A.309.10 of the General Statutes. The intent of the ban was to prevent oyster shells from being disposed in landfills in order to meet heavy demand for the shells as material for building oyster reefs in brackish water as habitat for oysters and other marine organisms. NC had seen a decline in its oyster stock and the health of its coastal brackish water ecosystem. The NC Department of Environment and Natural Resources' Division of Marine Fisheries (DMF) was given the responsibility to manage the program. Currently, at least 16 counties participate in the program.
The statute states:

> (f) No person shall knowingly dispose of the following solid wastes in landfills:
> (13) Oyster shells
> (l) Oyster shells that are delivered to a landfill shall be stored at the landfill for at least 90 days or until they are removed for recycling. If oyster shells that are stored at a landfill are not removed for recycling within 90 days of delivery to the landfill, then, notwithstanding subdivision (13) of subsection (f) of this section, the oyster shells may be disposed of in the landfill.

The statute refers to oyster shell recycling; however, the shells are actually *reused* in the construction of oyster reefs.

Through FY 2011, donations of oyster shells may be eligible for a tax credit equal to one dollar ($1) per bushel under General Statute 105-130.48, passed in summer 2006. Taxpayers must submit a donation form with receipt as proof. As of February 23, 2010, the state program had 118 public oyster shell donation sites.

Wake County, NC accepts oyster shells at all 11 of its convenience centers at no charge. Oyster shells are included in the list of materials acceptable for recycling published on the County

website. The County pays a private hauler through a grant to service the shell storage areas at the convenience centers. Restaurants pay a private hauler for collection service.

Orange County, NC accepts separated oyster shells at its landfill at no charge. Residents and businesses delivering oyster shells must cross the scales to be given a receipt. The shells are stored at the landfill until the County calls the state DMF for pickup. The DMF collects the shells in a truck and hauls them to the oyster beds. Although residents do participate in the program, the primary users are the restaurants. Participation by special event (public oyster roasts) organizers is growing.

"Business Recycling 101," accessible from The Mecklenburg County Solid Waste website pages, lists oyster shells as an item banned from disposal in landfills. The "Wipe Out Waste! Guide Book 2011/2012" lists oyster shells as a material banned from disposal in a landfill as well. However, neither document lists oyster shells in the list of recyclable materials accepted at full service drop-off centers or at the landfill. KCI could not find instructions for oyster shell donation on the website.

The City of Charlotte and Mecklenburg County Government website (www.charmeck.org) includes a link to an undated document entitled "Plastic Bottle/Motor Oil Filter/Wood Pallet Landfill Restriction." Under section, *How Do I Recycle*? it states:

- Oyster Shells: Mecklenburg County is in the process of establishing a recycling procedure.

KCI found there is not an oyster shell recovery program in the County.

Oyster Shells Use in Compost

KCI in-house composting experts reported that oyster shells do not decompose and are not suitable for commercial scale composting.

KCI research found information regarding the use of oyster shells for home composting. Although the shells themselves will not break down in the composting process, they can be pulverized and added to compost to provide additional calcium. However, the shells must undergo a rigorous cleaning process prior to use to avoid bad smells, insect infestation, and excess salt that can kill plants. The shells must be soaked in hot soapy water, scrubbed, rinsed, soaked in a bleach solution, rinsed again, soaked again, scrubbed with liquid detergent, then

rinsed and soaked a final time. The shells must be pulverized before being added to compost. Therefore, it is unlikely that residents will go through this tedious process to recycle them.

Recommendation

KCI recommends that the County work with the Division of Marine Fisheries to implement an oyster shell diversion program.

Subtask 1.3: Estimate Current Food Waste Diversion and Management Practices at Major Generators

BACKGROUND

Kessler Consulting, Inc. (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish a comprehensive countywide food waste recovery program. The study addresses both commercial and residential food waste. For the commercial sector, KCI work activities include:

- **Estimate current food waste diversion and management practices at major generators (Subtask 1.3)**

This document presents Subtask 1.3 methodology and results regarding food waste diversion and disposal practices by major generators identified in Subtask 1.1. Complete survey results are included as Attachment B.

METHODOLOGY

Mecklenburg County provided KCI access to the online BusinessWise database, which was the primary data source of basic business information. Prior commercial recycling studies for the County compared BusinessWise to other databases and determined that BusinessWise provides a reliable profile of the commercial sector for the Charlotte region.

KCI compiled a list of the businesses in the six (6) sectors identified in Subtask 1.1 as being major food waste generators commonly targeted by food waste recovery programs.[6] From this list, KCI selected the largest businesses based on number of employees, and building square footage (when available).

Hilton Charlotte Center City

KCI then developed and conducted a telephone survey of the 28 selected businesses. KCI called each business to identify the person responsible for trash service, and/or who was most familiar with food waste generation and management. This person was often a Facilities Manager, a Food Service Manager, or a Chef. Multiple calls were made until the correct contact was made. Efforts also included email and fax. In some instances, additional calls to identify a person responsible for Accounts Payable were necessary to determine the type, size, and service frequency of trash containers.

KCI reviewed and analyzed survey results to gain a picture of food waste management practices in these key sectors in the County. Due to the limits of the survey, responses regarding food waste quantities are considered unreliable because they were not field verified by inspection or quantitative waste analyses. Consequently, KCI also compiled data from comprehensive commercial waste characterization studies conducted elsewhere in the U.S.

SUMMARY OF FINDINGS

Survey Results

Of the 28 businesses targeted by the survey, 20 businesses completed the survey and eight (8) did not respond. Repeated attempts to contact food manufacturers were unsuccessful; therefore they are not represented in the survey analysis. The survey document is included as Attachment D.

[6] The six sectors are: food manufacturing, grocery stores, restaurants, hotels, hospitals, and educational institutions

Table 8 - Food Waste Survey – Number Targeted and Number of Respondents

Sector	Number Targeted for Survey	Number of Respondents
Retail Trade--Grocery	4	4
Retail Trade--Restaurant	5	4
Services--Hotel / Lodging	4	4
Services--Medical / Health	3	2
Services--Education	8	6
Food Manufacturer	4	0
Total	**28**	**20**

On average, the survey respondents reported that they employ an estimated 400 workers. The number of employees range from 40 (restaurant) to 4,500 (education). Respondents reported using dumpsters, compactors, and roll-off containers for garbage. Pull frequencies varied from bi-weekly to seven (7) times each week. Analysis did not reveal a discernible pattern of container type, size, and pull frequency among the six (6) business sectors.

Half the respondents provided an estimate of the food waste portion of their total trash. Table 9 compares estimates provided by survey respondents versus the results from a comprehensive commercial waste characterization study conducted in California in 2006 on food waste generation and disposal. The comparison suggests that results from the KCI survey are reasonable estimates. For example, the KCI survey found that medical/health service businesses estimated that food waste is 10 percent of total waste; the California study found that food waste represents 12 percent of total waste in this sector.

Table 9 - Food Waste Disposal Estimates

Sector	Survey Respondent Estimates	California Waste Characterization Study
Retail Trade--Grocery	5% - 50%	40%
Retail Trade--Restaurant	10% - 40%	56%
Services--Hotel / Lodging	5% - 75%	28%
Services--Medical / Health	10%	12%
Services--Education	10% - 50%	20%
Food Manufacturer	no response	22%

Participants from grocery stores most often cited the Produce Department for generating food waste. They also listed the Deli, Bakery, Meat, and Fresh Food departments. All of the restaurants and hotels listed the kitchen as a source of food waste, but attributed a larger quantity of the food waste to customers leaving food on their plates in the dining rooms, restaurants, or at banquets.

Harris Teeter Entrance

Table 10 below shows survey results regarding respondents' existing food waste diversion practices. Almost one half (45%) currently divert some fraction of their food waste. Donation to food banks is the most common practice. Four respondents have programs in place to collect fats, oils, and grease (FOG). Educational institutions were the only respondents sending food waste to composting (three out of six respondents), and of these, two (UNCC and Davidson College) send a fraction of their food waste to on-campus composting sites. None of the restaurants or healthcare facilities reported that they operate a food waste diversion program.

Table 10 - Food Waste Diversion Practices

Sector	Number Surveyed	Number Respondents	Have FW Diversion Program	Donate to Food Bank, etc.	Have FOG Program	Send to Garbage Feeder	Send to Compost Facility	Return to Manufacturer /Corporate
Retail Trade--Food Store	4	4	3	3	3	1	0	2
Retail Trade--Restaurants	5	4	0	0	1	0	0	0
Services--Hotels / Lodging	4	4	2	2	0	0	0	0
Services--Medical / Health	3	2	0	0	0	0	0	0
Services--Education	8	6	4	2	0	0	3	0
Food Manufacturer	4	0	N/A	N/A	N/A	N/A	N/A	N/A
Total	**28**	**20**	**9**	**7**	**4**	**1**	**3**	**2**
Percent Respondents			**45%**	**78%**	**44%**	**11%**	**33%**	**22%**

Note: Some respondents have multiple diversion practices (e.g. donation to food bank and FOG collection programs)

The businesses that did not have a food waste diversion program cited a variety of reasons including cost, space limitations, labor requirements, lack of decision making authority, or because they simply had not thought of it or had no interest in it.

When asked to identify potential barriers to food waste diversion, participants cited economic, environmental, and policy issues. Economic issues most often mentioned included space limitations, container requirements, labor and training, and transportation. Environmental concerns included sanitation issues such as rodents and pests, odors, health department requirements and food safety in the kitchen. Participants asked how often containers would be collected and what kind of containers would be used. Policy concerns included potential perceived legal issues, the need for behavior change, and that decision making on such matters would rest at a higher level of management.

Approximately two thirds (65%) of participants saw opportunities in a Food Waste (FW) diversion program. Some offered positive statements but did not offer specifics, comments included the following statements.

- "…very positive toward the idea."
- "It is a good idea."
- "Fantastic idea…"
- "It would be good in the long run."

Specific opportunities mentioned included cost savings, opportunity to help the community, saving resources, sustainability, and customer attitudes.

Restaurants were most likely to see little or no opportunity in food waste diversion; 75 percent responded negatively, citing additional cost, that it would not drive sales, or that it would be no incentive unless the food waste were purchased from the generator.

North Charleston, South Carolina Chili's Grill & Bar

Overall, participants' general perceptions of food waste diversion were positive; only 30 percent offered no overall perceptions or additional comments. Comments included the following statements.

- "It would be a good program if the restaurants would participate."
- "…surprised a major city like Charlotte doesn't have a program yet."
- "We would be flexible…consistent pickup service is important."
- "It's a legitimate product (FW)…there is a lot of value in it."
- "We disapprove of waste."
- "People are talking about it a lot more."

Two (2) chefs in hotel/lodging businesses described programs in which they had participated with previous employers in other parts of the U.S.

Although no local food manufacturers responded to the survey, some statements can be made about food waste generated by food manufacturers in general. As with any manufacturing process, operations management strives to minimize waste through tight control of overs (residual ingredients) and quality. A 2004 study of food waste generation in New Jersey's food manufacturing sector reported that 36 percent of those surveyed reported having no food waste.[7] Of those who reported generating a measurable amount of food waste, by volume 48 percent of the food waste was diverted to animal feeding operations. Two percent was reported as being contributed to hunger relief organizations and less than one (1) percent was sent to a food composting facility. Twenty nine percent of the food waste was reported going to renderers, 16 percent was handled by other methods, and two (2) percent went into the general waste stream.

The 2004 survey found that 22 percent of food manufacturers believed that at least some of their food waste would be usable by the emergency food system, such as food banks. Nine (9) percent believed that from 1 to 25 percent of their food waste could be used by the emergency food system, while eight (8) percent reported that 76 to 100 percent of their food waste could be so used.

Food manufacturers surveyed overwhelmingly expressed interest in food waste diversion programs. Forty-six expressed interest in learning more about hunger relief or food waste recycling programs; 78 percent said they would like to receive more information about food waste recycling programs.

[7] Food Waste Generation in New Jersey's Food Manufacturing Sector, Brian Schilling and Lucas Marxen, Rutgers Food Policy Institute, 2004

Conclusions

A significant percentage (45%) of the major food waste generators surveyed in the County are already diverting some of the food waste. The most common food waste diversion practice is to donate excess food to food banks. Educational institutions are the only sector surveyed that is currently sending the food waste to composting. Comments by survey respondents suggest that five (5) of the six (6) sectors are generally supportive of (if not already participating in) food waste recovery. Restaurants were the one (1) sector that most consistently raised concerns about food waste recovery and this appears to be due to a lack of awareness in understanding the potential diversion, recovery options, and possible economic benefits of a food waste organics diversion program.

Based on the comments received, it is also clear that businesses need to see a strong value proposition in order to implement food waste recovery. County efforts to implement and expand commercial food waste recovery will need to address businesses' concerns about economic viability, sanitation and odor, and food waste storage and handling, among other concerns and perceived barriers. KCI suggests workshops, guides and/or education kits to educate the commercial sector.

Conversely, the comments received clearly demonstrate that there is an unmet need for commercial food waste recovery in the County, as well as a strong willingness among major commercial food waste generators to consider food waste recovery options.

RECOMMENDATIONS

- Develop a voluntary commercial food waste diversion program. Include a pilot implementation in the plan.
- Continue researching local compost facility capacity to accept the food waste collected under the program. Initiate discussions with facilities and haulers in an effort to expand the local processing and collection infrastructure.
- Initiate dialogue with local food banks to expand the market for food waste suitable for human consumption.
- As part of the voluntary commercial food waste diversion program, develop educational materials and resources to be published on the County website to help businesses develop and implement a food waste diversion program. Include an offer of technical assistance and a directory of end users of food waste such as food banks.

- Develop a program to publicly recognize businesses that implement a food waste diversion program.

Please see the next page for Attachment D.

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Attachment D – Mecklenburg County Major Food Waste Generators Survey

1. Company Name: _____

2. SIC: _____ Business Type: _____

3. Address/location: _____
   ___ Occupant/Tenant ___ Owner ___ Property Manager _____

4. Number Employees: _____ Building Square Footage: _____

5. Major places where food waste is generated: _____
_____

6. Current Waste Collection Service:

Container Type	Size (gal/cy)	Pulls/Week	% Food Waste

Container type: cart/container/rolloff uncompacted/compacted

7. Currently diverting food waste? ____No (finish with Q#8) ____Yes (go to Q#9)

8. If not diverting food waste, why? _____
_____

9. If diverting food waste, where does it go?
   ____Food Donator/Church etc. Name: _____
   ____Farm Name: _____
   ____Compost Facility Name: _____
   ____Other:_____

10. Perceived barriers to food waste diversion: _____
_____

11. Perceived opportunities in food waste diversion: _____
_____

12. Overall perceptions about food waste diversion/additional comments: _____
_____

Subtask 1.4: Research and Identify Successful Commercial Food Waste Diversion Programs and Program Components In Other Jurisdictions with Commonalities for Application to Mecklenburg County

BACKGROUND

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish a comprehensive countywide Food Waste (FW) recovery program. The study addresses both commercial and residential food waste. For the commercial sector, KCI work activities include:

- **Profile successful food waste recovery programs in other jurisdictions (Subtask 1.4)**

This document presents Subtask 1.4 methodology and results regarding successful food waste diversion programs in other areas of the U.S.

METHODOLOGY

Comparison of Commercial Programs

KCI drew on its expertise and many contacts in the solid waste management field to identify successful commercial food waste diversion programs across the U.S. Success in a food waste diversion program can be measured through tonnage collected, participation levels, and/or diversion/recycling rates.


San Francisco Compost Facility

Research included analysis of jurisdictions' websites and telephone interviews with program staff. The programs identified for comparison include:

- Charleston County, SC
- King County, WA
- Oakland, CA
- Orange County, NC
- Portland, OR
- San Francisco, CA

Research explored what, if any, statues and regulations govern the food waste programs and whether or not a disposal ban plays a role in program implementation. KCI conducted a telephone survey to obtain recycling and waste diversion rates, any performance metrics, and waste composition data that might be available. Research examined the programs' goals, policies, market development efforts, and technical support services; identified whether private or public haulers provide collection service; and determined the number of processing facilities that support the programs. A table of research results is included as Attachment E.

SUMMARY OF FINDINGS

Survey Results

Waste Composition

Two jurisdictions were able to provide waste composition data from 2010 for both the commercial sector and the whole. Food waste comprises 25.5 percent of Orange County commercial waste and 16.7 percent of the waste countywide. In Charleston County, food waste is 22.3 percent of commercial waste and 19.4 percent of total waste. King County could provide data for commercial waste only from a 2006 waste composition study. That study found that food waste made up 13.4 percent commercial waste. That same year, a San Francisco study determined that food waste was 26.8 percent of the MSW generated within the city and disposed through Norcal Waste Systems, Inc., which operates the majority of the solid waste infrastructure in San Francisco. A 2008 study conducted by StopWaste.org found that in Oakland food waste comprised 27 percent of commercial waste and 20 percent of the city's total waste. Portland could not provide waste composition data, but reported that in 2009, the city disposed of 45,000 tons of commercial FW.

Statutes and Regulations

Of the six programs included in the study, only Portland and San Francisco have mandatory participation governed by ordinance or administrative rule. On October 31, 2011, Portland moved from a voluntary to a mandatory program with the passage of an Administrative Rule. The San Francisco Recycling and Composting Ordinance 100-09 mandates food waste source separation by targeting commercial property owners. While not a mandatory ordinance, Oakland Municipal Code Chapter 8.28.010 defines food waste as a recyclable material, and the 2007 Greenware Ordinance requires all food vendors to use compostable packaging.

Orange County, Charleston County, and King County have no statutes or regulations regarding commercial food waste diversion.

Disposal Ban Role

None of the jurisdictions have food waste landfill disposal bans. Charleston County and San Francisco have Yard Waste (YW) landfill bans. Oakland is governed by the Alameda County YW disposal ban.

Overall Commercial Recycling and Waste Diversion Rates

The jurisdictions varied in their method of tracking success in managing waste, making comparison difficult. One (Orange County) measures waste reduction; Charleston County, King County, and Portland, measure recycling; Oakland and San Francisco measure diversion. Only Portland could provide a commercial recycling rate; all others included all sectors combined.

Collecting Food Waste in Alameda County Bakery

The jurisdictions with mandatory food waste programs, Portland and San Francisco, achieve the highest rates of success, but data is not available to attribute the success to the food waste program. Portland reported a commercial recycling rate over 60 percent and San Francisco reported a diversion rate of 77 percent. The recycling or diversion rates of jurisdictions with voluntary programs ranged from a low of approximately 24 percent recycling rate in Charleston County to a diversion rate of 55 percent in Oakland. Orange County reported a waste reduction rate of 56 percent.

Commercial Food Waste Recovery Program Performance Metrics

The level of program metrics and evaluation available varied among the jurisdictions, as well as the methodology for capturing data. All but one track tonnage, four (4) track participation. San Francisco is the oldest and largest program in the country, with over 2,000 businesses participating. The program collects approximately 115,000 tons annually with a contamination rate that is less than five (5) percent. Portland, estimates that 30 percent of businesses participate and in 2011 the program recovered 12,000 tons. In Oakland, 20 percent of businesses

participate. Because these businesses tend to be large food generators, the program estimates that it is diverting 80 percent of the commercial FW. King County does not track tonnage, but approximately 200 businesses participate in that program. Orange County collects approximately 2,000 tons per year of commercial FW.

Food Waste Policies & Programs

Charleston County currently operates a pilot program that is permitted to collect up to 100 tons per week; however, the County has applied to have the limit removed so that the program can be expanded countywide.

Although Oakland operates a voluntary collection program targeting restaurants, the city mandates that food vendors use compostable packaging. Portland is in the process of phasing in the enforcement of mandatory source separation by businesses that generate food waste. All haulers are required to offer collection service for delivery to a compost facility or farm. San Francisco targets commercial property owners, requiring them to provide for source separation of food waste on-site, to provide training to tenants and employees, and to subscribe to a collection service. Restaurants and food vendors must use recyclable or compostable food ware. All city facilities are urged to compost and use compostable food ware.

Goals/Plans & Food Waste Diversion

Goals for MSW diversion range from a 40 percent recycling goal in Charleston County to a zero waste goal by 2020 in San Francisco and Oakland. Portland is striving to achieve 70 percent participation in its food waste program and a 50 percent capture rate with less than 5 percent contamination. Orange County targets a 61 percent waste reduction goal and plans to add two schools districts to its food waste program in the near future.

Collection Responsibility and Compost Processing Infrastructure

In all six jurisdictions, collection service is provided by private haulers. Also, processing in each jurisdiction is handled by a single facility. The composting facility in Charleston County is owned and operated by the county. The facilities in the other five jurisdictions are privately owned and operated.

Market Development Role

The role of market development varies among the programs. Advertising the sale of compost produced under the program is the most common method of support. Orange County, Charleston County, and Portland advertise compost sale on their websites. Orange County gives recognition to program participants on the County website. San Francisco provides grants to food banks, community gardens, and compost facilities. King County implemented a pilot program to encourage on-site, in-vessel composting for schools and businesses. The pilot ended in 2003 with minimum success, but some of the in-vessel equipment remains in use.

Technical Support Service

Websites provide access to an array of technical services that include but are not limited to brochures, posters, directories of haulers, compost facilities and food banks, case studies, and training guides. Portland offers containers, training, grants and loans. Orange County and Charleston County offer waste audits for commercial establishments.

Conclusions

Successful commercial food waste programs share several general characteristics. First, they generally are implemented in jurisdictions that have broad-based recycling efforts, with commercial food waste being the next logical expansion of commercial recycling programs after traditional programs targeting containers and fiber recycling. It is not always necessary to make food waste recycling mandatory or to ban it from disposal; however, two of the six programs profiled have mandated commercial recycling.

Charleston County Compost Facility

Based on our research, the major factor contributing to the success of commercial food waste recovery programs is outreach, public education, and technical assistance. It is also interesting to note that while the public jurisdictions are initiating and promoting commercial food waste recovery, they rely almost entirely on the private sector to provide collection and composting services through franchise agreements and long-term contracts.

Program performance data suggest that high levels of commercial food waste recovery can be achieved by focusing the program on those businesses that are major food waste generators rather than adopting a broad-based program affecting all business establishments.

RECOMMENDATIONS

- Develop educational materials and resources to be published on the County website to help businesses develop and implement a food waste diversion program. Include an offer of technical assistance.
- Develop a program to publicly recognize businesses that implement a food waste diversion program.
- Work with the State Department of Environment and Natural Resources to potentially implement a grant program to support infrastructure development in the local area.
- Consider a ban on the disposal of food waste by large scale generators in the region, such as food manufacturers.

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Attachment E – Profiles of Successful Commercial Food Waste Recovery Programs

Program	Statutes & Regulations	Recycling & Waste Diversion Rates	Food Waste Policies & Programs
Orange County, NC	N/A, voluntary only	FY 2010 waste reduction rate 56%	Voluntary program using contracted hauler and processor - Brooks Minimum qualifying quantity 40 lbs per month
Charleston County, SC	N/A, voluntary only	2010 recycling rate is ~24%	Pilot program using private haulers and county compost facility
King County, WA	N/A, voluntary only	Recycling rate 48%	County encourages, offers information on website, otherwise leaves it up to the 37 cities
Oakland, CA	January 1, 2007 Greenware Ordinance Muni Ordinance Ch 8.28.010 defines FW as a recyclable material	Waste diversion rate 55%	Food vendors must use compostable packaging City encourages restaurants to recycle food scraps
Portland, OR "Portland Composts!"	Administrative Rule adopted Oct 31, 2011	Commercial recycling rate >60%	Businesses that generate FW must separate and recycle it Businesses contract with private hauler for delivery to compost facility or farm All haulers must offer service Program mandatory in 2012, will be phased in beginning February 2012
San Francisco, CA	2009 Mandatory Recycling and Composting Ordinance 100-09 2006 Food Service Waste Reduction Ordinance No. 295-06 City Composting Resolution	MSW diversion rate 77%	Commercial property owners must provide for FW source separation, train tenants and employees, and subscribe to collection service Restaurants and food vendors must use recyclable or compostable food ware All city facilities urged to compost and use compostable food service ware

Attachment E – Profiles of Successful Commercial Food Waste Recovery Programs (continued)

Program	Goals/Plans & Food Waste Diversion	Who collects the materials (private, public, private/public haulers)?	# of Compost Facilities in Program	Disposal Ban Role
Orange County, NC	61% waste reduction goal Plans to add two school districts to program in near future	Private haulers	One (private)	N/A
Charleston County, SC	40% MSW recycling goal Currently 100 tons per week allowed for receipt under their permit	Private haulers	One, County owned and operated	Yard waste and plastic bag ban at the landfill
King County, WA	Zero waste by 2030	Private haulers	All goes to Cedar Grove compost facility (private)	N/A
Oakland, CA	Zero waste by 2020	Private haulers	Recology (private)	Alameda Co Yard Waste Landfill Ban
Portland, OR "Portland Composts!"	75% overall recycling rate by 2015 70% top tier businesses (1,000) participation in FW program 50% capture rate <5% contamination rate	Private haulers	One, Cedar Grove (private)	N/A
San Francisco, CA	Zero waste by 2020	Private haulers	Recology (private)	N/A

Attachment E – Profiles of Successful Commercial Food Waste Recovery Programs (continued)

Program	Market Development Role	Technical Support Services
Orange County, NC	Advertise compost sales on website Recognition to participants on website	Offers technical assistance free, from information to waste audits and assistance starting a program
Charleston County, SC	Advertise compost sales on website Sales at County recycling convenience centers Offers free bags of compost at events	Website; Commercial Waste Assessments; Collector/Hauler Training and Education Kit
King County, WA	2003 pilot tested on-site use of in-vessel by businesses and schools	Website offers information on food donation, lists of food banks, compost facilities, haulers, hot link to Cedar Grove
Oakland, CA	Website encourages compost use in home gardens and includes link to Oakland Food Policy Council, which encourages composting and compost use in community gardens	Website offers directories and databases of recycling service providers and links to resources of StopWaste.org Bay Area Green Business Program encourages restaurants to recycle FW
Portland, OR "Portland Composts!"	City directs FW to Cedar Grove Compost Facility, has hot link on web site Website informs public they can buy bags at local Home Improvement stores	Web page includes: posters, Guide, material list, Training Guide, Compostable list, Cedar Grove information, bioplastics facts, hauler list Offers information and training hotline, containers, recognition Grants and loans
San Francisco, CA	Compost used by farmers and vineyards Grants to food banks, community gardens, compost facilities	Web Page includes: Fact Sheet, FAQ, Ordinance, Waiver for Insufficient Space, Commercial Toolkit, training, signs, brochure, stickers and more Case studies Green business program Grants for equipment

Attachment E – Profiles of Successful Commercial Food Waste Recovery Programs (continued)

Program	Performance Metrics or Quantitative Data	Available Waste Composition Data
Orange County, NC	2,000 tpy	2010 WCS FW 25.5% (commercial only), 16.7% (countywide)
Charleston County, SC	2,402.49 tons received in 2011; 46.2 tons per week average	2010 WCS FW 19.4% (countywide), 22.3% (commercial only)
King County, WA	Approximately 200 businesses participate	2006 WCS FW 13.4% +/- 2.5% (commercial only)
Oakland, CA	20% businesses participate Tend to be large FW generators, so estimates diverting 80% commercial FW	2008 WCS FW 27.46% mean average (commercial) 20.43% mean average (citywide)
Portland, OR "Portland Composts!"	12/11 700 participants, 30% businesses 12,000 tons 2011 (15,000 if count out of region)	2009 WCS = 45,000 tons/year commercial FW disposed
San Francisco, CA	First and largest FW composting collection program in U.S. Over 2,000 businesses participate 1,629,219 total tons generated (commercial) 115,000 tons collected (commercial) Average 600 tons per day collected (citywide) 7% FW diversion Contamination 5%	2006 WCS 26.8% FW (citywide)

Subtask 1.5: Assess and Describe the Potential Options for Collection and Transportation Methods to Move Food Waste from the Targeted Commercial Generators to the Existing or Proposed Processing Facilities

BACKGROUND

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish the feasibility of a comprehensive countywide food waste recovery program. The study addresses both commercial and residential food waste. For the commercial sector, KCI work activities include:

- **Assess potential food waste collection and transport options (Subtask 1.5)**

This document presents Subtask 1.5, the purpose of which was to assess potential food waste collection and transportation options. Existing solid waste and recyclables collection programs for each City or Town in the County were identified as potential opportunities as well as private haulers providing service.

METHODOLOGY

A Municipal survey instrument was designed to gather information regarding existing commercial collection programs in the Municipalities of Charlotte, Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville, as well as the unincorporated portion of the county. The data from this survey was expected to identify and assess potential opportunities in utilizing existing Municipal waste collection and transportation infrastructure within the County. Each city/town was contacted via e-mail and sent a solid waste collection survey. All cities/towns responded.

Secondly, KCI designed and conducted a survey of major private haulers handling commercial waste in the County in order to assess their activities, interests and concerns regarding commercial food waste collection. A master list was prepared and each private hauler was contacted by phone to identify the decision maker within the company, and then sent a private hauler collection survey either via fax or e-mail depending on the collector's preference.

Twenty-eight private haulers were identified, 12 responded, 10 were non-responsive, and one had disconnected phone service. In addition, the County identified five one-vehicle haulers that would likely be too small to play a significant role in a food waste collection system. Consequently, KCI did not survey them.

TABLE 11 - Summary of Findings – Municipalities and County

Jurisdiction	Name	Title/Entity	Phone/Fax	Email
Unincorporated county	Geoffrey Burdick	Project Manager	704-336-4528 704-336-4314 (f)	geoffrey.burdick@mecklenburgcountync.gov
Charlotte	Brian Garrett	Contract Srvcs Division Mgr	(704) 336-3342	bgarrett@charlottenc.gov
Cornelius	Krysti Hawkins-Lowry	Admin. Assistn.	704-895-5212	khawkins@cornelius.org
Davidson	Leamon Brice	Town Manager	704-940-9618	lbrice@ci.davidson.nc.us
Huntersville	Bobby Williams Max Buchanan	Director of Eng & PW	(704) 766-2220	bobbyw@huntersville.org
Matthews	Ralph Messera	Public Works Director	(704) 847-3640	rmessera@matthewsnc.com
Mint Hill	Brian Welch	Town Manager	(704) 545-9726	bwelch@admin.minthill.com
Pineville	Eureka Bidgood	Payroll Technician	(704) 889-2291	ebidgood@pinevilledsl.net

Commercial garbage and recyclables collection is an open market throughout the unincorporated county and no Municipality provides collection service to businesses. None of the jurisdictions control collection through franchise or contract. The exception to the rule is that four (4) Municipalities, Charlotte, Cornelius, Huntersville, and Matthews, include some small businesses under their residential collection services program, and Davidson provides a central business district drop-off center (DOC) that services about 36 small businesses.

The County's commercial recycling source-separation ordinance (SSO), along with significant outreach, technical assistance and enforcement effort by County staff has helped to establish widespread commercial recycling being provided by private haulers and through the County's 14 full and self-service DOCs. The SSO requires all business establishments with 16 or more cubic yards per week of waste to separate and recycle cardboard and office paper. Prior studies have estimated that approximately 4,900 establishments are subject to the SSO; and that if the County were to reduce the threshold to 8 cubic yards of weekly service then 1,700 more businesses would be subject to the SSO. Interestingly enough, surveys found that approximately 50% of these additional businesses already recycle to some degree.

Additionally, North Carolina currently bans yard waste, aluminum cans, lead acid batteries, tires, used oil, antifreeze, and white goods from landfills. State law also requires all establishments that serve alcohol (e.g., bars and restaurants) to separate, store, and provided for the collection for recycling of all recyclable beverage containers sold at retail on the premises – including aluminum, plastic and glass beverage containers. Under this same House Bill in October 2009, the state landfill disposal ban was expanded to include motor vehicle oil filters, rigid plastic containers, wooden pallets and oyster shells. As previously stated, significant outreach, technical assistance, and enforcement effort by County staff has helped to establish widespread recycling programs for these materials by private haulers and through the County's DOCs. Those commercial generators (i.e., restaurants and bars) most impacted by these laws are possibly more adept at adding a food waste recovery program.

SUMMARY OF FINDINGS – PRIVATE HAULERS

Of the 12 responses received, only one organization currently has a food waste collection program. This organization (Foster Caviness) is not a solid waste/recyclables collector/hauler but a fruit and vegetable produce distributor. According to their website, they see themselves as a dependable and trusted liaison between the farmers that grow the high quality produce that they deliver, and the chefs and foodservice professionals that prepare it for consumers. Foster Caviness recently established a pilot scale reverse distribution system to collect food waste from existing customers, which they bring back to a vermicomposting operation. If successful, the company is interested in offering the service to other customers and potentially expanding outside their current customer base.

Of the 11 remaining haulers that responded, seven said that they were interested in adding a food waste collection program to their business. Of those who expressed interest, four have previous organics food waste collection experience along with access to expertise, two do not have previous experience but have access to expertise through their regional or national food waste program contacts, and one has neither experience nor access to expertise.

Two of the seven haulers who expressed interest did not know when they would be able to mobilize food waste collections, two felt three to six months were adequate, and one felt they could mobilize in less than a month.

Of the six haulers that have no interest in adding a food waste collection program, two expressed that they collect/haul scrap metal only, one reported that they are in the residential garbage collection only, one reported that they do not have the knowledge nor the manpower, and two did not provide a reason.

Haulers were asked "What opportunities or barriers exist for expanding food waste recovery?" Responses ranged from "unlimited" to "none," as well as "not familiar enough to answer." Cost was the primary barrier cited including, but not limited to, cost of transportation due to lack of processing infrastructure in close proximity, cost of vehicle/equipment required and increased taxes for heavier trucks. Existing building design at commercial establishments was cited as a barrier because many commercial locations do not have enough room for collection containers or existing enclosure laws make it difficult to add space for carts. Also cited was volume of food waste required to make a program profitable, flow control issues, weight of collected food waste, and odor were also cited. Haulers are looking for collection markets where solid waste tipping fees are high, food waste processing fees are low, and for local processing facilities within the County's jurisdictions to make it economically feasible for them and their customers.

KCI staff convened a follow-up call with Waste Management staff based on their response to provide further information on their responses and their interest for commercial food waste recovery. A national staff member (Director of Strategic Materials, Organics Sourcing) stated that they have an innovative collection program in place with large generators of food waste across the country, predominately grocery stores. They have a reverse distribution program in place working with these large generators to backhaul food waste to their central distribution centers/warehouses where these locations are within a 100 mile radius of an organics composting or digesting facility. They have a company policy not to deliver to programs that are direct animal feed. They are willing to participate in commercial pilot programs where a mature market exists to collect and transport to a facility where a favorable tipping fee exists (high solid waste disposal tip fees and lower composting processing facility tip fees). They would be interested in participating in a focus group or planning committee if the County was going to invest in a food waste program.

Signature Waste System is also interested in participating in any focus groups or committee meetings in the future planning stages.

RECOMMENDATIONS – COMMERCIAL PROGRAM

As previously stated, there are seven private haulers that expressed interest in building food waste collection into their operations. They are: (1) Advanced Disposal, (2) Hawk Sanitation & Recycling, (3) Inland Service Corp, (4) O'Leary Group Waste Systems, (5) Republic, (6) Signature Waste Systems, and (7) Waste Management. The table below reflects their interest, experience, access to expertise, anticipated mobilization timeframe, and perceived opportunities and barriers.

Table 12 - Private Haulers Interested in Adding a Food Waste Program

					Anticipated Mobilization				
Hauler	**Current FW Program?**	**Interested in adding FW program?**	**Experience?**	**Access to expertise?**	**<3 mo**	**3-6 mo**	**6 mo-1yr**	**1+ yr**	**Don't Know**
Advanced Disposal	No	Yes	No	No		X			
Hawk Sanitation & Recycling, Inc.	No	Yes	Yes	Yes	X				
Inland Service Corp.	No	Yes	Yes	Yes			X		
O'Leary Group Waste Systems	No	Yes	No	Yes					X
Republic	No	Yes	Yes	Yes			X		
Signature Waste Systems	No	Yes	No	Yes					X
Waste Management	No	Yes	Yes	Yes		X			

Of the seven interested private haulers, four have experience with food waste collection and six have access to food waste collection expertise (via parent company). Only one (Advanced Disposal) has no food waste collection experience or access to food waste collection expertise, but they are interested in adding food waste collection. Three responded that they could mobilize in less than 6 months: 1) Advanced Disposal, 2) Hawk Sanitation & Recycling, Inc., and 3) Waste Management.

If a countywide program is rolled out, the County could provide technical support to the private haulers for developing food waste diversion programs by:

- Conducting informal focus groups with collectors to follow-up and sign up program partners.

- Providing education training workshop(s).
- Provide information regarding North Carolina's tax exemption on equipment and facilities used exclusively for recycling and resource recovery.
- Producing a customer and collection hauler food waste education kit with resources to help implement a food waste diversion program (to include, but not be limited to, frequently asked questions, bilingual education materials, promotional fliers, and list of compost facilities and/or collection providers).
- Provide bilingual education material to provide to commercial customers, including, but not limited to, pictorial posters for reducing contamination and proper recovery of food waste.
- Work with interested haulers to identify customers who are major food waste generators, and offer to provide technical support and facilitation to establish food waste collection demonstration programs.
- Provide a food waste composting "meet-up' event between haulers and commercial customers at Chamber events or local business tradeshows or expos, etc.
- Updating the Resource Guide for Commercial Waste Reduction and Recycling when the program is rolled out countywide by adding composting to the title and a section about the commercial food waste composting program – proper inventory reduction based on proper incoming food procurement, food bank donation, and collection providers.
- Updating the County's website when the program is rolled out countywide.
- Identify and provide locations of and contact information for food waste processors that make it economically viable to collect and transport this material.

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Attachment F – Municipality Survey Instrument

Mecklenburg County
_____Commercial Collection

		Garbage	Recycling
Commercial Service Provider			
Number Customers			
Commercial Rates	Rolloff		
	Compacter		
	Dumpster		
	Roll Cart		
	Other		
	Other		
Fees			

Attachment G – Municipality Survey Responses (items left blank, information not provided or not available)

Jurisdiction	Type of Service	Does the City/Town Provide Collection Services to Businesses?	Type of Agreement	Commercial Service Provider	Number of Customers	Roll Off	Compacter	Dumpster	Roll Cart	Other	Fees	Contract Expiration Date	Would you be interested in participating in a food waste pilot program for businesses in your City/Town?
Unincorporated county	Garbage	No	Open Market	Open Market								N/A	Yes
	Recycling	No	Open Market	Open Market								N/A	
Charlotte	Garbage	No	Open Market	Open Market								N/A	N/A
	Recycling	No	Open Market	Open Market								N/A	
Cornelius	Garbage	No*	Open Market	Open Market	207*	*small businesses included in residential service contract.						N/A	Yes
	Recycling	No	Open Market	Open Market								N/A	
Davidson	Garbage	No	Open Market	Open Market	36*	*Small convenience center (1 compactor & 2 recycling dumpsters) for businesses in the downtown district; serviced under the County drop-off recycling convenience center contract.						N/A	N/A
	Recycling	No	Open Market	Open Market	36*							N/A	
Huntersville	Garbage	No	Open Market	Open Market								N/A	Yes
	Recycling	No	Open Market	Open Market								N/A	
Matthews	Garbage	No	Open Market	Open Market	175*	*small businesses included in residential service contract.						N/A	"Not really"
	Recycling	No	Open Market	Open Market	**	**Voluntary program for small businesses included in residential program.						N/A	
Mint Hill	Garbage	No	Open Market	Open Market	150							N/A	"Depends on what is required of me"
	Recycling	No	Open Market	Open Market								N/A	
Pineville	Garbage	No	Open Market	Open Market								N/A	Yes
	Recycling	No	Open Market	Open Market								N/A	

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Attachment H – Private Hauler Survey Instrument

Mecklenburg County
Private Hauler Collection Survey

I am working for Nadine Ford of Mecklenburg County (County) to acquire data that will help the County make recommendations to **develop a commercial food waste diversion program**. We are asking for your help to provide information to the County about your collection services. You are being contacted to help us identify future collection opportunities available within the County. We are conducting a brief survey to assess current solid waste collection infrastructure for the purpose of future planning. Our focus, initially, is specifically on a commercial application with homogenous groups (e.g., restaurants, bars, offices parks, schools, etc.).

Please return your responses via email to Lisa Lamppert @ llamppert@kesconsult.com or via fax to 813-971-8582, at your earliest convenience, but no later than EOB January 31, 2012.

1. Do you currently offer food waste collection program to commercial businesses?

   YES ☐ NO ☐

   If YES,

   a. What type of container and collection methods do you use? (check all that apply)

      Front load dumpster ☐ Rear load dumpster ☐ Wheeled cart ☐

      Roll-off/compactor ☐ Rendering trucks ☐

   b. How much **total weekly volume** could you pickup from businesses? _____ cubic yards

   c. Is your food waste collection fee greater than or less than your waste collection fee for the same amount of service? More ☐ Less ☐

   d. Based on your experience, what are opportunities and barriers for expanding food waste recovery in the County? _____

   If NO,

   a. Are you interested in getting into the food waste collection business if the County developed a food waste outreach program? Yes ☐ No ☐

      If No, why not?_____

   b. Does your company have previous experience with collecting food waste? Yes ☐ No ☐

      Does your company have access to knowledge/expertise needed (e.g., via parent company)? Yes ☐ No ☐

   c. How much time would it take to mobilize your operation to put a program in place?

      Less than 3 months ☐ 3-6 months ☐ 6 months to 1 year ☐ +1 year ☐ Don't Know ☐

   d. Based on your experience, what are opportunities and barriers for expanding food waste recovery in the County?_____

   Thank you in advance for your time and input to help develop the County's waste diversion program!

Task 1-5\Private Hauler Survey

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Innovative waste solutions

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Attachment I - Private Hauler Survey Responses

Mecklenburg County
Private Hauler Survey Responses

		If Current Program								If No Current Program									
		Types of Containers/Collection Methods												Anticipated Mobilization					
Hauler	**Current FW Program?**	**FL Dumpster**	**RL Dumpster**	**Wheeled Cart**	**Roll-off/ Compactor**	**Rendering Truck**	**Total Weekly Volume Available (cubic yards)**	**FW Fee > or < than SW fee?**	**Opportunities and barriers for expanding FW recovery**	**Interested in adding FW program?**	**If no, why not?**	**Experience?**	**Access to expertise?**	**<3 mo**	**3-6 mo**	**6mo-1yr**	**1+ yr**	**Don't Know**	**Opportunities and barriers for expanding FW recovery**
Advanced Disposal	No						Currently none; could create some should the opportunity present			Yes		No	No		X				
Allpoints Waste Service		Non-responsive																	
Bell Sanitation		Per County - this is a small "Mom and Pop" operation with only one vehicle																	
Berryhill Garbage Service		Per County - this is a small "Mom and Pop" operation with only one vehicle																	
Centralina Disposal Corp		Phones Disconnected																	
Choice Sanitation Inc.		Non-responsive																	
Convenant Waste Systems		Non-responsive																	
D&D Sanitation	No									No		No	No					X	
Dwain Industrial Scrap Metal and Waste Hauling	No									No	Only collect/haul scrap metal								
Foster Caviness	Yes	compost on site					By EOY expect 100 tons/year and up to 400 tons/year the year after	Don't collect garbage	Opportunities are great; believe we can divert 99% of waste from the municipal waste stream with recycling and composting. The challenges are infrastructure and all the details that it breaks down into.											
Hawk Sanitation & Recycling, Inc.	No	X		X	X		15,000	More		Yes		Yes	Yes	X					None
Inland Service Corp.	No									Yes		Yes	Yes			X			We would require the volume to support the capital requirements.
K&S Sanitation	No									No		No	No						N/A
O'Leary Group Waste Systems	No						Currently none; would purchase equipment if the County implements a program			Yes		No	Yes					X	Lack of processing infrastructure in close proximity and cost to provide the service.
People's Choice Sanitation		Per County - this is a small "Mom and Pop" operation with only one vehicle																	
Plyler Paper Stock Co.		Non-responsive																	
Republic	No									Yes		Yes	Yes			X			We would be pleased to meet and discuss the multiple opportunities and barriers to this type of service offering.
Residential Collection Service (RCS)	No									No	We are in the residential garbage collection only	No	No	X					Unlimited
Ross Sanitation Service		Per County - this is a small "Mom and Pop" operation with only one vehicle																	
Rudisill		Per County - this is a small "Mom and Pop" operation with only one vehicle																	
Sealand Disposal		Non-responsive																	
Select Sanitation	No			X						No	Do not have the knowledge nor the manpower	No	No					X	Not familiar enough to answer
Signature Waste Systems	No	X		X	X	X	unlimited	More	Flow control issues, weight, odor, and many more	Yes	Maybe, with a lot of questions answered	No	Yes					X	Room for collection containers, necessary volume, vehicle/equip requirements, taxes on heavier weights, and more; Joe is very interested in helping via committee help or any other way.
Southern Metals Company	No									No	Only collect/haul scrap metal								
Universal Sanitation Inc.		Non-responsive																	
Waste Connections		Non-responsive																	
Waste Management	No									Yes		Yes	Yes		X				The primary barrier to expanding food waste recovery is cost of transportation. Most composters have to be far away from the city center in order to minimize odor concerns, and therefore, the food waste needs to be transported a long distance, which is expensive. WM is piloting some unique and innovative food waste collection programs in other parts of the country, and would be happy to talk with the county about various options and costs.

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Subtask 1.6: Identify the Economic, Environmental, and Policy Drivers to Food Waste Diversion in the County

BACKGROUND

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish the feasibility of a comprehensive countywide food waste recovery program. The study addresses both commercial and residential food waste. For the commercial sector, KCI work activities include:

- **Identify economic, environmental, and policy drivers for commercial food waste diversion (Subtask 1.6)**

This document presents Subtask 1.6 to identify policy drivers for food waste diversion in order for the County staff to assess the direction of next steps for identifying a pilot program in the commercial sector.

METHODOLOGY

KCI staff reviewed, visited and interviewed various key points of contact, as well as gathered data and information from various sources. Those key actions are listed here, but are not limited to:

- Held meetings and phone calls with staff.
- Participated in two committee meetings, Solid Waste Advisory Board and Keep Mecklenburg Beautiful Board.
- Made primary site visits to appropriate Municipal collection contacts.
- Surveyed businesses, processors, public and private haulers.
- Toured and interviewed private and public processing locations.
- Researched various jurisdictions programs.
- Reviewed various industry periodicals, data and articles, including, but not limited to, Resource Recycling, Biocycle, KCI Resource Center, USCC Compost News, and the Internet.

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The information below provides the summary of findings for the program, economic, environmental, and policy drivers for developing commercial food waste composting programs.

SUMMARY OF FINDINGS

Commercial Program Drivers

For commercial programs to be successful and meet the local commercial demographics of a community, they typically follow six basic steps in the planning phase for both a pilot and countywide roll-out:

Step 1 – Target the largest commercial food waste generators.
Step 2 – Maximizing the organics recovery, diversion and possible cost savings for businesses requires targeting a broad range of food waste (including meat and dairy).
Step 3 – Collection frequency is more than weekly and typically performed in carts.
Step 4 – Education needs to be an integrated approach tying generators, collectors, processors and end markets together.
Step 5 – The location and distance of processing facilities drive the rates collectors charge businesses and those rates drive participation based on economics for businesses.
Step 6 – Developing a measurement and verification program is important to track participants in the program.

Implementing the six step program will ensure participation and an integrated program planning phase linking all partners together. It is recommended that the County develop a commercial pilot program.

Economic Drivers

Economic drivers in the recycling industry relate to the balance of available material, the cost to collect and transport the material and the relationship between disposal and processing fees for recovery.

Generators – For Businesses to want to participate in a food waste composting program, they not only need to be dedicated to sustainable "green" practices, many need an economic incentive to recycle any material, and that includes organics. Mecklenburg County's commercial tipping fees are high enough to warrant businesses to perform or have a waste assessment performed for the addition of food waste recovery to their recycling program. Mecklenburg's tipping fees for commercial waste are $55/ton. Typically, solid waste tipping fees greater than $45/ton allow for

a favorable economic condition to start an organics recycling program. Food waste or organic waste often make up a significant enough portion by weight of a business' waste stream to warrant an assessment and evaluation of the cost benefit.

Mecklenburg County Tipping Fees	
Type of Waste	**Estimated Tipping Fees**
Residential Waste	$ 27.50
Commercial Waste	**$ 55.00**
Construction & Demolition Debris	$ 39.00
Clean Wood Waste	$ 18.00
Clean Drywall	$ 29.00

Moving local government economic and planning models from a disposal to a recovery model also looks at the long term environmental benefits that come along with investing in recovery programs that may cost more upfront, but over time the long-term benefits include taking into account people, planet, and profits. The key for commercial programs is to analyze the unbundled fees a commercial business pays for disposal (collection, transportation and disposal) against the unbundled fees it pays for a food waste program. Since most businesses will probably already have a recycling program for at least fiber (office paper and cardboard), the diversion of all of these materials from the garbage container to the appropriate recycling container will allow the business to reduce garbage container, collection, and disposal costs through volume reductions and thereby break even or possibly reduce their total solid waste management expense. In some cases, businesses will be willing to pay more for their recovery and waste reduction programs to meet company/corporate environmental goals.

Collectors – Private haulers are the predominant provider of commercial food waste collection services across the U.S. They are motivated to move in this direction based on their customer demand to expand programs and local governments' efforts to develop food waste recovery programs to meet higher recycling and waste reduction goals. During the hauler surveys performed under subtask 1.5, every hauler who responded said they would invest in the Mecklenburg area for commercial food waste collection service as long as the distance to travel was no more than 25 miles for a collection route or within 100 miles for a reverse distribution route. Providing technical support to haulers will help them to offer these services, including meetings and hauler kits that provide information for them and their customers.

Processors – Both public sector and private sector organics facilities are being sited and designed as the need for an organics processing infrastructure grows. It is interesting to note that existing and proposed food waste recycling facilities in the Charlotte region are all "merchant" facilities motivated by economic drivers without public sector involvement up to this point. These organics programs are moving beyond just yard waste, clean woody debris, land clearing debris, storm debris and into pre- and post-consumer food waste, and even biosolids. Various methods of organics processing are in use today, ranging from no or low technology options to comprehensive and technologically advanced systems.

Windrow composting involves piling feedstock materials into elongated rows either outside or in a building, and turning them periodically based on time and temperature factors. This is by far the most common method of composting in the U.S. and Canada for yard waste and source-separated food waste. Windrow composting is fairly flexible and can be accomplished with turning equipment ranging from a front-end loader to specialized windrow turning machines.

The **Modified Static Aerobic Pile (MSAP)** method combines both static pile and windrow composting methods, which minimizes the need for mechanical turning while still maintaining aerobic conditions and excellent pathogen kill. This method accelerates the process with the use of an organic catalyst and creates a high quality compost product. The MSAP method was developed by Harvest Quest International, Inc., and is currently being applied in yard waste/food waste composting operations in South Carolina, Florida, and several other states in the U.S.

Aerated static pile composting involves placing air blowers and ducts under a pile of organic materials in order to maintain aerobic conditions. The pile is capped with an insulating blanket of wood chips or other material and not disturbed until the active composting process is complete.

In-vessel composting refers to enclosed systems such as large rotating tubes or elongated bays with mechanical turning machines and forced aeration systems. In-vessel systems tend to be more technologically advanced and therefore have higher capital and operational costs.

Anaerobic digestion (AD) is a biological process that takes place in the absence of oxygen. AD produces methane, which can be recovered for use as a biogas fuel. The solid digestate typically undergoes subsequent aerobic composting. There are numerous different AD technologies available. Historically, it has been used primarily for wastewater treatment and manure. With regard to source-separated organics from MSW, dozens of AD facilities operate in Europe and several are currently under development in the U.S.

Vermicomposting is derived from the Latin term vermis, meaning worms. It is essentially the consumption of organic material by earthworms. This speeds up the process of decomposition and provides a nutrient-rich end product, called vermicompost, in the form of worm castings. For large scale municipal or private facilities, vermicomposting can be conducted all year-round, providing environmental conditions remain within acceptable limits. For increased efficiency, care should be taken to ensure that organic feedstock and conditions allow worms to reproduce successfully and to withstand moisture and climatic fluctuations.

For either the public sector or private sector to embrace a specific processing method the economics have to meet many variables driving the final decision. In Mecklenburg County both the private and public sector have chosen to make investments in some organics processing operations and other private entities outside the County and in other states have an interest in bringing additional capacity to the community.

The costs and complexity of organics management systems increase substantially as the move is made from windrows to in-vessel composting, to anaerobic digestion. In general, aerobic in-vessel systems will cost twice as much as windrows, and anaerobic systems can cost three times as much. Subtask 1.2 identified those existing and potential future processing facilities in the County to determine current capacity and capacity needs.

Growing Power, a nonprofit urban garden and training center in Milwaukee, Wisconsin, was the feature cover story of Biocycle magazine's November 2008 issue. It is located on a two acre lot and provides affordable produce to underserved neighborhoods and processes a variety of organic wastes through composting and anaerobic digestion. Approximately 100,000 pounds of organic produce are grown annually, sold at the on-site retail store, as well as to restaurants and

food co-ops. The innovation with this program is that it was designed to be both productive and educational through classroom demonstrations and a kitchen and can be replicated in other communities. The economics for this closed-loop system translates to $5/square foot of produce annually in their beds and that translates to $200,000/acre.

KCI recommends that if the County moves its compost operation in the future to a site that has the potential to add food waste and biosolids, it should consider using the EPA recognized MSAP method because it has relatively low capital development costs, is easily scalable to accommodate program growth, and utilizes a very flexible process that can adapt to fluctuations in feedstocks. And by minimizing mechanical turning, the MSAP method provides economic and environmental rewards, mitigates odors and particulate discharge, and reduces composting time. Once the County rolls-out a pilot, then develops a countywide program and participation is increased and any contamination reduced, then overtime it is recommended that the County possibly look at alternative higher-technologies such as anaerobic digestion which is much more costly to develop but can achieve favorable economics at a large scale of operation.

Additionally, the County could work with the local agricultural extension office or the local University to also use the Green Power model to initiate in a similar program in the Charlotte region. A site visit by County management staff to one or more facilities using the technology would provide valuable information to aid in determining the process method that will best fit any expansion needs.

End Markets must be identified and developed to close the loop of yard waste and food diversion for a successful recovery program to be effective and sustainable. In most cases for the existing processing facilities they already have them identified. The volume and quality of the compost produced will impact which end users will be targeted and their acceptance of the product. Traditional users of compost include:

- Municipal public works, facilities, parks, and recreation areas
- Local landscape construction and maintenance contractors
- Soil blenders and landscape material suppliers
- Nearby military bases and related properties
- Traditional farmers
- Sod farms
- Golf courses and resorts

City facilities, parks, and recreation areas use of the compost not only closes the loop, but can offset costs by reducing or eliminating the need to purchase comparable landscaping material. Compost can be offered free or sold to residents for use in home gardens and landscaping. Compost can be offered for bulk pickup or distributed in bags. Sale of compost to commercial landscapers and other end users offsets costs and provides revenue.

New markets for compost material are growing and being driven as community supported agricultural farms, organic farms, farmers markets and community gardens increase in numbers and popularity with residents and businesses. And although these are listed in the market section, they are also a big part of the environmental drivers that can help to foster a sustainable composting program. They also help develop jobs and therefore contribute to the local economy. These markets provide new avenues for sale and partnerships as explained below:

Community Supported Agricultural (CSA) Farms: They are driving the trend in the food to table movement in local restaurants (i.e., Eat Local programs). CSA is a way of purchasing food that helps build a sustainable local food system in the process. By sharing some of the risk, the work, and the commitment with the farmers, local residents are helping in rebuilding that system in the Charlotte region. Know Your Farms, LLC handles the marketing, administration, and delivery of the CSA shares so that the farmers can focus on growing the food. This is being done for a network of CSA farms in the Charlotte region. For more information visit: http://knowyourfarms.com/j/

Organic Farms: There has always been organic farm products grown and sold in health food stores and nutrition stores, but consumer awareness of health and environmental issues have driven the expansion of the production and sale of organic products into traditional grocers and retailers. The Carolina Farm Stewardship Association (CFSA) is the driving force behind the organic farm movement in the Carolinas. CFSA's mission is to advocate, educate and build connections to create sustainable food systems centered on local and organic agriculture that is good for the farmer, the consumer and the land. It is a membership-based 501(c)(3) non-profit organization of more than 2,300 farmers, gardeners, consumers and businesses in North and South Carolina. For more information visit: http://carolinafarmstewards.org/

Farmers Markets: Farmers Markets have been around in many progressive communities for years and they are experiencing a rise in popularity and quantity. There are approximately 12 Farmers Markets in the County. The Farmers Market Association of North Carolina (FMANC) is a statewide, nonprofit organization focused on Su*pporting & Promoting Local, Sustainable Food! According to the FMANC*, there are more than 200 Farmers Markets in North Carolina that produce millions of dollars in revenue for the local farm economies across the State. The FMANC markets and promotes local, sustainable food and farm products. For more information visit: http://ncfarmersmarkets.org/default.aspx.

Community Gardens (CGs): Community gardens are a great way to learn about gardening and staying healthy too. Not only does gardening provide tasty, healthy foods, it teaches responsibility and patience to families and students. There are approximately 25 varieties of CGs located throughout the County. A CG can help to educate students, families and neighborhoods about not only gardening and healthy eating, but also about composting and using compost to grow foods. A closed-loop system model for food waste is Friendship Trays (FT): they receive and buy donated food, prepare nutritional food for special needs diets, have a community garden, produce compost, and grow food that is used by the catering company located next to Friendship Trays. Connecting CGs to restaurants may be another future alternative end market and support the farm to table program trend growing across the nation.

A program to market the compost to the local public can include branding and logo, a demonstration garden at the facility pickup site, promotion on the County website and at events such as Earth Day. Campaigns to market to other end user segments require the development of targeted messages and methods of delivery. And in most cases the existing permitted facilities either use the material on-site, or sell mulch and compost products in bulk or in bags. We included the trends in some of the newer markets that allow the County to create the economic and environmental closed-loop system discussed in this task write-up.

Environmental Drivers

There are many benefits to composting food waste and for the County, targeting the commercial sector provides an opportunity to support the environmental drivers for this sector. They include:

- Meeting corporate and institutional increased waste reduction and zero waste goals for expanding more of their recoverable waste stream (Green Goals).
- Targeting homogenous, pure organic waste streams like commercial and institutional food waste from grocers, restaurants and cafeterias.
- Typically, food waste has less contamination in a commercial establishment with proper education and training on mapping the food waste flow in kitchens and cafeterias to ensure minimal infringement on the existing handling process.
- Driving long distances to deliver food waste is not an environmentally friendly option and adds to Greenhouse Gas emissions, therefore, increasing local government expansion into food waste processing within their own borders to reduce these environmental transport impacts.
- Local governments can help to create an organics closed-loop system through developing and integrating a program that maps out a relationship between – generators, collectors, processors, end markets, local farmers producing local foods using compost, and the food is served in local restaurants or sold at local farmers' markets.
- The recycling of nutrients in food waste back to the soil offsets the demand for synthetic, fossil-fuel based fertilizers, which has the attendant environmental benefits of reduced pollution both in manufacturing and utilization.
- Well operated composting systems generate little if any methane[§§] as opposed to organic materials in a landfill which are the major sources of methane emissions, especially food waste.[***]
- Product from organics recycling (e.g., compost, worm casting, and digestate) provide physical, environmental or chemical benefits for erosion and sediment control, therefore, linking compost, soil quality, and water quality and resource protection together.
- These products also have water conservation benefits because they increase soil moisture holding capacity which can help reduce irrigation requirements.

[§§] U.S. Composting Council, *Keeping Organics Out of Landfills.*

[***] According to the 2006 IPCC Guidelines for national Greenhouse Gas Inventories, measured efficiency of landfill gas recovery systems range from 9-90%, and the report suggests a default guideline of 20% recovery efficiency.

Policy Drivers

Most efforts across the U.S. to develop pilot, countywide or statewide commercial food waste diversion programs are being driven by local, regional or state goals to divert waste from disposal facilities. In Mecklenburg County the policy driver for performing this study related to revising the Solid Waste Management Plan for the community. The commercial sector is the largest generator of Municipal Solid Waste in most jurisdictions. The key policy drivers for food waste diversion often include eight topic areas that a local government must develop a strategy for and update over time. Commercial food waste generators are also voters, and are key contributors to policy decisions. The policy driver questions for the County to consider when developing a pilot program include:

1. Generator Perceptions – what role do commercial businesses want local governments to play in a food waste program? What do businesses feel about food waste generation, handling and recovery? How educated are they about it or do they consider it a "yuk" factor issue? Do they understand that most compost facilities have quality standards they must meet to market a high quality finished compost product? What awareness and education program is needed to encourage action to source separate food waste?

2. Goals and Plans – What percentage of businesses or which homogenous generator(s) will the County target under its program? How long will the pilot program last and who will be the program partners?

3. Disposal Bans – North Carolina bans yard waste from disposal, will the County add a ban on food waste locally? Most national programs ban organics from the landfill then the trash and a handful ban plastic bags.[†††] Would the County's business community embrace such a localized action at the landfill?

4. Mandatory Versus Voluntary Programs – Will food waste recycling stay a voluntary program? The County's existing Source Separated Ordinance mandates and targets office paper and corrugated cardboard generated by businesses with greater than 16 cy of uncompacted garbage generated per week (exemptions exist). The ordinance's intent is to reduce the amount of waste being sent to the landfills.

5. Market Development – What traditional and non-traditional markets will the County help

[†††] *Beyond Recycling Composting, Food Scraps and Paper*, EPA Region 9, Center for a Competitive Waste Industry

foster within its local communities and with local partners? What role can the local universities cooperative extension agencies or *Farm to Table - Eat Local* organizations/associations do to help partner with the County to help build or expand markets?

6. Technical Assistance – What technical support and technical support staff (the County's existing Senior Environmental Specialist/Compost) will the County provide businesses, collection haulers, and existing and potential food waste processors?

7. Incentives – What type of innovative incentives will the County develop for businesses, collection haulers, and existing and potential food waste processors to participate and maximize recovery?

8. Funding – What resources will be needed to help support a commercial food waste composting pilot program and a countywide roll-out to businesses?

A national survey determined that approximately 267 food waste composting projects are operating in the U.S., including 39 municipally owned facilities, 93 college/university projects, 92 privately run commercial facilities, and 43 on-farm composting operations.[‡‡‡] All of these programs were driven in most part by policy decisions made by local governments to meet recycling and/or diversion goals.

RECOMMENDATIONS

The following recommendations are being made regarding the three key drivers – economic, environmental and policy.

Economic:

1. Identify and promote any grant opportunities for infrastructure expansion or large business participation as well as those that help expand the State's goal to increase collection, processing and end markets such as: NCNER's Community Waste Reduction and Recycling Grants and the Recycling Business Grants programs, respectively. Market these state grant programs as incentives to businesses, collectors, processors and end markets.

[‡‡‡] Cristina Olivares, et. al., *Food Composting Infrastructure*, Biocycle, December 2008.

2. Promote the commercial food waste program (food to soil) as an expansion of the existing food waste program that the County promotes - Food Banks/Soup Kitchens (food to people).
3. Provide public and political awareness regarding the connection to increasing jobs in the community through a food waste composting program (commercial generator, processing and marketing) and the end product (compost) being used by the local farmer to grow local food under the farm to table (Eat Local) program becoming popular and resonating with residents in the County and across the country.
4. Under the pilot program, work with businesses to perform a cost-benefit analysis to unbundle all disposal, recycling and composting costs and evaluate the true economic impacts under the local commercial tipping threshold for solid waste.
5. Perform a formal site and cost-benefit analysis for the County to evaluate moving its compost operations from its existing location in order to include food waste and possibly biosolids and whether or not the existing tipping fee would cover food waste composting along with the yard waste.
6. Prepare a cost-benefit proforma or template that County staff can use in conducting outreach and technical assistance to food waste generators and haulers, generator specific ones such as grocery store, restaurant, and cafeteria.

Environmental

1. At a minimum, develop an awareness campaign for the business community regarding the environmental benefits of food waste composting versus disposal and reductions to Greenhouse Gas emissions and water conservation. During the pilot, develop specific education and training material about the importance of food waste composting and environmental benefits.
2. Work with the local University of State agricultural extension office to develop environmental education material on the food waste composting.
3. Establish and publicize a “green” business alliance similar to the “Buy Local” movement that helps to promote businesses that recycle food waste.

Policy

1. The majority of large generators surveyed in Subtask 1.3, whether or not they had a food donation program, are interested in a commercial food waste composting program to complement their donation program; collection haulers want to be a part of a program

and can mobilize within six months; and existing food waste processing capacity exists to receive food waste and thereby warrant a pilot program. Convene individual sub-committees for generators, collectors, and processors and then integrate this group into one large committee to develop the pilot program plan together.

2. Include questions in the forthcoming LUESA survey regarding food waste composting to residents who are also business owners, managers, and employees to gather additional feedback and perceptions insight for a pilot. Including, but not limited to, the following key questions:
    a. Would you be supportive of a mandatory commercial recycling program to include food waste?
    b. Would you be supportive of adding food waste to the Source Separated Ordinance for businesses that currently includes cardboard and paper?
    c. Would you drop-off food waste at one of the Mecklenburg County Recycling Centers if it was made available to small businesses?
3. County staff performs a brief five question survey via a postcard and SurveyMonkey link to engage a statistical sampling of the businesses opinions regarding adding food waste to the Source Separation Ordinance.
4. Develop a pilot program plan and request approval to execute the pilot for large generators or specific homogenous subset groups of businesses and a drop-off food waste pilot for small businesses..

Subtask 1.7: Identify the Local Barriers to Food Waste Diversion

BACKGROUND

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish the feasibility of a comprehensive countywide food waste recovery program. The study addresses both commercial and residential food waste. For the commercial sector, KCI work activities include:

- **Identify local barriers to food waste recovery (Subtask 1.7)**

This document presents Subtask 1.7 where KCI has identified and outlined the local barriers to commercial food waste recovery.

METHODOLOGY

KCI staff reviewed, visited and interviewed various key points of contact, as well as gathered data and information from various sources to assess local barriers/gaps and opportunities for commercial waste diversion. Those key actions are listed here, but not limited to:

- Held meetings and phone calls with staff.
- Participated in two committee meetings, Solid Waste Advisory Board and Keep Mecklenburg Beautiful Board.
- Made primary site visits to appropriate Municipal collection contacts.
- Surveyed businesses, processors, public and private haulers.
- Toured and interviewed private and public processing locations.
- Researched various jurisdictions programs.
- Reviewed existing commercial education material.
- Reviewed various industry periodicals, data and articles, including, but not limited to, Resource Recycling, Biocycle, KCI Resource Center, USCC Compost News, and the Internet.

SUMMARY OF FINDINGS

Attachment J provides the summary of the gaps and opportunities and action(s) recommended to attempt to bridge the gap.

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Attachment J
Subtask 1.7: Identify the Local Barriers to Food Waste Diversion

Commercial Program	Barriers	Opportunities	Action(s) Recommended
(1) **Target Audience - Generators - Large (300)**	Lack of commercial food waste collection service for all generators.	Survey indicates that some major generators are interested in implementing or expanding food waste diversion. They are the largest generators of food waste and there is an immediate opportunity to create awareness of the existing programs and a potential to develop a pilot program for this sector to role out a countywide program.	Using the information in this study staff develop a voluntary pilot recycling program using a dual-pilot approach as listed in the opportunities section.
Target Audience - Generators - Medium/Small	Lack of specific information on food waste generation rates.	Develop a pilot drop-off program for Small/Medium Businesses.	Conduct targeted waste audits of major food waste generating sectors to quantify food waste generation and disposal rates.
(2) **Target Audience - Collectors**	County/Municipalities has no contract or franchise for commercial garbage or recycling collection service; it's all open market; Private haulers do not have an existing collection route in place - need market development information.	Five collection companies (4 haulers and one distribution company) are interested in adding food waste collection program to their current service options. Four of them can mobilize within six months. The lack of solid waste contracts or franchise is an opportunity, collectors can set up food waste routes without impinging on collection of waste that would be controlled by contract/franchise hauler.	Convene a meeting with the private haulers in the community and present the results of this report; invite those haulers who attend to participate in an advisory committee to help develop the collection infrastructure for a dual-pilot.
(3)	Compost Central cannot accept food waste under its current permit and existing location.	Lease has expired and County could use this opportunity to perform a site and cost-benefit analysis to relocate the Compost Central to handle through yard and food waste and biosolids through a new possible permit.	Evaluate performing the recommended study and consider any possible locations on the East side of town or at the McAlpine Wastewater Treatment Plant.
Target Audience - Processors	Four facilities are within 25 miles of the center of the City of Charlotte. Three of those facilities can currently accept food waste from outside sources under their permit. One facility is a demonstration pilot and only accepts food waste from its One facility (Wallace Farms) will need to find new site or stop receiving food waste in 2015.	Two of those facilities will and can accept food waste (Earth and Wallace Farms). Continue to monitor the pilot results of the Foster Caviness demonstration program and their expansion opportunities. Continue to monitor the development of the two private anaerobic digesters possibly coming to the Charlotte region. Two private anaerobic digesters are seeking to develop large scale facilities in Charlotte region.	Convene a meeting with the existing four processors in the community and present the results of this report; and invite those that are interested to participate in an advisory committee to help develop the processing infrastructure Continue to monitor the development of private anaerobic digesters. Continue to monitor Wallace Farm efforts to find a new site for food waste composting.
(4) **Existing Food Waste Diversion Programs**	Not all businesses are aware of the tiered hierarchy for food waste recovery: waste reduction (procurement reduction), food banks/food kitchens, local compost facilities, on-site composting available to them.	Opportunity to develop 1) Awareness Program and 2) Education and Outreach programs for the existing food waste diversion program and test them during the dual-pilot program.	Develop a brochure or flyer for businesses specifically for the current opportunities for diverting food waste: EPP, Food Banks/Food Kitchens, Existing Composting Facilities, On-site programs.
(5) **Economic Drivers**	Although the tipping fee is high enough to potentially warrant participation by businesses because of the potential cost avoidance and waste collection cost reduction at an average of $55/ton for disposal; it could be higher to increase the	Using existing staff (compost and commercial staff), perform waste assessments to gather and document the potential economic information (cost avoidance, reduced garbage volumes for collection services) to use as examples to	Under the proposed SWM goals - reduce per capita waste disposal by 35% by 2019 - using this report County Staff/Consultant integrate the recommendations to help meet this goal.
(6) **Policy Drivers**	The goals set by the County in its Solid Waste Master plan and diversion options to be presented and approved by Council, will drive the other decisions, such as a voluntary or mandatory program (through the Source Separation Ordinance) or	County staff evaluate the possibility and impact of including organics (including food waste) as an additional material under the current SSO.	Decide whether or not this can be achieved and whether businesses will be receptive of it during the next LUESA residential survey or a postcard/SurveyMonkey mailing to businesses.
(7) **Environmental Drivers**	Not enough general or comprehensive awareness about the environmental benefits of composting on a countywide basis and the outcomes it could bring to the community: more jobs, support water quality and solid conservation issues,	Develop material to outline and explain the ties between the economic and environmental barriers to the local community.	Test these materials through the dual-pilot program and expand them from lessons learned.
(8) **Organics Recycling Awareness**	Moderate awareness by the elected officials and majority of the commercial businesses population (large, medium, and small) regarding the various benefits to business waste reduction, community economics, and the environment.	Using the information in this report about Economic, Policy, and Environmental drivers generate an organics awareness program for both the commercial and residential sectors.	Develop an organics awareness program regardless if a dual-pilot program is approved.
(9) **Technical Support - Education and Outreach**	The existing commercial organics recycling program is not promoted in a comprehensive way on the County website, Resource Guide to Waste Reduction and Recycling, or by the commercial waste assessor.	Update the County website, Resource Guide, and distribute and include information to be distributed by staff to businesses.	Develop an education and outreach program to complement the organics awareness program regardless if a dual-pilot program is approved.
(10) **Pilot Program - Countywide Program** **Pilot Program - Small Businesses**	Large business currently have no comprehensive collection capacity, and existing processing capacity is not large enough for a countywide roll-out. Small businesses currently only have one avenue to compost and that's through a traditional on site (or backyard building) program.	Integrating the information in this study and the nine opportunities to overcome the barriers listed here, develop a dual-pilot program plan to establish (1) one route and (2) and a drop-off program at the full-service drop-off centers.	Seek approval to develop and roll-out a pilot program plan within 18 months to two years.

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SECTION 3.0
RESIDENTIAL FOOD WASTE

This Section 3.0 Residential Food Waste includes all of the write-ups for each subtask in the scope for the residential food waste component of the study. It provides supportive detail for the Final Report.

Subtask 2.1: Estimate the Amount of Residential Food Waste Created Per Household in Mecklenburg County

BACKGROUND

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish a comprehensive countywide food waste recovery program. The study addresses both commercial and residential food waste. For the residential sector, KCI work activities include:

- **Estimate the amount of residential food waste created per household (Subtask 2.1)**

This document presents Subtask 2.1 methodology and results regarding food waste diversion and disposal practices by the residential sector.

METHODOLOGY

KCI obtained County demographic data from the 2010 Census by the U.S. Census Bureau. These data were used to profile the County's residential sector in terms of population and number of households. Due to the lack of County-specific information, KCI compiled residential waste characterization data from jurisdictions in the Southeast U.S. in order to estimate food waste disposal. Mecklenburg County has for years actively promoted home composting and asks residents about home composting practices as part of the LUESA Annual Survey, however there is no County information about home composting of food waste. KCI supplemented LUESA's survey data with information from other jurisdictions that have surveyed home composting practices in order to estimate the amount of food waste recovered in this manner. The estimates of residential food waste disposal and home composting are combined to develop an estimate of total residential food waste generation.

KCI expanded the work effort for this task to include an assessment of potential residential food waste diversion. KCI identified communities in the U.S. with residential food waste collection programs and contacted them to obtain information regarding their program including program performance metrics (e.g., percent of households participating, quantities of food waste collected, etc.). Based on these data, KCI estimated the amount of food waste that a comprehensive food waste collection program could recover in Mecklenburg County.

SUMMARY OF FINDINGS

Profile of the Residential Sector

The 2010 U.S. Census estimated that the County is home to 920,000 residents with a population density of 1,755 persons per square mile. The County's population has grown over 32% from 2000 to 2010, almost twice the state's average 18.5% population growth. Approximately 92% reside in incorporated municipalities within the County. These municipalities are the City of Charlotte (77% of residents) and the Towns of Cornelius, Davidson, Huntersville, Matthews, Mint Hill and Pineville (totaling 15% of residents). The remaining 8% of the population resides in the unincorporated County.

The County contained approximately 398,500 housing units in 2010, of which an estimated 277,800 were single-family households.

Residential Food Waste Generation

Based on KCI's experience conducting numerous waste composition studies, we know that the composition of residential waste is relatively consistent across jurisdictions, and that variability is primarily due to socio-economic factors as well as the performance of residential recycling programs (i.e., when a recycling program captures a large percentage of the paper, plastic, metal and glass, there is a higher percent of food waste remaining in discarded waste).

Waste characterization studies conducted in the Southeastern U.S. indicate that the food waste accounts for approximately 10% - 14% of residential waste. Another material commonly targeted by residential organics recycling programs is soiled and non-recyclable paper. This material comprised another 6% - 14% of the residential waste discards in the studies reviewed by KCI (see Table 1).

Table 1 - Residential Waste Characterization Study Results for Southeastern U.S.

	Percent of Residential MSW	
Local Government	**Food Waste**	**Non-recyclable Paper**
Charleston County, SC	14.4%	13.9%
Polk County, FL	13.1%	9.9%
Pinellas County, FL	10.7%	6.1%
Wake County, NC	12.1%	n/a
Georgia Statewide	13.4%	10.7%
Orange County, NC	20.9%	n/a
Alachua County, FL	14.1%	6.9%
Average	**14.1%**	**9.5%**

Note: n/a = not available

It noted that Orange County reports that food waste represents 21% of its residential discards; however, KCI believes this would not be representative for Mecklenburg County because of Orange County's high recycling rate. KCI also noted in its research that waste composition studies conducted recently in Seattle and San Francisco (two cities with high recycling rates) found that food waste accounted for 27% - 29% of residential waste.

Based on this information, KCI developed the following estimates of the amount of food waste and non-recyclable paper being discarded by the residential sector in Mecklenburg County:

- Food waste in residential waste = 10% - 15%
- Non-recyclable / soiled paper in residential waste = 6% - 14%

KCI applied these assumptions to the amount of residential waste reported in the County's 2011 annual report to NCDENR (see Table 2). KCI estimates that County residents generate approximately 38,100 – 57,100 tons per year of food waste and 61,000 – 110,400 tons per year of food waste and non-recyclable paper combined.

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Table 2 - Estimated Quantities of Food Waste and Non-recyclable Paper in Residential Waste

	Low	High
Food Waste in Residential Waste	10%	15%
Non-recyclable Paper in Residential Waste	6%	14%
Mecklenburg Residential Waste (tons/year)	380,900	
Food Waste (tons/year)	38,100	57,100
Non-recyclable Paper (tons/year)	22,900	53,300
Total (tons/year)	**61,000**	**110,400**

Note: numbers rounded to nearest 100; numbers may not add due to rounding.

Home Composting Practices

The LUESA Annual Survey of Mecklenburg County Residents asked whether survey participants are home composters. In the 2003 through 2010 surveys, all participants were asked whether they practice home composting. An average of 39% responded "Yes" (See Table 3).

In 2011, the compost-related questions were changed. Participants were first asked whether they use compost at home, and only 21% of households answered "Yes," while 77% said that they do not use compost at home (see Table 4). Then only the 21% that *use* compost were asked whether they *make* compost at home, and 47% of them answered "Yes" (13% of all participants).

The dramatic difference in survey results (an average of 39% of household practicing home composting in 2003 through 2010 versus 13% of households making compost at home in 2011) may be due to the 2011 survey properly "filtering out" home composters by first asking if they use compost. Whatever the reason for the 2011 results, KCI believes that the average of the 2003 through 2010 surveys provides a reliable estimate of how prevalent home composting is among survey respondents.

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Table 3 - 2003 through 2010 Average Survey Responses

	Do you compost at home?	Do you have a compost bin?
Yes	39.0%	20.9%
No	60.2%	78.5%
Don't know/Refused	0.8%	0.7%
Total	**100%**	**100%**

Table 4 - 2011 Survey Responses

	Do you use compost?	Do you make compost?
Yes	21.4%	13.2%
No	76.9%	8.2%
Don't know/Refused	1.7%	0%
Skipped Question		78.6%
Total	**100%**	**100%**

More important to the objectives of this project, the LUESA survey does not ask how many survey participants compost food waste or how much of their food waste they compost. Results from surveys in Portland, OR of single-family residents home composting practices over the past decade found that 50% - 60% practice home composting and that 26% - 32% of them include food scraps in their compost. Results from a 2005 survey in Alameda County found that 24% of households with yards have some type of compost pile and 34% of them compost the majority of their food waste.

KCI used the results of these surveys in combination with the LUESA results to establish the following assumptions in order to estimate the level of food waste home composting:

- 40% - 50% of single-family households practice composting
- 25% - 35% of those practitioners compost an average of 50% of the food waste they generate

Using these assumptions and the residential food waste generation estimates described previously, KCI estimated the amount of residential food waste currently being recovered through home composting in the County at 800 – 2,900 tons per year (see Table 5).

Table 5 - Estimated Food Waste Diverted by Home Composting

	Low	High
County houses that are single-family	70%	70%
Single family household that home compost	30%	40%
Home composters that compost food waste	25%	35%
Percent of their food waste composted	40%	50%
Percent of total food waste composted	2%	5%
Food waste discarded (tons/year)	38,100	57,100
Food waste composted at home (tons/year)	800	2,900
Food waste generated (tons/year)	38,900	60,100
Food waste diversion (percent)	2%	5%

Note: numbers rounded to nearest 100; numbers may not add due to rounding.

Current Residential Food Waste Diversion

When compared with the estimate of residential food waste discards above, KCI estimates that 2% - 5% of residential food waste is currently being diverted by home composting activities (see Table 5). Please note that these estimates are calculated using assumptions derived from programs and practices in other jurisdictions because quantitative data on waste composition and home composting activities in Mecklenburg County are not currently available. Nevertheless, the results are in line with KCI expectations and are considered sufficient at this stage of County assessment and planning work.

Survey of Residential Food Waste Collection Programs

Portland OR Program Branding

In order to more fully assess the food waste diversion opportunities for Mecklenburg County, KCI expanded the scope of Subtask 2.1 to include an assessment of existing residential food waste collection programs in other jurisdictions and estimates of potential recovery in Mecklenburg County. The County provided KCI with comparative information from residential single family curbside collection programs that it had recently surveyed. In addition, KCI identified cities in the U.S. that currently operate residential food waste collection programs to obtain data that could be used to estimate potential diversion rates in Mecklenburg County.

The jurisdictions contacted were:

- Alameda County, CA
- Boulder, CO
- Chittenden Solid Waste District, VT
- King County, WA
- Oakland, CA
- San Francisco, CA
- Portland, OR

The level of program measurement and evaluation varied among jurisdictions, as well as the methodology for capturing data. County staff provided KCI with some initial residential research data and KCI expanded the County research information. Research conducted by the jurisdictions included waste composition studies, truck ride-alongs, lid-lifting assessments, and tonnage estimates. Reported participation in food waste collection was estimated from a low 33% in Alameda County, CA to 80% in Portland, OR; the estimated average is 52%. Food waste recovery ranged from 91 to 204 pounds per household per year in the Chittenden and San Francisco areas, respectively. The average reported was 136 pounds per household per year in those jurisdictions that measured those results. A table of findings is included as Attachment A.

Potential Residential Food Waste Collection Program Recovery

Based on the performance of programs in other jurisdictions, KCI established the following estimates for how a program in Mecklenburg County may perform:

- 35% - 80% of households will participate in a residential food waste recycling program
- The average food waste recovery rate will range from 100 – 200 pounds per household per year (average for all households including participants and non-participants)

San Francisco's 3 Cart Program

Based on these assumptions and the County's demographics, KCI estimates that a comprehensive residential food waste recovery program (i.e., one that includes food waste along with yard waste for residential organics collection using dedicated containers) could recover approximately 13,900 – 27,800 tons of food waste, which represents a recovery rate of 36% - 46% of food waste generated (see Table 6).

Table 6 - Potential Residential Food Waste Collection Program Recovery

	Low	High
Single family households	277,800	
Food waste recovery (lbs/household/year)	100	200
Food waste recovery (tons/year)	13,900	27,800
Food waste generation (tons/year)	38,900	60,100
Food waste diversion (%)	36%	46%

Note: numbers rounded to nearest 100; numbers may not add due to rounding.

In conclusion, KCI estimates that Mecklenburg County's residential sector generates approximately 38,900 to 60,100 tons per year of residential food waste of which an estimated 2% - 5% (800 – 2,900 tons per year) is being recovered through home composting. A comprehensive residential food waste recovery program would add another estimated 13,900 – 27,800 tpy of food waste recovery (36% - 46% of food waste generated).

RECOMMENDATIONS

- Rather than rely on data from other jurisdictions, the County should consider conducting a residential waste characterization study in order to more accurately determine the quantities of residential food waste in the County.

- Currently, the annual survey of County residents conducted by LUESA does not ask questions that may help to better measure food waste home composting practices. The County should consider modifying the annual survey to include questions that capture this level of detail regarding home composting practices. This would help to establish good baseline information and ultimately gauge performance of residential food waste recovery programs.

- The County should also consider implementing a residential food waste recovery pilot study. While the performance metrics presented in this report from other jurisdictions can be used to plan such a pilot, ultimately the information obtained from a pilot in the County would provide the basis for evaluating the impact and economics of a full-scale residential food waste recovery program.

Attachment A

Summary of Selected Residential Food Waste Recovery Programs

Program	Recycling	Yard Waste Collection
Boulder, CO	Service required	Haulers must provide 32 gallon bi-weekly combined yard/food service + up to 3 bags of leaves and 3 bundles of branches
Chittenden Solid Waste District, VT		Seasonal in some towns
Fresno, CA	Mandatory Weekly 96 gallon cart	Weekly Combined yard/food collection 96 gallon cart
Oakland, CA	Weekly single stream service 64 gallon cart	Weekly Combined yard/food collection 96 gallon cart
Alameda County, CA	Same as Above	Same as Above
Portland, OR	Weekly	Weekly combined yard/food collection
San Francisco, CA	Mandatory	Mandatory yard/food collection
San Jose, CA	Weekly	Weekly
Seattle, WA	Recyclables prohibited from disposal in trash	Yard/food collection (Yard waste disposal ban)
King County, WA	Bi-weekly	Bi-weekly Combined yard/food collection

Attachment A

Summary of Selected Residential Food Waste Recovery Programs (continued)

Program	Food Waste Collection	Other
Boulder, CO	Combined yard/food collection	PAYT
Chittenden Solid Waste District, VT	Limited availability through private haulers & drop offs	N/A
Fresno, CA	Combined yard/food collection	Fines for contamination applied to utility bill
Oakland, CA	Weekly combined yard/food collection	Second green cart $7.99/ month
Alameda County, CA	Same as Above	N/A
Portland, OR	Weekly, as of Oct 31, 2011 Combined food/yard collection	Small grants program
San Francisco, CA	Mandatory yard/food waste collection	PAYT
San Jose, CA	N/A	PAYT
Seattle, WA	Yard/food waste collection by private haulers for a fee; drop-offs available for a fee	PAYT - Garbage is uncollected if recycling, food or yard waste inside
King County, WA	Bi-weekly yard/food waste collection by private haulers	Partnership with retailers, haulers, compost facility

Attachment A

Summary Comparison of Selected Residential Food Waste Recovery Programs (continued)

Program	Results
Boulder, CO	D 46%
Chittenden Solid Waste District, VT	Participation FW 47% (pilot) 7.6 lbs/HH/week FW 16.6 lbs/HH/week YW/FW total
Fresno, CA	D 74% Participation rate 90% Only fruit/veggies from yard allowed, no kitchen FW no FW measurements
Oakland, CA	See Alameda County, CA
Alameda County, CA	Participation FW 32.6% Average 11.2 lbs/HH/week Estimate 75% FW potentially capturable Capture estimate: 31,802 tpy
Portland, OR	Capturing 50% FW generated 80% participate regularly
San Francisco, CA	D 60% Total annual generation 450,000 tons Compost collected annually: 85 lbs per capita; 206 lbs per HH; 36,000 tons; 7 lbs per capita/month; 17 lbs/HH per month Diversion 8%; Contamination 1%
San Jose, CA	Effective Jan 2012 fee charged for disposable bags at POS
Seattle, WA	R 70.3% (66.1 lbs./HH per month 2010)
King County, WA	50% participation 9 - 10 lbs/HH collected (35 lbs per month) 45 lbs/HH generated per month

D = Diversion R = Recycling

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Attachment B – Comparison of Residential Food Waste Programs

Program	Recycling	Yard Waste Collection	Food Waste Collection	Other	Results
Boulder, CO	Service required	Haulers must provide 32 gallon bi-weekly combined yard/food service + up to 3 bags of leaves and 3 bundles of branches	Combined yard/food collection	PAYT	D 46%
Chittenden Solid Waste District, VT		Seasonal in some towns	Limited availability private haulers drop offs	N/A	Participation FW 47% (pilot) 7.6 lbs/HH/week FW 16.6 lbs/HH/week YW/FW total
Fresno, CA	Mandatory Weekly 96 gallon cart	Weekly Combined yard/food collection* 96 gallon cart	Combined yard/food collection	Fines for contamination applied to utility bill	D 74% Participation rate 90% *only fruit/veggies from yard allowed, no kitchen FW no FW measurements
Oakland, CA	Weekly single stream service 64 gallon cart	Weekly Combined yard/food collection 96 gallon cart	Weekly Combined yard/food collection	Second green cart $7.99/ month	See Alameda County, CA
Alameda County, CA	Same as Above	Same as Above	Same as Above	N/A	Participation FW 32.6% Average 11.2 lbs/HH/week Estimate 75% FW potentially capturable Capture estimate: 31,802 tpy (335k HH x 52 wks x 32.6% x 11.2 /2000)
Portland, OR	Weekly	Weekly combined yard/food collection	Weekly, as of Oct 31, 2011 Combined food/yard collection	Small grants program	Capturing 50% FW generated 80% participate regularly
San Francisco, CA	Mandatory	Mandatory yard/food collection	Mandatory yard/food waste collection	PAYT	D 60% Total annual generation 450,000 tons Compost collected annually: 85 lbs per capita; 206 lbs per HH; 36,000 tons 7 lbs per capita/month; 17 lbs/HH per month Diversion 8% Contamination 1%
San Jose, CA	Weekly	Weekly	N/A	PAYT	Effective Jan 2012 fee charged for disposable bags at POS
Seattle, WA	Recyclables prohibited from disposal in trash	Yard/food collection (Yard waste disposal ban)	Yard/food waste collection by private haulers for a fee; 3 Dropoffs available, fee $13.25/passenger vehicle, $82.50/ton; All goes to Cedar Grove compost facility	PAYT Garbage is uncollected if recycling, food or yard waste inside	R 70.3% (66.1 lbs./hh per month 2010)
King County, WA	Bi-weekly	Bi-weekly Combined yard/food collection	Bi-weekly combined yard/food waste collection by private haulers All goes to Cedar Grove compost facility	Partnership with retailers, haulers, compost facility	50% participation 9 - 10 lbs/HH collected (35 lbs per month) 45 lbs/HH generated per month

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Subtask 2.2: Review Existing Mecklenburg County Residential Curbside Collection Programs and the Potential to Include Food Waste Diversion

BACKGROUND

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish a comprehensive countywide food waste recovery program. The study addresses both commercial and residential food waste. For the residential sector, KCI work activities include:

- **Review existing Mecklenburg County residential curbside collection programs and the potential for food waste diversion (Subtask 2.2)**

This document presents Subtask 2.2 the purpose of which was to assess potential residential collection and transportation options for food waste. Existing solid waste and recyclables collection programs for each City or Town in the County were identified as potential opportunities.

METHODOLOGY

A residential Municipal survey instrument was designed to gather information regarding existing residential and collection programs in the municipalities of Charlotte, Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville, as well as the unincorporated portion of the county (Attachment A). The data from this survey was expected to identify and assess potential opportunities in utilizing existing Municipal waste collection and transportation infrastructure within the County. Each city/town was contacted via e-mail and sent a solid waste collection survey. County staff recommended that KCI hold a meeting with the Town of Huntersville due to their automated collection program for garbage, recyclables and yard waste. All cities/towns responded and a meeting was held with Town of Huntersville. A spreadsheet was created depicting the survey results (Attachment B).

SUMMARY OF FINDINGS – MUNICIPALITIES AND COUNTY

All municipalities within the County provide garbage, recycling, and yard waste collection service. All but one city (Cornelius) provide bulk waste collection. The City of Charlotte is the only municipality that provides its own collection services (garbage and yard waste); all others contract with service providers. These private haulers include Republic Services, Waste Management, Inland Service (recyclables only), Advanced Disposal, RCS, and Signature Waste. The unincorporated area of the County is an open market. These are the Municipal contacts surveyed.

Mecklenburg County
Contact Information

	Contact Information			
Jurisdiction	**Name**	**Title/Entity**	**Phone/Fax**	**Email**
Unincorporated County	Laurette Hall	Environmental Manager	704-432-1970	Laurette.Hall@MecklenburgCountyNC.gov
Charlotte	Brian Garrett	Contract Srvcs Division Mgr	704- 336-3342	bgarrett@charlottenc.gov
Cornelius	Krysti Hawkins-Lowry	Admin. Assistn.	704-895-5212	khawkins@cornelius.org
Davidson	Leamon Brice	Town Manager	704-940-9618	lbrice@ci.davidson.nc.us
Huntersville	Bobby Williams Max Buchanan	Director of Eng & PW	704- 766-2220	bobbyw@huntersville.org
Matthews	Ralph Messera	Public Works Director	704- 847-3640	rmessera@matthewsnc.com
Mint Hill	Brian Welch	Town Manager	704- 545-9726	bwelch@admin.minthill.com
Pineville	Eureka Bidgood	Payroll Technician	704- 889-2291	ebidgood@pinevilledsl.net

Huntersville 3 Cart Program

All municipalities provide weekly automated or semi-automated garbage collection. Two of the cities/town (Davidson and Mint Hill) provide weekly manual recyclables collection; the rest provide bi-weekly automated or semi-automated recyclables collection. One town (Huntersville) provides carted yard waste collection with weekly automated pickup; the rest of the cities/towns provide semi-automated or manual collection of yard waste via cans, bags and/or piles.

All of the residential collection service providers have five-year contracts ending June 30th, with expiration dates ranging from 2013 to 2016. Additionally, the County has a Solid Waste

Interlocal Agreement (ILA) with each of the Municipalities. The ILA outlines the responsibilities of the County (responsible for providing and operating all recycling, yard waste and solid waste management facilities) and those of the Municipalities (separate collection of recyclables, yard waste, and solid waste in the Municipality's corporate limits and delivery of these materials to the designated facilities listed in the ILA Exhibit A). Additionally, if the County's obligation is met through a third party owned and operated facility, the Municipality must consent to the designation of any third party owned and operated facility located outside of a circle with its center at the Town/City Hall, and having a radius of forty miles. Exhibit A may be amended from time to time as long as it is consistent with the remainder of the ILA and the current Solid Waste Management Plan. This information is important for identifying the generator, collection and processing infrastructure that county would possibly put in place in the future.

KCI met with Huntersville staff and its collection hauler (Advanced Disposal). During this meeting the study was explained along with preliminary dialogue regarding whether the Town would be interested in further discussion with County management staff regarding hosting a residential or commercial pilot in its community. The Town is not interested at this time in hosting a commercial pilot and recommended the County focus on homogenous generators such as schools or commercial establishments such as restaurants countywide. The Town did mention that they would entertain further discussions with County staff and its collection provider regarding the possibility of a residential pilot and what that might entail. The Town's population has significantly grown as many residents have moved to new suburban developments in the community and commute into the City of Charlotte for business. These residents are new to the community and are "transplants" and it will take time for them to fully integrate the same way in which families who have been in the community for years have so buy in and promotion of a food waste program to residents would need to include a general awareness campaign to educate these citizens.

RECOMMENDATIONS – RESIDENTIAL PROGRAM

Three municipalities expressed interest in participating in a residential food waste diversion pilot program (Huntersville, Cornelius, and Pineville). Advanced Disposal provides residential collection service in Huntersville, Republic Services provides residential collection service in Cornelius, and Signature Waste provides residential collection service in Pineville. Based on

existing collection infrastructure, Huntersville may be the best suited for a pilot program because of the three, it is the only one with automated containerized residential curbside collection for yard waste. Huntersville has rollcarts for yard waste, which may make it possible to add food waste to the yard waste cart collection service versus other communities where yard waste is collected in bags or bulk. With further discussion with the Town and its collection provider, it is possible that the yard waste container could be piloted as an organics container for both yard and food waste pending the contractual arrangements with Advanced Disposal. KCI recommends County staff:

- Consider adding a question or questions about residential interest in and willingness to utilize curbside and drop-off food waste recycling in the next LEUSA residential survey.
- Continue dialogue to secure meetings with Charlotte, Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville management staff to confirm the best possible Municipal partner for a residential food waste collection pilot program. To prepare for this follow-up and next steps:
    - Provide these three Municipalities a full copy of the final report.
    - Purchase and provide a copy of the BioCycle January 2012 article titled *Residential Food Waste Collection in the U.S.* to show examples to Huntersville and the other two potential Municipal partners the jurisdictions across the Country that have implemented such programs through public-private collection partnerships.
    - Discuss the specific role food waste will play in the County's Solid Waste Management Plan currently under revision.
    - Once a pilot partner is indentified, a memorandum of understanding would be recommended between the County and Municipality regarding the pilot and expected outcome or application of said results for a potential countywide roll-out. When and if a countywide program is planned the ILAs and Exhibit A should be revised as appropriate.
        - Define household pilot target size
        - Identify target neighborhood(s)
        - Designate partner processing facility and determine capacity and constraints with regard to quantity, quality and types of residential organics
        - Define food waste materials to be recovered and processed (i.e., fruits, vegetables, meat, dairy, and soiled paper)
        - Identify kitchen pail/container(s) to be tested

- Work with collection hauler to define possible fees for either a 1) curbside program or 2) drop-off program
    - Identify curbside cart to be utilized based on collection partner equipment if a pilot program partnership is not formed with Huntersville
        - 13, 35, 64, or 95 gallon lidded cart/curbside container
    - Identify drop-off container type to be utilized based on collection partner equipment
        - 2, 4, or 8 cubic yard poly dumpsters or carts
- Develop awareness, education and outreach program
- Discuss whether compostable bags will be allowed or not with processor
- Implement measurement process or activity to monitor garbage container volume reduction, tonnage diversion and participation

- Provide all Municipalities with copies of the collection survey results from all Municipal respondents.

Attachments
Provided on Following Pages

Attachment C
Municipality Survey Instrument

Mecklenburg County
_____ Residential Operations

		Garbage	Recycling	Yard Waste
Hauler				
Number Customers Served				
Collection Frequency	1/week			
	1/ 2 weeks			
	Other			
BW Collection Frequency				
SW Collection Method				
SW Container Type & Size				
Contract Term				
Residential Fee (per month)				

Attachment D
Municipality Survey Responses

Mecklenburg County
Residential Collection Operations

Jurisdiction	Type[1]	Hauler	# of Customers	Collection Frequency	Collection Method[2,3]	Container Type & Size[4]	BW Collection Frequency	Contract Term	Residential Fee
Unincorporated county*	G	open market	399,089	Unincorporated residents can self-haul to one of the full-service recycling drop-off centers or choose to pay for a subscription garbage service.					$15/year user fee
	R	open market	399,089	If a hauler provides curbside garbage collection, they are required to offer recycling collection services.					Don't know subscription rates
	YW	open market	399,089	Yard waste is typically available for a fee.					
Charlotte	G	City of Charlotte	207,738	1/week	Fully & semi automated	95-gal cart	On call	N/A	N/C - funded through the general fund
	R	Inland Service Corp.	207,738	1/2 weeks	Fully & semi automated	95-gal cart or bins		5yr + 2 yr option	
	YW	City of Charlotte	207,738	1/week	Semi-automated	bag/pile		N/A	
Cornelius	G	Republic Services	8,938	1/week	Automated	96-gal cart	N/A	5 yr (6/30/15)	$7.25
	R	Republic Services	8,938	1/2 weeks	Automated	65-gal cart		5 yr (6/30/15)	$3.19
	YW	Republic Services	8,938	1/week	Automated	bags/piles		5 yr (6/30/15)	$4.29
Davidson	G	Republic Services	3,350	1/week	Automated	Cart	On call	5 yr (6/30/13)	$8.40
	R	Republic Services	3,350	1/week	Manual	Bins		5 yr (6/30/13)	$3.00
	YW	Republic Services	3,350	1/week	Manual	bag/piles		5 yr (6/30/13)	$4.42
Huntersville	G	Advanced Disposal	16,100	1/week	Automated	95-gal cart	By application to Town Hall and fee	5 yr (6/30/15)	$18.00
	R	Advanced Disposal	16,100	1/2 weeks	Automated	95-gal cart		5 yr (6/30/15)	$18.00
	YW	Advanced Disposal	16,100	1/week	Automated	95-gal cart		5 yr (6/30/15)	$18.00
Matthews	G	Republic Services	8,674	1/week	Semi-automated	96-gal cart	On call	5 yr (6/30/16)	$6.93
	R	Republic Services	8,674	1/2 weeks	Automated	96-gal cart		5 yr (6/30/16)	$2.32
	YW	Republic Services	8,674	1/week	Manual	bagged/piles		5 yr (6/30/16)	$4.55
Mint Hill	G	RCS	8,100	1/week	Semi-automated	95-gal cart	On call	5 yr (6/30/13)	N/C - funded through the general fund
	R	RCS	8,100	1/week	Manual	bins		5 yr (6/30/13)	
	YW	RCS	8,100	1/week	Manual	cans/bags/piles		5 yr (6/30/13)	
Pineville	G	Signature Waste	1,550	1/week	Automated	95-gal cart	On call	5 yr (6/30/15)	$7.46
	R	Signature Waste	1,550	1/2 weeks	Automated	95-gal cart		5 yr (6/30/15)	$3.00
	YW	Signature Waste	1,550	1/week	Manual	bag/pile		5 yr (6/30/15)	$3.00

Notes:
[1] G = garbage; R = recycling; YW = yard waste
[2] SW Collection Method: manual, semi-automated, automated
[3] YW Collection Method: resident bags/cans, loose, plastic ok, curbside debag, how separated from BW
[4] SW Container Type & Size: resident bags/cans, standard roll-cart(s), roll-cart size (gallons)
* Provides county drop off centers

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Subtask 2.3: Identify Program Implementation Gaps and Opportunities for Bridging Gaps

BACKGROUND

Kessler Consulting, Inc (KCI) was retained by Mecklenburg County (County) in October 2011 to complete a Food Waste Diversion Study. The Study's goal is to establish baseline information needed to establish the feasibility of a comprehensive countywide food waste recovery program. The study addresses both commercial and residential food waste. For the residential sector, KCI work activities include:

- **Identify program implementation gaps and opportunities for bridging the gaps (Subtask 2.3)**

This document presents Subtask 2.3 to identify residential program implementation gaps and opportunities for bridging the gaps.

METHODOLOGY

KCI staff reviewed, visited and interviewed various key points of contact, as well as gathered data and information from various sources to assess program gaps and opportunities. Those key actions are listed here, but not limited to:

- Held meetings and phone calls with staff.
- Participated in two committee meetings, Solid Waste Advisory Board and Keep Mecklenburg Beautiful Board.
- Made primary site visits to appropriate Municipal collection contacts.
- Surveyed businesses, processors, public and private haulers.
- Toured and interviewed private and public processing locations.
- Researched various jurisdictions programs.
- Reviewed various industry periodicals, data and articles, including, but not limited to, Resource Recycling, Biocycle, KCI Resource Center, USCC Compost News, and the Internet.

SUMMARY OF FINDINGS

Attachment E provides the summary of the gaps and opportunities and action(s) recommended to attempt to bridge the gap.

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Attachment E – Gaps and Opportunities Analysis

Commercial Program	Barriers	Opportunities	Action(s) Recommended
(1)		Survey indicates that some major generators are interested in implementing or expanding food waste diversion.	
Target Audience - Generators - Large (300)	Lack of commercial food waste collection service for all generators.	They are the largest generators of food waste and there is an immediate opportunity to create awareness of the existing programs and a potential to develop a pilot program for this sector to role out a countywide program.	Using the information in this study staff develop a voluntary pilot recycling program using a dual pilot approach as listed in the opportunities section.
Target Audience - Generators - Medium/Small	Lack of specific information on food waste generation rates.	Develop a pilot drop-off program for Small/Medium Businesses.	Conduct targeted waste audits of major food waste generating sectors to quantify food waste generation and disposal rates.
(2)			
Target Audience - Collectors	County/Municipalities has no contract or franchise for commercial garbage or recycling collection service; it's all open market; Private haulers do not have an existing collection route in place - need market development information.	Five collection companies (4 haulers and one distribution company) are interested in adding food waste collection program to their current service options. Four of them can mobilize within six months. The lack of solid waste contracts or franchise is an opportunity, collectors can set up food waste routes without impinging on collection of waste that would be controlled by contract/franchise hauler.	Convene a meeting with the private haulers in the community and present the results of this report; invite those haulers who attend to participate in an advisory committee to help develop the collection infrastructure for a dual-pilot.
(3)	Compost Central cannot accept food waste under its current permit and existing location.	Lease has expired and County could use this opportunity to perform a site and cost-benefit analysis to relocate the Compost Central to handle through yard and food waste and biosolids through a new possible permit.	Evaluate performing the recommended study and consider any possible locations on the East side of town or at the McAlpine Wastewater Treatment Plant.
Target Audience - Processors	Four facilities are within 25 miles of the center of the City of Charlotte. Three of those facilities can currently accept food waste from outside sources under their permit. One facility is a demonstration pilot and only accepts food waste from its customers.	Two of those facilities will and can accept food waste (Earth and Wallace Farms). Continue to monitor the pilot results of the Foster Caviness demonstration program and their expansion opportunities.	Convene a meeting with the existing four processors in the community and present the results of this report; and invite those that are interested to participate in an advisory committee to help develop the processing infrastructure for a dual-pilot.
	One facility (Wallace Farms) will need to find new site or stop receiving food waste in 2015.	Continue to monitor the development of the two private anaerobic digesters possibly coming to the Charlotte region.	Continue to monitor the development of private anaerobic digesters. Continue to monitor Wallace Farm efforts to find a new site for food waste composting.
		Two private anaerobic digesters are seeking to develop large scale facilities in Charlotte region.	
(4)			
Existing Food Waste Diversion Programs	Not all businesses are aware of the tiered hierarchy for food waste recovery: waste reduction (procurement reduction), food banks/food kitchens, local compost facilities, on-site composting available to them.	Opportunity to develop 1) Awareness Program and 2) Education and Outreach programs for the existing food waste diversion program and test them during the dual-pilot program.	Develop a brochure or flyer for businesses specifically for the current opportunities for diverting food waste: EPP, Food Banks/Food Kitchens, Existing Composting Facilities, On-site programs.
(5)			
Economic Drivers	Although the tipping fee is high enough to potentially warrant participation by businesses because of the potential cost avoidance and waste collection cost reduction at an average of $55/ton for disposal; it could be higher to increase the incentive to separate out organics further by a larger population of businesses.	Using existing staff (compost and commercial staff), perform waste assessments to gather and document the potential economic information (cost avoidance, reduced garbage volumes for collection services) to use as examples to businesses showing the potential economic value for diverting traditional materials (SSO) and adding organics recycling to the mix (mini pro-formas for small, medium, and large businesses).	Under the proposed SWM goals - reduce per capita waste disposal by 35% by 2019 - using this report County Staff/Consultant integrate the recommendations to help meet this goal.
(6)			
Policy Drivers	The goals set by the County in its Solid Waste Master plan and diversion options to be presented and approved by Council, will drive the other decisions, such as a voluntary or mandatory program (through the Source Separation Ordinance) or at the landfill.	County staff evaluate the possibility and impact of including organics (including food waste) as an additional material under the current SSO.	Decide whether or not this can be achieved and whether businesses will be receptive of it during the next LUESA residential survey or a postcard/SurveyMonkey mailing to businesses.
(7)			
Environmental Drivers	Not enough general or comprehensive awareness about the environmental benefits of composting on a countywide basis and the outcomes it could bring to the community: more jobs, support water quality and solid conservation issues, link to Farm to Table, Eat Local program; reduction in Greenhouse Gas emissions.	Develop material to outline and explain the ties between the economic and environmental barriers to the local community.	Test these materials through the dual-pilot program and expand them from lessons learned.
(8)			
Organics Recycling Awareness	Moderate awareness by the elected officials and majority of the commercial businesses population (large, medium, and small) regarding the various benefits to business waste reduction, community economics, and the environment.	Using the information in this report about Economic, Policy, and Environmental drivers generate an organics awareness program for both the commercial and residential sectors.	Develop an organics awareness program regardless if a dual-pilot program is approved.
(9)			
Technical Support - Education and Outreach	The existing commercial organics recycling program is not promoted in a comprehensive way on the County website, Resource Guide to Waste Reduction and Recycling, or by the commercial waste assessor.	Update the County website, Resource Guide, and distribute and include information to be distributed by staff to businesses.	Develop an education and outreach program to complement the organics awareness program regardless if a dual-pilot program is approved.
(10)			
Pilot Program - Countywide Program	Large business currently have no comprehensive collection capacity, and existing processing capacity is not large enough for a countywide roll-out.	Integrating the information in this study and the nine opportunities to overcome the barriers listed here, develop a dual-pilot program plan to establish (1) one route and (2) and a drop-off program at the full-service drop-off centers.	Seek approval to develop and roll-out a pilot program plan within 18 months to two years.
Pilot Program - Small Businesses	Small businesses currently only have one avenue to compost and that's through a traditional on site (or backyard building) program.		