# Wake County

## Solid Waste Management Plan

APEX • CARY • FUQUAY-VARINA • GARNER • HOLLY SPRINGS
KNIGHTDALE • MORRISVILLE • RALEIGH • ROLESVILLE
WAKE COUNTY • WAKE FOREST • WENDELL • ZEBULON

2012 - 2022 Planning Period

*JULY 2012*

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# Executive Summary

**Participating Jurisdictions**

Apex
Cary
Fuquay-Varina
Garner
Holly Springs
Knightdale
Morrisville
Raleigh
Rolesville
Wake Forest
Wendell
Zebulon
Wake County

Pursuant to NC General Statute 130A-309A(b), each unit of local government is required to develop a Ten Year Solid Waste Management Plan and update the Plan every three years. In Wake County, the original plan was adopted in 1997 and has been updated every third year since. This 2012 Plan Update, completed in cooperation with all 12 local municipal governments, was prepared in accordance with the latest Ten Year Solid Waste Management Plan Guide. The Plan presents a progressive vision for managing solid waste in Wake County through the development of intended actions for solid waste planning elements which include: reduction; collection; recycling and reuse; composting and mulching; incineration; transfer; disposal; education; special wastes; illegal disposal/litter; purchasing of recycled products; disaster response; collection of discarded electronics; and management of abandoned manufactured homes.

## Accomplishments

Over the past three years, the jurisdictions of Wake County have individually and collectively made improvements to elements of their own solid waste programs and the County's shared solid waste system. The most notable accomplishments born from previous intended actions include the following:

- Over the previous four years, the total amount of waste generated in Wake County and disposed (in a landfill) has declined by 20 percent. At the same time, Wake County's population has grown by over 15 percent. The decrease in the amount of waste disposed in a landfill coupled with the increase in population has resulted in a per capita waste disposal rate decline of 30 percent, from 1.44 to 1.00 tons per person per year. While fewer construction starts, reduced industrial output, and less overall consumption of goods have certainly contributed to this trend, the waste reduction and source reduction programs offered by the 13 local governments and the commercial, institutional, and industrial sectors have undoubtedly played a role.

- The local governments in Wake County have previously established a collective per capita waste reduction goal of 20 percent when compared to the County's baseline rate of 1.40 tons per person established in fiscal year (FY) 1989. The goal was achieved in FY10, when the per capita disposal rate was 29.0 percent below the baseline rate, and again in FY11, when it was 28.4 percent below baseline. They continue to support the 20 percent goal and will strive to maintain a waste reduction rate below 1.12 tons per person during each year of the 2012-2022 planning period.

- Residential recycling rates have increased by 4 percent county-wide when compared to 2008 rates. Overall, 24 percent of residential waste was recycled in FY11. All municipalities have begun to phase in, or have completely switched to large, roll-out recycling carts in place of the 18 gallon bin. Expanding the types of materials collected curbside and providing more public education have also contributed to the increase in recycling.

- To improve commercial recycling rates, the City of Raleigh expanded curbside recycling in the Central Business District. Over 150 businesses had joined the program as of the end of fiscal year FY11. Similarly, other Towns, have expanded recyclables collection programs, or are in the process of expanding them, to include some businesses. Fuquay-Varina is offering cardboard collection to the 214 businesses in its downtown area.

- Wake County's Feed the Bin recycling and environmental education program resulted in approximately 1.3 million pounds of mixed paper (9.1 lbs/student) being recycled from Wake County Public Schools in the 2009-2010 school year.

- Wake County completed a waste characterization study of residential and commercial waste received at the South Wake Landfill (SWLF). The County is using this information to identify actions and opportunities to increase waste diversion.

- Wake County, the Town of Cary, and the Town Fuquay-Varina cooperatively negotiated a contract with Waste Management Recycle America to maximize revenue from the sale of recyclables. The new contract and the recent increase in the market rate for recyclables has resulted in an unexpected revenue stream for the County and Towns, which will be used to fund existing solid waste programs and support new ones.

- Wake County and other local jurisdictions continue to provide collection and drop-off opportunities for special wastes that are not appropriate for landfill disposal, or may be beneficially reused or recycled. Since the last Plan Update was prepared, Wake County expanded household hazardous waste (HHW) collection to 6-days a week at both the North Wake and South Wake Solid Waste Management Facilities. During FY11, Wake County collected 682 tons of HHW; 732 tons of white goods; 13,661 tons of tires; 31,525 gallons of used oil; 3,715 gallons of antifreeze; and 1,565 tons of televisions and other electronics from the two multi-material recycling facilities. The City of Raleigh and several towns, including Cary and Zebulon also offered special one-day HHW collection events, netting an additional 39 tons of HHW.

- To educate and emotionally engage the County's residents on the impacts of litter to public health, the environment and the economy, Wake County initiated a campaign to celebrate anti-litter behavior and reestablish a sense of pride in the community. The 86it Anti-Litter Movement was developed and launched in 2010, with strategies and tactics to thoughtfully engage citizen participation and support. Litter cleanup events were also conducted, including the "***I Love Wake County Bonito***" campaign sponsored by the City of Raleigh Community Services and Solid Waste Services departments and Wake County. The campaign was modeled after similar litter cleanups in Charlotte and Durham in which Hispanic and Latino volunteers demonstrate their pride in the area where they live.

## Future Actions

Over the last three years, Wake County and the municipal governments have taken actions to increase residential recycling rates, expand commercial recycling opportunities, reduce the amount HHW and electronics being disposed in the landfill, and improve upon many other elements. Nevertheless, the local jurisdictions recognize that additional effort is needed in virtually all areas in order to achieve their established vision and goals. In this regard, the 13 local governments have developed 116 intended actions that may result in additional improvements to the jurisdictions solid waste programs

and the County's overall system. The intended actions support a shared vision for the 2012-2022 planning period that:

- Provides the maximum opportunity practicable for waste reduction, reuse, and recycling using appropriate incentives, disincentives, and policies to motivate residents, institutions, and businesses;
- Ensures the availability of economical, long-term municipal solid waste (MSW) disposal capacity;
- Maintains an efficient system for collection, processing, recovery, diversion, transfer and delivery of all solid waste streams;
- Offers a convenient method for residents to recycle a wide range of marketable materials including special wastes and yard wastes;
- Communicates easily understood information regarding opportunities for all residents to reduce and recycle waste;
- Employs effective methods to reduce illegal dumping and littering, and to monitor and enforce regulations prohibiting such behavior;
- Provides a plan and adequate facilities for the proper management of disaster debris;
- Is supported by a secure, transparent, and equitable funding system to cover the cost of the current and future solid waste management programs, as outlined in this Plan; and
- Realizes increased efficiencies and cost savings through inter-governmental partnerships and the most appropriate mix of public and private sector services and facilities.

## Solid Waste Contacts

The solid waste representatives and contacts for the local governments in Wake County are:

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# Section 1
# Introduction

Pursuant to NC General Statute 130A-309A(b), each unit of local government is required to develop a Ten Year Solid Waste Management Plan and update the Plan every three years. In Wake County, the original plan was adopted in 1997 and has been updated every three years since. This 2012 Update, completed in cooperation with all 12 local municipal governments, was prepared in accordance with the latest North Carolina Department of Environment and Natural Resources (NCDENR) Ten Year Solid Waste Management Plan Guide. The Plan presents a progressive vision for managing solid waste in Wake County through the development of intended actions within various solid waste planning elements.

## 1.1 Organization

The 2012 Update is organized into six sections as noted below:

**Section 2** presents a summary of waste reduction and management goals;

**Section 3** characterizes the County's solid waste stream and provides a description of the flow of solid waste;

**Section 4** presents a summary of each jurisdictions program with regard to the twelve planning elements and provides current intended actions;

**Section 5** provides information about the current cost of solid waste programs; and

**Section 6** provides an update on Wake County's solid waste management program and partnership with the local governments.

Appendices to this Plan provide supporting information used in developing the Plan.

## 1.2 Participants

This Plan addresses the waste management planning needs and requirements of Wake County and all 12 municipal governments which include:

- Apex
- Cary
- Fuquay-Varina
- Garner
- Holly Springs
- Knightdale
- Morrisville
- Raleigh
- Rolesville
- Wake Forest
- Wendell
- Zebulon

The municipal governments participated in the Plan preparation by meeting individually with the County's consultants to review their solid waste programs, provide updates on previous intended actions, and develop new intended actions. The Solid Waste Technical Advisory Committee (TAC) and Solid Waste Advisory Committee (SWAC) oversaw and participated in the Plan's development, and recommended the plan for adoption by the elected officials of each local government. The TAC and SWAC are comprised of representatives from each local government.

A draft of the Plan has been placed in all Wake County Public Libraries and Chambers of Commerce for public review and comment. The draft Plan has also been posted on Wake County's web site. Paid advertising notices of the opportunity to review the plan were placed in the following papers (see notice in Appendix B):

- Apex Herald (March 22)
- Fuquay-Varina Independent (March 21)
- Garner News (March 21)
- Holly Springs Sun (March 22)
- News and Observer (March 25)
- Wake Weekly (March 22)

The public comment period spans March 26th to April 9th, 2012. Additional opportunities for public input in the planning process will be provided at each meeting of elected municipal officials when the draft plan will be presented for review and consideration. It is necessary for the draft Plan to be adopted by each local government by resolution. Copies of the resolutions will be provided in Appendix A of the Final Plan Update.

# Section 2
# Waste Reduction and Management Goals

Wake County and its municipal partners continue to support and refine the vision and goals for managing solid waste that were established during the previous Plan Updates. Their shared vision for the 2012-2022 planning period supports a solid waste management system serving residents, institutions, and businesses that:

- Provides the maximum opportunity practicable for waste reduction, reuse, and recycling using appropriate incentives, disincentives, and policies to motivate residents, institutions, and businesses;
- Ensures the availability of economical, long-term municipal solid waste (MSW) disposal capacity;
- Maintains an efficient system for collection, processing, recovery, diversion, transfer and delivery of all solid waste streams;
- Offers a convenient method for residents to recycle a wide range of marketable materials including special wastes and yard wastes;
- Communicates easily understood information regarding opportunities for all residents to reduce and recycle waste;
- Employs effective methods to reduce illegal dumping and littering, and to monitor and enforce regulations prohibiting such behavior;
- Provides a plan and adequate facilities for the proper management of disaster debris;
- Is supported by a secure, transparent, and equitable funding system to cover the cost of the current and future solid waste management programs, as outlined in this Plan; and
- Realizes increased efficiencies and cost savings through inter-governmental partnerships and the most appropriate mix of public and private sector services and facilities.

## 2.1 Solid Waste Management Goals

Solid waste reduction and management goals that have been established to achieve the shared vision and which are supported by an updated set of intended actions listed in subsequent sections of this Plan are presented below:

### Collection

- Provide cost-effective means of collecting MSW, recyclables, bulky waste, yard waste, and certain special wastes including household hazardous waste (HHW) at approved service levels, from primarily single-family residential customers served by the participating jurisdictions.
- Ensure that solid waste management and recycling collection services are made available to all solid waste generators, including businesses and institutions.

## Transfer and Disposal

- Operate the South Wake Landfill (SWLF) in an efficient and environmentally sound manner using appropriate and innovative methods to ensure maximum use of airspace while considering reuse of methane gas for energy and possible beneficial end uses of the site
- Continually evaluate SWLF and East Wake Transfer Station (EWTS) tip fees to encourage in-county disposal and optimize the efficient use of both facilities.

## Waste Reduction, Recycling, and Reuse

- Reduce, reuse, and recycle MSW to the maximum extent practicable in all participating jurisdictions, with the overall objective of achieving the State's waste reduction goal of 40 percent as measured against the baseline year of FY 1988-89.
- Provide incentives, disincentives, and policies to motivate Wake County residents, businesses, and institutions to reduce, reuse, compost, and recycle solid waste.
- Support economic development efforts aimed at enhancing existing and developing "sustainable" businesses, including those that can utilize local secondary material feedstocks as an alternative energy source or supply.

## Composting/Mulching

- Continue to provide convenient opportunities for Wake County residents to learn about the benefits and techniques for backyard composting of yard debris, food scraps, and other suitable organic wastes.
- Investigate and pursue appropriate opportunities for food waste composting and other means to reduce food waste disposal at the SWLF.
- Consider initiatives to work with surrounding counties and states on larger projects such as organic waste composting and regional disposal alternatives.

## Management of Special Wastes

- Continue to provide opportunities and the necessary services and facilities for Wake County to properly manage waste requiring special handling.

## Education

- Continue to supply all residents and businesses with information on how to reduce, reuse, and recycle waste in their homes, places of work, and throughout the community.
- Develop public awareness regarding the implications of over-consumption on solid waste generation and the environment, and inform residents about consumption practices that result in less waste generation as well as more efficient, environmentally sound use of resources.
- Continue to provide a consistent and coordinated message of proper solid waste management and environmental stewardship for students, local government employees, and the general public.
- Provide environmental education and recycling services to every public school in the Wake County Public School System (WCPSS).

### Prevention of Illegal Dumping and Litter

- Make measurable and steady progress toward reducing illegal dumping and littering, including increased enforcement of the N.C. covered truck requirements.

### Purchasing

- Promote business, institutional, and consumer involvement in buying products made from recycled materials.
- Expand County and municipal recycled products purchasing programs via establishment of formal policies on procurement of recycled content and other "green" products and supplies by Wake County local governments.

### Disaster Response

- Institute an effective disaster debris management system consisting of facilities and services reflecting coordination among County, municipal, state, and federal agencies.

### Management and Financing

- Utilize full cost accounting practices for identifying and monitoring all solid waste management program costs.
- Institute a balanced, secure, and equitable funding system to cover current and future costs associated with the programs and services needed to meet the County's solid waste reduction and management goals.
- Identify opportunities to reduce or control costs and increase revenue opportunities associated with solid waste disposal and recycling services for County and municipal buildings.
- Work collectively to integrate and coordinate services and programs, and to realize increased efficiencies and cost savings that result from these joint efforts.
- Strengthen partnerships with private sector service providers, to ensure appropriate and effective use of both public and private sector services and facilities in the most environmentally sound and cost-effective manner practicable.
- Participate in regional planning and decision-making activities to address regional opportunities for enhancing the effectiveness and efficiency of recycling and sold waste management operations.
- Establish program measures and an evaluation system to monitor progress toward attaining local solid waste management goals.
- Ensure that there is a process and a place for public input into solid waste management plans and facility siting decisions.
- Comply with all state and federal solid waste management regulations.

Additional, and mostly complementary goals, were recently debated and developed by the members of Wake County's Sustainability Task Force. The Task Force, comprised of Wake County citizens with a

wide variety of backgrounds, experience, and expertise, developed one dozen recommendations and strategies supporting the following solid waste management goals:

- Financial and environmental benefits of the SWLF and other (closed) Wake County landfills will be extended;
- Waste Reduction, Reuse, and Recycling for C&D waste will be increased; and
- Investigations for the next generation waste management system will be initiated.

The goals are generally consistent with the goals and intended actions of this, and previous Plans. Several of the recommendations provided by the Task Force have been specifically addressed as part of this Plan Update, including evaluations of (1) food waste diversion; (2) C&D recycling opportunities and impediments; (3) MSW tipping fees; (4) Pay-as-You-Throw (PAYT) pricing for residential customers; and (5) diversion of bulky and/or high volume materials from the SWLF. The results of these evaluations are summarized in Section 4 of this Plan Update. Supporting Technical Memoranda are included in Appendix H.

## 2.2 Waste Reduction Rate and Goals

The 1991 amendment to the Solid Waste Management Act of 1989 established a statewide goal to reduce the amount of landfilled material 40 percent by 2001 (on a per capita basis). Statewide, the goal was not met, however per capita disposal rates have dropped over the last five years and are now below the baseline fiscal year (FY) rate of 1.07 tons per person per year established in 1991-1992. The statewide per capita waste disposal rate in FY11 was 0.99 tons per person per year – which is 7.5 percent below the baseline rate. In Wake County, the per capita disposal rate has mirrored the declining trend statewide. Since FY07, Wake County's per capita waste disposal rate has declined by 30 percent, from 1.44 to 1.00 tons per person per year (Table 2-1).

The jurisdictions in Wake County have previously established a *collective* per capita waste reduction goal of 20 percent when compared to the County's baseline (FY89) rate of 1.40 tons per person. The goal was achieved in FY10, when the per capita disposal rate was 29.0 percent below the baseline rate, and again in FY11, when it was 28.4 percent below baseline. They continue to support the 20 percent goal and will strive to maintain a waste reduction rate below 1.12 tons per person during each year of the 2012-2022 planning period.

**Table 2-1**
**Wake County Waste Disposal and Reduction Rate**

| Fiscal Year | MSW Tons Disposed | Wake Co. Population | Waste Disposal Rate | % Change from Baseline[1] |
|---|---|---|---|---|
| 04-05 | 999,535 | 723,708 | 1.38 | -1.3% |
| 05-06 | 1,071,973 | 755,034 | 1.42 | 1.4% |
| 06-07 | 1,140,479 | 790,007 | 1.44 | 3.1% |
| 07-08 | 1,151,050 | 832,590 | 1.38 | -1.3% |
| 08-09 | 976,762 | 864,429 | 1.13 | -19.3% |
| 09-10 | 886,814 | 892,409 | 0.99 | -29.0% |
| 10-11 | 910,034 | 907,314 | 1.00 | -28.4% |

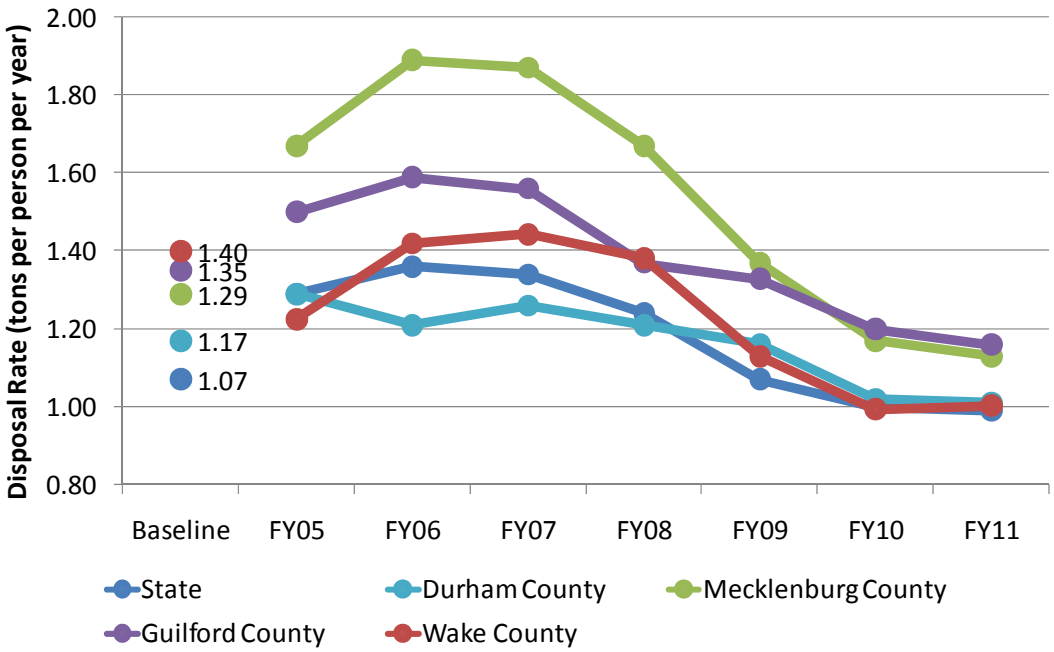
[1] Wake County's baseline rate from FY88-89 was 1.40 tons per person per year.

The jurisdictions of Wake County continue to take actions to reduce the per capita waste disposal rate and limit the amount of waste landfilled. Consistent with the trend that started approximately five years ago, numerous municipalities, including Apex, Cary, Fuquay-Varina, Garner, Morrisville, Raleigh, and Rolesville switched from 18-gallon bins or small carts to larger roll-out carts (e.g., 65 or 95 gallon) for recyclables to facilitate increased residential curbside recycling. The jurisdictions have also maximized the types of materials that can be recycled by residents, collectively offering a consistent and comprehensive menu of "accepted" recyclables.

While these factors have likely lowered the amount of waste landfilled, the downturn in the economy since 2008 has undoubtedly played a significant role. Fewer construction starts, reduced industrial output, and less overall consumption of goods have resulted in less waste disposal. The declining per capita disposal rate is evident in peer counties, including Mecklenburg, Guilford, and Durham (Figure 2-1). Statewide, the waste disposal rate has dropped by 27 percent over the last five years, and has mirrored the rate observed in Wake County over the last two years. As the economy begins to expand, the true impact of waste reduction measures, such as the increase in recycling, will be easier to distinguish.

Through effective planning and commitments from its municipal partners, Wake County developed the SWLF, which provides long-term disposal capacity at low cost, compared to other available options. While it is the County's primary goal to implement measures that will reduce waste generation and preserve landfill airspace (thus extending the life of the landfill), it is also a goal to provide for cost-effective solid waste disposal to citizens, businesses, and institutions. The cost of solid waste disposal generally increases, on a per ton basis, as disposal tonnage rates decrease. As such, there is a continual balancing of priorities (disposal cost vs. waste reduction) that must occur.

**Figure 2-1**
**North Carolina Per Capita Waste Disposal Rates**



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# Section 3
# Solid Waste Generation, Composition, and Disposition

In order for the County and local jurisdictions to reach the goals defined in Section 2, it is important to understand the types, quantities, sources, and current disposition of waste materials generated in the County. To facilitate this understanding, the NCDENR Division of Waste Management (DWM) requires all jurisdictions and certain types of facilities that manage waste to report annual solid waste statistics. The statistics are compiled and made available on the DWM web site. These databases provide valuable insight into waste generation and disposal amounts and trends throughout the County and State. In addition, Wake County has performed several studies of waste composition on a county-wide level and for certain elements of their organization. Most recently, the County commissioned a waste characterization study for residential and commercial waste received at the SWLF. The following sections summarize the most recent information available for the County regarding waste generation, disposition, and composition.

## 3.1 Waste Generation

Residential dwelling units, businesses, industries, government entities and institutions all generate waste that is ultimately collected, processed and disposed through solid waste service providers (both public and private). The following sections summarize available data for MSW, C&D debris, and LCID.

### 3.1.1 Municipal Solid Waste

The distribution of MSW is primarily driven by population and growth patterns throughout the County and plays an important role in how efficiently the solid waste services can be provided. Therefore, an important element of any management plan is an evaluation of the population growth patterns in the service area. Table 3-1 shows current and projected population estimates for each of the local jurisdictions and the County. The Office of State Budget and projects Wake County's population to grow from approximately 916,000 today, to over 1.16 million by the year 2020. Since the last Plan Update in 2009, the 2020 projected population has been lowered by approximately 70,000, likely as a result of the slower than expected economic growth over the past three years. Nevertheless, Wake County's population is still expected to grow by an average annual rate of 2.7 percent between now and 2020, resulting in an additional 244,000 residents. Despite efforts to reduce waste generation, this projected growth of both residents and businesses will significantly increase waste generation throughout the County and its' jurisdictions.

Table 3-2 shows the tons of MSW managed by each municipality for FY 2011.This includes primarily residential waste, recyclables, white goods, and yard waste. Left out of this assessment is commercial waste and recyclables (except for a small amount of commercial waste collected by municipalities), used tires, HHW, and other special wastes. The County jurisdictions managed 378,783 tons of waste in FY11, which was only slightly more than the amount managed three years ago (371,690 tons in FY08). Per capita waste generation dropped for eight of the 13 local jurisdictions and the county-wide average dropped by just over 3 percent.

**Table 3-1**
**Estimated Populations by Jurisdiction**

| Jurisdiction | Population 2008 | Population 2011[1] | Population 2015[2] | Population 2020[2] | Population 2025[2] |
|---|---|---|---|---|---|
| Apex | 34,463 | **38,180** | 43,173 | 50,832 | 59,849 |
| Cary | 132,647 | **142,613** | 162,262 | 193,649 | 223,077 |
| Fuquay-Varina | 15,000 | **20,000** | 17,702 | 23,323 | 30,729 |
| Garner | 25,429 | **26,000** | 33,463 | 40,713 | 49,533 |
| Holly Springs | 22,362 | **25,000** | 31,189 | 39,394 | 49,757 |
| Knightdale | 10,000 | **14,000** | 13,338 | 14,876 | 17,245 |
| Morrisville | 15,003 | **18,521** | 17,750 | 20,800 | 23,900 |
| Raleigh | 380,173 | **403,892** | 451,906 | 511,290 | 578,478 |
| Rolesville | 2,800 | **3,813** | 3,562 | 4,231 | 5,025 |
| Wake Forest | 26,150 | **28,542** | 33,270 | 39,514 | 46,931 |
| Wendell | 5,742 | **5,742** | 6,415 | 7,369 | 8,464 |
| Zebulon | 4,781 | **4,433** | 8,872 | 10,283 | 10,312 |
| Total Incorporated Area[3] | 674,550 | **730,736** | 822,902 | 956,274 | 1,103,300 |
| Unincorporated Area[4] | 182,377 | **185,175** | 211,167 | 204,549 | 184,279 |
| Wake County Total[5] | 856,927 | **915,911** | 1,034,069 | 1,160,823 | 1,287,579 |

***Notes:***

*1. The 2011 population estimates are from the 2010-2011 Solid Waste and Materials Management Annual Reports for each jurisdiction.*

*2. The population projections were provided by municipal staff or developed from demographic data found on a jurisdiction's website. Apex, Fuquay-Varina, Holly Springs were shown on the jurisdiction websites. Cary, Garner, Morrisville, and Zebulon were adapted from the County's Water and Sewer Plan. Knightdale, Raleigh, Rolesville, and Wake Forest were developed from average annual growth rates. Wendell projections were previously provided by their Planning Department.*

*3. Calculated by adding the total of all 12 municipal estimates*

*4. Calculated by subtracting the sum of municipalities' populations from the Wake County total population.*

*5. From the State's Office of State Budget and Management ( http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates.shtm )*

## 3.1.2 C&D Waste

Based on the FY11 DWM annual disposal reports, 352,733 tons of C&D waste were generated in Wake County – a 24 percent decrease since FY06. There are currently four permitted and active C&D landfills in Wake County and one mixed waste procession (MWP) center. Nearly 100 percent of the C&D waste generated in Wake County was either disposed in one of the four in-County C&D landfills or was recycled during FY11. Wake County no longer operates facilities to handle C&D waste.

## 3.1.3 LCID

Land clearing operations produce such waste as trees, tree parts, stumps, rock, soil stone and other materials which are not permitted by the State for disposal in MSW landfills. There are currently four permitted and active land clearing and inert debris (LCID) landfills in Wake County.

The municipalities reported collection of 59,715 tons of yard waste in FY11. It is estimated that less than 15 percent of the residential yard waste was landfilled. The remaining amount was delivered to one of several operations within and outside Wake County (e.g. the City of Raleigh Yard Waste Facility) that grind it for mulch and/or compost. It is unclear how much yard waste and vegetative

**Table 3-2**
**MSW Managed by Jurisdictions in Wake County**
**(includes Landfilled Tonnage, White Goods, Recyclables, and Yard Waste)**

| Jurisdiction | Population 2011 [1] | Tons of Materials Managed 2011 [2] | Pounds per Person Managed 2011 | Pounds per Person Managed 2008 [3] |
|---|---|---|---|---|
| Apex | 38,180 | 20,168 | 1,056 | 1,161 |
| Cary | 142,613 | 58,300 | 818 | 807 |
| Fuquay-Varina | 20,000 | 8,929 | 893 | 858 |
| Garner | 26,000 | 11,022 | 848 | 761 |
| Holly Springs | 25,000 | 8,262 | 661 | 881 |
| Knightdale | 14,000 | 3,326 | 475 | 569 |
| Morrisville | 18,521 | 3,496 | 378 | 482 |
| Raleigh | 403,892 | 182,804 | 905 | 956 |
| Rolesville | 3,813 | 1,100 | 577 | 769 |
| Wake Forest | 28,542 | 16,437 | 1,152 | 1,391 |
| Wendell | 5,742 | 4,399 | 1,532 | 1,220 |
| Zebulon | 4,433 | 3,426 | 1,546 | 2,072 |
| Unincorporated Area [4] | 185,175 | 57,116 | 617 | 582 |
| Total County | 915,911 | 378,783 | 827 | 856 |

***Notes:***

*1. Estimates provided by jurisdictions.*

*2. Tonnage estimates from Solid Waste Management Annual Report for each jurisdiction, reporting period July 1, 2010 - June 30, 2011.*

*3. Source: Wake County Solid Waste Management Plan Update - June 2009*

*4. Tons of materials delivered to Wake County convenience centers (does not include tires).*

matter from commercial-scale site clearing ended up in Wake County LCID landfills since the State does not track this information.

## 3.2 Solid Waste Disposition

Based on a review of facility reports provided to the DWM and reports provided by the local jurisdictions, approximately 1.1 million tons of MSW was generated in Wake County in FY11. This includes both MSW and C&D sent to disposal facilities or transferred to out-of-county landfills and landfills located in South Carolina and Virginia. It also includes recyclables, yard waste, and white goods recovered by local jurisdiction programs, which totaled 110,153 tons. It should be noted, however, that the amount of waste recovered and recycled in Wake County is greater since business and institutional recycling is not monitored or controlled by local jurisdictions. A summary of solid waste generation and recycling is shown in Table 3-3. The locations of Wake County disposal and recycling facilities are shown in Figure 3-1.

**Table 3-3**
**Management of Solid Waste Generated in Wake County (FY 2010-2011)**

| Management Practice | Facility Location | Tons (FY 2010-2011) | Percent of Category | Percent of All MSW Waste |
|---|---|---|---|---|
| **Landfilled MSW** | | | | |
| Wake County (South Wake) Landfill | Raleigh, NC | 426,903 | 67.5% | |
| WI-Sampson County Disposal Inc. | Roseboro, NC | 172,634 | 27.3% | |
| Brunswick Landfill | Lawrenceville, VA | 10,756 | 1.7% | |
| Richland Landfill, Inc. | Elgin, SC | 8,779 | 1.4% | |
| Upper Piedmont Reg. Landfill | Rougemont, NC | 8,217 | 1.3% | |
| Lee County Landfill | Bishopville, SC | 3,920 | 0.6% | |
| BFI-Charlotte Motor Speedway Landfill | Concord, NC | 511 | 0.1% | |
| Palmetto Landfill | Wellford, SC | 149 | 0.0% | |
| Uwharrie Env. Reg. Landfill | Mt. Gilead, NC | 126 | 0.0% | |
| East Carolina Reg. Landfill | Aulander, NC | 6 | 0.0% | |
| ***Total Tons MSW Landfilled*** | | ***632,001*** | ***100%*** | ***57.0%*** |
| **C&D Landfilled and/or Recovered** | | | | |
| Shotwell Landfill | Wendell, NC | 119,907 | 34.0% | |
| Material Recovery/Brownfield Rd. C&D Landfill | Raleigh, NC | 98,303 | 27.9% | |
| WCA Material Reclamation ***(RECLAMATION)*** | Raleigh, NC | 50,217 | 14.2% | |
| Hwy 55 C&D Landfill | Apex, NC | 47,957 | 13.6% | |
| Red Rock Disposal, LLC | Raleigh, NC | 35,660 | 10.1% | |
| Greenway Recycling ***(RECLAMATION)*** | Harrisburg, NC | 686 | 0.2% | |
| WI-Sampson County C&D Unit | Roseboro, NC | 3 | 0.0% | |
| ***Total Tons C&D Waste Landfilled and/or Recovered*** | | ***352,733*** | ***66%*** | ***31.8%*** |
| **Recyclables Recovered [1]** | | | | |
| Household Recyclables (glass, metal and plastic containers, household grades of paper) | | 48,921 | 44.7% | |
| White Goods[2] | | 732 | 0.7% | |
| Yard Waste[3] | | 59,715 | 54.6% | |
| ***Total Tons Recycled*** | | ***109,368*** | ***100%*** | ***9.9%*** |
| **Landfilled Tires[4]** | | | | |
| Central Carolina Tire Monofill | Cameron, NC | 13,661 | 100.0% | |
| ***Total Tons Tires Landfilled*** | | ***13,661*** | ***100%*** | ***1.2%*** |
| **HHW[5]** | | | | |
| Wake County HHW Facility | Raleigh, NC | 739 | 100.0% | |
| ***Total Tons HHW*** | | ***739*** | ***100%*** | ***0.07%*** |
| ***TOTAL MSW GENERATED*** | | ***1,108,502*** | | ***100.0%*** |

***Notes:***

*Primary Source: County Waste Disposal Report, NC DENR, Solid Waste Program*

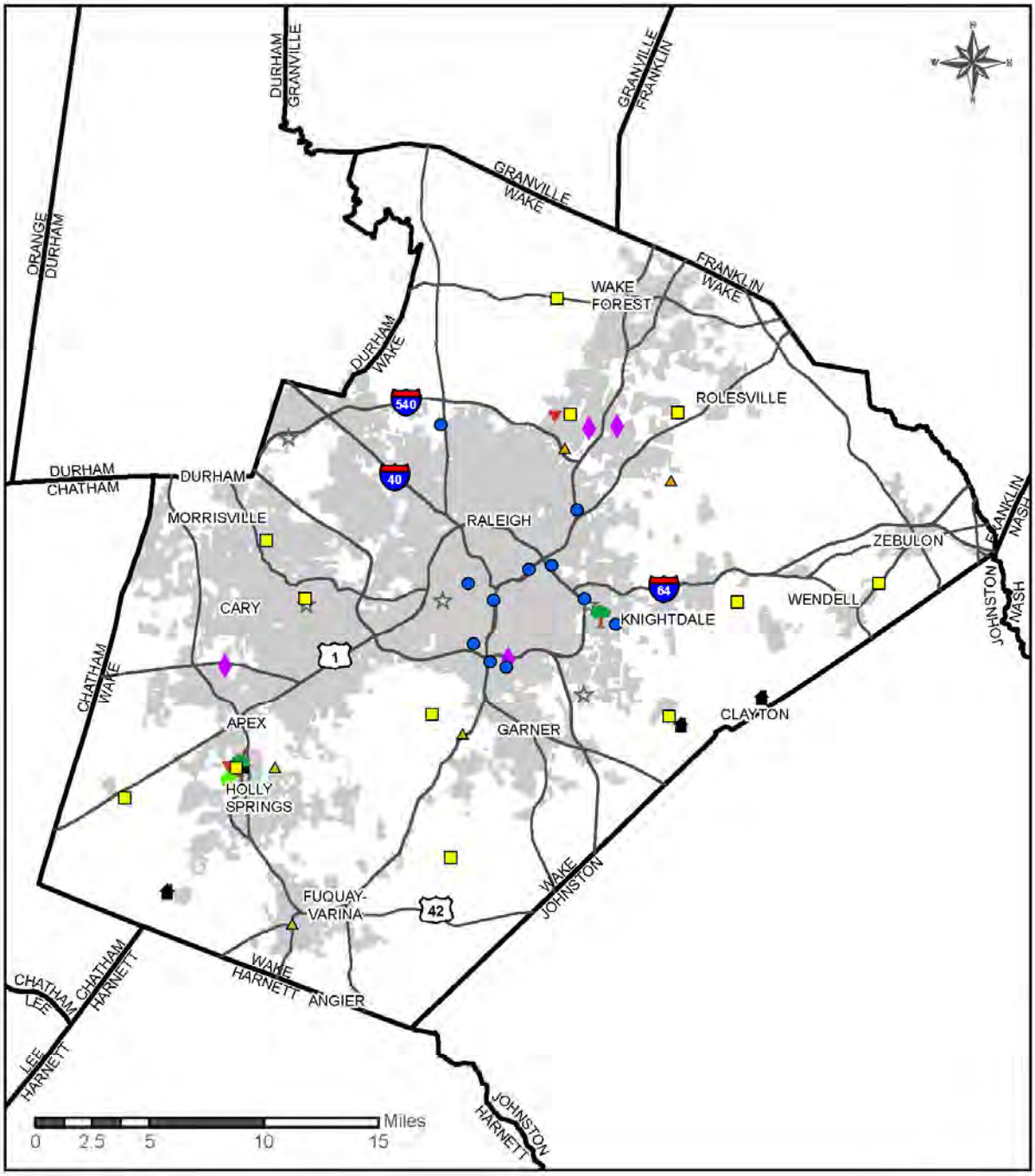
*1. Recyclables tonnage includes program recyclables, white goods, and yard waste recovered through jurisdictions' programs. Additional materials are recovered by the private sector; however records are not kept regarding these materials.*

*2. White Goods data provided by Wake County staff for FY 2010-2011 data*

*3. Yard Waste data provided by local jurisdiction staff for FY 2010-2011 data*

*4. Landfilled Tires data provided by Wake County staff for FY 2010-2011 data*

*5. HHW data provided by Wake County staff for FY 2010-2011 data. While some HHW is recycled, this analysis includes all as disposed.*




**Legend**

Disposal Facilities

- C+D Landfill
- C+D Transfer Station
- Convenience Center
- Household Hazardous Waste
- LCID Landfill
- Materials Recycling Facility
- MSW Landfill
- MSW Transfer Station
- Yard Waste
- Roads
- Incorporated Area

Figure 3-1

Waste Management Facilities in Wake County

## 3.3 Solid Waste Composition

The previous updates to the Solid Waste Management Plan included a summary of a 1998-1999 Waste Characterization Study performed for Wake County. The study provided statistical information to characterize and quantify the County's solid waste stream received at the North Wake Landfill (NWLF). In 2011, Wake County commissioned a study of waste received at the SWLF (SCS, 2011). Table 3-4 presents a summary of the mean waste composition from both the 1998-1999 and the 2011 studies.

Although differences exist between the methods used and waste categories selected during the 1998 and 2011 studies, a comparison of the waste characterization results suggest some possible and notable changes in waste composition. These include:

- Paper accounted for 34.1 percent (by weight) of the overall waste composition in 1998, compared to 26.3 in 2011. This might suggest that paper recycling has increased over the last 13 years, but one must also consider that fewer print publications are circulated today due to the availability of electronic information.
- Similarly, wood waste and C&D debris account for 7.6 and 5.7 percent less of the overall waste stream now, as compared to 1998-1999, respectively. This might suggest that efforts to keep C&D materials out of the SWLF have been effective and/or lower cost disposal options within the county have diverted waste away from the SWLF.
- The weight percentage of HHW has also declined from 0.5 percent in 1998-1999 to 0.2 percent in 2011. While the more than 50 percent reduction in weight percent of HHW over the last 13 years is a positive trend, the fact that even small amounts of HHW are making it to the landfill suggest that additional education and more HHW diversion and disposal options are warranted.

**Table 3-4**
**Waste Characterization Field Sorts of Disposed Solid Waste at North Wake (1998-1999) and South Wake (2011) Landfills**

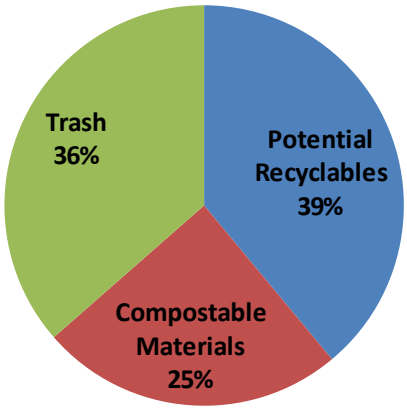
| Category | 1998 NWLF Mean Composition | 2011 SWLF Mean Composition | Change from 1998 to 2011 |
|---|---|---|---|
| Paper | 34.1% | 26.3% | -7.8% |
| Plastic | 12.9% | 17.3% | 4.4% |
| Food Waste | 12.1% | 15.1% | 3.0% |
| Wood | 10.3% | 2.7% | -7.6% |
| C&D Debris | 6.3% | 0.6% | -5.7% |
| Metal | 5.9% | 3.7% | -2.2% |
| Durables | 4.1% | 1.5% | -2.6% |
| Glass | 3.2% | 3.0% | -0.2% |
| Textiles | 2.9% | 3.7% | 0.8% |
| Diapers | 2.2% | 3.6% | 1.4% |
| Yard Waste | 1.8% | 2.3% | 0.5% |
| Other Inorganics | 1.7% | 6.2% | 4.5% |
| Other Organics | 1.5% | 11.7% | 10.2% |
| HHW | 0.5% | 0.2% | -0.3% |
| Rubber | 0.3% | 2.0% | 1.7% |
| Other | 0.2% | 0.1% | -0.1% |
| TOTALS | 100.0% | 100.0% | |

***Sources:***
*1998-1999 Waste Sort as originally included in 2006 Solid Waste Management Plan Update*
*Wake County, North Carolina Waste Characterization Study Summary of Results May 2011 (SCS Engineers)*

The 2011 waste characterization results indicate that there are still significant opportunities for waste diversion. Within the single family waste stream, potential recyclables account for 38.9

percent of the total (Figure 3-2). Potential recyclables include paper, plastics, metals, glass, electronics, C&D debris and other materials. Section 4.3 presents opportunities and intended actions to improve diversion of these materials. Similarly, nearly 25 percent of the single family waste stream is considered compostable. Opportunities and intended actions related to composting are presented in Section 4.4.

**Figure 3-2. Composition of the Single Family Waste Stream**
*2011 Wake County Waste Characterization Study*




### 3.3.1 Public School System Waste Composition Study

In 2008, Wake County completed a waste composition study for the WCPSS. The study was intended to determine the types and relative amounts of recyclable materials being disposed of by the students, faculty, and staff of the school system. The Wake County Solid Waste Division planned to use the information to gauge the effectiveness of the County school recycling program and identify actions to increase waste diversion from disposal.

Table 3-5 depicts the composition of the waste disposed by the WCPSS as a whole. Approximately 22 percent of the waste disposed consists of materials that could have been recycled in the system's existing recycling program. This includes recyclable paper (mixed paper, newspaper, corrugated cardboard, catalogs and magazines, telephone books, and text books totaling 15.9 percent), containers (HDPE and PET containers, aluminum cans, and tin/steel cans totaling 3.9 percent), and expanded polystyrene foam (not necessarily cafeteria trays, totaling 1.5 percent).

Based on the study results, a number of opportunities were identified to help maximize waste diversion and increase the effectiveness of the WCPSS recycling program. The following is a list of primary recommendations from the study:

- Provide education targeted for teenage/high-school students;
- Expand materials recovery to include chipboard/paperboard, cardboard and organics; and
- Consider modifications to existing contracts to obtain more cost effective services.

### 3.3.2 County Government Facilities Waste Composition Study

In 2008, the County also completed a composition study of the County's Government Facility waste stream. Similar to the Public School Study, the Solid Waste Division planned to use the information to gauge the effectiveness of the County government facility recycling program and identify actions to increase the recovery of recycled materials.

Table 3-6 presents the results of the 2008 County government facilities waste composition study. The table includes the weighted average of each material category. Results of the 2008 waste composition study reveal that more than 22 percent of the waste stream generated in the Wake County government facilities is comprised of recyclable materials that are accepted in the County's existing recycling program, which includes recyclable paper (18.5 percent) and recyclable containers (3.7 percent).

**Table 3-5**
**Composition of Waste Disposed by the Wake County Public School System (% by weight)**

| Material Categories | Percentage |
|---|---|
| Other Non-Recyclable Trash | 49.1% |
| Food Waste | 13.9% |
| Mixed Recyclable Paper | 9.2% |
| Aseptic Containers | 6.7% |
| Plastic Film | 6.1% |
| PET Containers | 2.5% |
| Catalogs and Magazines | 2.4% |
| Corrugated Cardboard | 2.3% |
| Newspaper | 1.7% |
| Polystyrene | 1.5% |
| C&D Debris | 1.2% |
| Scrap Metals | 0.6% |
| HDPE Containers | 0.6% |
| Glass Containers | 0.5% |
| Aluminum Cans | 0.4% |
| Yard Waste | 0.3% |
| Tin/Steel Cans | 0.3% |
| Electronics | 0.3% |
| Telephone Books | 0.2% |
| Text Books | 0.1% |
| **TOTALS** | **100.0%** |

**Table 3-6**
**Composition of Waste Disposed by County Government Facilities (% by weight)**

| Material Categories | Percentage |
|---|---|
| Other Non-Recyclable Trash | 50.4% |
| Mixed Recyclable Paper | 8.8% |
| Plastic Film | 7.7% |
| Food Waste | 5.9% |
| Corrugated Cardboard | 3.7% |
| Polystyrene | 3.6% |
| Newspaper | 2.7% |
| C&D Debris | 2.7% |
| Aseptic Containers | 2.4% |
| PET Containers | 2.2% |
| Catalogs and Magazines | 2.1% |
| Electronics | 1.7% |
| Telephone Books | 1.2% |
| HDPE Containers | 1.0% |
| Tin/Steel Cans | 0.9% |
| Scrap Metals | 0.9% |
| Glass Containers | 0.8% |
| Text Books | 0.5% |
| Aluminum Cans | 0.5% |
| Yard Waste | 0.4% |
| **TOTALS** | **100.0%** |

Based on the results of this study, a number of opportunities exist to maximize waste diversion and increase the effectiveness of the County's government facilities recycling program.

Recommendations to improve recycling included: providing more education and technical assistance; expanding the materials accepted; right-sizing disposal containers; using competitive procurement for recycling services; and program tracking. Over the past several years, the County has acted on many of these recommendations. Additional information regarding the recent improvements made to recycling at County facilities is provided in Section 4.3.3.

## 3.4 Solid Waste Materials Flow

Once the waste is collected, the materials within the County and its jurisdictions flow through several channels and may be disposed at a number of facilities. Many factors influence the flow of solid waste

materials from the point of generation to the point of disposition. These factors may include the following:

- Material type;
- Collection service cost;
- Facility tipping fees;
- Value of recovered materials;
- Proximity of disposal facilities and the time associated with disposal;
- Relationship of each facility owner/operator to the hauling entity;
- Existing service agreement terms; and
- Hauler preferences

The sections below summarize the material flow for residential solid waste and non-residential waste.

### 3.4.1 Residential Waste Flow

Residents of Wake County and its jurisdictions have multiple options for disposing of MSW, recyclables, yard waste and C&D waste. Figure 3-3 depicts these options and general process flows for waste generated by the residents of Wake County.

In order to support development of the SWLF and create the most cost-effective MSW disposal option for the citizens of Wake County, 12 of the 13 local jurisdictions entered into an inter-local agreement (ILA) prior to completion of the SWLF. By creating the ILA, the jurisdictions agreed to pool their residential MSW waste streams for disposal at the SWLF in return for improved economy and predictability in waste disposal costs. As a result, all residential waste that is collected by the participating local jurisdictions or from Wake County's convenience centers is directed to the SWLF. Municipalities that contract with waste collection and hauling firms include provisions in their contracts requiring that the waste be delivered to the SWLF. Residential waste that is collected by private haulers in the unincorporated portions of Wake County may be delivered to the SWLF or may end up at an out-of-county landfill.

### 3.4.2 Non-Residential Waste Flow

Non-residential waste is generated primarily from commercial, industrial, and institutional (CII) sources. This waste may include MSW, recyclables, and yard waste. The flow for non-residential waste often differs from residential waste, which is true for Wake County and its jurisdictions. Non-residential waste that is not collected by the municipalities does not necessarily flow to the SWLF. Figure 3-4 provides a flow chart of the non-residential waste flow process. Waste haulers which also operate private landfills in the region often bring waste that is collected by their forces to their own landfills. The three private landfills in North Carolina located within a 100 mile radius of Wake County include:

- Republic's Upper Piedmont Regional Landfill (70 miles)
- Waste Industries' Sampson County Landfill (84 miles)

- Republic's Uwharrie Environmental Regional Landfill (85 miles)

As noted in Table 3-3, these three landfills received nearly 181,000 tons, or approximately 29 percent of the total tons of MSW landfilled in FY11 that originated in Wake County. The Sampson County Landfill received over 95 percent of that amount.

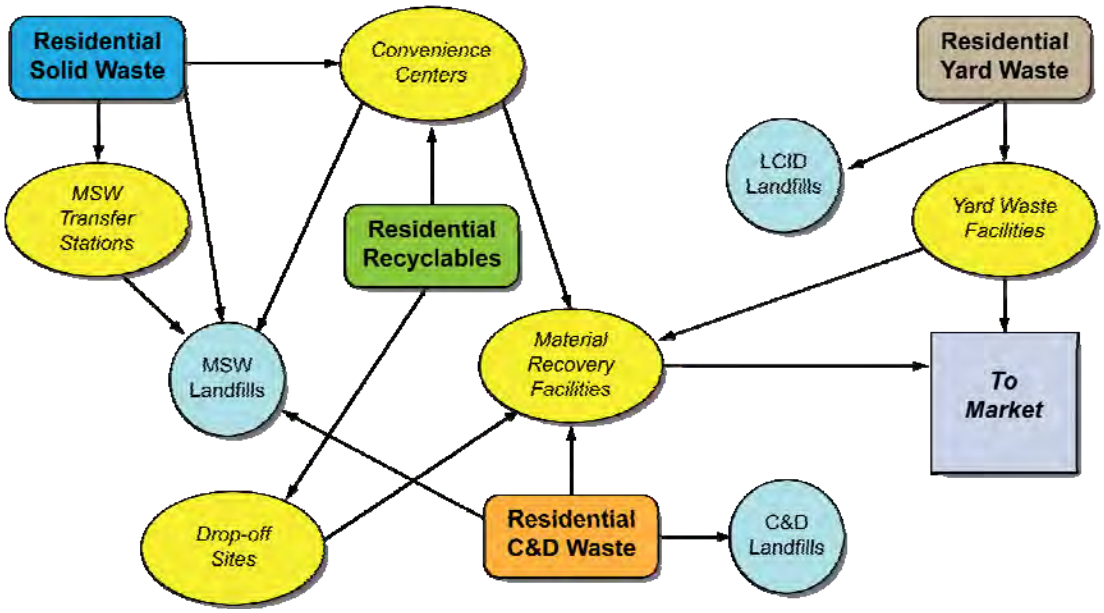



**Figure 3-3. Residential Waste Flow**

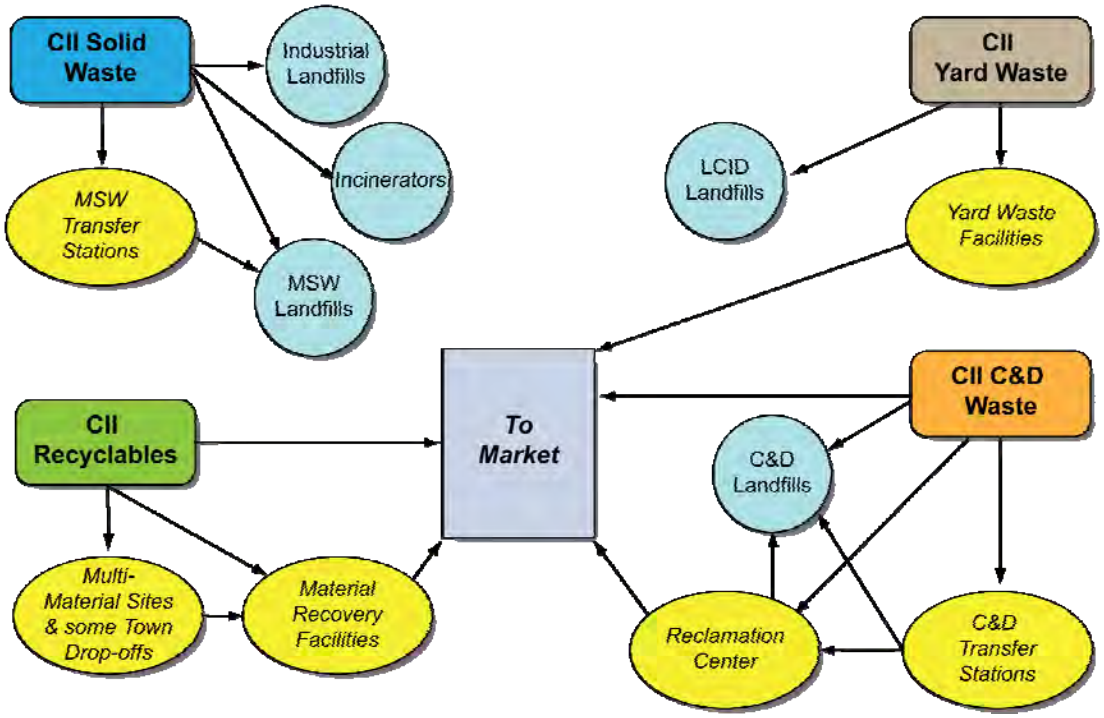



**Figure 3-4. CII Waste Flow**

# Section 4
# Waste Management and Reduction Programs

As part of the Plan Update process, the State requires local governments to assess the adequacy of solid waste management programs and services, identify impediments, and consider solutions to minimize the impediments and achieve goals. To facilitate this process, the State has specified that current programs be inventoried and analyzed with regard to the following planning elements:

- Reduction;
- Collection;
- Recycling and Reuse;
- Composting and Mulching;
- Incineration;
- Transfer Outside of Geographic Area;
- Disposal;
- Education with the Community and through the Schools;
- Special Wastes;
- Illegal Disposal/Litter;
- Purchasing Recycled Products;
- Disaster Response;
- Collection of Discarded Electronics; and
- Management of Abandoned Manufactured Homes

In addressing this planning requirement, the local jurisdictions of Wake County have provided summaries of their current programs and the status of intended actions from the previous Plan Update. New intended actions aimed at achieving the solid waste goals presented in Section 2 are also discussed in the following pages.

## 4.1 Reduction

As noted in Section 2, Wake County's per capita waste disposal rate has declined by 30 percent since FY07 to 1.00 tons per person per year. Reduced industrial production and lower public consumption of goods as a result of the poor economic conditions during the last several years have no doubt played a large role in this trend. As a result, the effectiveness of source reduction programs has been difficult to quantify.

Seven of the local governments offer source reduction programs and promote them to the public, which is up from only five, three years ago. Many of the local governments have focused more on waste reduction programs (which includes recycling) than on source reduction. Most jurisdictions have increased the number of recyclable materials accepted curbside and they continue to improve the collection methods by offering larger, roll-out carts.

## 4.1.1 Current Activities

### Residential Source Reduction

Wake County and the municipal governments continue to provide a variety of source reduction programs to the residents of Wake County. Eight municipalities offer backyard composting programs. Several of them offer composting bins for distribution or sale. Raleigh has been the most active by far in this regard, selling 532 compost bins in FY11. Raleigh has held special one-day-only compost events offering bins, kitchen collection containers, compost aerators, and compost thermometers for sale.

Other source reduction programs offered include grasscycling, junk mail reduction, xeriscaping, enviroshopping, and non-toxics use. The City of Raleigh is the only local government currently operating a waste exchange (swap shop).

Wake County supports and promotes waste reduction activities for residents through a variety of means. In addition to providing information on their web site, several programs are in place to reduce the amount of waste landfilled. These include:

- The on-line "Trash Takers" database listing numerous reuse and recycling options for various types of waste;
- The Holiday Wrap-up Recycling Program which provides opportunities for residents to recycle Christmas trees, corrugated cardboard, chip board, holiday cards, magazines/catalogs, solid-bleached sulfate (SBS) board, and wrapping paper. The program also provides tips on source reduction around the holidays (Raleigh also provides an 8-page guide listing tips for reducing holiday waste); and
- The Master Gardeners' Program which offers backyard composting education through promotions and demonstrations.

### Commercial, Institutional, and Industrial (CII) and C&D Waste Reduction

Nearly all jurisdictions have taken steps to reduce in-house waste generation through increased use of electronic communication, promoting recycling in government offices, and other means. Wake County offers technical assistance to CII establishments in the following ways:

- Identify recycling haulers;
- Provide recommendations on self-waste assessments; and
- Assist with the design of a collection system.

Additionally, Wake County continues to award Commercial Waste Reduction Grants to businesses and the municipalities to start or expand their waste reduction and/or recycling program. In the past year, the County has awarded the following waste reduction grants:

- A $4,800 grant to Community Workforce Solutions to start a company-wide waste reduction and recycling program. Funds were used to purchase recycling stations for common areas, recycling bins, outdoor recycling containers, composting supplies, educational materials and directional signage.
- A $3,000 grant to the Triangle Volleyball Club to increase recycling efforts. Funds were used to purchase recycling containers, educational materials and instructional signage.
- A $4,500 grant to the Town of Zebulon to coordinate a large community recycling event to collect electronics, tires, oil, antifreeze, batteries, paint and fluorescent lamps. Funds were used to purchase collection containers, a platform ramp, outreach and promotional materials for the event, and educational materials and instructional signage.

### 4.1.2 Intended Actions

Table 4-1 lists the intended actions established by the jurisdictions of Wake County to meet their goals pertaining to waste reduction. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

**Table 4-1. Waste Reduction Intended Actions**

| Jurisdiction | Intended Action |
|---|---|
| Wake County | 1. Continue to provide waste reduction information on County web site and encourage municipalities to establish links. |
| | 2. Use existing grant program to encourage and support waste reduction initiatives and efforts. |
| All Jurisdictions | 3. Work collectively to inform and encourage C&D contractors and land developers to reduce the generation of C&D debris and build incentives/disincentives into the permit application requirements. |

## 4.2 Collection

### 4.2.1 Current Activities

Table 4-2 provides a summary of curbside collection services offered in Wake County for residential and commercial solid waste, recyclables, yard waste, and bulky waste.

In addition to the curbside collection programs offered by the municipalities in the incorporated areas and by private firms in the unincorporated areas, Wake County's 11 convenience centers provide a valuable service to the residents of Wake County for drop-off of household waste, recyclables, and HHW – which was only recently added. Approximately 5 to 10 percent of the household waste and recyclables generated in Wake County are handled through the convenience centers, at a cost of approximately $70/ton, including disposal (Joyce, 2011). In an ongoing effort to evaluate the effectiveness of the convenience centers and recommended improvements, the County commissioned a Convenience Center Master Plan in 2011. Some of the Master Plan recommendations included expanding services at several locations and relocating sites further away from expanding municipal limits. Space constraints were noted at many of the sites which hinder their ability to offer more services. Wake County continues to review the results and recommendations of the Convenience Center Master Plan while collaborating closely with the municipalities to optimize both the convenience center and curbside collection programs.

**Table 4-2**
**Curbside Collection Services Provided in Wake County Jurisdictions**

| Jurisdiction | Residential Waste | | Commercial Waste | Recyclables | | Yard Waste | | Bulky Waste | |
|---|---|---|---|---|---|---|---|---|---|
| | Frequency | Provider | Provider | Frequency | Provider | Frequency | Provider | Frequency | Provider |
| Apex | Weekly | Waste Ind. | Open Market | Weekly | Waste Ind. | Weekly | Town | By Request | Town |
| | *fully & semi-automated/96-gal cart* | | | *18-gallon bin & 65-gal cart (as of 2009)* | | *leaves collected in season* | | *fee-based* | |
| Cary | Weekly | Town | Open Market | Bi-weekly & Weekly | Town & Waste Ind. | Weekly | Town | By Request | Town |
| | *fully & semi-automated & manual/96-gal cart/32-gal for townhomes & condominiums* | | | *multiple sizes of carts available (as of 2009)* | | *leaves collected in season* | | *fee-based* | |
| Fuquay-Varina | Weekly | Town | Waste Ind. & Town | Every other wk | Town | Weekly (by request) | Town | By Request | Town |
| | *semi-automated/96-gal cart* | | | *multiple sizes of carts available (as of 2008)* | | *leaves collected in season* | | *No added fee* | |
| Garner | Weekly | All Star Waste | Open Market | Bi-weekly | Allstar Waste | Weekly | Allstar Waste | Weekly & By Request | Allstar Waste |
| | *semi-automated/96-gal cart* | | | *65 gallon cart for most residents* | | *leaves collected in season* | | *fee-based* | |
| Holly Springs | Weekly | Waste Ind. | Open Market | Weekly | Waste Ind. | Weekly | Town | By Request | Town |
| | *fully-automated/48-gal cart* | | | *48-gal cart as of 2009* | | *leaves collected in season* | | *fee-based* | |
| Knightdale | Weekly | Waste Ind. | Open Market | Weekly | Waste Ind. | Weekly | Waste Ind. | By Request | Town |
| | *fully-automated/96-gal cart* | | | *48-gal cart as of 2009* | | *leaves collected in season* | | *fee-based*[2] | |
| Morrisville | Weekly | Waste Ind. | Open Market | Weekly | Waste Ind. | Bi-monthly | Waste Ind. | Bi-annual | Waste Ind. |
| | *semi-automated/96-gal cart* | | | *18-gal bin (65-gal cart as of July 2010)* | | *leaves collected in season* | | *No added fee*[1] | |
| Raleigh | Weekly | City (& Waste Ind. for Mult-Family) | Open Market | Bi-weekly (starting FY 10/11) | City | Weekly | City | By Request | City |
| | *fully & semi-automated/65-gal & 95-gal carts* | | City in CBD | *65-gal & 95-gal carts are phasing out 18-gal bins* | | *leaves collected in season* | | *No added fee*[1] | |
| Rolesville | Weekly | Waste Ind. | Waste Ind. | Weekly | Waste Ind. | Every other wk | Allwoods Tree | By Request | Waste Ind. |
| | *fully-automated/96-gal cart* | | | *18-gal bin (65-gal cart as of 2009)* | | *leaves collected in season* | | *No added fee* | |
| Wake Forest | Weekly | Republic Waste | Waste Ind. | Weekly | Republic Waste | Weekly | Town | Weekly (by request) | Republic Waste |
| | *fully-automated/96-gal cart* | | | *48-gal cart as of 2005* | | *leaves collected in season* | | *No added fee* | |
| Wendell | Weekly | Waste Ind. | Open Market | Weekly | Waste Ind. | Every other wk | Town | Weekly | Town |
| | *semi-automated/72-gal cart* | | | *48-gal cart as of 2008* | | *leaves collected in season* | | *No added fee*[1] | |
| Zebulon | Weekly | Waste Ind. & Town | Open Market | Weekly | Waste Ind. | Every other wk | Town | Weekly | Town |
| | *fully-automated/96-gal cart* | | | *48-gal cart as of 2008* | | *leaves collected in season* | | *No added fee*[1] | |
| Wake County | Open Market | | Open Market | Open Market | | Open Market | | Open Market | |

**Notes:**

[1] No added fee for items up to a certain size and/or weight.

[2] Town offers special bi-annual collection of bulky waste at no fee.

## Solid Waste Collection

Collection frequencies, providers, and methods vary among the municipal jurisdictions, but there are many similarities. Three municipalities operate their own fleet of solid waste collection vehicles (Raleigh, Cary, and Fuquay-Varina). Three private firms, Waste Industries, Republic Services, and All Star Waste Services are under contract with the other nine municipalities to collect solid waste. With the exception of Holly Springs, all towns require by contract that the private firms bring the waste collected from their residential routes to the SWLF. In the unincorporated portions of Wake County, residents contract directly with private haulers if they desire curbside service. Alternatively, they can use one of the County's 11 convenience centers or the citizen drop-off area at the SWLF.

In an effort to improve collection efficiency and control costs and be consistent with the intended actions of the previous Plan Update, most municipal and private fleets have either fully switched or begun transitioning to semi- or fully-automated collection using 96 gallon roll-out carts. Another method recently used to control costs is cooperative contracting. In past years, several Wake County towns have simultaneously and cooperatively negotiated with private haulers during renewal of their residential solid waste collection contracts as a means to control cost.

Although it has yet to be pursued, franchising remains a viable option to consider in Wake County to provide a uniform service for residential recycling and trash collection in the unincorporated areas. Other benefits include the elimination of duplicate collection routes along County roads and in subdivisions (resulting in less truck traffic and associated wear and tear on County roads and decreased air emissions) and reductions in the cost of collection. Other counties within North Carolina, including Alamance, Buncombe, Cabarrus, Catawba, Forsyth, and Guilford have established franchise areas and have realized many of the above noted benefits. One potential concern related to franchising is that some courts have ruled that once a local government establishes a franchise area, they can no longer specify the disposal destination of the waste collected in that area. In Wake County, this would open up the possibility of less waste being delivered to the County-owned SWLF, thereby potentially increasing the annual cost of disposal to the County and its' municipal partners.

The majority of CII generated solid waste is collected by private haulers on the open market. In some instances, Town staff collect from small businesses or CII establishments self-haul to a disposal or transfer facility. The City of Raleigh collects solid waste in the Commercial Business District (CBD) using its own fleet and staff.

Wake County's Solid Waste Ordinance requires all persons, firms and corporations engaged in the collection of garbage, refuse, solid waste or recyclables in Wake County to obtain a Solid Waste Hauler's Privilege License. The program helps to ensure a certain levels and quality of service are provided to customers in Wake County. Wake County fulfilled the intended action of the previous Plan Update by updating the hauler privilege licensing portion of the Solid Waste Ordinance.

## Recyclables Collection

As noted in Table 4-2, many Wake County jurisdictions have replaced, or begun to replace 18-gallon bins with larger, 48-, 65- or even 95-gallon recyclables carts and have switched to single-stream recycling, and typically, bi-weekly collection. By moving to the larger roll-out carts and offering single-stream collection, improvements in both collection efficiency and recycling rates have been observed since more materials can be easily stored, brought to the curb, and emptied into an automated or semi-automated collection vehicle. Evidence of the effectiveness of this switch, at least with regard to increasing the amount of recyclables collected is provided in Section 4.3. The movement to larger roll-

out carts and their collection using semi and fully-automated vehicles satisfies the largest set of intended actions offered by the municipalities in the previous Plan Update.

### Yard Waste and Bulky Waste Collection

Curbside yard waste collection service is offered in all municipalities on a weekly or every-other-week basis. Leaves are collected in season, and most offer curbside Christmas tree collection during the holidays. Two thirds of the municipalities use their own staff and equipment to collect their yard waste. Private firms maintain yard waste collection contracts in four towns. Bulky waste collection is offered in all municipalities on a weekly or by-request basis. Several municipalities also offer special collection events throughout the year.

## 4.2.2 Intended Actions

Table 4-3 lists the intended actions established by the jurisdictions of Wake County to meet their goals pertaining to collection. Consistent with what many municipalities have already done, several intended actions focus on a move to semi- or fully-automated collection methods and the expanded use of larger, roll-out carts for recycling. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

**Table 4-3. Collection Intended Actions**

| Jurisdiction | Intended Action | |
|---|---|---|
| Apex | 1. | Re-evaluate private collection and recycling contract when current one expires in 2015. |
| Fuquay-Varina | 2. | Increase the number of Town disposal and recycling crews from three to four. |
| Garner | 3. | Evaluate garbage and recyclables collection contract and consider semi- or fully-automated methods for collection (including larger roll-out carts for recycling). |
| Holly Springs | 4. | Re-evaluate private collection and recycling contract when current one expires in 2015. |
| Knightdale | 5. | Re-evaluate private collection and recycling contract when current one expires at end of 2012. |
| Raleigh | 6. | Continue the phased roll-out of larger carts for recycling. |
| | 7. | Investigate the cost and potential savings of cameras on collection trucks to improve enforcement of code violations. |
| Rolesville | 8. | Continue to re-evaluate yard waste collection contract. |
| Wake County | 9. | Consider franchising residential solid waste and recyclables collection in unincorporated areas. |
| | 10. | Review and consider upgrading hauler licensing provisions and continue to perform regular inspections. |
| Wendell | 11. | Re-evaluate private collection and recycling contract when current one expires in 2013. |
| | 12. | Continue to evaluate size of collection carts and frequency of collection. |

# 4.3 Recycling and Reuse

## 4.3.1 Residential Recycling

The total tons of material recycled and waste disposed by each jurisdiction's residential sector during FY 2011 is shown in Table 4-4. Most jurisdictions have seen increases in both the amount and the percentage of waste recycled versus landfilled over the last three years, continuing a trend noted in the previous Plan Update. Countywide, 10,036 more tons were recycled in 2011, an increase of almost

**Table 4-4**
**Waste Disposed and Recycled by Wake County Jurisdictions, FY 2011**

| Jurisdiction | 2011 Population | Tons of Waste Disposed | Tons Recycled | Percentage of Waste Recycled 2011 | Change in Percent from 2008 |
|---|---|---|---|---|---|
| Apex | 38,180 | 11,580 | 3,643 | 31.5% | 16% |
| Cary | 142,613 | 30,562 | 11,184 | 36.6% | 8% |
| Fuquay-Varina | 20,000 | 5,644 | 1,035 | 18.3% | 3% |
| Garner | 26,000 | 6,801 | 1,653 | 24.3% | 12% |
| Holly Springs | 25,000 | 6,178 | 1,770 | 28.6% | 11% |
| Knightdale | 14,000 | 2,740 | 507 | 18.5% | 0.1% |
| Morrisville | 18,521 | 2,481 | 822 | 33.1% | 8% |
| Raleigh | 403,892 | 131,280 | 25,205 | 19.2% | 3% |
| Rolesville | 3,813 | 809 | 291 | 36.0% | 17% |
| Wake Forest | 28,542 | 9,971 | 2,746 | 27.5% | -2% |
| Wendell | 5,742 | 2,647 | 568 | 21.5% | 9% |
| Zebulon | 4,433 | 1,336 | 282 | 21.1% | 17% |
| Wake County (unincorporated) | 185,175 | 45,498 | 11,738 | 25.8% | -1% |
| **Overall** | **915,911** | **257,527** | **61,444** | **23.9%** | 4% |

Source: FY2008 Solid Waste Management Annual Reports.
Waste disposed and tons recycled shown in the table reflects residential waste, and a small amount of commercial waste collected by municipalities. The recycling tonnage for unincorporated Wake County does not include the following materials that were also recycled: tires (13,661 tons) and HHW (715 tons).

20 percent. Almost 29 percent of residential waste was recycled (not including yard waste) – an increase of just over 9 percent compared to 2008.

The continuing trend toward increased recycling can be attributed to several factors:

- Further increases in the types of materials collected curbside. Five of the 12 municipalities began accepting materials that were previously not accepted curbside, including cardboard, junk mail, and certain types of plastic. Table 4-5 lists the materials collected curbside by each jurisdiction.
- Larger bins/carts. All municipalities have switched, or are in the process of switching to larger, roll-out carts which facilitate household recycling, improve collection efficiency, and reduce the possibility of operator injury during collection.
- Increased public awareness. Public awareness of the types of materials that can be recycled is improving. Municipal web sites continue to be updated and improved to provide a consistent and comprehensive list of accepted materials.

In addition to curbside programs, seven jurisdictions operate drop-off centers that accept recyclable materials, as shown in Table 4-6. Nineteen percent of the residential recycling tonnage during FY 2011 came from Wake County's 11 convenience centers and two multi-material recycling facilities, which is

**Table 4-5**
**Recyclables Collected through Residential Curbside Recycling Programs**

| Jurisdiction | ONP | OCC | Chip | OMG | Junk Mail/ OP | AL | Steel | Glass | PB# 1-2 | PB# 3-7 | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Apex | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ◆ | plastic beverage rings, telephone books |
| Cary | ✓ | ✓ | ✓ | ✓ | ◆ | ✓ | ✓ | ✓ | ✓ | ✓ | 6-pack rings, drink boxes gable-top cartons; computers, waste cooking oil, and used motor oil/filters (last 3 upon request) |
| Fuquay-Varina | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6-pack rings, drink boxes gable-top cartons; foil |
| Garner | ✓ | ◆ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | drink boxes gable-top cartons; foil |
| Holly Springs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | magazines with stapled bindings only, only junk mail without plastic windows, adhesives, or stickers. |
| Knightdale | ✓ | | | | | | ✓ | ✓ | ✓ | ✓ | |
| Morrisville | ✓ | ✓ | ✓ | ✓ | ◆ | ✓ | ✓ | ✓ | ✓ | ✓ | 6-pack rings, gable-top cartons, foil, phonebooks |
| Raleigh | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6-pack rings, drink boxes gable-top cartons; foil; scrap metal; seasonal cooking oil and grease; TVs, computers and other corded items (twice per month). |
| Rolesville | ✓ | ◆ | ◆ | ✓ | ◆ | ✓ | ✓ | ✓ | ✓ | ◆ | |
| Wake Forest | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6-pack rings, drink boxes gable-top cartons; foil |
| Wendell | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Zebulon | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Wake County | Service is available through private contractors | | | | | | | | | | |

Key:
ONP = Newspaper OCC = Cardboard Chip = Chipboard OMG = Magazines Glass = Glass containers
Junk Mail/OP = Junk mail/office paper Al = Aluminum cans Steel = Steel cans PB#1-2 = Plastic bottles/jugs #1 and #2
PB#3-7 = Plastic bottles #3-7 ◆ = Not collected in 2008 but now collected

**Table 4-6**
**Recyclables Collected through Local Government Sponsored Drop-Off Sites**

| Jurisdiction | ONP | OCC | Chip | OMG | Junk Mail/ OP | AL | Steel | Glass | PB# 1-2 | PB# 3-7 | Other | Number of Sites |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apex | | | | | | | | | | | Motor oil & electronics | 1 |
| Cary | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Appliances, wood pallets, & yard waste | 1 |
| Garner | | ✓ | | | | | | | | | | 1 |
| Raleigh | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Same materials as collected curbside | 7 |
| Wake Forest | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | 1 |
| Wendell | | ✓ | | | | | | | | | | 2 |
| Wake County | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Appliances, batteries, computers/electronics, motor oil, & tires at multi material facilities | 15 |

Key:
ONP = Newspaper OCC = Cardboard Chip = Chipboard OMG = Magazines Glass = Glass containers
Junk Mail/OP = Junk mail/office paper Al = Aluminum cans Steel = Steel cans PB#1-2 = Plastic bottles/jugs #1 and #2
PB#3-7 = Plastic bottles #3-7

slightly lower than reported in the previous Plan Update. This trend further reflects the improvements in recyclables collection made by the municipalities.

Annual totals of the type of materials recycled through the curbside and drop-off programs are shown in Figure 4-1. An increasing number of jurisdictions report only total commingled tons of recyclables on their Solid Waste Management Annual Reports; therefore, the totals shown do not reflect the entire material amounts.

Figure 4-2 shows the amount of recyclables and yard waste recovered annually in Wake County since FY 1995. As with the previous tables and figures, these amounts reflect materials recovered through residential programs only and do not account for materials recycled through commercial establishments or yard waste generated and recovered by commercial landscapers. While the amount of recyclables recovered continues to rise on an annual basis, yard waste generation and recovery shows more variability due to storm events. Over the past three fiscal years, an average of 126,000 tons per year of recyclables and yard waste were diverted from the landfill through residential programs. Notably, FY11 marked the first year that the amount (in tons) of recyclables collected through residential programs surpassed that of yard waste.

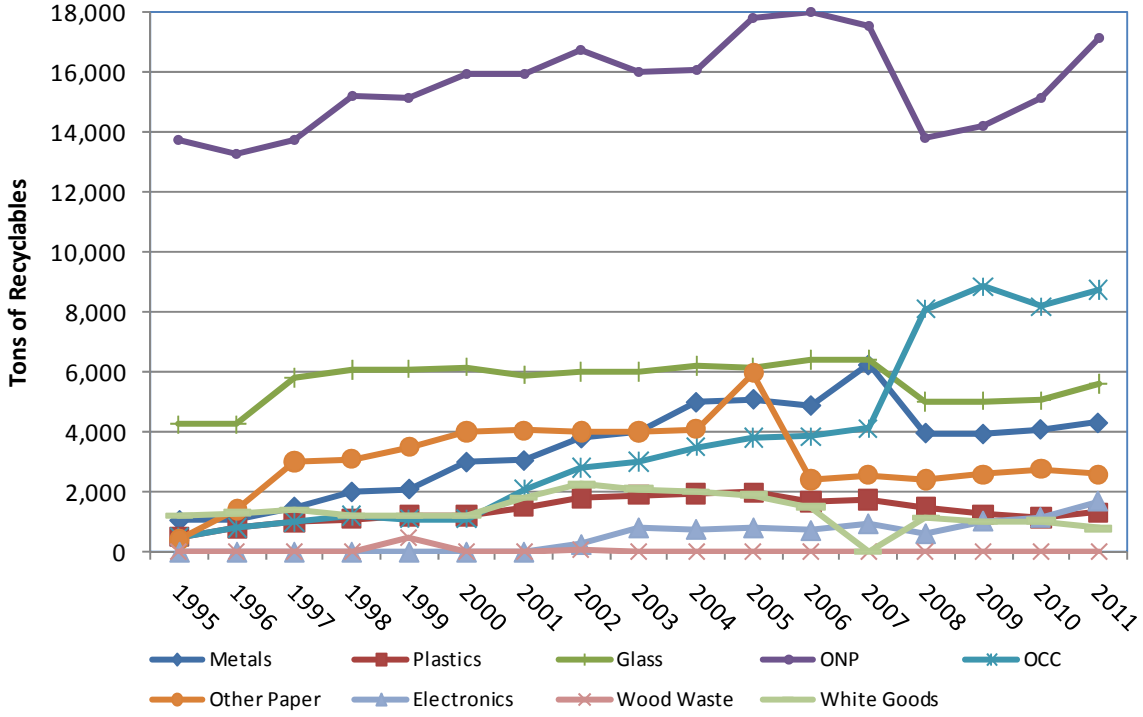
To the benefit of certain Wake County jurisdictions, the market for recyclables improved significantly, beginning in 2011, resulting in a previously unanticipated revenue stream. For example, the Town of Fuquay-Varina was paying $29 per ton to a processor of recyclables between March and June 2009. As the recyclables market improved, the Town, along with the Town of Cary and Wake County, collaboratively negotiated a contract with Waste Management Recycle America that pays the towns and County a minimum market-based price of $18 per ton for their recyclables. Between July and September of 2011, the market price for recyclables had increased to approximately $67/ton, resulting in a revenue stream of $18,000 for Fuquay-Varina during that three month period. The Town of Cary received $395,675 in revenue from recyclables in FY11.

### 4.3.2 CII Recycling and Reuse Programs

Jurisdictional-sponsored recycling programs that serve the CII sector include:

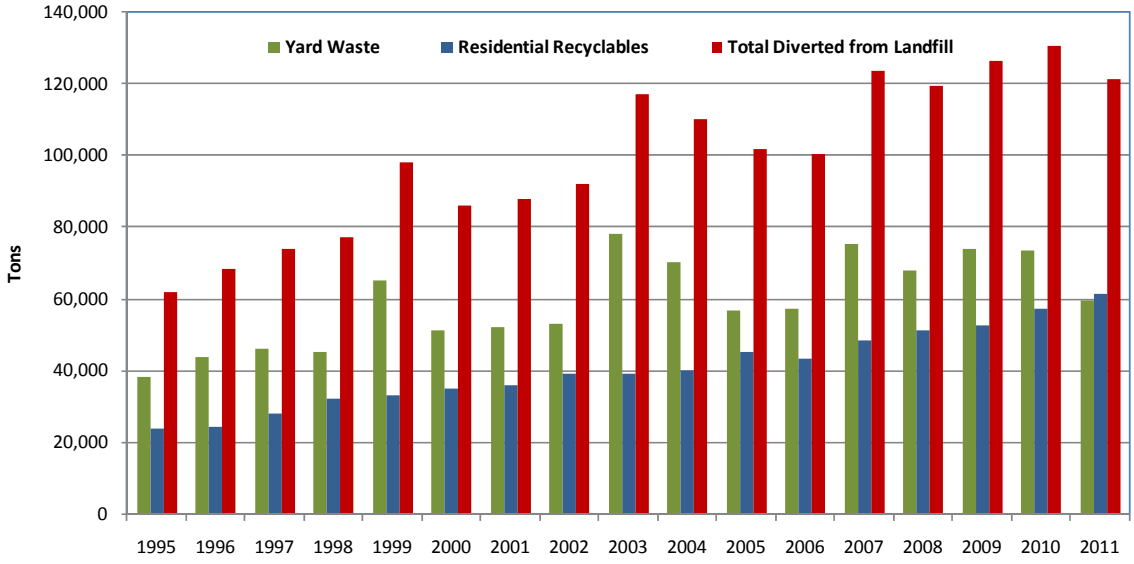
- Wake County's two multi-material recycling facilities accept several types of materials from business, including cardboard, computers, electronics, and scrap metal. The City of Raleigh allows businesses to use its' seven recycling drop off centers.
- The City of Raleigh currently offers curbside recycling in the CBD. Paper, cardboard, chipboard, glass, and plastic are all accepted. The City has distributed 64-gallon carts and offers collection service both six and seven times a week. Over 150 businesses had joined the program to date.
- In November 2011, the Town of Fuquay Varina voted to begin offering cardboard collection at the 214 commercial accounts that it provides refuse collection to. Commercial accounts will have the opportunity to purchase up to two 96-gallon recycling carts for cardboard. They will be serviced every other week. If they chose not to use the Town service, they will be required to contract with a private vendor to help ensure that cardboard stays out of the landfill.
- Several municipalities allow certain small businesses to participate in their residential curbside collection program.

**Figure 4-1**
**Materials Recovered from Curbside and Drop-off Recycling Programs**




*Some jurisdictions reported only comingled tonnages beginning in 2006, therefore material trends do not reflect actual totals.*

**Figure 4-2**
**Recyclables and Yard Waste Recovered**




*Recyclables and yard waste amounts are primarily from residential sources and do not include tires and HHW.*
*Yard waste does not include the amount recycled by commercial landscapers.*

- Wake County's "Feed the Bin" program offers recycling and environmental education opportunities to students of the WCPSS at over 171 school sites. The program focuses on paper recycling. During the 2010-2011 school year approximately 1.3 million pounds of mixed paper (9.1 lbs/student) were recycled. WCPSS encourages recycling in all schools and offices. All sites recycle corrugated cardboard, aluminum cans, and polystyrene when used on a regular basis. Certain schools in the WCPSS participated in the Keep America Beautiful Recycle Bowl Competition which tracked the amount of paper, cans, bottles, and lunch trays recycled over a four week period.

- Wake County offers free on-site waste assessments to businesses and assistance in establishing recycling programs. As previously noted, the County also awards Commercial Waste Reduction Grants and Recycling Container Grants for businesses to start or expand their waste reduction and/or recycling program.

- CII establishments may participate in recycling by using one or more local haulers or recycling processors. Collection services for conventional recyclables are relatively available for both large and small establishments; however, small establishments are less likely to participate due to cost factors.

- North Carolina State University, one of the largest institutions in Wake County, offers a comprehensive group of recycling programs aimed at faculty, staff, students, and visitors. These programs include:

  - A stadium recycling program called "WE Recycle" which recycles nearly 20 tons of beverage containers during each football season;

  - On-campus paper shredding and electronics recycling events and composting education opportunities during America Recycles Day;

  - Recyclemania, a competition and benchmarking tool for college and university recycling programs to promote waste reduction activities to their campus communities; and

  - An annual Pack-n-Go Sale and an office supplies giveway which divert recyclable and unwanted materials from the trash.

North Carolina House Bill (HB) 1518 created requirements for businesses with Alcoholic Beverage Control (ABC) permits to separate, store, and recycle all recyclable beverage containers. Similarly, HB 1465 prohibits the disposal of motor oil filters, rigid plastic containers, wooden pallets, and oyster shells in landfills. Businesses that generate these items have identified disposal alternatives, or in the case of wooden pallets, they place them in a C&D landfill in addition to recycling.

To discourage disposal of corrugated cardboard, waste loads that have more than 10 percent cardboard are required to pay a surcharge bringing the total tipping fee to $60 per ton at the SWLF and East Wake Transfer Station (EWTS).

A significant opportunity exists to enhance county-wide recycling by increasing participation in the CII sector. Counties that have established mandatory recycling ordinances for businesses, including Mecklenburg, Durham, and Fairfax Virginia, have reported gains in recycling.

### 4.3.3 In-House Recycling Programs

A 2008 study of recycling at County-owned facilities indicated that Wake County has an effective government facility recycling program in place, but also revealed opportunities for improvement. Recommendations to improve recycling included: implementing a dual-stream recovery system; providing more education and technical assistance; expanding the materials accepted; right-sizing disposal containers; using competitive procurement for recycling services; and program tracking. Over the past several years, the County has acted on many of these recommendations. Some of the improvements include:

- Expanding the list of recyclables to include ink and toner cartridges;
- Partnering with the WCPSS to contract with a private hauler to collect cardboard and refuse from public schools and General Services Administration (GSA) facilities; and
- Offering commingled recycling, which includes aluminum cans, plastics and cardboard.

Wake County continues to evaluate recycling options at its facilities with the goal of enhancing waste reduction.

### 4.3.4 C&D Recycling and Reuse

A 2008 Wake County assessment of C&D disposal found that the lack of landfill space is currently not a motivating factor to achieve increases in C&D recycling (GBB, 2008). Many local options exist for C&D waste haulers to dispose their material. The study identified nearly 26 million tons of permitted capacity for C&D available in the area providing more than 50 years of disposal life. The study also noted that any regulatory action by Wake County regarding C&D recycling would lead to increased C&D waste management costs. Due to the variety of different C&D collection systems, transfer/processing plants, and newly licensed disposal sites, the current marketplace is highly competitive with several alternatives, which keeps disposal costs relatively low.

The amount of C&D waste recycled and landfilled is shown in Table 4-7. The amount of C&D waste landfilled has decreased significantly beginning in FY09 and has remained relatively low due to a reduction in construction starts. While the estimated total amount of C&D recycling in Wake County has also decreased, certain materials, such as metals, are being recycled more frequently at the point of generation, due to increases in the market rate for these materials. In the current market, most contractors monitor recycling markets and segregate materials with marketable value from C&D waste at the construction site. These materials are then transported directly to recyclers, bypassing the processing facility. In contrast, when market values recede, materials return to the processing facility.

**Table 4-7**
**C&D Waste Landfilled and Recycled**

| Fiscal Year | Recycled | Landfilled |
|---|---|---|
| 2003 | 53,755 | 316,122 |
| 2004 | 91,374 | 328,753 |
| 2005 | 99,833 | 431,615 |
| 2006 | 93,864 | 467,594 |
| 2007 | 89,403 | 486,571 |
| 2008 | 106,935* | 502,624 |
| 2009 | 70,758* | 332,586 |
| 2010 | 56,512* | 265,625 |
| 2011 | 64,215* | 301,831 |

Sources: 2008 GB&B Wake County C&D Waste Assessment and County Waste Disposal Reports.

* Estimates based on 21% average recycling percentage for 2003-2007.

C&D recovery rates are also impeded by the low market value of large volume waste materials including wood waste and drywall. Where wood waste provides some opportunities in the composting and energy market, processors have yet to find a way to effectively recycle drywall. The drywall that enters processing facilities ultimately is disposed in a landfill.

Legislation, when properly enacted, can help increase recycling, but is generally not a favorable option, unless the technologies, markets and materials are already available. An example of legislation in North Carolina that has increased recycling of C&D waste is the 2009 ban of wooden pallets in landfills. The legislation discontinued landfilling pallets and take advantage of available manufacturing processes to stimulate a market for pallet recycling that has reduced the amount of virgin resources required for new pallet construction.

In addition, or as an alternative driver, to legislation, program initiatives can be used to increase C&D recycling. The Leadership in Energy and Environmental Design (LEED) Certification Green Building Rating System for new construction and major renovations is a program initiative that rewards construction projects for reuse of existing structures and for developing waste management plans to ensure material reuse and recycling of construction materials. According to processors, implementation of this program has helped the C&D recycling market by providing more flow from construction to processing. The City of Raleigh's new Solid Waste Services Building is one example of a recently constructed LEED (Platinum Level) certified building.

As part of this Plan Update, an evaluation of the C&D waste processing and recycling occurring within Wake County was conducted to identify impediments and suggest opportunities to improve recycling. The results of this evaluation are included in the *C&D Waste Evaluation Technical Memorandum* contained in Appendix H.

### 4.3.5 Intended Actions

Table 4-8 lists the intended actions established by the jurisdictions of Wake County to meet their goals pertaining to recycling and reuse. The list of intended actions includes increasing recycling opportunities for under-served sectors (such as multi-family housing units), increasing recycling at special events, and offering certain recycling services to businesses. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

Although not listed explicitly as an intended action, the Town of Fuquay-Varina has agreed to participate in nationwide Recyclebank curbside recycling incentives program. The program is a national competition that will encourage 50 chosen cities to raise residential recycling performance for a chance to win prizes based on levels of participation within the community. The program will begin in mid-2012 and end on July 1, 2014.

## 4.4 Composting and Mulching

### 4.4.1 Current Activities

As shown in Table 4-2, all jurisdictions offer curbside yard waste collection on a weekly or every-other-week basis. The amounts collected and processed, the end-use, and the destination of the yard waste is shown in Table 4-9.

Two municipal programs currently process yard waste and offer it back to citizens. Zebulon offers it back free of charge to Town residents. In the spring of 2011, approximately 2,700 cubic yards were

**Table 4-8. Recycling and Reuse Intended Actions**

| Jurisdiction | Intended Action |
|---|---|
| Apex | 1. Continue providing an annual shred-a-thon event. |
| | 2. Continue to offer recycling services at special events. |
| Cary | 3. Evaluate expansion of recycling at the Town's convenience center in conjunction with any County-planned expansion or changes to their nearby convenience center. |
| | 4. Begin to accept rigid plastics curbside and at the convenience center. |
| | 5. Continue providing an annual shred-a-thon event. |
| Fuquay-Varina | 6. Complete the conversion to 95-gallon recycling carts Town-wide. |
| Garner | 7. Evaluate use of 95 gallon rollout carts for recycling instead of 65 gallon carts. |
| Raleigh | 8. Improve enforcement of recycling ordinances to increase City-wide recycling rate. |
| | 9. Study feasibility of collecting cardboard from businesses. |
| | 10. Pilot pedestrian recycling containers in portions of Raleigh's downtown. |
| | 11. Expand Recycling in the Parks program to all city parks. |
| | 12. Promote and offer two "Reuse Rodeos" per year. |
| Wake County | 13. Partner with municipalities to implement recycling at special events. |
| | 14. Explore recycling alternatives for wooden pallets. |
| | 15. Cooperatively work with the Wake County Public School System to enhance recycling and reuse efforts and maximize revenue from recycling. |
| | 16. Consider offering used cooking oil collection at additional convenience centers. |
| | 17. Identify and evaluate methods to improve commercial/industrial/institutional recycling rates. |
| | 18. Conduct pilot tests to provide information necessary for evaluating the implementation of a food waste diversion program. |
| Wake Forest | 19. Establish a "Swap Shop" to improve reuse of materials and products. |
| Zebulon | 20. Continue to offer recycling services at special events. |
| All Jurisdictions | 21. Continue to offer, enhance, and/or require recycling collection services at multi-family units. |

returned to the residents of Zebulon. The City of Raleigh offers mulch, compost, and wood chips for sale to the general public and businesses. Nearly one-half of the total amount of yard waste collected in Wake County is processed by the City of Raleigh and sold back for beneficial reuse. The Town of Cary annually offers 100 cubic yards of compost to its residents free of charge during their annual compost giveaway.

Wake County continues to consider alternatives for food waste disposal. The 2011 solid waste characterization study indicated that food waste comprised over 15 percent of the total waste stream, indicating a significant opportunity to reduce the amount of waste landfilled through composting or other means such as anaerobic digestion or co-digestion with wastewater treatment plant sludge. Currently, Brooks Contractor collects food waste from over 20 commercial establishments in Wake County each month, including Whole Foods and North Carolina State University, for use in their composting operation. As part of this Plan Update, an evaluation of alternative food waste disposal options was performed to identify and describe how food waste might be collected and beneficially reused. The results of this evaluation are included in the *Food Waste Evaluation Technical*

**Table 4-9**
**Municipal Yard Waste Program Summary, FY 2011**

| Jurisdiction | Tons Processed | End Use | Destination |
|---|---|---|---|
| Apex | 4,944 | Farmer or Homeowner, Composted/Mulched | Hwy 55 LCID |
| Cary | 16,554 | Composted/Mulched* | Town of Cary, McGill Environmental, Brooks Contracting |
| Fuquay-Varina | 2,249 | Farmer or Homeowner, Composted/Mulched, Landfilled | Bryant Landfill, Harnett County, & local residents and farmers |
| Garner | 2,568 | Farmer or Homeowner, Composted/Mulched, Landfilled | Shotwell, Buffaloe, local nursery |
| Holly Springs | 96 | Composted/Mulched, Landfilled | Earthtec, Bryant Landfill (Harnett Co.) |
| Knightdale | 80 | Mulched | Waste Industries |
| Morrisville | 193 | Farmer or Homeowner, Composted/Mulched* | City of Raleigh Yard Waste Center |
| Raleigh | 26,319 | Farmer or Homeowner, Composted/Mulched* | City of Raleigh Yard Waste Center |
| Rolesville | not available | Composted and/or Landfilled | Rowland Landfill/Novozymes |
| Wake Forest | 3,720 | Farmer or Homeowner, Composted/Mulched, Landfilled | Rowland Landfill/Novozymes, Organic Recycling |
| Wendell | 1,184 | Farmer or Homeowner | Farmer/Homeowner |
| Zebulon | 1,808 | Mulched* | Town Yard Waste Facility |
| **Total** | **59,715** | | |

Source: FY11 Solid Waste Management Annual Reports

* Mulch is sold (Raleigh) or given to Town residents free of charge (Zebulon). Cary offers 100 cy free to residents during their annual compost giveaway.

*Memorandum* contained in Appendix H, and may be used to support a food waste collection pilot program at a later date.

Fats, oils, and greases (FOG) are a component of food waste that, when improperly disposed down drains clog sewer lines and cause backups. The Town of Cary offers a program that provides curbside pickup of used cooking oil and grease. Bio-fuels are created from the collected cooking oil. The City of Raleigh also runs an annual program to collect cooking oil and grease at curbside from November through early January of each year. Residents, churches, and synagogues are able to recycle cooking oil by calling Raleigh's Solid Waste Services to set up a collection date. In FY10, 700 gallons of used cooking oil and grease were collected and recycled into bio-fuels. In FY11, over twice as much was collected – 1,923 gallons – from 199 locations.

Through grants, Wake County has funded several food waste composting programs and will continue to do so to promote food waste composting and reduce the impacts of FOG.

### 4.4.2 Intended Actions

Table 4-10 lists the intended actions established by the jurisdictions of Wake County to meet their goals pertaining to composting and mulching. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

**Table 4-10. Composting and Mulching Intended Actions**

| Jurisdiction | Intended Action |
|---|---|
| Apex | 1. Continue to promote backyard composting. |
| | 2. Procure new yard waste equipment to maintain current efficiency. |
| Cary | 3. Continue to identify and evaluate new end uses for yard wastes and leaves. |
| | 4. Promote backyard composting and evaluate use of private vendor who collects compostable materials curbside. |
| | 5. Continue providing an annual free compost giveaway event for Cary residents. |
| Fuquay-Varina | 6. Continue to identify and evaluate new end uses for yard wastes and leaves. |
| Holly Springs | 7. Procure new grapple truck and vacuum truck to improve yard waste collection efficiency. |
| | 8. Evaluate feasibility of building a biosolids/compost facility where yard waste could be processed. |
| Knightdale | 9. Improve yard and leaf waste collection and processing with the goal of returning mulch and/or compost to residents. |
| Raleigh | 10. Explore feasibility of offering delivery of yard waste products. |
| | 11. Explore possibility of requiring use of paper or other biodegradable bags in place of plastic for yard waste. |
| Wake County | 12. Evaluate a yard waste transfer and/or processing facility at the SWLF to assist with the cover and closure processes. |
| | 13. Consider outlets for organic (food and yard) waste, especially for residents in unincorporated portions of the County. |

## 4.5 Incineration

### 4.5.1 Current Activities

In 2002 Wake County evaluated the feasibility of waste-to-energy (WTE) incineration. The assessment determined that while WTE was technically feasible, it would result in significantly higher costs compared to all other existing alternatives. It was also determined that regional cooperation would be necessary to establish a sufficient waste stream.

In 2004, Wake County further opened the door for the possibility of alternative disposal options, including incineration, when they released a Request for Expressions of Interest for MSW Waste Disposal. No interest from the private sector was identified as only firms interested in managing Wake County's waste stream through landfilling options responded.

Nevertheless, Wake County continues to consider WTE – or energy-from-waste (EfW) as it's more recently been called – as a potential method of waste disposal as the SWLF begins to reach capacity. Because of the potentially long lead time associated with identifying a sufficient waste stream, siting, designing, permitting, negotiating an energy contract, procurement, financing, constructing, and startup testing of a EfW facility, this option deserves thorough consideration well in advance of when it's actually needed. Current estimates are in the range of five to seven years – and potentially greater,

depending a variety of factors. While an EfW plant would most likely not be needed during the next ten year planning period, continued consideration is warranted. As part of this Plan Update, an evaluation of the economics of a potential regional EfW facility was completed. The complete results of this evaluation are included in the *Energy-from-Waste Evaluation Technical Memorandum* contained in Appendix H. A summary of the base-case economics of a potential EfW facility are provided in the following paragraphs.

An 1,800 tons per day (tpd) mass-burn EfW facility was selected as the base case option due to the large population and combustible waste stream that is present in the Triangle region, which is expected to experience continual growth over the near future. Based upon the above assumed parameters, the estimated net cost (after revenues) of the EfW facility would be $48,078,000 at year 1. This equates to an average unit cost of $81.25 per ton of MSW processed, assuming 90% availability. Similar unit costs per ton would be expected for subsequent years; however, they would be subject to fluctuations in many factors, including but not limited to inflation associated with the cost of labor and materials; the price paid for electricity; and the markets for recyclables. The 1,800 tpd EfW base case analysis does not include the following additional benefits and potential revenues:

- MSW tipping fees, in addition to the EfW process cost, to cover the additional costs associated with the entire solid waste management system;
- Sale of RECs or other environmental attributes to national or state markets;
- Value of avoided transportation and disposal of MSW to local landfills;
- Value of ash as alternative daily cover (ADC) in lieu of purchase of dirt;
- Time value of money saved by extending the life of the host county's Subtitle D landfill (i.e. delaying the incurrence of capital construction costs);
- Financial assurance (reduced annual cost);
- Closure costs deferred (final cover system and closure plan) assuming that NCDENR does not implement partial closure requirements;
- Time value of money saved by extending the time needed to build a new landfill or contract to send out-of-county (land costs, permitting costs, design costs, construction costs); and
- Reduced operating costs (reduced personnel, equipment, equipment maintenance and gas costs, daily and final cover material, reduced litter control, reduced leachate, and reduced landfill gas).

A series of better case and worse case alternate scenarios were developed to examine the sensitivity of the average unit MSW processing cost ($/ton). These cases vary the parameters that would have major impact on the final cost per ton. For example, increasing the electrical sale rate from 6¢/kWh to 7¢/kWh decreases cost by approximately $5/ton to about $76/ton. The results of the sensitivity analysis are detailed in the *Energy-from-Waste Evaluation Technical Memorandum* of Appendix H.

Additional analysis of the overall project solid waste management system on a life cycle basis would be necessary to calculate the overall cost and benefit of a regional EfW project. As an item of note, a recent report (December 2011) was published by the Applied Research Foundation (ARF) of the Solid Waste Association of North America (SWANA) titled "*The Economic Development Benefits of Waste-to-*

*Energy Systems."* This report evaluated the long-term performance of EfW facilities over a 40 year lifecycle compared to disposal at remote regional landfills. The analysis showed a significant overall lifecycle cost benefit due to the predictable nature of costs and benefits of EfW over a 40-year period. The retirement of the EfW project revenue bonds occurs at the mid-point of the project life, which translates into overall project benefits. In summary, the cost of processing MSW in a modern mass-burn EfW facility ranges between $50/ton to $100/ton.

### 4.5.2 Intended Actions

Table 4-11 lists the intended actions established by the jurisdictions of Wake County to meet their goals pertaining to incineration. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

**Table 4-11. Incineration Intended Actions**

| Jurisdiction | Intended Action |
|---|---|
| Wake County | 1. Continue to monitor regional discussions regarding use of waste-to-energy and other processing and disposal methods to serve the Triangle region in future years. |
| | 2. Investigate development lead-time, permitting issues, economics, and other factors of the next waste management option once the SWLF approaches capacity. |

## 4.6 Waste Transfer

### 4.6.1 Current Activities

In FY 2011, 31 percent (292,963 tons) of the MSW generated in Wake County that was disposed in a landfill was first delivered to one of seven state-permitted transfer stations operating in or around Wake County. Just over 87 percent (255,098) of the transferred MSW went through the EWTS. Because of the EWTS location (just east of downtown Raleigh), and in part due to its ease-of-use compared to the SWLF, approximately 80,000 tons more MSW went through the EWTS than was direct hauled to the SWLF in FY11.

The economics of solid waste management can be impacted by changes to the existing waste transfer system. The addition or improvement of local, privately-operated waste transfer stations can result, and at times has resulted, in less CII waste being delivered to the SWLF. While minor changes in waste flow tend to have little impact on the economics of the SWLF, more significant changes, coupled with reduced waste generation due to a slowing economy, may lower revenue to a point that it negatively impacts the economics. To alleviate this possibility, Wake County continues to pay close attention to changes in waste flow, waste generation rates, and market-based tipping fees at both public and private regional landfills. To this regard, an evaluation of regional landfill tipping fees was performed as part of this Plan Update. The results of this evaluation are included in the *Tipping Fee Evaluation Technical Memorandum* contained in Appendix H.

Consistent with a previous intended action, Wake County worked in conjunction with Cary and Fuquay-Varina to evaluate the consolidation of their single stream recycling at the South Wake Transfer Station (SWTS). Based on the results of the pilot, it was decided that the facility would not be used to consolidate their recycling streams.

### 4.6.2 Intended Actions

Table 4-12 lists the intended actions established by the jurisdictions of Wake County to meet their goals pertaining to waste transfer. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

**Table 4-12. Waste Transfer Intended Actions**

| Jurisdiction | Intended Action |
|---|---|
| Wake County | 1. In anticipation of future waste management sites, evaluate the need for additional transfer stations or modifications to existing ones. |

## 4.7 Disposal

As of January 2011, there were eight permitted and active disposal facilities in Wake County including one MSW landfill, four C&D landfills, and three LCID landfills. Table 4-13 lists these disposal facilities and their locations. Included on the list is the one permitted materials recovery facility located in Wake County, which receives and processes C&D waste.

**Table 4-13**
**Permitted Active Disposal Facilities in Wake County**

| Waste | Permit # | Facility | Address | City |
|---|---|---|---|---|
| MSW | 9222-MSWLF-2008 | Wake County South Wake MSWLF | 6300 Old Smithfield Road | Apex |
| Mat Recov | 9224-MWP-2008 | WCA Material Reclamation | 421 Raleigh View Road | Raleigh |
| CD | 9226-CDLF-2001 | Shotwell Landfill, Inc. | 4724 Smithfield Road | Wendell |
| CD | 9228-CDLF-2001 | Red Rock Disposal, LLC | 7130 New Landfill Drive | Holly Springs |
| CD | 9230-CDLF- | Hwy 55 C&D Landfill, LLC | 5940 Old Smithfield Road | Apex |
| CD | 9231-CDLF- | Material Recovery/Brownfield Rd | 2600 Brownfield Road | Raleigh |
| LCID | 92M-LCID- | Rowland Demo Landfill | 3000 Gresham Lake Road | Raleigh |
| LCID | 92N-LCID-1986 | Currin Brothers Landfill | 4547 Sunset Lake / S.R. 1301 | Holly Springs |
| LCID | 92V-LCID- | Carolina Tree Debris | 1417 Old Watkins Rd | Raleigh |

Source: NCDENR facility list by County at http://portal.ncdenr.org/web/deao/permit-directory/#F

### 4.7.1 MSW Disposal

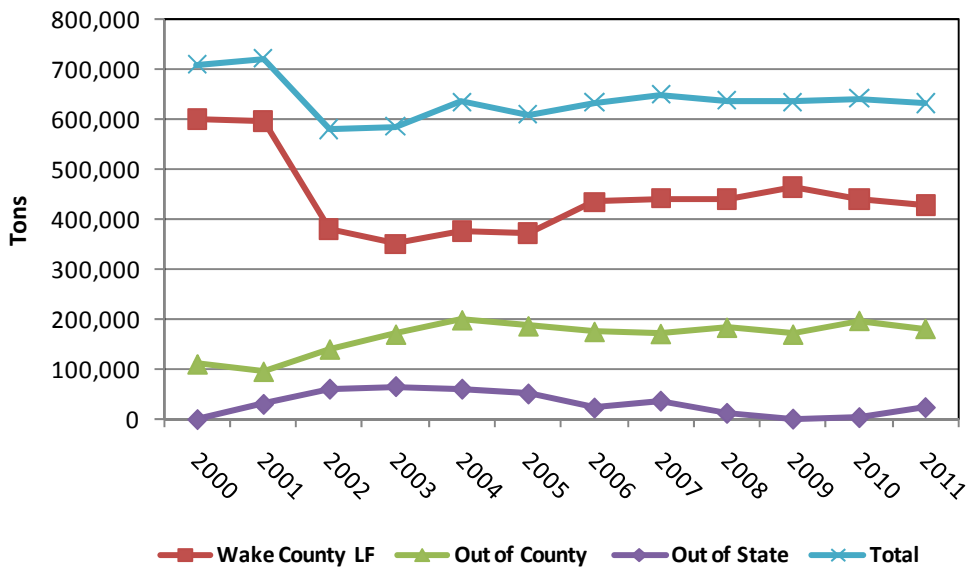
The opening of the SWLF in 2008 marked the culmination of 18 years of siting, planning, designing, permitting, and constructing – interrupted by a thorough re-evaluation of whether development of a new in-county landfill was the best waste disposal alternative for the citizens of Wake County. During the planning and development process, the County partnered with the local municipal jurisdictions, eventually developing an inter-local agreement (the ILA) establishing the "South Wake Landfill Partnership" and solidifying the landfill development, operation, and use as a joint undertaking. By creating the ILA, eleven of the twelve the jurisdictions agreed to pool their residential MSW waste streams for disposal at the SWLF in return for improved economy and predictability in waste disposal

costs. Eleven jurisdictions and Wake County are partners in the ILA. The ILA was later amended to include the EWTS. A copy of the ILA is included in Appendix C.

The SWLF is projected to provide between 20 and 25 years of disposal capacity. It is currently permitted to only accept waste that is generated from inside Wake County. As of the end of FY11, the SWLF had received 1.4 million tons of waste, or less than 8 percent of its anticipated capacity. The possibility of accepting waste from neighboring counties (e.g., Orange and Durham) has been considered, primarily as a means to lower the overall cost of disposal for the partners in the ILA; however, by accepting outside waste, the available airspace to dispose of Wake County-generated waste is reduced, shortening the lifespan of the landfill. As such, no actions have been taken to modify the permit to allow acceptance of out-of-county waste as of yet.

Figure 4-3 shows the amount of Wake County-generated MSW disposed at in-County, out-of-County, and out-of-State facilities for FY00 through FY11, based on County disposal reports provided by the State. At the end of FY11, Wake County reported 426,903 tons were disposed at the SWLF during the previous year.

**Figure 4-3**
**Tons of Wake County-Generated MSW Disposed in Landfills**




A variety of bulky wastes are received and disposed at the SWLF, such as mattresses, creosote poles, automobile bumpers and other items. These items take additional time to handle and dispose, may cause delays at the working face, and are taking up valuable airspace. As part of this Plan Update, an evaluation of possible means to divert, process, or recycle these materials was conducted. Based on feedback provided by the operator of the SWLF (Waste Industries), mattresses are perhaps the most problematic of these wastes because of the quantity received and airspace they consume (relative to their weight). The SWLF receives approximately 80 mattresses per day. Although recycling opportunities have been proposed and investigated, no real opportunities to recycle mattresses have been identified and implemented – primarily due to cost factor. Since landfill disposal is the only viable option at present, the County may consider establishing a special fee for mattresses, or

alternatively, a minimum price for a load of mattresses, similar to what is done at other landfills, including neighboring Orange County. In this manner, the lost airspace caused by mattresses (and potentially other bulky but light materials) can be accounted for, while at the same time, making mattress recycling a more viable economic alternative. The detailed results of this evaluation are included in the *Special Waste Evaluation Technical Memorandum* contained in Appendix H.

### 4.7.2 C&D Disposal

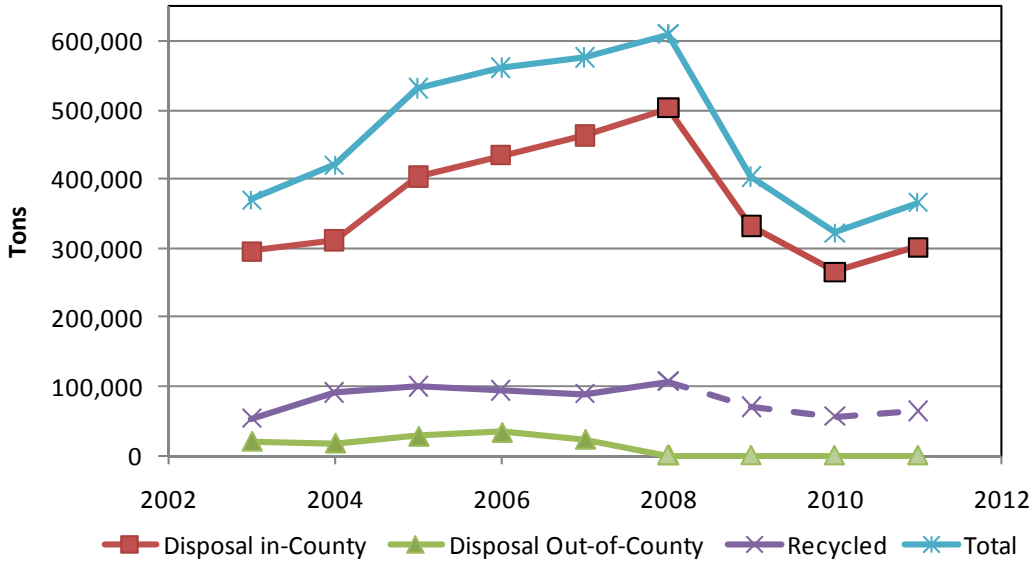
There are currently four permitted and active C&D landfills in Wake County and one mixed waste processing (MWP) center. Most of the C&D waste generated in Wake County is either disposed in one of the four in-County C&D landfills or is recycled. Only 3 tons of the 352,733 tons of C&D waste generated in Wake County was disposed in an out-of-County C&D landfill.

According to the GBB study completed in early 2008, the annual C&D disposal capacity requirement is estimated to be 470,000 tons per year, assuming a 16 to 17 percent reuse/recycling rate. Based on this, the study offered the following conclusions regarding C&D disposal capacity:

- If the total In-County C&D capacity was assumed used entirely by Wake County, the 32.2 million tons of projected C&D landfill capacity would last more than 68 years;
- If Wake County C&D recycling increased to 30 percent and Wake County used 75 percent of projected capacity, the useful life, at a nominal 400,000 tons per year of disposal requirement, would be 60 years.

Figure 4-4 shows the amount of C&D waste from Wake County sources that was distinguished from other MSW and disposed or recycled for FY03 through FY11. Note that the amount of C&D waste recycled is estimated based on the same assumed 21 percent reuse/recycling rate observed during the five years between FY03 and FY07.

**Figure 4-4**
**Wake County C&D Waste Disposed**




*The actual amount recycled between 2008 and 2011 is unknown and has been estimated here based on previous averages.

### 4.7.3 LCID Disposal

North Carolina solid waste regulations preclude disposal of LCID, including yard waste, in sanitary landfills. Management and disposal options for LCID include processing at compost/yard waste facilities or placement in LCID or C&D landfills. There are currently three permitted and active LCID landfills in Wake County.

As shown in Table 4-9, the municipalities reported collection of 59,715 tons of yard waste in FY11. Less than 15 percent of the residential yard waste was landfilled in an LCID facility. It is unclear how much yard waste and vegetative matter from site clearing ended up in Wake County LCID landfills since the State does not track this information.

### 4.7.4 Intended Actions

Table 4-14 lists the new intended actions established by the jurisdictions of Wake County to meet their goals pertaining to waste disposal. Since sufficient disposal capacity has been secured for the next 20 to 25 years (barring any unforeseen circumstances), the intended actions pertain to other facets of disposal such as evaluating and using new methods and technologies to maximize airspace usage and generating new revenue streams from landfill operations to help control disposal costs. A summary of progress made toward intended actions specified in the previous Plan Update is included in Appendix D.

**Table 4-14. Disposal Intended Actions**

| Jurisdiction | Intended Action |
|---|---|
| Apex and Holly Springs | 1. Participate in on-going discussions with Wake County regarding the South Wake Landfill Master Plan and continue to evaluate both short and long-term end-uses. |
| Wake County | 2. Continue to evaluate long-term disposal capacity and alternatives in light of variations in waste generation rates. |
| | 3. Consider the land needs for future waste management facilities and evaluate land purchase opportunities. |
| | 4. Keep options open for disposal of alternative materials, such as wastewater biosolids at the SWLF, based on partnership needs. |
| | 5. Evaluate benefits of leachate recirculation and bio-reactor technology at the SWLF. |
| | 6. Continue to consider and evaluate options to improve methane gas production, increase the solid waste compaction rate, and increase the available volume for waste disposal at the SWLF. |
| | 7. Continue to evaluate long-term disposal capacity and alternatives in light of variations in waste generation rates. |

## 4.8 Education

### 4.8.1 Current Activities

The Wake County jurisdictions have long understood the importance and impact of solid waste-related education and outreach activities. Recycling, in particular, requires frequent, clear, and concise instructions to effect long-term participation and build familiarity with the ever increasing types of recyclable materials. Table 4-15 depicts the current education activities of the Wake County jurisdictions.

## Education for Residents

All Wake County jurisdictions use their web sites to convey information regarding basic solid waste services including pickup schedules, procedures, acceptable materials, special waste pickups, fees, and contact information. Approximately half of the jurisdictions offer a more comprehensive selection such as information on reuse, tips on generating less waste, and the location of public and privately operated sites to recycle or dispose special waste items. Wake County has tailored its recycling and solid waste web site to inform residents, businesses, and schools about a variety of solid waste issues. For residents, the County provides information on seasonal recycling opportunities such as the Holiday Wrap-up Recycling Program. Through both a print brochure and web site table, the County offers a recycling guide offering facility locations and acceptable material lists. Most municipal jurisdictions have established links to Wake County's web site as a means of providing a consistent and clear message for disposal and recycling opportunities available to all citizens of the County.

The City of Raleigh has developed a very comprehensive web site offering information to residents about all facets of its solid waste services and programs. In addition to the web site, the City uses a variety of other forms of education. Solid Waste Services staff are available to speak to schools, civic groups, neighborhood associations or Scout troops about solid waste issues. Presentations on recycling, backyard composting and vermicomposting are available. The City offers tours of local recycling facilities to educate the public about recyclables. Staff members welcome the opportunity to participate in school science fairs, career days and Earth Day events. In addition, the specialists provide literature or advice to Girl and Boy Scouts working on environmental badges.

Ten of the thirteen jurisdiction mail newsletters or periodically include information on solid waste disposal and recycling in utility bills and seven of thirteen prepare newspaper inserts or advertisements to inform the public about collection schedules and other events.

**Table 4-15**
**Education Efforts Undertaken By Wake County Jurisdictions**

| Jurisdiction | School | Radio/ TV | Newspaper | Mail/News-letter | Take-Home Items | Hotline | Website | | Recycle Guys | Workshops | Events |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Basic | Comprehensive | | | |
| Apex | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Cary | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| Fuquay-Varina | | | ✓ | ✓ | ✓ | | ✓ | | | | |
| Garner | | | ✓ | ✓ | ✓ | | ✓ | | | | |
| Holly Springs | | ✓ | | ✓ | | | | ✓ | | | |
| Knightdale | | | | | | | ✓ | | | | |
| Morrisville | | | | ✓ | ✓ | | | ✓ | ✓ | | ✓ |
| Raleigh | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |
| Rolesville | | | | | ✓ | | ✓ | | | | |
| Wake Forest | | ✓ | | ✓ | | | | ✓ | | | |
| Wendell | | | | ✓ | ✓ | | ✓ | | | | |
| Zebulon | | ✓ | ✓ | ✓ | ✓ | | ✓ | | | | ✓ |
| Wake County | ✓ | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |

Source: 2011 Annual Reports submitted to NC DENR and information from municipal web sites.

### Education for CII Establishments

As discussed under the recycling planning element, Wake County offers free on-site waste assessments to businesses and provides assistance in establishing recycling programs. The County also provides information specifically tailored to businesses on its web site. Some examples of the other CII sector outreach activities conducted by Wake County and/or the municipalities have included:

- Formation of special task groups, including the Food Waste Task Group and C&D Task Group, which have helped generators of these specific wastes become aware of waste reduction methods and alternatives to disposal;
- Sponsoring the "Go Green. Save Green" business recycling workshop for local businesses to network and learn how to cut waste and costs;
- Educating target groups generating large amounts of old newspapers about recycling opportunities; and
- Distributing flyers in Spanish and English on used motor oil recycling to repair shops.

As Wake County does not have an ordinance requiring recycling of certain materials by the CII sector, education and outreach activities geared toward this sector are critical to improve on the overall recycling rate in Wake County.

### Education for Schools

Education for schools has been delivered through Wake County's school recycling program, Feed the Bin (FTB). The program includes an environmental stewardship education component to promote waste reduction, recycling, and other desired behaviors. The approach is to use the practical experience of recycling at schools to reinforce the learning of environmental topics, including those that are reflected in Wake County's Environmental Stewardship Agenda.

The FTB program is executed and promoted through newsletters geared to different grade levels; curriculum workshops held for teachers and administrators; lesson plans, games, and activities offered via the County web site; and a FTB poster as well as other means.

The municipalities of Wake County also recognize the importance of rewarding positive behaviors with regard to recycling, littering, and other aspects at an early age. Several, including Raleigh, Cary, Apex, and Zebulon have also participated in or supported school education programs.

## 4.8.2 Intended Actions

Table 4-16 lists the intended actions established by the jurisdictions of Wake County to meet their goals pertaining to education and outreach. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

# 4.9 Special Wastes

## 4.9.1 Current Activities

Special waste management focuses on items that are problematic to dispose and or not suitable for landfill disposal. They include household hazardous waste (HHW), white goods, tires, used motor oil,

**Table 4-16. Education and Outreach Intended Actions**

| Jurisdiction | Intended Action |
|---|---|
| Apex | 1. Continue to improve and expand information available on the Town's website. |
| | 2. Continue to use newsletters, Town website and other means to promote recycling, waste reduction, and Town services. |
| Cary | 3. Improve and expand information available on the Town's web site. |
| | 4. Focus education efforts on low participation areas (for recycling). Evaluate opportunities to improve recycling at festivals, sporting events, and venues. |
| Garner | 5. Educate public about waste reduction on the local access channel, newsletter, and website. |
| Holly Springs | 6. Post website announcements of upcoming events like HHW collection days at the SWLF. |
| Knightdale | 7. Continue to provide public service announcements on litter prevention. |
| | 8. Promote backyard composting and grass clipping grass-cycling education. |
| Morrisville | 9. Use e-mails and monthly Town newsletters to remind residents to recycle. |
| | 10. Help Wake County advertise the annual HHW collection events. |
| Raleigh | 11. Update all print publications. |
| | 12. Implement GovDelivery web software allowing visitors to the site to sign up to receive various types of information such as service delays, holiday schedule changes, and recycling/waste reduction/reuse events/waste reduction tips. |
| Wake County | 13. Review and update as necessary, the information available discussing CII recycling options, including the County's website and recycling guide. |
| | 14. Use various means to educate the public about Wake County facilities that can be used to dispose or recycle wastes (including household hazardous waste), recyclable materials, and other waste types. |
| | 15. Advertise "bottle law" for restaurants to increase recycling participation. |
| | 16. Provide public education on recycling and continue to expand education via bill stuffers and other means. |
| Wendell | 17. Continue to advertise solid waste/recycling services through East Wake TV and other methods. |
| Zebulon | 18. Continue to use East Wake TV, newsletters, Town website and other means to promote recycling, waste reduction, and Town services. |

antifreeze, lead acid batteries, and electronics (e-waste). Management of electronics is discussed separately in Section 4.13.

## Household Hazardous Waste

In 2008, Wake County conducted a pilot study to determine if extending the number of days per month for HHW collection would increase participation and the amount of HHW collected. Based on the positive results, the County expanded HHW collection to 6-days a week at both the North Wake and South Wake Solid Waste Management Facilities. As a result, Wake County collected 682 tons of HHW from these two locations (at a cost of $669,357) during FY11, compared to 471 tons in FY08. Materials accepted include: acids/bases, batteries, cooking oil, drain openers, dry chemical fire extinguishers, fluorescent bulbs, paints, solvents, pesticides/herbicides, mercury thermometers, and others. In FY11, the County used a private contractor (Ecoflo) to properly, containerize, haul away and dispose the HHW.

Several of the municipalities have also offered special HHW collection events, including:

- The Town of Zebulon, using a Waste Reduction Grant received from Wake County, held a one day HHW collection event which netted 2 tons of HHW at a cost of $2,181;
- The Town of Cary held a one day HHW collection event that netted 21 tons of HHW; and
- The City of Raleigh collected HHW, among other items, at a one day "America Recycles Event" that netted 16 tons of HHW.

## White Goods

Wake County offers white goods drop-off at both of its' multi-material recycling facilities and at two (Nos. 1 and 11) of the eleven convenience centers. All of Wake County's municipalities offer white goods collection either directly or through their contracted hauler. Four provide this service on a weekly basis while the rest offer by-request service and/or special seasonal collection events. Four municipalities charge a special fee for by-request collection.

During FY11, Wake County was able to recover 732 tons of white goods that were brought to its multi-material recycling facilities and designated convenience centers by the jurisdictions, their contract haulers, and residents. Up until July 1, 2012 Wake County contracted with Advance Disposal to collect and haul white goods from the multi-material facilities. Currently, Waste Industries operates the multi-material recycling facilities and is responsible for removing CFCs from refrigerant-bearing white goods into the appropriate Freon container (R-22, R-12, or R-134) onsite. Once the extraction tanks reach 52 psi, they are taken to RE Michels for recycling. Waste Industries keeps records onsite indicating the date, type, and number of tanks taken for recycling. Farrell Kidd, LLC collects and hauls white goods from convenience centers Nos. 1 and 11. Prior to collection and hauling, CFCs are extracted into appropriate containers and then taken to ACR Supply Company for recycling. Ferrell Kidd, LLC maintains records of extraction indicating the date, type, and number of tanks. Convenience Center white goods (once CFCs are removed) are taken to TT&E Iron and Metal. White goods are collected from the County facilities when receiving trailers are full. White goods with and without CFCs are not segregated at the collection facilities. A forklift is used to move white goods onto receiving trailers.

## Tires

Wake County accepts waste tires from all County residents at the multi-material recycling facilities and at convenience center No. 11. There is no fee for passenger car or lightweight truck tires generated in-state. CII-generators can deliver waste tires to the facilities if they provide a tire identification number and certification form. During FY11, 13,661 tons of tires were collected at a cost of $1,112,790. Most of this amount was reimbursed by the State. At the North Wake multi-material facility, tires are thrown from above into an open-toped trailer. At the South Wake multi-material facility, tires are hand laced into a truck. Tires delivered to the multi-material recycling facilities and convenience center No. 11 are hauled for disposal at the Central Carolina Tire Monofill in Cameron, North Carolina. Shipments are made when the trailers are full.

Several municipalities offer curbside collection of a limited number of tires during special cleanup events.

### Used Motor Oil and Antifreeze

Used motor oil and antifreeze are accepted at the multi-material recycling facilities and during the HHW collection events. During FY11, 31,535 gallons of used oil and 3,715 gallons of antifreeze were accepted by Wake County. Several municipalities also offer used oil drop-off or special collection services. Apex residents may dispose of up to 2 gallons of used oil per week at the Apex Public Works Department. Cary residents may request curbside pickup for up to five gallons. Both services are offered free of charge. During FY11, Apex collected 2,553 gallons of oil from residents and Cary collected 1,722 gallons.

### Batteries

Lead-acid batteries are accepted at the multi-material recycling facilities and during the HHW collection events. During FY11, 210 lead-acid batteries were accepted by Wake County. The City of Raleigh's "Charge Up to Recycle" program allows residents to drop off rechargeable batteries for recycling at any of the City's twenty-seven fire stations and several administrative offices.

## 4.9.2 Intended Actions

Table 4-17 lists the intended actions established by the jurisdictions of Wake County to meet their goals pertaining to management of special wastes. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

**Table 4-17. Special Wastes Intended Actions**

| Jurisdiction | Intended Action | |
|---|---|---|
| Apex | 1. | Improve HHW and electronic drop-off facilities with Public Works Expansion project. |
| Cary | 2. | Offer a HHW/special waste drop-off event at least one time per year. |
| Garner | 3. | Collaborate with Wake County on HHW collection events in the Town of Garner. |
| Morrisville | 4. | Working with Wake County and Cary, hold annual HHW and special waste collection events. |
| Rolesville | 5. | Promote special waste management options offered by the Town and others. |
| Wake County | 6. | Keep abreast of recycle and disposal options for used tires. |
| | 7. | Partner with municipalities to offer HHW drop-off special events. |
| Wake Forest | 8. | Promote e-waste pickup offered by Town and re-evaluate collection frequency to ensure efficient and effective service. |
| | 9. | Consider collection of compact fluorescent bulbs (CFLs). |
| | 10. | Construct a drop-off oil site. |
| Zebulon | 11. | Host an annual or bi-annual HHW collection event and seek grant funding to cover costs. |
| All Jurisdictions | 12. | Consider feasibility of adding curbside collection of additional special wastes, either directly or through contract negotiations. |
| | 13. | Promote and maximize programs that offer special wastes collection and disposal opportunities for residents. |

# 4.10 Illegal Disposal/Litter

## 4.10.1 Current Activities

Curbside solid waste services are available to 80 percent of Wake County's residents. The other 20 percent have access to the 11 convenience centers and 2 multi-material recycling facilities to drop-off refuse, recyclables, and special wastes. Together, the curbside and drop-off opportunities help reduce the amount of illegal dumping and littering in the County.

Unfortunately, litter and illegal dumping still occurs and in response, the local jurisdictions have taken actions to better understand and prevent these activities from recurring and have initiated efforts to clean-up after they occur. Some the current programs addressing litter and illegal dumping include:

- NC DOT Adopt-A-Highway
- NC DOT Litter Sweep
- NC DOC Inmate Crews
- NC DOC Maintenance Crews
- Neuse River Cleanup
- North Carolina Big Sweep
- Wake County Solid Waste Facility Contracts

Within Wake County, NC DOT collects litter from 811 miles of roads and NC DOC collects from 183 miles (with 91 overlapping miles).

Wake County recently partnered with the NC State University Center for Urban Affairs and Community Services to conduct a telephone survey of randomly-selected Wake County households and a voluntary web survey of Wake County residents. The surveys focused on attitudes, behaviors, and perceptions relating to litter. The survey found that residents perceive that litter is a problem, and are willing to support legal and community action to prevent littering. Those who are especially invested in the community —namely, those who own property and those who are older — are most concerned and willing to act. The survey results suggested that future campaigns can work to better involve the relatively young and transient in collective efforts to prevent littering, and mobilize the enthusiasm of those already invested in environmental change. Building from this knowledge, the County has recently expanded their approach to reducing litter to more effectively involve Wake's citizens in the solution. The four-pronged approach includes:

- ***Cleanup.*** It is recognized that this approach, at a cost of nearly a million dollars for state and local government to clean up Wake County alone, is only a temporary fix when executed.
- ***Enforcement.*** Though citations have risen, the County's law enforcement officers simply cannot make litter a priority. When they are able to prosecute, getting a conviction is difficult because courts are burdened with more serious crimes.
- ***Education.*** Spreading the word regarding the impacts of litter to public health, the environment and the economy is critical. Educational programs in the WCPSS schools provide a critical message when behaviors are first being formed.

- ***Connection.*** Although each of the above approaches plays a role in addressing litter, they do not fully address the root problem – people are still littering. To emotionally engage the County's residents, a campaign to celebrate anti-litter behavior and reestablish a sense of pride in the community was initiated. The 86it Anti-Litter Movement was developed and launched in 2010, with strategies and tactics to thoughtfully engage citizen participation and support. Outreach is accomplished through social media strategies to encourage involvement and unique promotions such as fold-up trash can posters and 'prize patrols' to reinforce the message and reward desired behavior.

The City of Raleigh and certain other municipalities also support and offer litter prevention, reduction, and clean-up programs. The City of Raleigh Community Services and Solid Waste Services departments helped Wake County organize the "***I Love Wake County Bonito***" campaign. The campaign was modeled after similar litter cleanups in Charlotte and Durham in which Hispanic and Latino volunteers demonstrate their pride in the area where they live.

Many municipalities, including Cary and Morrisville, support, promote and organize groups to participate in the North Carolina Big Sweep events and other seasonal or annual events. Committees, such as Morrisville's Community Appearance Committee routinely tackle litter issues.

### 4.10.2 Intended Actions

Table 4-18 lists the intended actions established by the jurisdictions of Wake County to meet their goals pertaining to illegal disposal and litter. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

**Table 4-18. Illegal Disposal/Litter Intended Actions**

| Jurisdiction | Intended Action |
|---|---|
| Apex | 1. Promote and help support a bi-annual Big Sweep event along Beaver Creek. |
| Garner | 2. Hold two bi-annual litter sweeps in conjunction with Governor's Litter Proclamation and Big Sweep waterway clean-up. |
| | 3. Evaluate use of more litter containers on major thoroughfares. |
| Knightdale | 4. Support Wake County's litter pick-up programs. |
| Wake County | 5. Evaluate the effectiveness of the "86it - Respect the Can" anti-littering campaign and expand and/or adjust as necessary to increase its reach and message. |
| | 6. Continue partnership with Department of Corrections to clean littered roadways. |
| | 7. Continue monitoring illegal disposal and enforcing ordinances. |

## 4.11 Purchasing Recycled Products

### 4.11.1 Current Activities

As the Town of Cary web site suggests, "If you aren't buying recycled, you really aren't recycling". Many of the local governments in Wake County adopted this philosophy and have established programs or policies encouraging or requiring government agencies to purchase recycled products. Jurisdictions with programs or policies in place include Cary, Garner, Morrisville, Raleigh, Wendell, Zebulon, and Wake County. Several examples include:

The Town of Cary has developed a web page promoting recycled products purchasing. The web page discusses the important of buying recycled products, dispels common myths about the quality and cost of recycled products, and provides links to lists of companies that offer recycled products for sale.

In 2003, the City of Raleigh established a management policy emphasizing the purchase of recycled products by City departments and their staff. More recently, they have proposed in the latest Comprehensive Plan Update to "enact a Sustainable Purchasing Policy for the City of Raleigh and its contractors; expand on current policy by including specific goals for toxic pollution reduction, recycled content products, energy and water savings, green building construction and renovation, landscaping, forest conservation, and agricultural bio-based products."

As far back as 1992, the Board of County Commissioners developed a resolution establishing a recycled materials procurement policy. The policy dictates that Wake County may, at its option and on a case by case basis, consider purchasing recycled products, not to exceed a 10 percent premium over a virgin product. The policy also states that special emphasis will be given to products made from post consumer recycled materials.

In FY09, Wake County spent $82,462 on paper purchases. Twenty-two percent contained at least 10 percent recycled content and 78 percent contained zero percent recycled content. Paper with no recycled content was purchased for $35.31 per case. Paper with 10 percent recycled content was purchased for $35.93 per case, which was 1.7 percent more expensive. Paper with 100 percent recycled content would have cost the County $47.21 per case, which is 33.7 percent more expensive than paper with no recycled content.

### 4.11.2 Intended Actions

A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D. No new intended actions have been proposed with regard to purchasing recycled products.

## 4.12 Disaster Response

### 4.12.1 Current Activities

Most of the jurisdictions in Wake County have developed disaster response plans which include provisions for dealing with disaster-generated debris. Due to their size, they are not included as part of the Plan Update, but are maintained separately by each local jurisdiction.

Wake County has recently re-established pre-positioning contracts with two engineering firms for monitoring debris management and two debris management contractors for debris collection, hauling, and processing. The contracts are currently re-bid every three years. The municipalities in Wake County can enter into their own agreements with the selected firms, which have been pre-qualified by Wake County.

The agreements with the debris collection and hauling firms include provisions for the firms to secure temporary debris storage and reduction (TDSR) sites as part of their service. Wake County also has the option of offering the North Wake Landfill and Feltonsville Landfill as TDSR sites, having received previous approval from DENR to use these sites.

Several of the municipalities have identified locations within their City/Town limits that can serve as TDSR sites. Several municipalities have also made arrangements with private haulers and/or partnerships (mutual-aid contracts) with other Towns to help manage disaster debris.

### 4.12.2 Intended Actions

Table 4-19 lists the intended actions established by the jurisdictions of Wake County to meet their goals pertaining to disaster response. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

**Table 4-19. Disaster Response Intended Actions**

| Jurisdiction | Intended Action |
|---|---|
| Cary | 1. Identify and evaluate temporary debris storage and reduction sites. |
| Zebulon | 2. Prepare a Disaster Debris Management Plan. |
| Apex | 3. Finalize the Town's Disaster Debris Plan. |
| Garner | 4. Develop a Disaster Debris Disposal Plan. |
| All Jurisdictions | 5. Using the Contracting mechanisms put in place by Wake County or through separate efforts, establish standby contracts with Debris Management and Engineering Oversight Firms. |

## 4.13 Collection of Discarded Electronics

### 4.13.1 Current Activities

House Bill 819 (Session Law 2008-208) amended the requirements governing management of discarded computer equipment to include management for discarded televisions and makes other changes. Subsequently, Senate Bill 887 (Session Law 2010-67) repealed S.L. 2008-208, and then clarified and further modified the laws governing the management of discarded computer equipment and televisions. Effective July 1, 2011 televisions and computer equipment were banned from disposal in North Carolina landfills by state law. The bill stipulates that each discarded computer equipment and television collector shall ensure that discarded equipment is properly stored, and either held for pickup by a manufacturer or delivered to a facility designated by a manufacturer. Wake County's drop-off area for electronics meets this requirement.

Wake County will accept nearly any piece of electronics equipment with a cord at the two multi-material recycling facilities. During FY11, 1,565 tons of e-waste was dropped off by residents and businesses. Many of the local jurisdictions have electronic recycling programs that include one or more of the following collection methods: curb-side collection, drop-off centers, disposal by an electronic recycler, and special collection events. By having an Electronics Management Plan in place, Wake County's jurisdictions remain eligible for disbursements from the States electronic recycling fund. Wake County and all 12 participating jurisdictions received just over $64,000 from the fund during the first year of eligibility. Wake County continues to request Electronic Recycling State funding from NCDENR, Solid Waste Management. The proceeds will are shared among the participating local governments. The money received will be used to enhance their electronics management programs.

The County, City, and all Towns will use only certified electronics recycling vendors for electronics recycling. The County, which receives the Electronics Fund disbursements from the State, will not distribute any of the received funds to municipalities who do not use a R2 or E-steward certified

vendor for electronics recycling. A copy of Wake County's agreement with their current electronics recycling vendor (Creative Recycling) is included in Appendix I. Also included are the current (FY2013) vendor's and previous (FY2012) vendor's third-party certification documents.

The Town of Cary collects electronics both curbside by citizen request and at their Citizens Convenience Center and contracts with a certified electronics vendor for recycling of the material. The Town of Apex allows residents to drop off electronics at the Town's Public Works Facility and also contracts with a certified vendor. The Towns of Morrisville and Zebulon have held annual events for residents to drop off electronics, and in doing so have partnered with certified electronics recycling vendors. Copies of the certifications for the vendors which each of these have Towns have historically used are included in Appendix I. In future years, the County and municipalities may use different, but appropriately certified vendors.

Wake County's Electronics Waste Management Plan, which has been incorporated into this 2012 Solid Waste Management Plan, addresses the following:

- Existing and intended electronic collection programs, including the type of electronic material collected and how it will be marketed for recycling (Section 4.13.2);
- Educational programs regarding electronics recycling (Section 4.13.3);
- Electronic material tracking (Section 4.13.4);
- Accounting for the receipt and expenditure of funds from the State Electronics Management Program (Section 4.13.5); and
- A description of local the governments collaborative arrangements to recycle electronics (Section 4.13.6).

## 4.13.2 Intended Actions

Both intended and completed actions relating to collection and management of discarded electronics for each jurisdiction are provided in Table 4-20 on the following two pages.

## 4.13.3 Education Programs

Local governments have notified their residents in writing regarding the electronic materials banned from the landfill and will continue to publish via websites or through links, additional educational materials regarding electronic recycling opportunities.

In addition, Wake County government has developed a special section on its website to provide information about the recycling and reuse of discarded computer equipment, televisions, and other electronic devices (http://www.wakegov.com/recycling/business/multimaterialdropoff.htm). The focus of this website is to provide citizens with information about the programs that exist within Wake County, to recycle or reuse electronics (including county sponsored programs), as well as programs sponsored by the municipalities and manufacturers. The website includes information about the new law, the process of electronics recycling, and FAQs. Wake County government submitted information to the municipalities to include in their utility bill newsletters and developed a video segment shown on WakeGov television channel. The information was displayed at informational booths that staff members hosted as requested at community festivals and events.

**Table 4-20. Collection of Discarded Electronics Intended and Completed Actions**

| Jurisdiction | Intended Action |
|---|---|
| Apex | 1. Maintains a drop-off site located at the Town Public Works & Utilities Department at 105 Upchurch Street. |
| | 2. Collects material including computers, monitors, cords, processing units, speakers, keyboards, mice, printers, scanners, copiers, fax machines, and other computer parts. Due to space constraints televisions are not currently accepted. |
| | 3. Discarded televisions will be accepted once the drop-off site expansion is completed. |
| | 4. In November 2010, partnered with Metech Recycling, e-steward certified to appropriately recycle electronic material. |
| Cary | 5. Offers curbside collection of electronics free of charge. |
| | 6. Maintains a drop-off site at the Citizen's Convenience Center at 313 North Dixon Avenue. |
| | 7. Maintains on its website a list of businesses accepting electronics donations. |
| | 8. Has partnered with the electronic recycler American Greenz, who has responsible practices related to safety, data security and material preparation for smelters. |
| Fuquay-Varina | 9. Offers curbside collection of electronics free of charge. |
| | 10. Stores the collected electronic material at its Public Works facility at 533 North Main Street until such time as a truck load is accumulated. |
| | 11. Hauls discarded electronic material to the South Wake Multi-Material Recycling Facility operated by Wake County. |
| | 12. Posts the electronic material ban on its web site and newsletters. |
| Garner | 13. Intends to refer its residents to the closest electronic recycler and/or Wake County facility. |
| | 14. Plans to offer curbside collection semi-annually and deliver the materials to a Wake County operated facility. |
| | 15. Will advertise the electronic ban to its residents through their web site, newsletters, cable channel and other special events. |
| Holly Springs | 16. Advertises electronics ban to residents through website, newsletters, utility bills, cable channel and other special events. |
| | 17. Refer s residents to Wake County's Old Smithfield Road Convenience Center. |
| | 18. May consider curbside pick-up for a small fee in the future. |
| Knightdale | 19. Intends to recycle public electronics material through a partnership with Wake county's special remote collection events and to direct its residents to Wake County operated sites. |
| | 20. Will consider, based on future need, implementing of a curbside collection program which will deliver the material to a Wake County designated site. |
| | 21. Will educate its residents of this new law through the East Wake Television channel and website information with link to the Wake County Website. |
| Morrisville | 22. Offers a biannual curbside collection of bulky items inclusive of computer equipment and televisions. |
| | 23. Refers its residents to recycler American Greenz to dispose of their electronic material. |
| | 24. Established a web link to the Wake County website to provide additional information. |
| Raleigh | 25. Offers special collection services upon request at no charge. The City intends to add additional vehicles to support increased demand for this service. |
| | 26. Has partnered with Eco Lube for a drop-off location at 4901 Atlantic Avenue. |
| | 27. Collects electronic material including items with a cord such as computer equipment, speakers, televisions, and other electronics. |
| | 28. Delivers collected electronic material to the North Wake Multi-Material site operated by Wake County. |
| | 29. Provides information on collection and drop off on its website and printed comprehensive booklet Talking Trash. |

**Table 4-20 (continued). Collection of Discarded Electronics Intended and Completed Actions**

| Jurisdiction | Intended Action |
|---|---|
| Raleigh (continued) | 30. Web site also offers residents opportunities for local reuse and recycling at businesses and at non-profits. |
| | 31. Intends to create an educational video and run throughout the year on community cable channel RTN. |
| | 32. Periodically reminds residents of the ban via departments email distribution list, Facebook page and Twitter account. |
| | 33. Intends to include an article in a utility bill insert. |
| | 34. Coordinates collection events (particularly inside beltline) with Wake County. |
| Rolesville | 35. Will implement a curbside collection program and deliver the material to a Wake County designated site. |
| | 36. Will advertise the electronic ban to its residents through (1) website with a link to the Wake County website, (2) newsletters, (3) cable channel and (4) other special events. |
| Wake Forest | 37. Currently has a program for curbside service upon request to collect televisions and other electronics through contract with Republic Waste Services. |
| | 38. Will advertize the electronic ban to its residents through their web site with a link to the Wake County website, newsletters, cable channel and other special events. |
| Wendell | 39. Curbside bulky materials collection includes electronics and televisions through a contract with Republic Waste Services. |
| | 40. Intends to educate the public through its community television channel and website information with a link to the Wake County website. |
| Zebulon | 41. Intends to send a newsletter to its residents announcing the ban of electronics material in the landfill. |
| | 42. Will educate its residents through a link to the Wake County website. |
| | 43. Will partner with Wake County and will encourage its residents to use the Wake County Convenience Center located in Wendell to drop-off their electronics for recycling. |
| | 44. Residents and some municipalities use three drop-off sites: North Wake Multi-Material Recycling Facility located at 9029 Deponie Drive in North Raleigh, South Wake Multi-Material Recycling Facility located at 6130 Old Smithfield Road in Apex, and Convenience Center Site #11 located at 5051 Wendell Boulevard in Wendell. |
| | 45. Will consider adding more sites, as space and budget constraints permit. |
| | 46. Has expanded its electronics recycling program to include nearly any electronic device with a cord, including computer equipment and televisions. |
| | 47. Partners with towns to conduct periodic electronic collection and household hazardous waste events. |
| | 48. Contracts Synergy Recycling (R2-Certified) to recycle and market obsolete electronics, as well as refurbishing and marketing of reusable parts to buyers throughout the U.S. and abroad. |
| | 49. Will administer and share among the towns the proceeds from the Electronic Recycling fund. |

Other units of local government have created links to the county's website for information on electronics recycling.

## 4.13.4 Tracking of Public Program Data

All local governments will comply with the state requirement to track material data in such a way as to be able to report television tonnage separately from other electronic materials. Municipalities

delivering electronics to a site operated by Wake County are not required to track their own data because it will be included in the data tracked and reported by Wake County. Currently Raleigh, Fuquay-Varina and Wendell are delivering their electronic material to Wake County sites. More towns could do the same in the future.

All other municipalities directly working with an electronic recycler are required to track their own tonnage for televisions and other electronics separately. For example, it is the Town of Cary's responsibility to track the data for all materials managed by their program with American Greenz. Similarly, the Town of Apex will be responsible for tracking their own data managed with Metech. All other towns without an electronic recycling collection program will not have data to report.

### 4.13.5 Accounting for the Receipt and Expenditure of Funds from the State

Each jurisdiction receiving funds from the State's Electronics Management Program, either directly or through Wake County, will track the expenditure of those funds and only use them in support of electronics recycling efforts.

All local governments receiving funds from the State Electronics Management Program will create separate accounting codes for televisions and for other electronic material. In addition, it will create separate budget accounts for the receipt and the expenditure of funds received. For example, Wake County will create separate accounting codes for (1) televisions and (2) other electronics in both (a) revenues and (b) expenses. Similarly, all the towns sharing in the state electronic fund distribution will do the same.

### 4.13.6 Collaborative Arrangements for Electronics Recycling

Wake County government will continue to partner with all the local municipalities to recycle electronic material through the following initiatives:

- Municipalities may dispose of their collected electronic material at designated Wake County operated sites;
- Municipal educational programs may include a link to Wake County's electronic recycling website;
- Municipalities may partner with Wake County in special collection events;
- Wake County will serve as the lead local governmental unit to receive directly from the State the Electronics Management Fund distribution. The proceeds will be divided among local governments proportional to their population data;
- The population data source will be the State Demographer: http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/demog/munpop09.html; and
- Wake County will calculate and make payments to local governments within 45 days of receiving the funds from the state.

As the electronic recycling programs evolve over time, all the local governments will make necessary adjustments.

## 4.14 Management of Abandoned Manufactured Homes

House Bill 1134, which became effective on July 1, 2009, encourages counties to develop plans that provide for the deconstruction of abandoned manufactured homes and the removal of reusable or recyclable components. The bill requires that each county consider whether to implement a program for the management of abandoned manufactured homes. Counties that decide not to implement a program must state in their Solid Waste Management Plan Update that they considered a program but decided against implementing one. Wake County has determined that abandoned manufactured homes are currently not a significant threat to public health and the environment in Wake County, and therefore has chosen not to develop a plan at this time. The County will continue to evaluate this decision, and if conditions warrant, develop a written plan and include it as a component of the next Solid Waste Management Plan Update.

# Section 5
# Program Costs and Financing

The solid waste management goals that have been established with regard to financing include: utilizing full cost accounting practices; identifying opportunities to reduce or control costs and increase revenue opportunities; working collectively to integrate and coordinate services and programs; making effective use of both public and private sector services; participating in regional planning and decision-making activities to address regional opportunities for enhancing program effectiveness and efficiency; and establishing program measures to monitor progress toward attaining these goals. While many of these goals have been achieved, others are still evolving. This section presents a summary of financing mechanisms currently in place, discusses progress made toward achieving certain goals, and presents intended actions to realize other goals.

## 5.1 Description and Assessment of Costs and Funding Mechanisms

As described in Section 4, each jurisdiction provides a variety of solid waste services, some of which are self performed while others are contracted to private haulers. The following paragraphs and tables provide a comparison of costs per household for each program and residential user fees.

### 5.1.1 Program Costs and Residential User Fees

Table 5-1 describes annual costs per household of solid waste collection and disposal, reduction, reuse and recycling, and mulch/compost programs where they exist. The primary source of data was the FY11 Solid Waste Management Annual Reports in addition to input from local jurisdiction staff.

It should be noted that each program's operation practices and costs are unique depending on the types of services they provide, how the service is delivered, and how costs are grouped/reported on the State's forms. Also, collection contract costs may include limited service to commercial entities which may artificially raise unit costs. Therefore, caution should be exercised when comparing these costs.

Table 5-1 shows that the program cost and fees are widely variable across the jurisdictions. The overall annual program cost per household ranges from $140.68 (for Cary) to $303.66 (for Zebulon). The average annual program cost for all twelve municipalities is $218 per household. Ten of 12 municipalities have increased their program cost (on a per household basis) since the previous Plan update was completed, which looked at FY08 data. Two jurisdictions, reported a decrease in program cost due to revenue from the sale of recyclables and/or other factors.

As shown in Table 5-2, 10 of the 12 local jurisdictions charge a user fee for service (excluding Wake County). In FY11, 8 of the 10 jurisdictions which charge a user fee, charged less than the FY11 program cost per household; one jurisdiction charged the same amount as its FY11 program cost per household; and one jurisdiction charged more than its FY11 program cost per household. Jurisdictions which charged less rely on property taxes and their general fund to make up the difference. Wake County continues to charge a $20/year per household availability fee to its residents for use of the convenience centers.

**Table 5-1**
**Wake County Plan Jurisdictions' Solid Waste Management Per-Household Program Costs and User Fees**
**(Reported for FY11)**

| | *Summary of Program Service Costs for FY11* | | | | | | *Summary of Household User Fees for FY11* | | | | | *User Fees* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jurisdiction | Collection and Disposal ($/HH/YR) | Reduction, Reuse and Recycling ($/HH/YR) | Yard Waste Program ($/HH/YR) | Overall Program Cost ($) | Number of Households | Overall Program Cost per Household ($/HH/YR) | Solid Waste User Fee ($/month) | Recycling User Fee ($/month) | Yard Waste User Fee ($/month) | Bulky Waste User Fee ($/month) | Availability Fee ($/month) | Total Residential User Fees ($/HH/YR) |
| Apex | $135.96 | $26.62 | $56.64 | $2,518,063 | 11,432 | $220.26 | $9.29 | $2.22 | $4.00 | -- | -- | $186.12 |
| Cary | $120.80 | $17.51 | $2.36 | $6,309,978 | 44,855 | $140.68 | -- | -- | -- | -- | -- | $168.00 |
| Fuquay Varina | $135.69 | NP | $47.97 | $1,157,073 | 6,300 | $183.66 | -- | -- | -- | -- | -- | $171.00 |
| Garner | $125.43 | $23.89 | $66.54 | $1,861,006 | 8,687 | $214.23 | -- | -- | -- | -- | -- | -- |
| Holly Springs | NP | NP | NP | $1,862,650 | 8,182 | $227.65 | $8.75 | $3.65 | $2.00 | -- | -- | $172.80 |
| Knightdale | $167.18 | NP | NP | $531,633 | 3,180 | $167.18 | $9.76 | $3.65 | -- | -- | $0.25 | $163.92 |
| Morrisville[1] | $113.73 | $44.57 | $16.10 | $773,078 | 4,440 | $174.12 | -- | -- | -- | -- | -- | -- |
| Raleigh | $82.40 | $37.84 | $41.20 | $20,743,390 | 114,467 | $181.22 | $7.70 | $2.60 | -- | -- | -- | $123.60 |
| Rolesville | $234.23 | $0.00 | $22.88 | $332,191 | 1,292 | $257.11 | $11.30 | $4.00 | $2.20 | -- | -- | $210.00 |
| Wake Forest[1] | NP | NP | NP | $2,568,100 | 9,231 | $278.20 | -- | -- | -- | -- | -- | -- |
| Wendell | $103.56 | $51.12 | $109.32 | $486,552 | 1,843 | $264.00 | -- | -- | -- | -- | -- | $264.00 |
| Zebulon | $150.02 | $73.63 | $82.52 | $498,921 | 1,643 | $303.66 | $9.76 | $3.72 | -- | $3.52 | -- | $204.00 |
| Wake County | $12.63 | $8.53 | NA | $7,825,279 | 369,787 | $21.16 | -- | -- | -- | -- | $20.00 | $20.00 |

**Notes:**

Certain Towns also provide services to some commercial entities, and the total costs shown includes that cost.

NP = Not provided; "Overall Program Cost" reflects the cost of all three services.

NA = Not applicable (Wake County does not have a yard waste program

[1] - Household Fees are not used as a funding source

Source: Solid Waste and Materials Management Annual Reports, July 1, 2010 - June 30, 2011

**Table 5-2**
**Solid Waste Program Funding Sources of Wake County Local Governments**

| Jurisdiction | Solid Waste Program Funding Sources |
|---|---|
| Apex | Property Tax/General Fund, per Household Charge and Grants |
| Cary | Property Tax/General Fund, per Household Charge and Sale of Recyclables |
| Fuquay Varina | Property Tax/General Fund and per Household Charge |
| Garner | Property Tax/General Fund |
| Holly Springs | Per Household Charge |
| Knightdale | Per Household Charge |
| Morrisville | Property Tax/General Fund |
| Raleigh | Property Tax/General Fund and per Household Charge |
| Rolesville | Per Household Charge |
| Wake Forest | Property Tax/General Fund |
| Wendell | Property Tax/General Fund and per Household Charge |
| Zebulon | Property Tax/General Fund, per Household Charge and Grants |
| Wake County | Tiping Fees, Sale of Recyclables, Per Household Charges, Tire Tax, White Goods and Disposal Tax |

Of the 12 municipal jurisdictions, only three self-perform all of their solid waste services (Cary, Fuquay Varina, and Raleigh). The remaining nine jurisdictions contract service to Waste Industries (7), Republic (1), or Allstar Waste (1). A survey was completed as part of the last plan update to understand the range of monthly per residence charges offered by the contract service providers. In general, monthly per residence charges for weekly garbage collection was uniform, with a range of approximately $8 to $10 per month and an average of approximately $9 per month. Recycling charges showed more variability, ranging from approximately $2 to a high of nearly $5 per residence per month. Although a new survey was not performed as part of this Plan Update, these charges are not expected to have changed significantly.

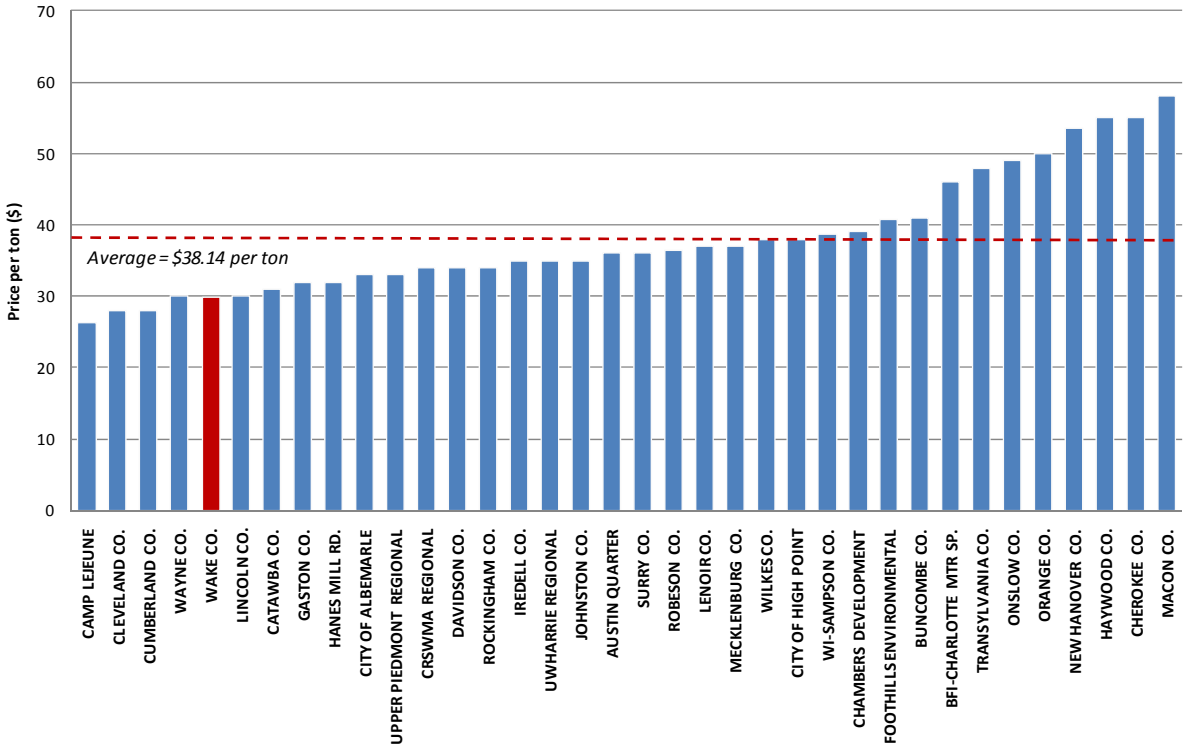
### 5.1.2 Recyclables Revenue

The jurisdictions that self-perform recyclables collection have benefited from the recent increase in market rates for recyclables. As noted in Section 4.3.1, Wake County and the towns of Cary and Fuquay-Varina collaboratively negotiated a contract with Waste Management Recycle America that pays a minimum market-based price of $18 per ton for their recyclables. Between July and September of 2011, the market price for recyclables had increased to approximately $67/ton, resulting in a significant and unexpected revenue stream. During FY11, the Town of Cary received $395,675 in revenue from recyclables.

### 5.1.3 SWLF Tipping Fee Evaluation

Disposal costs (i.e. tipping fees), are a significant component of the overall cost of solid waste services. Disposal costs remain low in Wake County, compared to other areas of the State, as a result of a SWLF tipping fee that is among the lowest 25 percent in the State (see Figure 5-1). Wake County continues to monitor changes in waste flow, waste generation rates, and market-based tipping fees at both public and private regional landfills to ensure that the tipping fee at the SWLF is appropriately set, relative to

**Figure 5-1**
**North Carolina MSW Landfill Tipping Fees at End of FY 2010 ($/ton)**
***(State Solid Waste Tax is not included)***




other disposal alternatives in the region. Irrespective of market rates, the County and partners must ensure that the tipping fee is set to cover the cost of operation and allow for the creation of necessary closure and post-closure reserve funds. To help in this regard, an evaluation of regional landfill tipping fees was performed as part of this Plan Update. The detailed results of this evaluation are included in the *Tipping Fee Evaluation Technical Memorandum* contained in Appendix H. Wake County continues to offer a very competitive tipping fee, compared to the regional public disposal facilities in Johnston, Wayne, Alamance, and Orange counties, which charge from $30 to $57 dollars per ton.

Historically, several regional private landfills have been the recipient of a portion of the waste collected primarily from the CII sector in Wake County. The three private landfills within 100 miles of the SWLF were noted in Section 3.4.2, and include the Republic Upper Piedmont Regional Landfill, the Waste Industries Sampson County Landfill, and the Uwharrie Environmental Regional Landfill.

Private landfill disposal pricing varies depending upon a number of factors, some of which include:

- Capital and operating costs;
- Volume and types of materials received;
- Hauling distance;
- Available airspace;
- Fuel surcharges; and

- Contract term.

Private firms, including Waste Industries and Republic, which operate regional landfills and maintain collection contracts, will weigh each one of these factors when deciding where to deliver and dispose of the waste they collect. In many instances, this decision is not strongly influenced by the currently established tipping fee at the SWLF, assuming it is within a reasonable, market-based range.

The jurisdictions that joined the SWLF Partnership share excess revenue that is generated from tipping fees at the SWLF. The current SWLF financial model predicts excess revenue when annual tonnage is in excess of approximately 350,000 (this threshold increases annually). The excess revenue is returned to the partners and used to fund existing and future solid waste programs.

## 5.2 Intended Actions

The intended actions established by the jurisdictions of Wake County to meet their goals pertaining to program costs and financing are provided in Table 5-3. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

**Table 5-3. Program Costs and Financing Intended Actions**

| Jurisdiction | Intended Action | |
|---|---|---|
| Cary | 1. | Annually review solid waste rate and expenditures to ensure a cost effective program. |
| | 2. | Re-evaluate recycling contract with WM Recycle America when it expires in three years. |
| Fuquay-Varina | 3. | Purchase new and larger equipment (e.g. 25 cy trucks) to help provide efficient service. |
| Garner | 4. | Evaluate recycling revenue-sharing options within existing and future recyclable collection contracts. |
| Raleigh | 5. | Develop and implement an apprenticeship program. |
| Rolesville | 6. | Evaluate recycling revenue-sharing options of future recyclable collection contracts. |
| Wake County | 7. | Revise SWLF schedule of rates, fees, and charges that reflect the actual cost of service associated with management of wastes received, including special wastes such as mattresses, bulky wastes, and non-organic materials. |
| | 8. | Continue to identify potential opportunities to reduce or control costs and increase revenue associated with solid waste disposal and recycling services for Wake County buildings. |
| | 9. | Annually evaluate the EWTS and SWLF tipping fees with regard to market rates, waste volume, and revenues. |
| | 10. | Promote programs to capture a greater market share of recyclable materials at convenience centers and multi-material recycling centers and continue to evaluate recycling market development opportunities. |

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# Section 6
# Program Management and Administration

Wake County and the municipal jurisdictions continue to work collaboratively to ensure the availability of economic, long-term, waste disposal capacity to exclusively serve the residents and businesses of Wake County. The County, City of Raleigh, and ten Towns which formed the South Wake Landfill Partnership have agreed to share in the responsibilities and benefits of maintaining the SWLF as the primary long-term MSW disposal option. The Partnership has effectively strengthened the cooperation among municipalities with regard to solid waste management and planning. Outside of the Partnership, the County and municipalities continue to collaborate in areas such as HHW collection, recyclables sale, yard waste management, disaster debris management preparedness, and planning for short and long-term beneficial uses for the SWLF and adjoining properties.

In making the decision to develop a publicly-owned solid waste disposal facility, the partners have assumed greater control and flexibility in creating and using revenue from tipping fees to fund their solid waste programs. The partners will continually need to evaluate SWLF tipping fees to ensure adequate waste amounts (which lower overall costs) while at the same time, preserving landfill airspace and the duration for which the facility can accept waste. As noted in the disposal element, Wake County continues to evaluate approaches that would allow for acceptance of more waste while maintaining the long-term viability of the landfill.

The Solid Waste Technical Advisory Committee (TAC) comprised of solid waste program managers from all 13 jurisdictions continues to meet on a routine basis to share information about their programs, address needs, discuss changes in markets and regulations, and identify opportunities. The Managers Committee and its' supporting TAC, which collectively form the Solid Waste Advisory Committee (SWAC), have established a strong track record of collaboration and consensus building with regard to solid waste management in Wake County. At the same time, it is understood that the various jurisdictions do not share all of the same goals and expectations. Individual effort by each jurisdiction is necessary to achieve both the shared and uncommon goals. It is up to each jurisdiction participating in this planning process to undertake work to realize these goals.

Each jurisdiction also has the responsibility of building and maintaining institutional capacity of their solid waste program and supporting the development of staff knowledge and understanding. This can be accomplished by encouraging and funding staff participation in local, State, regional, and national conferences, seminars, and training opportunities such as those offered by the Solid Waste Association of North America (SWANA).

The intended actions collectively established by the jurisdictions of Wake County to meet their goals pertaining to program management and administration are listed in Table 6-1. A summary of progress made toward actions specified in the previous Plan Update is included in Appendix D.

**Table 6-1. Program Management and Administration Intended Actions**

| Jurisdiction | Intended Action |
|---|---|
| Knightdale | 1. Implement a web-based request and tracking system for missed refuse and recycling pickups. |
| | 2. Evaluate opportunities to increase automation of services and performance monitoring to improve efficiency. |
| Morrisville | 3. Consider relocation of Town Public Works Facility to a site that would allow for increased solid waste services, and allow for possible expansion of the Wake County convenience center. |
| Raleigh | 4. Investigate the possibility of converting to an enterprise fund. |
| Wake County | 5. Continue to modify service delivery for the convenience centers and multi-material recycling facilities by executing separate contracts for facility operation, material hauling, and recycling material processing. |
| | 6. Continue to re-assess the number, location, and services to be provided by convenience centers, material recycling facilities, and other current and proposed waste management facilities. |
| Zebulon | 7. Work with Town's refuse and recycling collection vendor to implement a web-based work order system. |
| All Jurisdictions | 8. Periodically evaluate costs versus benefits of the activities and services provided under each solid waste management program element. |
| | 9. Evaluate existing private sector relationships and explore opportunities for cooperative contracting, as well as additional public/private partnership opportunities. |
| | 10. Provide for employee training and education, as needed, to keep pace with job requirements and improvements in solid waste management systems. |

One of the City of Raleigh's intended actions, as noted in Table 6-1, is to investigate the advantages and disadvantages of converting to an enterprise fund, rather than relying the combination of household charges, property taxes, and the general fund. Nationwide, the aggregate number of enterprise funds in larger cities has increased, with the largest increases occurring in solid waste and drainage/ stormwater departments. One of the commonly cited reasons for shifting to enterprise fund accounting is that user fees and charges established in enterprise funds promote efficiency by shifting payment of costs to specific users of services, thereby avoiding general taxation. An enterprise fund would provide the City with the flexibility to account separately for all financial activities associated with the full range of solid waste services provided.

Several towns have developed intended actions that focus on information technology (IT) improvements. Technologies like automated vehicle location (AVL) systems, routing software, and Geographic Information Systems (GIS) are used by municipalities and/or their service providers to increase efficiencies, reduce costs, and improve customer service. The trend toward the use of IT in solid waste services is only likely to increase over the next 10 years.

# Appendix A

Local Government Resolutions Adopting the Plan

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**Resolution # 12-** 2012-0515-09

**RESOLUTION ACCEPTING AND ENDORSING THE SOLID WASTE MANAGEMENT PLAN UPDATE OF 2012 FOR WAKE COUNTY**

**WHEREAS**, it is a priority of this community to protect human health and the environment through safe and effective management of municipal solid waste;

**WHEREAS**, the reduction of the amount and toxicity of the local waste stream is a goal of this community;

**WHEREAS**, equitable and efficient delivery of solid waste management services is an essential characteristic of the local solid waste management system;

**WHEREAS**, it is a goal of the community to maintain and improve its physical appearance and to reduce the adverse effects of illegal disposal and littering;

**WHEREAS**, The Town of Apex recognizes its role in the encouragement of recycling markets by purchasing recycled products;

**WHEREAS**, involvement and education of the citizenry is critical to the establishment of an effective local solid waste program;

**WHEREAS**, the State of North Carolina has placed planning responsibility on local governments for the management of solid waste;

**WHEREAS**, NC General Statute 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other units of local government, to update the Ten Year Comprehensive Solid Waste Management Plan at least every three years;

**WHEREAS**, the Town of Apex, in a collaborative effort with the Wake County Solid Waste Management Department and Citizens Solid Waste Advisory Council have undertaken and completed a long-range planning effort to evaluate the appropriate technologies and strategies available to manage solid waste effectively;

**WHEREAS**, the Wake County 2012 Ten Year Comprehensive Solid Waste Management Plan is available for review on Wake County's website at: http://www.wakegov.com/recycling/managementplan.htm.

**NOW, THEREFORE, BE IT RESOLVED** by the Town Council of the Town of Apex, that Wake County's 2012 Ten Year Comprehensive Solid Waste Management Plan Update is hereby accepted, endorsed, and placed on file with the Town Clerk on this the 15th day of May, 2012.

By _____
Keith H. Weatherly
Mayor

ATTEST:

_____
Donna Hosch
Town Clerk

APPROVED AS TO FORM:

_____
Henry C. Fordham, Jr.
Town Attorney

OFFICE OF THE MAYOR

RESOLUTION TO APPROVE THE WAKE COUNTY SOLID WASTE PLAN THREE YEAR UPDATE

WHEREAS, it is a priority of this community to protect human health and the environment through safe and effective management of municipal solid waste;

WHEREAS, the reduction of the amount and toxicity of the local waste stream is a goal of this community;

WHEREAS, equitable and efficient delivery of solid waste management services is an essential characteristic of the local solid waste management system;

WHEREAS, it is a goal of the community to maintain and improve its physical appearance and to reduce the adverse effects of illegal disposal and littering;

WHEREAS, The Town of Cary recognizes its role in the encouragement of recycling markets by purchasing recycled products;

WHEREAS, involvement and education of the citizenry is critical to the establishment of an effective local solid waste program;

WHEREAS, the State of North Carolina has placed planning responsibility on local government for the management of solid waste;

WHEREAS, NC General Statute 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other units of local government, to update the Ten Year Comprehensive Solid Waste Management Plan at least every three years;

WHEREAS, The Town of Cary Solid Waste Management Division has undertaken and completed a long-range planning effort to evaluate the appropriate technologies and strategies available to manage solid waste effectively;

NOW, THEREFORE, BE IT RESOLVED that The Town Council of Cary hereby approves the Wake County Ten Year Comprehensive Solid Waste Management Plan Three Year Update.

Adopted this 10 day of May, 2012.

Harold Weinbrecht
Mayor

Attest:

Sue Ryvoland
Town Clerk

TOWN of CARY
316 N. Academy Street • Cary, NC 27513 • PO Box 8005 • Cary, NC 27512-8005
tel 919-469-4011 • fax 919-460-4910 • www.townofcary.org

**Resolution No. 12-2222**

**TOWN OF FUQUAY-VARINA**
401 Old Honeycutt Road
Fuquay-Varina, North Carolina 27526

# RESOLUTION TO APPROVE THE WAKE COUNTY GOVERNMENTS' 10-YEAR COMPREHENSIVE SOLID WASTE MANAGEMENT PLAN THREE YEAR UPDATE

WHEREAS, better planning for solid waste will help protect public health and the environment, provide for an improve solid waste management system, better utilize our natural resources, control the cost of solid waste management: and,

WHEREAS, North Carolina General Statutes 130A-309.09A9b) requires each unit of local government, either individually or in cooperation with other units of local government to update the Ten Year Comprehensive Solid Waste Management Plan at least every three years: and,

WHEREAS, the Town of Fuquay-Varina is represented on the Wake County Solid Waste Advisory Committee and has been actively involved in the planning process;

NOW, THEREFORE, BE IT RESOLVED that the Town Board of Commissioners of Fuquay-Varina hereby approve the Wake County Government' 10-Year Comprehensive Solid Waste Management Plan Three Year Update and acknowledge and accept the Town's inclusion in the county wide plan.

Adopted this the 7th day of May 2012.

MAYOR

TOWN OF FUQUAY-VARINA, N.C. INCORPORATED 1909

ATTEST:

TOWN CLERK

RESOLUTION NO. (2012) 2125

RESOLUTION ADOPTING THE TEN YEAR SOLID WASTE MANAGEMENT PLAN OF JULY 1, 2012 THROUGH JUNE 30, 2022 FOR THE TOWN OF GARNER

WHEREAS, it is a priority of this community to protect human health and the environment through safe and effective management of municipal solid waste;

WHEREAS, the reduction of the amount and toxicity of the local waste stream is a goal of this community;

WHEREAS, equitable and efficient delivery of solid waste management services is an essential characteristic of the local solid waste management system;

WHEREAS, it is a goal of the community to maintain and improve its physical appearance and to reduce the adverse effects of illegal disposal and littering;

WHEREAS, the Town of Garner recognizes its role in the encouragement of recycling markets by purchasing recycled products;

WHEREAS, involvement and education of the citizenry is critical to the establishment of an effective local solid waste program;

WHEREAS, the State of North Carolina has placed planning responsibility on local government for the management of solid waste;

WHEREAS, NC General Statute 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other units of local government, to update the Ten Year Comprehensive Solid Waste Management Plan at least every three years;

WHEREAS, the Wake County's Solid Waste Management Department and Citizens Solid Waste Advisory Council have undertaken and completed a long-range planning effort to evaluate the appropriate technologies and strategies available to manage solid waste effectively;

NOW, THEREFORE, BE IT RESOLVED BY THE GOVERNING BOARD OF THE TOWN OF GARNER:

That County's 2012 Ten Year Comprehensive Solid Waste Management Plan is accepted and endorsed and placed on file with the Clerk to the Town Council on this the 22nd day of May, 2012.

Ronnie S Williams
Mayor

Kimberly A. Moffett
Town Clerk

THE TOWN OF

# Holly Springs

**Resolution No.:** 12-10
**Date Submitted:** June 5, 2012
**Date Adopted:** June 5, 2012

**RESOLUTION ACCEPTING AND ENDORSING THE UPDATED SOLID WASTE MANAGEMENT PLAN OF 2012 FOR THE TOWN OF HOLLY SPRINGS**

**WHEREAS**, it is a priority of this community to protect human health and the environment through safe and effective management of municipal solid waste; and

**WHEREAS**, the reduction of the amount and toxicity of the local waste stream is a goal of this community; and

**WHEREAS**, equitable and efficient delivery of solid waste management services is an essential characteristic of the local solid waste management system; and

**WHEREAS**, it is a goal of the community to maintain and improve its physical appearance and to reduce the adverse effects of illegal disposal and littering; and

**WHEREAS**, the Town of Holly Springs recognizes its role in the encouragement of recycling markets by purchasing recycled products; and

**WHEREAS**, involvement and education of the citizenry is critical to the establishment of an effective local solid waste program; and

**WHEREAS**, the State of North Carolina has placed planning responsibility on local government for the management of solid waste; and

**WHEREAS**, NC General Statute 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other units of local government, to update the Ten Year Comprehensive Solid Waste Management Plan at least every three years; and

**WHEREAS**, the Town of Holly Springs Administration and Public Works Departments have participated in the long-range planning effort to evaluate the appropriate technologies and strategies available to manage solid waste effectively; and

**NOW, THEREFORE, BE IT RESOLVED BY THE HOLLY SPRINGS TOWN COUNCIL** that it accepts and endorses the Wake County 2012 Ten-Year Comprehensive Solid Waste Management Plan and directs its placement on file with the Town Clerk on this 5th day of June 2012.

The motion to adopt this resolution was made by Councilman Sack, seconded by Councilman Cobb and passed by a vote of 4 to 0.

Dick Sears, Mayor

**Office of the Mayor**

**128 S. Main Street • P.O. Box 8 • Holly Springs, NC 27540 • (919) 557-3901 • (919) 552-0654 *fax***
**dick.sears@hollyspringsnc.us • www.hollyspringsnc.us**

# TOWN OF KNIGHTDALE

950 Steeple Square Court ● Knightdale, NC 27545
Office (919) 217-2220 ● Fax (919) 217-2229

**RESOLUTION NO. 12-05-16-002**

**RESOLUTION ACCEPTING AND ENDORSING THE SOLID WASTE MANAGEMENT PLAN OF 2012 FOR WAKE COUNTY AND THE TOWN OF KNIGHTDALE**

**WHEREAS**, it is a priority of this community to protect human health and the environment through safe and effective management of municipal solid waste; and

**WHEREAS**, the reduction of the amount and toxicity of the local waste stream is a goal of this community; and

**WHEREAS**, equitable and efficient delivery of solid waste management services is an essential characteristic of the local solid waste management system; and

**WHEREAS**, it is a goal of the community to maintain and improve its physical appearance and to reduce the adverse effects of illegal disposal and littering; and

**WHEREAS**, the Town of Knightdale recognizes its role in the encouragement of recycling markets by purchasing recycled products; and

**WHEREAS**, involvement and education of the citizenry is critical to the establishment of an effective solid waste program; and

**WHEREAS**, the State of North Carolina has placed planning responsibility on local government for the management of solid waste; and

**WHEREAS**, NC General Statute 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other units of government, to update the Ten Year Comprehensive Solid Waste Management Plan at least every three years; and

**WHEREAS**, the Wake County Solid Waste Management Department and Citizens Solid Waste Advisory Council, in cooperation with the Town of Knightdale, have undertaken and completed a long-range planning effort to evaluate the appropriate technologies and strategies available to manage solid waste effectively;

**NOW, THEREFORE, BE IT RESOLVED** that the Town Council of the Town of Knightdale hereby adopts Wake County's 2012 Ten Year Comprehensive Solid Waste Management Plan this 16th day of May, 2012.

Russell B. Killen, Mayor

ATTEST & SEAL:

Suzanne M. Yeatts, Town Clerk

TOWN OF MORRISVILLE * PO BOX 166 * MORRISVILLE, NC 27560

# RESOLUTION 2012-066 OF THE MORRISVILLE TOWN COUNCIL PERTAING TO ADOPTION OF THE 2012 WAKE COUNTY TEN YEAR COMPREHENSIVE SOLID WASTE MANAGEMENT PLAN

**WHEREAS,** it is a priority of this community to protect human health and the environment through safe and effective management of municipal solid waste; and

**WHEREAS,** the reduction of the amount and toxicity of the local waste stream is a goal of this community; and

**WHEREAS,** equitable and efficient delivery of solid waste management service is an essential characteristic of the local solid waste management system; and

**WHEREAS,** it is the goal of the community to maintain and improve its physical appearance and to reduce the adverse effects of illegal disposal and littering; and

**WHEREAS,** the Town of Morrisville recognizes its role in the encouragement of recycling markets by purchasing recycled products; and

**WHEREAS,** the State of North Carolina has placed planning responsibility on local government for management of solid waste; and

**WHEREAS,** NC General Statute 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other units of local government, to update the ten year comprehensive Solid Waste Management Plan at least every three years; and

**WHEREAS,** the Wake County Solid Waste Management Department and Technical Advisory Committee have undertaken and completed a long range planning effort to evaluate the appropriate technologies and strategies available to manage solid waste effectively:

**NOW, THEREFORE, BE IT RESOLVED THAT THE MORRISVILLE TOWN COUNCIL ADOPTS** the Wake County 2012 Ten Year Comprehensive Solid Waste Management Plan, a copy of which is placed on file with the Town Clerk.

Adopted this the 22nd day of May, 2012.

J. S. Holcombe, Mayor

ATTEST:

Diana R. Davis, Town Clerk

City Of Raleigh
NORTH CAROLINA

(STATE OF NORTH CAROLINA

COUNTY OF WAKE)

# CERTIFICATION

I, Gail G. Smith, City Clerk of the City of Raleigh, North Carolina, do hereby certify that the attached are true and exact copies of excerpts of a meeting of the Raleigh City Council held May 1, 2012 including a list of those City Council members in attendance and discussion pertaining to the following item:

TEN YEAR COMPREHENSIVE SOLID WASTE MANAGEMENT PLAN UPDATE - APPROVED

IN WITNESS WHEREOF, I have hereunto set my hand and have caused the Seal of the City of Raleigh, North Carolina to be affixed this 30th day of July, 2012.

CITY OF RALEIGH (SEAL) NORTH CAROLINA

Gail G. Smith
City Clerk

## TEN YEAR COMPREHENSIVE SOLID WASTE MANAGEMENT PLAN UPDATE - APPROVED

Pursuant to NC General Statute 130A-309A(b), each unit of local government is required to develop a ten-year, solid waste management plan and update the plan every three years. In Wake County, the original plan was adopted in 1997 and has been updated every third year since (2000, 2003, 2006, and 2009). The 2012 update, completed in collaboration with all 12 local municipal governments, was prepared in accordance with the latest Ten Year Solid Waste Management Plan Guide. The Plan presents a progressive vision for managing solid waste in Wake County through the development of intended actions for solid waste planning elements, which include: reduction; collection; recycling and reuse; composting and mulching; incineration; transfer; disposal; education; special wastes; illegal disposal/litter; purchasing of recycled products; disaster response; collection of discarded electronics; and management of abandoned manufactured homes.

**Recommendation:** Approve the Ten Year Plan Update for 2012. Upheld on Consent Agenda, Crowder/Baldwin – 8 ayes.

# RESOLUTION ACCEPTING AND ENDORSING THE SOLID WASTE MANAGEMENT PLAN OF 2012 FOR THE TOWN OF ROLESVILLE

**WHEREAS**, it is a priority of this community to protect human health and the environment through safe and effective management of municipal solid waste; and

**WHEREAS**, the reduction of the amount and toxicity of the local waste stream is a goal of this community; and

**WHEREAS**, equitable and efficient delivery of solid waste management services is an essential characteristic of the local solid waste management system; and

**WHEREAS**, it is a goal of the community to maintain and improve its health and reduce the adverse effects of illegal disposal and littering; and

**WHEREAS**, the Town of Rolesville recognizes its role in the encouragement of recycling markets by purchasing recycled products; and

**WHEREAS**, involvement and education of the citizenry is critical to implementing an effective local solid waste program; and

**WHEREAS**, N.C. General Statue 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other local governments, to update the Ten Year Comprehensive Sold Waste Management Plan at least every three years; and

**WHEREAS**, the Town of Rolesville's Solid Waste Management Department and Citizens Solid Waste Advisory Council have undertaken and completed long-range planning to evaluate the appropriate technologies and strategies to manage solid waste effectively;

**NOW THEREFORE, BE IT RESOLVED** by the governing board of the Town of Rolesville that the Town of Rolesville's 2012 Ten Year Comprehensive Solid Waste Management Plan is accepted and endorsed and placed on file with the Clerk to the Board on this day, June 4, 2012.

C. Frank Eagles

C. Frank Eagles, Mayor of Rolesville

Attest: Leslie Rudd

Leslie Rudd, Town Clerk

# RESOLUTION ACCEPTING AND ENDORSING

# THE WAKE COUNTY TEN YEAR COMPREHENSIVE

# SOLID WASTE MANAGEMENT PLAN UPDATE FOR 2012-2022

WHEREAS, the State of North Carolina has placed planning responsibility on local government for the management of solid waste;

WHEREAS, NC Statute 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other units of local government, to update the Ten Year Comprehensive Solid Waste Management Plan at least every three years;

WHEREAS, it is a priority of Wake County to protect human health and the environment through safe and effective management of municipal solid waste;

WHEREAS, the reduction of the amount and toxicity of the local waste stream is a goal of Wake County; WHEREAS, equitable and efficient delivery of solid waste management services is an essential characteristic of the local solid waste management system;

WHEREAS, it is a goal of Wake County to maintain and improve its physical appearance and to reduce the adverse effects of illegal disposal and littering;

WHEREAS, Wake County recognizes its role in the encouragement of recycling markets by purchasing recycled products;

WHEREAS, involvement and education of the citizenry is critical to the establishment of an effective local solid waste program;

WHEREAS, the Wake County Environmental Services Department, Solid Waste Management Division and the County's Solid Waste Advisory Committee have undertaken and completed a long-range planning effort to evaluate the appropriate technologies and strategies available to manage solid waste effectively;

NOW, THEREFORE, BE IT RESOLVED BY THE GOVERNING BOARD OF WAKE COUNTY:

That Wake County's 2009 Ten Year Comprehensive Solid Waste Management Plan is accepted and endorsed and placed in file with the Clerk to the Board on this day, June 18, 2012.

ADOPTED this the 18th day of June, 2012.

County of Wake

BY: _____

Paul Y. Coble, Chairman

ATTEST:

_____

Susan Banks, Clerk

# RESOLUTION 2012-77

## RESOLUTION TO APPROVE THE WAKE COUNTY SOLID WASTE PLAN THREE (3) YEAR UPDATE

WHEREAS, better planning for solid waste management will help protect public health and the environment, provide for an improved solid waste management system, better utilize our natural resources, control the cost of solid waste management; and

WHEREAS, North Carolina General Statutes 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other units of local government, to update the Ten Year Comprehensive Solid Waste Management Plan at least every three (3) years; and

WHEREAS, the Town of Wake Forest was adequately represented on the Wake County Solid Waste Advisory Committee and was actively involved in the planning process.

NOW, THEREFORE, BE IT RESOLVED by the Board of Commissioners of the Town of Wake Forest, North Carolina does hereby approve the Wake County Ten Year Comprehensive Solid Waste Plan Three Year Update.

This the 19th day of July 2012.

Motion by: Frank Drake

Second by: Greg Harrington

Mayor: Vivian A. Jones

ATTEST:

Deeda W. Harris
Town Clerk

**TOWN OF WENDELL** **NORTH CAROLINA**

**Resolution # R-2-2012**

**ACCEPTING AND ENDORSING THE SOLID WASTE MANAGEMENT PLAN OF 2012 FOR THE TOWN OF WENDELL**

**WHEREAS,** it is a priority of the Town of Wendell to protect human health and the environment through safe and effective management of municipal solid waste; and

**WHEREAS,** the reduction of the amount of toxicity of the local waste stream is a goal of this community; and

**WHEREAS,** equitable and efficient delivery of solid waste management services is an essential characteristic of the local solid waste management system; and

**WHEREAS,** it is a goal of the community to maintain and improve its physical appearance and to reduce the adverse effects of illegal disposal and lettering; and

**WHEREAS,** Wendell recognizes its role in the encouragement of recycling markets by purchasing recycled products; and

**WHEREAS,** involvement and education of the citizenry is critical to the establishment of an effective local solid waste program; and

**WHEREAS,** the State of North Carolina has placed planning responsibility on local government for the management of solid waste; and

**WHEREAS,** N.C. General Statute 130A-309.09(a)(b) requires each unit of local government, either individually or in cooperation with other units of local government, to update the Ten Year Comprehensive Solid Waste Management Plan at least every three years; and

**WHEREAS,** the Wake County Solid Waste Management Department and Citizens Solid Waste Advisory Council have undertaken and completed a long-range planning effort to evaluate the appropriate technologies and strategies available to manage solid waste effectively.

**NOW, THEREFORE, BE IT RESOLVED BY THE GOVERNING BOARD OF THE TOWN OF WENDELL,** that Wake County/Town of Wendell 2012 Ten Year Comprehensive Solid Waste Management Plan is accepted and endorsed and placed on file with the Clerk to the Board.

Adopted this the 29th day of May 2012.

Attest:

Jonnie Driver, Town Clerk

Timothy A. Hinnant, Mayor

R 2 2012

**RESOLUTION 2012-19**
**RESOLUTION ACCEPTING AND ENDORSING THE SOLID WASTE MANAGEMENT PLAN OF 2012 FOR THE TOWN OF ZEBULON**

WHEREAS, it is a priority of this community to protect human health and the environment through safe and effective management of municipal solid waste;

WHEREAS, the reduction of the amount and toxicity of the local waste stream is a goal of this community;

WHEREAS, equitable and efficient delivery of solid waste management services is an essential characteristic of the local solid waste management system;

WHEREAS, it is a goal of the community to maintain and improve its physical appearance and to reduce the adverse effects of illegal disposal and littering;

WHEREAS, The Town of Zebulon recognizes its role in the encouragement of recycling markets by purchasing recycled products;

WHEREAS, involvement and education of the citizenry is critical to the establishment of an effective local solid waste program;

WHEREAS, the State of North Carolina has placed planning responsibility on local government for the management of solid waste;

WHEREAS, NC General Statute 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other units of local government, to update the Ten Year Comprehensive Solid Waste Management Plan at least every three years;

WHEREAS, the Town of Zebulon and Citizens Solid Waste Advisory Council have undertaken and completed a long-range planning effort to evaluate the appropriate technologies and strategies available to manage solid waste effectively;

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS FOR THE TOWN OF ZEBULON

That the Town of Zebulon 2012 Ten Year Comprehensive Solid Waste Management Plan is accepted and endorsed and placed on file with the Clerk to the Board on this day, May 7, 2012.

TOWN OF ZEBULON INCORPORATED SEAL SEAL 1907 NORTH CAROLINA

Robert S. Matheny—Mayor

Lisa M. Markland, CMC—Town Clerk

## Appendix B

Notices of Opportunity for Public Comment and Meetings

### *PUBLIC COMMENT REQUESTED FOR SOLID WASTE PLAN*

The 2012 update to the Wake County Ten Year Solid Waste Management Plan is available for public review and comment from March 26 through April 9. The plan can be viewed online at *www.wakegov.com/recycling/managementplan.htm* and at the following locations throughout the County:

Area Chambers of Commerce
Athens Drive Community Library - Raleigh
Cameron Village Library - Raleigh
Cary Public Library - Cary
Duraleigh Road Library - Raleigh
East Regional Library - Knightdale
Express Library - Raleigh
Eva H. Perry Library - Apex
Fuquay-Varina Library - Fuquay-Varina
Green Road Library - Raleigh
Holly Springs Library - Holly Springs
Library Administration Building - Wake County Office Park
North Regional Library - Raleigh
Olivia Raney History Library - Wake County Office Park
Richard B. Harrison Library - Raleigh
Southeast Regional Library - Garner
Southgate Library - Raleigh
Wake Forest Branch Library - Wake Forest
Wendell Branch Library - Wendell
West Regional Library - Cary
Zebulon Branch Library - Zebulon

WAKE COUNTY NORTH CAROLINA

Comments may be faxed to (919) 743-4772, ATTN. Lowell Shaw; emailed to 2012TenYearPlan@wakegov.com or mailed to: ATTN. Lowell Shaw, Wake County Solid Waste Management Division, PO Box 550, Raleigh NC 27602 (post-marked no later than April 9, 2012).

WAKE COUNTY NORTH CAROLINA

Wake County
Ten Year Solid Waste Management Plan
Public Meeting
Thursday, April 26, 2012, 4:00 - 6:00 p.m.

Wake County and all twelve local municipal jurisdictions are completing an update to the Ten Year Solid Waste Management Plan. A public meeting will be held to receive comments on the Plan on Thursday, April 26, 2012 from 4:00 - 6:00 p.m. at the Wilders Grove Solid Waste Center at 630 Beacon Lake Drive, Raleigh, NC 27610 (off Corporation Parkway and Commerce Park Drive). A copy of the document is available for review at *www.wakegov.com/recycling/managementplan.htm*. Questions should be directed to Lowell Shaw at (919) 518-0273 or lshaw@wakegov.com.

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**Appendix C**

South Wake Landfill Interlocal Agreement

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# INTERLOCAL AGREEMENT

This **Interlocal Agreement** is dated as of Sept. 5, 2006, among **APEX, NORTH CAROLINA** ("Apex"); **CARY, NORTH CAROLINA** ("Cary"); **FUQUAY-VARINA, NORTH CAROLINA** ("Fuquay-Varina"); **GARNER, NORTH CAROLINA** ("Garner"); **KNIGHTDALE, NORTH CAROLINA** ("Knightdale"); **MORRISVILLE, NORTH CAROLINA** ("Morrisville"); **RALEIGH, NORTH CAROLINA** ("Raleigh"); **ROLESVILLE, NORTH CAROLINA** ("Rolesville"); **WAKE FOREST, NORTH CAROLINA** ("Wake Forest"); **WENDELL, NORTH CAROLINA** ("Wendell"); **ZEBULON, NORTH CAROLINA** ("Zebulon"); all of the above being municipal corporations and public bodies politic of the State of North Carolina; and **WAKE COUNTY, NORTH CAROLINA** (the "County" or "Wake"), a public body politic and corporate of the State of North Carolina.

## RECITALS:

**WHEREAS**, the Parties intend to establish a long-term solution to solid waste disposal needs by the cooperative management of a new South Wake Landfill (the "Landfill") that will serve both the Municipalities and the County; and

**WHEREAS**, the intent of this agreement is to establish a joint undertaking (the Interlocal Solid Waste Management System) whereby the Parties agree to share the economic benefits and responsibilities involved in securing an economical 25 year public landfill solution to their Municipal Solid Waste (MSW) disposal needs; and

**WHEREAS**, Wake currently owns the South Wake Landfill property and permit, but unincorporated areas of Wake County alone do not generate a sufficient amount of Municipal Solid Waste to justify the County's construction and operation of the South Wake Landfill; and

**WHEREAS**, the Parties desire to enter into this Agreement pursuant to the statutory authority authorizing interlocal agreements, N.C.G.S. §§160A-460 to 160A-464, in order to pursue the above stated goals.

**NOW THEREFORE**, for and in consideration of the mutual promises and covenants contained in this Agreement, the sufficiency of which is hereby acknowledged, the Parties agree as follows:

## ARTICLE I
## Definitions

1.01. **Definitions**. For all purposes of this Agreement, unless the context requires otherwise, the following terms shall have the following meanings:

"Agreement" means this Interlocal Agreement.

"Commercial Solid Waste" means non-residential municipal solid waste that does not pass through a Party's solid waste system.

"Facility" or "Disposal Facility" means the South Wake Landfill and its related improvements and structures (roads, water and sewer lines, scale houses, administration buildings, and transfer stations). For purposes of determining the cost of providing and operating the disposal facility, the term "facility" includes the Parties' solid waste management programs providing services specified in G.S. §130A-309.04(a) of the Solid Waste Management Act of 1989.

"Interlocal Solid Waste Management System" or "System" means the collaborative effort being undertaken by the Parties to this Agreement. It includes the Disposal Facility and other facilities and programs as the Parties may incorporate into the System in accordance with such Agreement.

"Landfill" means the South Wake Landfill, more specifically described and identified in NCDENR Permit #92-22.

"Municipal Solid Waste" (MSW) is waste that may be disposed of in the South Wake Landfill and is defined in G.S. §130A-290.

"Residential Municipal Solid Waste" means municipal solid waste from residences and households that passes through a Party's solid waste collection/disposal system.

"Commercial Municipal Solid Waste" means non-residential MSW and other solid waste that passes through a Party's solid waste collection/disposal system.

"Party" or "Parties" means either a municipality or the county, as the context or the usage of such term may require, which is a signatory to this Interlocal Agreement.

"Solid Waste Advisory Committee" (SWAC) means the Wake County Solid Waste Advisory Committee established by action of the County Board of Commissioners Resolution R-90-05.

"Solid Waste Management" means purposeful, systematic control of the generation, storage, collection, transport, separation, treatment, processing, recycling, recovery and disposal of solid waste.

"State" means the State of North Carolina and all of its appropriate administrative, contracting and regulatory agencies and offices.

## ARTICLE II
## Purpose and Structure

**2.01. Purpose.** The Parties agree to pool their MSW waste streams for disposal in the South Wake Landfill in return for improved economy and predictability in waste

disposal costs during the Landfill's proposed 25-year operation and for participation in the System so that further economies can be implemented in the future.

**2.02. Roles and Responsibilities of the Parties.** All Parties agree to arrange to dispose of all of their jurisdiction's Residential Municipal Solid Waste and Commercial Municipal Solid Waste at the South Wake Landfill as soon as the Landfill opens until the end of the term specified in this Agreement.

(a) No volume guarantees are required.

(b) Parties agree to continue their MSW collection services, to provide such services to newly annexed property, and to continue to encourage sound solid waste management practices.

(c) All Parties who provide transfer station services must provide those services to all other Parties, subject to transfer station facility capacity, at rates and under conditions that provide the same benefits as enjoyed by the Party providing the services.

**2.03 Rights and Privileges of the Parties.** The County will set tipping fees at the Landfill at rates that encourage appropriate landfill use. In setting the fees, the County will consider, at a minimum, fees at other landfills in the area, the costs of other solid waste management programs under the Solid Waste Act of 1989, and the recommendation of the Parties to this Agreement. Net revenues derived from the Landfill will be distributed among the Parties in accordance with Section 3.04 of this Agreement.

**2.04 Liabilities of the Parties.**

(a) Environmental remediation. The Parties agree to joint environmental liability for the South Wake Landfill in accordance with this section. To the extent that the cost of remediation exceeds insurance proceeds and the amount of the Environmental Remediation account in the Wake County Solid Waste Enterprise Fund, the Parties agree to contribute to remediation costs based on their proportionate usage of the landfill from the landfill opening date until the date when remediation begins.

(b) Each Party also agrees to indemnify all other for any damages resulting from violations of the Parties' agreement to spend net revenue funds for any purpose other than solid waste management in accordance with G.S. §130A-309.04(a).

**2.05 Designation of County as Lead Agency for Matters Related to South Wake Landfill.** The Parties agree that the County is the entity to negotiate with Contractor(s) constructing and operating the South Wake Landfill and to monitor construction, operation, closure and post-closure.

## ARTICLE III
## Financing the System; Apportionment of Costs and Revenues

**3.01 South Wake Landfill Operations Costs.** The County has expended significant funds to purchase land for the South Wake Landfill, obtain a permit for the landfill, and defend the permit against legal challenges. The County will not seek reimbursement for these costs. The Parties anticipate that the South Wake Landfill Construction and Operation Contractor(s) will charge a per ton solid waste disposal fee to the County for construction and operation of the Landfill ("Contractor's Disposal Fee.")

This Contractor's Disposal Fee will be included in the landfill tipping fees for all users of the Landfill. Other costs to the county directly arising from operation or monitoring of the landfill (including building and operating the landfill scale house and billing/collections for the landfill) will also be included in the landfill tipping fees.

**3.02 County Solid Waste Program Charges.** The County currently uses Landfill tipping fees to defray costs attributable to portions of the County's solid waste program (County Program Charges) other than the Landfill. This Agreement currently contemplates no County Program Charges will be included in the Municipal Solid Waste Landfill Tipping Fee. The Parties to this Agreement may recommend to the County the nature and amount of County Program Charges to be included in the Landfill Tipping Fees in the future. Allowed County Program Costs will be included in Landfill Tipping Fees and will be a component of the operations cost of the Interlocal Solid Waste Management System (System Operations Cost).

**3.03 Other Costs Which May Be Included in the Operations Cost of the Interlocal Solid Waste Management System (System Operations Cost):**

(a) Any debt service, financing, construction and operating costs associated with structures or programs supporting the System that the Parties agree to assume for the overall benefit of the System may be included in System Operations Cost.

(b) Any fees lawfully imposed on Landfill operations, other than penalties imposed on the Contractor(s) for improper operation of the Landfill, will be included in the System Operations Cost.

**3.04 Revenue from the South Wake Landfill.**

(a) Tipping Fees received at the South Wake Landfill minus the Landfill Operations Costs will constitute Net Landfill Revenue. Because of the large volume of waste that Raleigh is committing to be delivered to the landfill over the life of the Agreement, Raleigh will pay a landfill tipping fee for all its Residential Municipal Solid Waste that is $3.00 per ton less than the landfill tipping fee paid by other Parties to the Agreement for disposal of their Residential Municipal Solid Waste.

(b) Net Landfill Revenue will be divided among the Parties (revenue sharing) at least two times a year in a manner that reflects each Party's usage of the landfill during the previous period. The Parties agree that Net Landfill Revenue will be expended only for Solid Waste programs or operations as provided in G.S. §130A-309.04(a).

(c) Net Landfill Revenue generated from the total tons of waste disposed at the landfill at or below a designated threshold each year (the Revenue Share Threshold) will be shared proportionally among the Parties on a per-ton basis. Net Landfill Revenue generated from the total tons of waste disposed at the landfill above the Revenue Share Threshold will be shared proportionally among the Parties based on total dollars paid for landfill tipping fees. The Revenue Share Threshold is 350,000 tons in FY08 and escalates at 2.8% per year.

## ARTICLE IV
## Personnel Necessary to Operation of the System

**4.01** All Parties will continue to staff and operate their own Solid Waste Programs and will continue to participate in the Solid Waste Advisory Committee.

**4.01.** The County will continue to staff the Solid Waste Advisory Committee.

**4.02.** County will provide for operation of the Landfill Scale House/Office and for monitoring and oversight of its Contractor(s) Landfill construction and operation, and will provide relevant information and accounting for the Landfill's revenue (Tipping Fees) and expenses (Landfill Operations Costs) to all other Parties through the Solid Waste Advisory Committee.

## ARTICLE V
## Term

**5.01.** This agreement shall become effective on the date when the South Wake Landfill opens for acceptance of MSW. The initial term of this Agreement shall be for the operating life of the South Wake landfill, or 25 years, whichever is less, and maybe extended by agreement of the Parties.

## ARTICLE VI
## Ownership of System Property

**6.01. Ownership of Real and Personal Property Involved in the System.** All Parties will continue to own the property they have at the inception of this agreement. Wake County, as permit holder and owner of the South Wake Landfill will remain the owner. Any Party that currently owns a transfer station will remain its owner.

**6.02. Transfer Stations.** This Agreement contemplates that Raleigh will either own and obtain (or having obtained) the permit for a transfer station at or near Wilder's Grove, or provide transfer station services through a private transfer station in the same location to serve eastern and northern Wake County.

**6.03 Additional Transfer Stations.** To the extent that the Parties agree that one or more additional transfer stations will enhance the System, the Parties may agree to include them in the System after reaching agreement on costs, ownership, and financing.

## ARTICLE VII
## Limitation to Original Parties

**7.01. No Additional Parties.** No additional Parties will be allowed to participate during the initial term of this agreement.

**7.02. Agreement to Withdraw.** No Party shall have the right to withdraw from participation in this agreement without the consent of all other Parties.

## ARTICLE VIII
## Miscellaneous

**8.01. Governing Law.** The Parties intend that North Carolina law shall govern this Agreement.

**8.02. Severability.** If any provision of this Agreement shall be determined to be unenforceable by a court of competent jurisdiction, such determination will not affect any other provision of this Agreement.

**8.03. Entire Agreement; Amendments.** This Agreement constitutes the entire contract between the Parties, and this Agreement shall not be changed except in writing signed by all the Parties.

**8.04. Binding Effect; Third Party Beneficiaries.** Subject to the specific provisions of this Agreement, this Agreement shall be binding upon and inure to the benefit of and be enforceable by the Parties, their respective successors and assigns. The Operator of the South Wake Landfill will be a third party beneficiary of this Interlocal Agreement authorized to enforce its provisions.

**8.05. Liability of Officers and Agents.** No officer, agent or employee of any Party shall be subject to any personal liability or accountability by reason of the execution of this Agreement or any other documents related to the transactions contemplated hereby. Such officers, agents, or employees shall be deemed to execute such documents in their official capacities only, and not in their individual capacities. This Section shall not relieve any such officer, agent or employee from the performance of any official duty provided by law.

**8.06. Counterparts.** This Agreement may be executed in several counterparts, including separate counterparts. Each shall be an original, but all of them together constitute the same instrument.

**8.07. Existing Contracts.** The Parties agree not to enter into any contract for MSW collection, hauling or disposal that is inconsistent with this Agreement. This Agreement shall not affect existing contracts between the Parties and private solid waste collectors which require municipal solid waste disposal in a location other than the South Wake Landfill after the South Wake Landfill is open for MSW disposal, provided that such contracts will be modified if possible to comport with this Agreement, and, if such modification is not possible, such contract will not be extended or renewed. It is the intent of this provision that all Parties commit to disposing of their MSW stream at the South Wake Landfill when it opens or as soon as possible thereafter.

**8.08. Survival of Obligations.** The liabilities and obligations of the Parties specified in Section 2.04 shall survive the original term of this agreement and shall be enforceable after closure of the South Wake Landfill.

**8.09. Assignment.** No Party shall sell or assign any interest in or obligation under this Agreement without the prior express written consent of all the Parties.

**8.10. Termination Prior to End of Initial Term.** This Agreement shall not be terminated prior to the end of its original term except by agreement of all Parties.

**IN WITNESS WHEREOF,** the Parties have caused this Agreement to be ratified by resolution of their governing Boards or Councils as evidenced by the minutes of their governing Boards or Councils, and executed by their duly authorized officers as of the date first above written.

**TOWN OF APEX, NORTH CAROLINA**

By: _____

Keith H. Weatherly
Mayor

ATTEST:

_____

Georgia A. Evangelist, Clerk
Town of Apex, North Carolina

**TOWN OF FUQUAY-VARINA, NORTH CAROLINA**

By: _____

John W. Byrne
Mayor

ATTEST:

_____

Rose H. John, Clerk
Town of Fuquay-Varina, North Carolina

**TOWN OF GARNER, NORTH CAROLINA**

By: _____

~~Sam Bridges~~ Ronnie S. Williams
Mayor

ATTEST:

_____

Judy Bass, Clerk
Town of Garner, North Carolina

**TOWN OF KNIGHTDALE, NORTH CAROLINA**

By: _____

Doug Boyd
Mayor

ATTEST:

_____

Suzanne Yeatts, Clerk
Town of Knightdale, North Carolina

**TOWN OF MORRISVILLE, NORTH CAROLINA**

By: _____

Jan Faulkner
Mayor

ATTEST:

_____
Diana R. Davis, Clerk
Town of Morrisville, North Carolina

**CITY OF RALEIGH, NORTH CAROLINA**

By: _____

Charles Meeker
Mayor

ATTEST:

_____
Gail Smith, Clerk
City of Raleigh, North Carolina

THIS INSTRUMENT APPROVED AS TO FORM

_____
CITY ATTORNEY

**TOWN OF ROLESVILLE, NORTH CAROLINA**

By: _____

Nancy Kelly

Mayor

ATTEST:

_____
Lynn House, Clerk
Town of Rolesville, North Carolina

**TOWN OF WAKE FOREST, NORTH CAROLINA**

By: _____

Vivian Jones
Mayor

ATTEST:

_____
Joyce Wilson, Clerk
Town of Wake Forest, North Carolina

**TOWN OF WENDELL, NORTH CAROLINA**

By: _____

Timothy A. Hinnant
Mayor

ATTEST:

_____
Timothy C. Burgess, Clerk
Town of Wendell, North Carolina

**TOWN OF ZEBULON, NORTH CAROLINA**

By: _____

Robert S. Matheny
Mayor

ATTEST:

_____

Lisa M. Markland, Clerk
Town of Zebulon, North Carolina

TOWN OF ZEBULON INCORPORATED SEAL 1907 NORTH CAROLINA

**COUNTY OF WAKE, NORTH CAROLINA**

By: _____

Tony Gurley
Chairman, Board of Commissioners

ATTEST:

_____

Susan Banks, Clerk
County of Wake, North Carolina

THIS INSTRUMENT APPROVED AS TO FORM

_____
WAKE COUNTY ATTORNEY

6-14-06
DATE

**TOWN OF CARY, NORTH CAROLINA**

By: _____

Ernest F. McAlister
Mayor

ATTEST:

_____

Sue Rowland, Clerk
Town of Cary, North Carolina

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# Appendix D

## Progress Summary – Intended Actions

*This Progress Summary was prepared in lieu of completion of the Intended Actions sheets. It provides a concise summary of progress made toward previous intended actions. Refer to Sections 4, 5, and 6 for information regarding intended actions for the next ten year planning period.*

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## Appendix D
## Progress Summary of Intended Actions

**The NC solid waste management planning guidelines specify that each jurisdiction in the County is to supply information on the status of implementing "Intended Actions" listed in the previously submitted Plan. This table summarizes the status of intended actions from the 2009 Plan Update.**

| Jurisdiction | Intended Action - **Collection** | Implementation Status | Comments |
|---|---|---|---|
| Apex | Consider changing recycling collection service to include use of larger roll-out carts. | Completed | Have distributed 65 gallon carts to approximately 90 percent of residents. |
| Cary | Start automated recyclable collection every other week using a 65-gal cart. | Completed | Town has also distributed 4,000 95 gallon carts. |
| Cary | Initiate the Used Waste Cooking Oil Program (which includes curbside collection). | Completed | Now offer on-demand used cooking oil pickup. |
| Fuquay-Varina | Consider changing recycling collection service to include use of larger roll-out carts. | In progress | 95 gallon carts are being distributed to replace bins and smaller 35 gallon carts. 65 gallon are also in use. |
| Garner | Re-bid garbage and recyclables collection contract and consider semi- or fully-automated methods for collection (including larger roll-out carts for recycling). | Completed | Awarded 3-yr contract to Allstar Waste Services but decided to avoid automated collection (no cost savings and level of service would have dropped). |
| Holly Springs | Work with multi-family residential complexes to maximize recycling potential with roll-out containers. | Completed | Some multi-family units covered under Waste Industries contract with the Town. |
| Morrisville | Consider changing recycling collection service to include use of larger roll-out carts. | Completed | Have distributed 65 gallon carts to approximately 30 percent of residents. |
| Raleigh | Consider changing recycling collection service to include use of larger roll-out carts. | In progress | Currently phasing in larger carts. Expect to be completed in 2013. |
| Raleigh | Purchase and implement routing software and automatic vehicle locator system to optimize efficiency, control costs and reduce fuel consumption. | Completed | This action was accomplished. |
| Raleigh | Pilot use of solar-powered trash compactors to increase fuel efficiency in downtown garbage collection. | In progress | Still to be completed. |
| Rolesville | Use Town Staff to collect yard waste (service is currently provided by Wake Forest). | Not implemented | Decided to use private vendor |
| Rolesville | Consider changing recycling collection service to include use of larger roll-out carts. | Completed | This action was accomplished. |
| Wake County | Consider franchising residential solid waste and recyclables collection in unincorporated areas and providing both services to unincorporated households on automatic/fee basis. | Not implemented | Franchising may receive consideration, based on outcome of ongoing convenience center evaluations |
| Wake County | Re-assess the number, location, and services to be provided by convenience centers and multi-material facilities based on the outcome of franchising investigations and revise operations accordingly. | Completed | An evaluation of the convenience centers was completed in 2010. Additional evaluations are on-going. |
| Wake County | In cooperation with municipalities, review and upgrade hauler licensing provisions and perform regular inspections. | Completed | This action was accomplished. Regular inspections will continue. |
| Zebulon | Rewrite ordinance for complexes to offer/improve collection at multi-family and apartment complexes. | Not implemented | Decided against strengthening the ordinance. |

| Jurisdiction | Intended Action - **Waste Transfer** | Implemented Actions | Comments |
|---|---|---|---|
| Cary | Test direct hauls to South Wake Landfill and evaluate the possibility of closing the transfer station. | Completed | Direct hauling is now performed; however TS will remain open. |
| Wake County | In cooperation with municipalities, evaluate the need for additional transfer stations (or modifications to existing ones) based on waste flow and the location of future waste management sites. | In progress | Ongoing action. |

| Jurisdiction | Intended Action - **Incineration** | Implemented Actions | Comments |
|---|---|---|---|
| Wake County | Continue to monitor regional discussions regarding use of waste-to-energy and other processing and disposal methods to serve the Triangle region in future years. | In progress | Ongoing action. |
| Wake County | Investigate lead-time, permitting issues, economics, and other factors of constructing a waste-to-energy facility as a means of disposal after the South Wake Landfill reaches capacity. | In progress | Ongoing action. Economics of a regional energy from waste (EfW) plant were evaluated as part of this Plan Update. |

| Jurisdiction | Intended Action - **Waste Disposal** | Implemented Actions | Comments |
|---|---|---|---|
| Morrisville | Develop alternatives for yard waste disposal. | Completed | Now deliver yard waste to Raleigh Yard Waste Facility. |
| Wake County | Continue to evaluate long-term disposal capacity and alternatives in light of variations in waste generation rates. | In progress | Ongoing action. |
| Wake County | Renegotiate gas rights contract with gas developer at North Wake Landfill. | In progress | Ongoing action. |
| Wake County | Consider applying for a permit modification to implement leachate recirculation at the NWLF. | Not implemented | May be considered at a later date, based on the results of gas rights negotiations. |
| Wake County | Evaluate the feasibility of selling credits associated with greenhouse gas destruction at the Feltonsville Landfill. | In progress | Ongoing action. Gas collection and control wells were installed at the Feltonsville Landfill. |
| Wake County | Implement beneficial reuse of methane gas at the SWLF. | In progress | Contracts are in place with vendors to accomplish this. |
| Wake County | Consider applying for a permit modification to allow disposal of municipal sludge at the SWLF to increase methane gas production. | In progress | County ordinance now allows sludge disposal at SWLF. |
| Wake County | Consider applying for a permit modification to allow implementation of leachate recirculation and bio-reactor technology at the SWLF. | Not implemented | May be considered at a later date. |
| Wake County | Evaluate the use of shredder technology at the EWTS and/or SWLF to improve methane gas production and increase the solid waste compaction rate. | Completed | Considered, but regulatory resistance was encountered. |
| Wake County | Consider applying for a permit modification to increase side slopes at the SWLF, thereby increasing disposal capacity. | In progress | Completed an evaluation of additional volume that would be achieved through this action. |
| Wake County | Consider petitioning the State to allow for food waste and yard waste to be added to the closed Feltonsville Landfill to create methane gas and a marketable compost material. | Not implemented | No action taken. |

| Jurisdiction | Intended Action - **Waste Reduction** | Implemented Actions | Comments |
|---|---|---|---|
| All Jurisdictions | Work collectively to inform and encourage C&D contractors and land developers to reduce the generation of C&D debris and build incentives/disincentives into the permit application requirements. | In progress | The topic was addressed by Wake County's Sustainability Committee and a Task Force was proposed to further explore C&D waste issues. Due to few construction starts, C&D waste has not been a priority in recent years. |
| Cary | Begin to accept chipboard, junk mail, and phone books in curbside recycling program. | Completed | This action was accomplished. |
| Cary | Investigate porcelain recycling. | Evaluated but did not implement | Decided not to provide this service. |
| Cary | Review expansion of recycling activities at Citizens Convenience Center. | Completed | Convenience center now accepts everything accepted curbside. |
| Cary | Update comprehensive recycling plan to include parks and greenways. | Completed | Added bins to parks. |
| Cary | Place the piloted Used Waste Cooking Oil Collection Program on the FY 2010 budget for Council approval. | Completed | Now offer on-demand used cooking oil pickup. |
| Holly Springs | Continue dissemination of educational literature to residents regarding the new 48 gallon recycling containers. | Completed | This action was accomplished. |
| Holly Springs | Expand wood chipping program to reduce yard waste going into the landfill. | Completed | Wood chips are ground at curb now and delivered to Earthtech. |
| Knightdale | Increase use of electronic communication within Town to reduce paperwork; implement an electronic work order system that is field accessible. | Completed | This action was accomplished. |
| Wake County | Continue to provide waste reduction information on County web site and encourage municipalities to establish links. | In progress | Ongoing action. |
| Wake Forest | Pass a C&D ordinance. | In progress | A C&D ordinance is still being discussed and debated |
| Wake Forest | Advertise "bottle law" for restaurants to increase participation. | In progress | Ongoing action. |

| Jurisdiction | Intended Action - **Recycling and Reuse** | Implemented Actions | Comments |
|---|---|---|---|
| All Jurisdictions | Consider offering recycling collection services to multi-family units. Raleigh's existing multi-family program can be used as a guide. | In progress | Several Towns have taken steps to enhance recycling at multi-family units, including requiring new units to have adequate space. |
| Apex | Consider scrap metal recycling for Town. | Completed | Hired a vendor to haul away scrap metal collected by DPW. |
| Cary | Initiate Used Waste Oil Cooking Program (curbside recycling of waste cooking oil). | Completed | Now offer on-demand used cooking oil pickup. |
| Cary | Begin to accept chipboard, junk mail, and phone books in curbside program. | Completed | This action was accomplished. |
| Cary | Consider establishing a porcelain recycling program. | Evaluated but did not implement | Decided not to provide this service. |
| Fuquay-Varina | Run an education campaign to recycle, with participation from Recycle America. | In progress | Negotiated new contract with Recycle America and will be participating in Recyclebank program beginning in 2012. |
| Fuquay-Varina | Consider establishing a mandatory recycling program. | Considered, but not implemented | No ordinance making recycling mandatory, but if resident does not accept a bin or cart, they must show how they dispose of recyclables. |
| Garner | Evaluate use of 65 gallon rollout carts for recycling instead of 18 gallon bins. | Completed | Rolled out 65 gallon carts to most residents. |
| Holly Springs | Market wood chipping program product as cheap and easy landscaping material. | Not implemented | Not implemented due to other priorities |
| Morrisville | Strengthen ordinance for multi-family recycling program and requirements. | Not implemented | Decided against strengthening the ordinance. |
| Raleigh | Study feasibility of collecting cardboard from businesses. | In progress | Still to be completed. |
| Raleigh | Pilot pedestrian recycling containers in portions of Raleigh's downtown. | In progress | Still to be completed. |
| Raleigh | Expand Recycling in the Parks program to all city parks. | In progress | Still to be completed. |
| Raleigh | Incorporate reused and recycled material into construction of new SWS facility. | Completed | This action was accomplished. The facility will receive LEED certification (Platinum) |
| Wake County | Re-assess the number, location, and services to be provided by convenience centers, material recycling facilities, and other current or proposed waste management facilities. | In progress | Ongoing action. Convenience centers were evaluated again in 2010. |
| Wake County | Initiate advertisement and promotional programs to capture a greater market share of recyclable materials at convenience centers and multi-material recycling centers and continue to evaluate recycling market development opportunities. | In progress | Partnered with Cary and Fuquay-Varina in contract with Recycle America that provides a revenue stream for recyclables. |
| Wake County | Working with Cary and Fuquay-Varina, evaluate consolidation of their single stream recycling at the South Wake Transfer Station. | Completed | Conducted a pilot but decided not to implement full-scale. |
| Wake County | Evaluate cardboard scavenging from loads dumped at the East Wake Transfer Station. | Not implemented | Remains an option to evaluate and implement. |
| Wake County | Evaluate feasibility of re-directing dry loads (paper, cardboard, plastics) arriving at the South Wake Landfill to the South Wake Transfer Station for recycling. | Completed | Evaluated but decided not to implement. |
| Wake County | Partner with municipalities to implement recycling at special events. The State Fair can be used as a guide to demonstrate large event recycling. | Completed | Partnered with municipalities to offer HHW collection events and awarded grants for such. |
| Wake County | Continue to evaluate market conditions and demand for C&D materials and reevaluate benefit of C&D recycling ordinance if conditions warrant. | Ongoing | The economic conditions of the past three years have moved this down the list of priorities. |
| Wake County | Explore recycling alternatives for wooden pallets in lieu of 10-1-2009 ban on landfill disposal. | Not implemented | Intend to accomplish this in coming years. |
| Wake County | Work with WCPSS to institutionalize collection of mixed paper in local schools and to obtain greater involvement of WCPSS schools in recycling. | Completed | Worked with WCPSS to increased the type or recyclables collected. |
| Wake County | Update the County's website to increase information available discussing CII recycling options. | In progress | Ongoing action. |
| Wake Forest | Implement a "swap shop" recycling program. | Not implemented | Intend to accomplish this in coming years. |

| Jurisdiction | Intended Action - **Composting and Mulching** | Implemented Actions | Comments |
|---|---|---|---|
| Cary | Continue to ID compost/mulch end-users and facilities to accept yard waste. | In progress | Both Brooks and McGill are currently used, and the Town will continue to studying yard waste alternatives. |
| Garner | Evaluate the use of Town crews to collect yard waste. | Completed | Decided to have vendor provide this service. |
| Holly Springs | Complete construction of Town mulching facility. | Not implemented | Not implemented due to other priorities |
| Morrisville | Purchase vac-truck to use for in-house yard waste program. | Not implemented | Private vendor continues to provide yard waste collection. |
| Raleigh | Begin offering painted/decorative woodchips for sale at Yard Waste Center. | Completed | This action was accomplished. |
| Raleigh | Explore feasibility of offering delivery of yard waste products. | In progress | Mulch delivery continues to be evaluated. |
| Rolesville | Provide more education on composting/mulching opportunities. | Completed | This action was accomplished. |
| Wake County | Evaluate locating a biomass facility at the South Wake Landfill or a yard waste transfer and/or processing facility at the South Wake Multi-Material Recycling Facility or potential "Supercenter" site. | Not implemented | Remains an option to evaluate and implement. |
| Wake County | Partner with the municipal jurisdictions to educate the public about fats, oils, and greases (FOG) causing sewer blockages and restrictions and promote alternatives to placing the material down the drain. | In progress | Wake County is now accepting cooking oil at convenience center #11; educating the public is ongoing. |
| Wake Forest | Provide drop-off facility for composting. | Not implemented | Town staff will pick up yard debris and 70-75 percent of it gets composted. |

| Jurisdiction | Intended Action - **Education** | Implemented Actions | Comments |
|---|---|---|---|
| Apex | Establish a designated person to manage and implement education and outreach. | Not implemented | This activity is still accomplished by multiple individuals. |
| Apex | Develop a Green Zone area to be integrated with the annual PeakFest. | Completed | This action was accomplished. |
| Apex | Provide nature park expansion and class. | Not implemented | This action was not accomplished. |
| Cary | Improve and expand information available on the Town's web site. | In progress | Ongoing action. |
| Cary | Focus education efforts on low participation areas (for recycling). | Not completed | Low participating areas have not been targeted for increased education as of yet. |
| Cary | Conduct a waste characterization and provide results to Town residents. | Not completed | Wake County, however, conducted a waste characterization study which included waste collected from Cary. |
| Garner | Educate public about waste reduction on the planned local access channel. | In progress | Ongoing action. |
| Garner | Educate public about automated collection, should the Town switch to that method. | Not implemented | Did not switch to fully automated collection. |
| Holly Springs | Work with Waste Industries to create insert fliers for resident utility bills in an effort to remind citizens what types of materials can be recycled and the benefits of participating. | Completed | This action was accomplished. |
| Holly Springs | Post website announcements of upcoming events like household hazardous waste collection days at the SWLF. | Completed | This action was accomplished. |
| Morrisville | Participate with League of Municipalities Green Program. | Completed | This action was accomplished. |
| Raleigh | Work with Curbside Value Partnership, local colleges and other partners to target recycling education to low-participation areas. | Completed | Ran a "Recycle and Win" program with Coca Cola and Harris Teeter to reward recycling and reinforce positive behavior. |
| Raleigh | Produce quarterly programming for local public-access station, beginning January 2009. | Completed | This action was accomplished. |
| Raleigh | Redesign website as part of citywide shift to web portal. | Completed | This action was accomplished. |
| Raleigh | Update all print publications. | In progress | Still to be completed. |
| Raleigh | Design exhibits and programming for the new Solid Waste Services facility. | In progress | Still to be completed. |
| Wake County | Use various means to educate the public about Wake County facilities that can be used to dispose or recycle special wastes (including household hazardous waste), recyclable materials, and other waste types. | Completed | Used the web; updated County Disposal Guide; and gave facility tours. |

| Jurisdiction | Intended Action - **Special Waste** | Implemented Actions | Comments |
|---|---|---|---|
| All Jurisdictions | Consider feasibility of adding curbside collection of additional special wastes, either directly or through contract negotiations. | In progress | Many of the municipalities added electronics curbside collection (on demand, typically) to their collection service. Raleigh (seasonally) and Cary (year round) both collect used cooking oil. |
| All Jurisdictions | Promote and maximize special wastes that are already collected. | In progress | All jurisdictions have been proactive in updating web sites and distributing information that promotes special waste collection and disposal alternatives. |
| Cary | Offer a twice a year HHW/special waste drop-off event. | Partially Completed | Held an annual HHW event with Wake County and participated in a Reuse Rodeo with Triangle Reuse Alliance. |
| Holly Springs | Post website announcements of upcoming events like HHW collection days at the SWLF. | Completed | This action was accomplished. |
| Knightdale | Expand the HHW services offered to citizens. | In progress | Working with Wake County to offer a HHW collection event. |
| Morrisville | Considering a program to pickup HHW (oil specifically). | Not implemented | Evaluated, but limited by space constraints at existing DPW facility to temporarily store collected oil. |
| Raleigh | Support Wake County-led effort to educate residents about proper disposal of pharmaceuticals. | Completed | Helped publicize events held by Raleigh City Police. |
| Rolesville | Promote special waste management options. | Completed | Partnered with Wake County to accomplish this. |
| Wake County | Reevaluate services to be provided by convenience centers, including collection of additional types of special wastes. | In progress | Ongoing action. Convenience centers were evaluated again in 2010. |
| Wake County | Evaluate alternative recycle and disposal options for used tires. | Completed | This action was accomplished. |
| Wake County | Collect anti-freeze and used oil from General Services Administration (GSA) fleet. | Completed | This action was accomplished and is ongoing. |
| Wake County | Collect surplus computers and monitors from GSA and Information Services Department. | Completed | This action was accomplished and is ongoing. |
| Wake Forest | Provide a drop-off site for oil. | Not implemented | Have applied for a grant to accomplish this. |

| Jurisdiction | Intended Action - **Illegal Disposal/Litter** | Implemented Actions | Comments |
|---|---|---|---|
| Apex | Participate in Gov's State-wide Litter Sweep (bi-annual). | Completed | This action was accomplished. |
| Apex | Support the Adopt-a-Site Program (a Town Council Initiative). | Not implemented | This action was not accomplished. |
| Garner | Hold two bi-annual litter sweeps in conjunction with Governor's Litter Proclamation and Big Sweep waterway clean-up. | Completed | This action was accomplished. |
| Holly Springs | Continue promoting a twice a year litter clean-up day. | Partially Completed | This action was accomplished, but not in every year. |
| Knightdale | Offer more education about litter and enhancing the community appearance. | Completed | Used public service announcements. |
| Morrisville | Offer public education for the Adopt-A-Road program. | Completed | Five to 6 groups participate. Town also runs a litter sweep twice a year. |
| Raleigh | Work with Community Services Department to implement a volunteer-based Adopt-a-Street program for high-litter areas. | Not implemented | This action was not accomplished. |
| Raleigh | Work with city-wide enterprise resource-planning process to try and recover costs associated with illegal dumping cleanup. | Not implemented | This action was not accomplished. |
| Wake County | Implement the "Don't Leave Litter in Your Wake!" anti-littering campaign. | Completed | Now implementing a different ant-litter campaign. |
| Wake Forest | Continue to expand education; use bill stuffers. | In progress | Ongoing action. |

| Jurisdiction | Intended Action - **Purchsaing of Recycled Products** | Implemented Actions | Comments |
|---|---|---|---|
| Raleigh | Incorporate buy-recycled principles into new city-wide Sustainability Policy. | In progress | Still to be completed. |
| Wake Forest | Add information on Town website to promote recycled products purchasing. | Completed | This action was accomplished. |

| Jurisdiction | Intended Action - **Disaster Response** | Implemented Actions | Comments |
|---|---|---|---|
| Apex | Evaluate properties for consideration as temporary debris storage and reduction sites for compliance with the Debris Management Plan. | In progress | Working to finalize the Plan. |
| Apex | Finalize standby contracts with debris management and monitoring firms. | Completed | This action was accomplished. |
| Apex | Finalize Debris Management Plan and obtain approval from FEMA. | In progress | Working to finalize the Plan. |
| Apex | Locate addition debris management sites. | In progress | Working to finalize the Debris Management Plan and locate additional sites. |
| Garner | Develop a Disaster Debris Disposal Plan. | In progress | A formal Disaster Debris Plan is still to be developed. |
| Holly Springs | Finalize the Town's Natural Hazard Mitigation Plan Update and receive approval from FEMA. | Completed | This action was accomplished. |
| Knightdale | Finalize standby contract with debris management firm. | In progress | Will use pre-positioning contract vehicle established by County. |
| Morrisville | Run real-time simulations following the Disaster Response Plan. | In progress | Disaster Response Plan is nearing completion. |
| Raleigh | Update disaster response/debris management plan as necessary. | In progress | No updates were needed during the previous three years. |
| Rolesville | Locate addition debris management sites. | In progress | Ongoing action. |
| Wake Forest | Locate addition debris management sites. | Completed | One site in Wake Forest identified. Will use prepositioning contract vehicle established by County. |

| Jurisdiction | Intended Action - **Collection of Discarded Electronics** | Implemented Actions | Comments |
|---|---|---|---|
| | *See Section 4.13.2 for a summary of completed actions* | | |

| Jurisdiction | Intended Action - **Program Costs and Financing** | Implemented Actions | Comments |
|---|---|---|---|
| Cary | Annually review Solid Waste rate to ensure a 75 percent cost recovery. | Completed | This action was accomplished. |
| Fuquay-Varina | Purchase new equipment to help provide efficient service. | In progress | Purchasing a new 25 CY packer truck with long term goal of upgrading entire fleet to 25 CY. |
| Raleigh | Seek grant funding to support existing and new initiatives. | Completed | This action was accomplished. |
| Wake County | Revise SWLF schedule of rates, fees, and charges that reflect the actual cost of service associated with management of special wastes received such as mattresses, bulky wastes, and non-organic materials. | In progress | An evaluation of bulky and other special wastes was completed as part of this Plan Update. |
| Wake County | Identify potential opportunities to reduce or control costs and increase revenue associated with solid waste disposal and recycling services for Wake County buildings. | Completed | This action was accomplished. |
| Wake County | Evaluate establishment of a C&D charge at the convenience centers to discourage C&D drop-off and reduce the amount of C&D waste sent to the SWLF (while promoting private C&D landfills as the preferred disposal option). | Not implemented | Intend to accomplish this in coming years. |

| Jurisdiction | Intended Action - **Management and Administration** | Implemented Actions | Comments |
|---|---|---|---|
| All Jurisdictions | Periodically evaluate costs versus benefits of the activities and services provided under each solid waste management program element. | In progress | All jurisdictions annually evaluate the adequacy of their solid waste budgets with regard to the expected level of service. |
| All Jurisdictions | Evaluate existing private sector relationships and explore opportunities for cooperative contracting, as well as additional public/private partnership opportunities. | In progress | Wake County and several towns collaboratively negotiated a recyclables contract; Wake County established pre-positioning contracts for debris management, and has encouraged the municipalities to use these contracts. |
| All Jurisdictions | Provide for employee training and education, as needed, to keep pace with job requirements and improvements in solid waste management systems. | In progress | All jurisdictions report that they offer some form of training to staff responsible for solid waste management activities. |
| Holly Springs | Consider hiring a part-time recycling specialist. | Not implemented | Not implemented due to other priorities |
| Knightdale | Implement more electronic systems for work orders. | In progress | Intend to continue to automate processes. |
| Raleigh | Develop and implement an apprenticeship program. | In progress | Still to be completed. |
| Wake County | When establishing new service contracts for Wake County buildings and WCPSS, require waste to be delivered to Wake County solid waste facilities and include quantities in rebate calculations for the SWLF partnership. | Completed | This action was accomplished. |
| Wake County | Modify service delivery for the convenience centers and multi-material recycling facilities by executing separate contracts for facility operation, material hauling, and recycling material processing. | Completed | This action was accomplished. |
| Wake Forest | Consider implementing a solid waste (or similar) advisory committee. | Not implemented | This action is on hold. |

# Appendix E

Waste Reduction Goal Sheet

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**WASTE REDUCTION GOAL SHEET**
**NC LOCAL GOVERNMENT TEN YEAR SOLID WASTE MANAGEMENT PLAN**

Local Government Name: Wake County

Previously established waste reduction goal: 10% for Wake County unincorporated area 20% collectively for all jurisdictions %

After considering your government's current and projected solid waste activities, resources, population, and economic growth have you reached your previously established goal? ☒ Yes ☐ No

Establish a new waste reduction goal: 20 %

**WASTE REDUCTION CALCULATION**

To provide 10 years of solid waste management planning, as per G.S. 130A-309.09A(b), waste reduction goals need to be updated. Use the following chart to determine the tonnage needed to be diverted from landfills in order to reach the new waste reduction goal.

| **CALCULATION** | **FY 2019** |
|---|---|
| 1. Baseline year per capita disposal rate<br>*(FY 1991-1992 unless alternate approved by Section)* | 1.40 |
| 2. Percent waste reduction goal | 20 % |
| 3. Targeted per capita disposal rate<br>(Subtract line 2 from 1.0 and multiply result by line 1) | 1.12 |
| 4. Estimated population in the new waste reduction goal year<br>(Available at Office of State Budget and Management website:<br>Projected Annual County Population Totals 2010-2019) | 1,206,703 |
| 5. Projected tonnage for disposal at baseline disposal rate<br>(Multiply line 1 by line 4) | 1,689,384 |
| 6. Targeted annual tonnage for disposal<br>(Multiply line 3 by line 4) | 1,351,507 |
| 7. Targeted annual tonnage to reduce<br>(Subtract line 6 from line 5) | 337,877 |

Population Link: http://www.osbm.state.nc.us/ncosbm/facts_and_figures/socioeconomic_data/population_estimates/demog/cpa2010p.html

**WASTE REDUCTION PLAN**

Given the targeted annual tonnage amount to be reduced, explain how you plan to reach the goal:

Efforts to achieve the above waste reduction goal will focus primarily on increasing recycling rates and source reduction. Approximately 60 percent (101,363) of the targeted reduction is expected to come from increases in recycling and 40 percent (67,575) through source reduction.

While the 20% waste reduction goal has already been reached, it is understood that poor economic conditions of 2008 - 2011 have much to do with the reduction in waste generation. As such, the County and municipal governments are maintaining their collective 20% waste reduction goal, and will strive to annually meet that goal. This will pose a challenge as the economy improves and construction starts, industrial output, and consumer purchasing increase.

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# Appendix F

Buy Recycled Policies and Ordinances

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CITY OF RALEIGH, N.C

# Management Policy

TITLE: SOLID WASTE / RECYCLING - BUY RECYCLED POLICY

The City of Raleigh seeks to protect our natural resources and maximize the life of the county sanitary landfill through environmentally sound practices including recycling and waste reduction efforts. Recent innovations and technological advancements are resulting in products made from recycled content that are comparable in cost and quality to those made from virgin materials. The use of recycled and environmentally friendly products by the City of Raleigh can spur private sector development of new technologies and use of such products, thereby creating business and employment opportunities and enhancing regional and local economics.

1. All City of Raleigh departments should set an example by procuring goods and/or supplies that have a lesser or reduced effect on human health and the environment, including products made wholly or in part from recycled materials.

2. The City of Raleigh encourages all departments to give consideration to products that help preserve our natural resources and are more energy efficient, less toxic, less polluting, which generates less waste overall, thereby reducing the financial burden for waste processing on the citizens of Raleigh.

3. The City of Raleigh supports and encourages the development and implementation of practices and policies which further the aims of waste reduction and recycling within City Government operations.

4. City of Raleigh employees should seek to reduce waste at the source.

5. The City of Raleigh shall seek to purchase products for the City use which contain recycled materials, giving preference to those products with higher levels of post-consumer recycled content whenever such products meet minimum standards for their particular function; so long as the products made from recycled materials are equal in quality and equal or less in price as compared to similar products made from virgin materials.

J. Russell Allen
City Manager

R-92-71

# RESOLUTION

## RESOLUTION ESTABLISHING A RECYCLED MATERIALS PROCUREMENT POLICY

WHEREAS, landfill space is at a premium, and future landfill sites will be increasingly difficult to find; and

WHEREAS, much of the material that enters the waste stream can be recycled, reused or incorporated in the manufacture of new products; and

WHEREAS, the Wake County Board of Commissioners support waste reduction, increased recycling and the manufacture and use of products made with recycled materials; and

WHEREAS, the County of Wake has already established the practice of purchasing recycled paper products, and other materials; and

WHEREAS, the Board desires to participate in the national and statewide effort to promote recycling through purchase and use of products made with recycled materials;

NOW, THEREFORE, BE IT RESOLVED that the following policies and procedures be applicable to the procurement of recycled products and in-house recycling efforts of the County of Wake until such time as it is altered, modified, or rescinded by the Board of Commissioners:

1. The County of Wake will seek to buy and use products needed for County services which are made with recycled materials if the recycled items are reasonably competitive with non-recycled products and meet or exceed specifications and user required quality levels set forth by the County. Wake County may, at its option and on a case by case basis, consider purchasing recycled products, not be exceed a 10% premium over a virgin product.

2. The County will give special emphasis to products and materials made from post consumer recycled materials.

3. The County will continue to adhere to statutory requirements regarding purchasing procedures.

4. The County will seek to coordinate purchasing activities with other governments to promote purchasing based on the above policies.

5. The County Manager will review the County's purchasing needs and specifications to identify new opportunities to specify and purchase items with recycled materials in accord with the above policies.

6. The Board authorizes the County Manager to establish administrative policies and procedures regarding purchase of items made with recycled material. Such policies shall be consistent with this resolution.

Commissioner Adcock made the motion that the above Resolution be adopted. Commissioner Ward seconded the motion. Upon vote the motion was passed unanimously this the 7th day of December, 1992.

# Appendix G

## Public Comments on 2012 Plan

A draft of the Plan was placed in all Wake County Public Libraries and Chambers of Commerce for public review and comment. The draft Plan was also posted on Wake County's web site. Paid advertising notices of the opportunity to review the plan were placed in the following papers (see notice in Appendix B):

- Apex Herald (March 22)
- Fuquay-Varina Independent (March 21)
- Garner News (March 21)
- Holly Springs Sun (March 22)
- News and Observer (March 25)
- Wake Weekly (March 22)

The public comment period spanned March 26th to April 9th, 2012. An advertised public meeting was held on April 26th, from 4:00 to 6:00 pm. **No comments on the 2012 draft Plan Update were submitted during the public comment period or at the advertised public meeting.**

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# Appendix H

Supporting Technical Memoranda to the 2012 Plan

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# Memorandum

*To:* *Mr. Lowell Shaw*
*Mr. John Roberson, P.E.*

*From:* *CDM Smith*

*Date:* *February 1, 2012*

*Subject:* *Wake County North Carolina*
*Solid Waste Management Plan Update*
*Subtask 5.1 – Benchmarking of Tipping Fees*

As a component of the 2012 Solid Waste Management Plan Update, CDM Smith collected data characterizing tipping fees at both publicly and privately owned municipal solid waste (MSW) landfills in the region. An understanding of current market rates for solid waste disposal is important with regard to maintaining a competitive tipping fee at the South Wake Subtitle D Landfill (SWLF). This memorandum presents the results of this data collection effort, discusses the factors which influence how tipping fees are set within the region, and provides information that Wake County and its municipal partners can use to help establish an appropriate tipping fee for the SWLF.

## Introduction

North Carolina has 40 active Subtitle D landfills, of which only seven are owned and operated by private waste management companies. One landfill is exclusively for the Camp LeJeune Marine Corps Base in Jacksonville, N.C. Therefore, the remaining 32 Subtitle D landfills (80 percent) in North Carolina are owned by local municipalities (either county or city government).

Public solid waste departments typically operate as enterprise funds, and thus are required to be financially self-supporting. Solid waste enterprise funds are often supported financially through user fees, availability fees, grants, and other miscellaneous sources of revenues. For communities with a publically-owned landfill, the revenues from the landfill tip fees are by far the largest source of revenues contributing to the long-term financial viability of the solid waste enterprise fund.

Subtitle D landfills can generate significant revenues for the owner given a sufficient quantity of waste. County-owned Subtitle D landfills that receive a significant portion of the waste generated within the county typically generate excess revenues (beyond operational costs) that

support other county solid waste programs. Often times, the excess landfill revenue is utilized to support convenience center operations, recycling programs, household hazardous waste (HHW) collection events, education programs, litter prevention, and a host of other types of solid waste activities.

Wake County has a good system of solid waste management infrastructure that provides a variety of services for its citizens and businesses. At the center of this system is the SWLF that handles approximately 45 percent of the MSW generated within the County.

## South Wake Subtitle D Landfill

The County's Landfill operates under a public-private partnership agreement with Waste Industries where Waste Industries manages the day-to-day operations of the landfill.

The North Carolina Department of Natural Resources (NCDENR) FY 2010-2011 waste disposal volume data indicates that 426,903 tons of MSW material was disposed at the SWLF. This data essentially matches the County's tonnage figure of 426,901 for FY2011. Based upon this volume of waste handled at the SWLF, the County owns the largest publically-owned landfill in North Carolina, and the 5th largest overall in the state.

The current landfill tipping fee is $30 per ton, or $32 per ton including the mandatory $2 per ton state tax, which is one of the lowest tipping fees in the state.

## Evaluation of North Carolina Landfill Tipping Fees

During the growth years prior to the economic recession, tipping fees were in a steady upward trend in North Carolina. For FY 2009 the average tipping fee across the state was $38.42 based on NCDENR data. A slight decrease in FY 2010 to an average tipping fee is $38.14 per ton. The average rates exclude the $2/ton state tax. The average tipping fee calculated by NCDENR is based on the actual gate rates that both public and private landfills. The average fee does not account for lower fees that private landfills negotiate with customers as a part of long-term contracts. Figure 1 provides a graphical representation of the trend in tipping fees for all landfills in the state.

Compared to the overall average landfill tipping fee within North Carolina, the County's tip fee at $30/ton is 21 percent below the average fee, which provides the citizens and businesses of Wake County a low-cost and environmentally sound means of waste disposal. According to the NCDENR FY2010 tipping fee data, Wake County was tied (with Wayne County) for 4th lowest tipping fee in the state. Cumberland and Cleveland counties were slightly lower at approximately $28 per ton. Figure 2 provides a chart of the NCDENR FY 2010 landfill tipping fee data.

**Figure 1. North Carolina Historical Tipping Fee Trend**

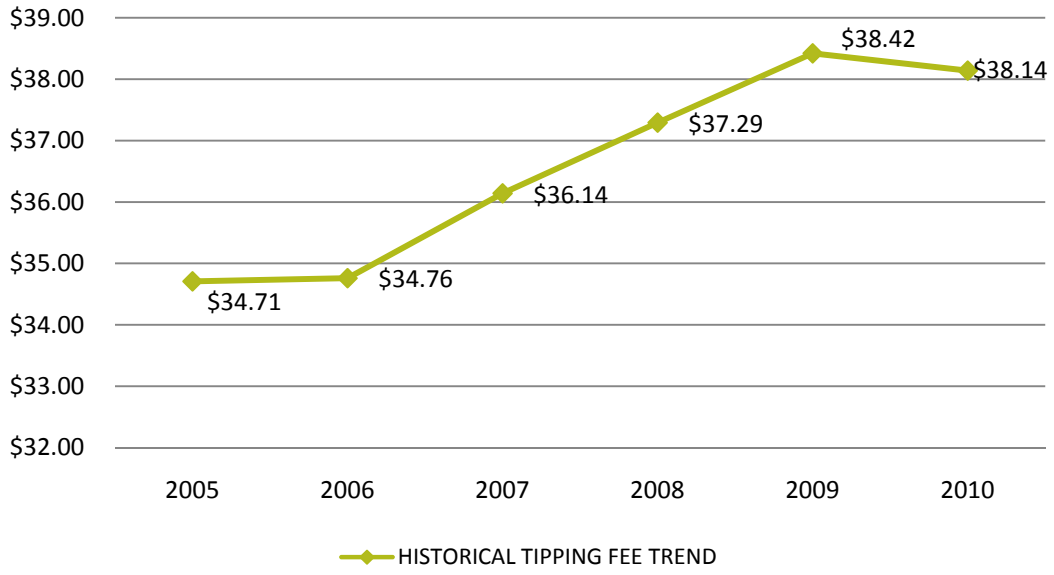
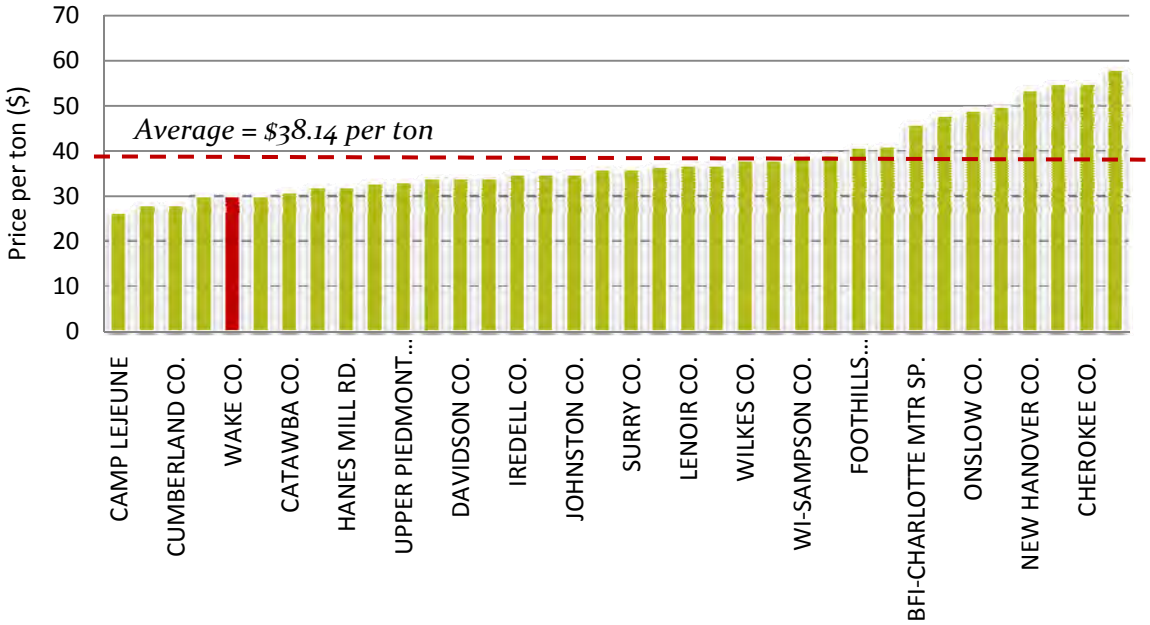



**Figure 2. North Carolina MSW Landfill Tipping Fees at End of FY 2010**

***(State Solid Waste Tax is not included)***



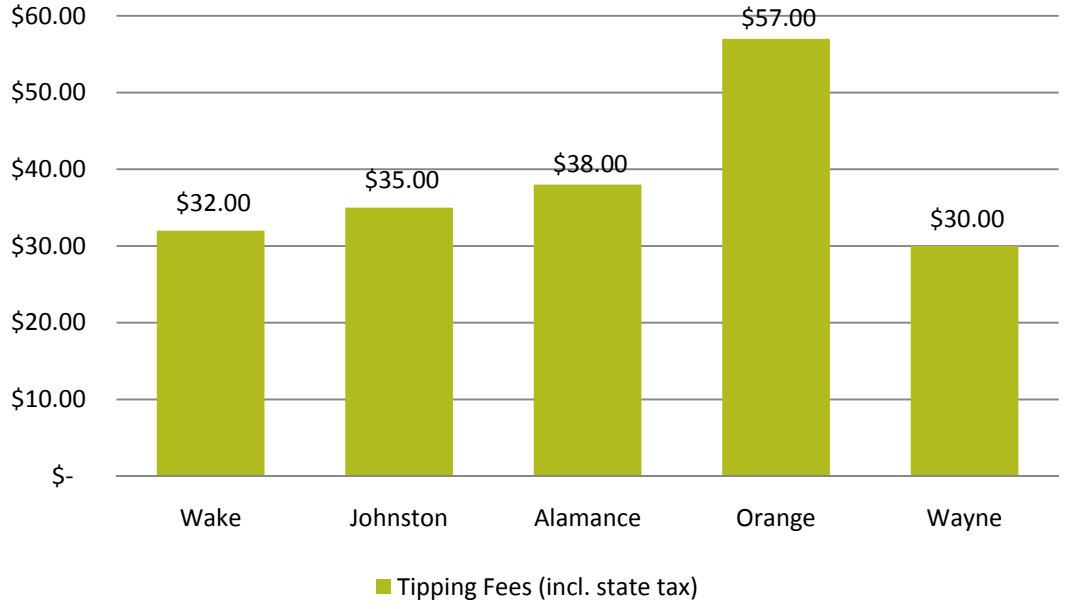
## Tipping Fee Benchmark Analysis of Public Landfills

Based upon 2010 population estimates certified by the North Carolina Office of State Budget and Management (OSBM), Wake County is the second largest county with a population of 907,314 people, and is one of the most densely populated (people/square mile) counties. When comparing aspects of a local government solid waste program, an effective approach often used is to conduct a benchmark analysis against other similar sized programs.

The top 10 populated counties within North Carolina, according to OSBM data, are Mecklenburg, Wake, Guilford, Forsyth, Cumberland, Durham, Buncombe, Gaston, New Hanover, and Union. Out of these 10 counties only Durham and Union counties don't have publically-owned Subtitle D landfills.

A review of current published landfill tipping fees (including the state $2/ton tax) at these county facilities indicates that the Wake County Landfill is tied with Gaston County for the 2nd lowest tipping fee. Cumberland County has the lowest rate at $30 per ton. Mecklenburg County's Subtitle D landfill currently only accepts construction and demolition (C&D) materials, and Mecklenburg is not interested in pricing tipping fees to attract additional C&D waste material to their landfill. Figure 3 provides a chart comparing the landfill tipping fees for eight of the top ten populated counties.

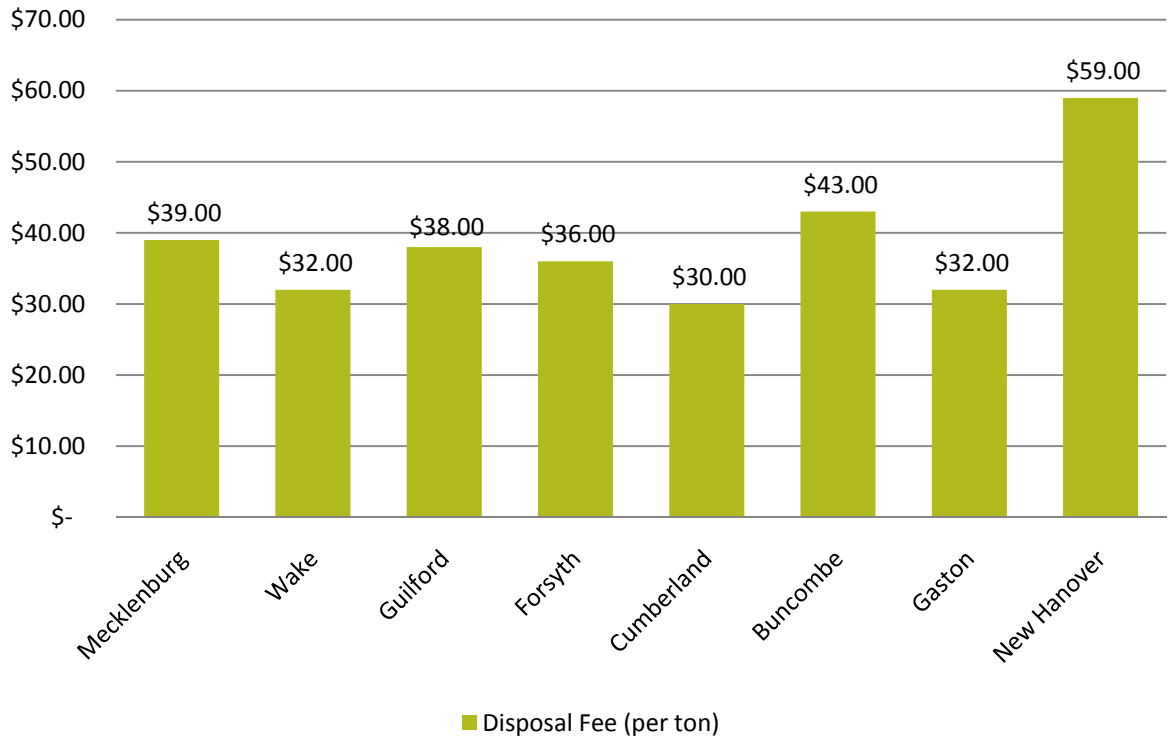
**Figure 3. Tipping Fees of County-Owned Landfills Nearby to Wake County**



In addition to evaluating similar large counties, reviewing the landfill tipping fees at surrounding county landfills is also a valuable means of assessing the County's tipping fees against the regional market for waste disposal services. The following nearby counties have

Subtitle D landfills: Alamance, Johnston, Orange, and Wayne. Based on current published tipping fees, only Wayne County has a lower tipping fee than Wake County. Figure 4 provides a chart comparing the landfill tipping fees for the county landfills within the immediate regional area.

**Figure 4. Top 10 Populated Counties with Publicly-Owned Subtitle D Landfills**




The data regarding landfill tipping fees within North Carolina and surrounding Wake County clearly shows that the County is offering MSW disposal services at a competitive tipping fee compared to other counties. In the competitive waste disposal business, the County's relatively low disposal fee is a key factor in the landfill handling approximately 45 percent of the waste generated in the County.

## Waste Disposal at Private Landfills in North Carolina

Even though local municipalities own most of the Subtitle D landfill facilities in the state, the majority (approximately 60 percent) of available permitted waste disposal airspace is controlled by the private sector. The development of large, privately-owned regional landfills is the reason why the private sector controls the majority of permitted disposal airspace in North Carolina.

Typically, public landfills serve their particular jurisdictional area, while private landfills operate as large, regional facilities. Private landfills operators also provide collection services to municipalities and commercial customers. This vertical integration within waste management companies provide them the opportunity to direct waste to their own disposal facilities, even if the facility is not the closest.

The top three largest private landfills handle 40 percent of waste disposal in North Carolina which provides these facilities great economies of scale relative to pricing. These facilities are:

- Waste Industries Sampson County Landfill;
- Republic Services Charlotte-Motor Speedway Landfill; and
- Republic Uwharrie Environmental Regional Landfill.

The trend towards privatization or closing of existing publically-owned landfills will continue to increase the percentage of waste disposal airspace handled by the private sector.

Transfer stations play a significant role in the movement of waste from areas of generation to final landfill disposal. Because of the ability to efficiently transfer waste to private regional landfills, the proximity of private landfills to Wake County provide alternative disposal options for waste haulers. The alternative private landfills within a 100-mile radius of the SWLF are:

- Republic Upper Piedmont Regional Landfill – 70 miles one-way;
- Waste Industries Sampson County Landfill – 84 miles; and
- Uwharrie Environmental Regional Landfill – 85 miles.

According to NCDENR records, some waste from Wake County was disposed at each of these three private landfills. The Waste Industries Sampson County Landfill receives approximately 18 percent of waste generated within the County, and a majority of the waste from counties surrounding Wake County.

## Private Landfill Disposal Pricing

Private landfill owners and operators are in the business of efficiently selling landfill disposal airspace; therefore, private Subtitle D landfills are interested in maximizing the disposal of MSW and other value-added waste materials in their landfills. Private landfills, more than public facilities, will negotiate varying tipping fees with customers to secure the waste volumes necessary to meet their business objectives. Higher waste disposal volumes allow private landfills to decrease their per ton costs which allows lower disposal rates for high volume customers.

For example, counties and cities that own their transfer stations negotiate long-term disposal contracts with private landfills. The private landfills receive a guaranteed waste stream while the municipality receives guaranteed disposal airspace for the term of the agreement.

There are a myriad of factors that influence the disposal pricing at private landfills, and many of the factors are the same for publically-owned landfills. The primary factors affecting private landfill pricing are:

- Capital and operating costs;
    - Establish a landfills fixed and variable costs
    - Economies of scale, efficient operations, and attempts to lower airspace development costs all help private landfills lower costs
- Volume and type of material disposed;
    - High volume customers will receive lower discounted rates
    - Material such as MSW, sludge, and asbestos have varying handling costs and consume airspace at different rates compared to their weight
    - Materials that are less dense (bulky) may have higher tipping fees than denser materials such as ash
- Hauling Distance Advantage;
    - Private landfills may utilize a pricing strategy that accounts for the proximity of the next closest disposal alternative
    - Ability to charge a higher tip fee due to the additional hauling costs associated with another facility that is farther away
- Available airspace;

- Fuel surcharges;
- Contract Term; and
- Profit.

## Private Landfill Disposal Tipping Fees

CDM Smith researched publically available information on private landfill disposal rates to attempt to provide a general idea of both negotiated and gate rate disposal fees at private landfills. Pricing and annual waste disposal tonnage information for the City of Greensboro, City of Durham, and Mecklenburg County are provided below. The tipping fees provided below include the $2 per ton state tax.

As previously discussed, private landfill tipping fees are based on a myriad of factors and the outcome of negotiated terms and conditions of the disposal agreement. Since CDM Smith did not have access to the fully negotiated agreements, the pricing information provided may not fully reflect all of the costs or additional fees associated with waste disposal at the private landfill.

Based upon conversations with members of the North Carolina solid waste industry, the average tipping fee for private regional landfills is estimated to be in the range of $35-40 per ton.

- Private Landfill Negotiated Rates
    - City of Greensboro (160,000 tons)
        - $24.34 per ton
    - City of Durham (130,000 tons)
        - $31.50 per ton
    - Mecklenburg County (380,000 tons)
        - $27 per ton
- Private Landfill Gate Rates
    - Waste Industries Sampson County Landfill gate rate = $45 per ton for out-of-county waste
    - Uwharrie Environmental Regional Landfill has a 2-ton minimum at a cost of approximately $65

# Memorandum

*To:* *Mr. Lowell Shaw*
*Mr. John Roberson, P.E.*

*From:* *CDM Smith*

*Date:* *February 1, 2012*

*Subject:* *Wake County, North Carolina*
*Solid Waste Management Plan Update*
*Subtask 5.2 – Food Waste Evaluation*

As a component of the 2012 Ten Year Solid Waste Update, CDM Smith performed an evaluation of opportunities related to food waste diversion, processing, and beneficial use. This memorandum presents the results of this evaluation, and discusses the following topics:

- the amount of food waste potentially available for recovery in Wake County;
- food waste processing facilities in the region;
- requirements, impediments, and benefits of a food waste digestion operation located at the South Wake Landfill (SWLF);
- future opportunities for co-digestion of food waste and sludge from wastewater treatment process; and
- parameters that would characterize a potential food waste pilot program in Wake County.

## Introduction

According to the U.S. EPA, food waste is the second largest category of municipal solid waste (MSW), accounting for approximately 18 percent of the waste stream. Less than 3 percent of food waste is currently being diverted from landfills, with most of the diverted food waste being composted to produce fertilizer (EPA, 2007). According to the *2011 Wake County Waste Characterization Study*, food waste accounted for approximately 15 percent of the waste stream by weight (SCS, 2011). The study sampled 51 single-family residential, 14 multi-family residential and 35 commercial waste generators. The mean composition of food waste from single family residential, multi-family residential, and commercial sources was 12.9 percent, 14.9 percent, and 19.2 percent, respectively.

During fiscal year (FY) 2010-2011, the County generated 632,000 tons of MSW and disposed 426,900 tons at the SWLF. Assuming food waste accounts for 15 percent of the County's overall MSW stream, the County disposed over 95,000 tons of food waste during FY 2010-2011, with approximately 64,500 tons going to the South Wake Landfill.

## Regional Food Waste Processing Facilities

There are currently two food waste processing facilities in proximity to Wake County that could potentially collaborate with Wake County to conduct a food waste pilot program – Brooks Contractor and McGill Composting.

Brooks Contracting is permitted to recycle and compost 75,000 tons of organic materials per year. Their food waste recycling program started as a pilot program in 1999 with Orange County, NC. After developing an effective program with Orange County, the company expanded their service to 140 locations in Chatham, Cumberland, Durham, Guilford, Orange, and Wake counties. Brooks provides service to over 20 locations in Wake County including Whole Foods and North Carolina State University. Their services also include collection of the food waste using a fleet of trucks that were modified specifically for food waste collection and cleaning of the containers. Brooks collects organics in either 8-yd dumpsters or 64-gallon wheeled containers, depending on the available dock space and volume of waste.

McGill Composting has a composting facility in New Hill, NC. The facility currently processes 1,000 to 1,500 tons per week but does not provide collection services. McGill receives food waste from a number of Wal-Marts, private haulers that service supermarkets, and from the cafeterias in Research Triangle Park (RTP). They do not pre-screen for contaminants, but do screen on the back end of the process. They are in the process of expanding their New Hill facility capacity to 104,000 tons per year which will provide sufficient capacity to accommodate a Wake County pilot program.

## Food Waste Digestion

Anaerobic digestion (AD) is a proven means of reducing the volume of organic material, such as food waste and sewage sludge, and producing methane gas for use in heating or electrical power generation. AD is widely used for the treatment of municipal organic solid waste (MOSW; e.g. food waste) in the European Union, due in large part to regulatory requirements that mandate a significant reduction in the amount of landfilled organic waste by 2016 (Ljukpa, 2010; De Baere and Matheeus, 2010). As of 2010, over 200 facilities with a combined annual capacity of nearly 6 million tons were digesting various types of municipal solid waste in Europe (De Baere and Matheeus, 2010). In the U.S., AD is common for the treatment of sludge at wastewater treatment plants, but has seen only limited use for MOSW due to a lack of regulatory incentives and low energy prices, which reduce the value of the biogas produced by the process (Lane Council of Governments [Cog] et al., 2009). A small technology company, W2E Organic Power, is currently building one of the first AD facilities in the U.S., near Columbia, SC. The facility will

accept 48,000 metric tonnes (52,910 tons) of food waste, grease, yard waste, and certain other organic wastes annually. The resulting biogas from the AD process is expected to generate 3.2 MW of electricity, and will be sold to Santee Cooper, South Carolina's state-owned electric and water utility. According to one report, the facility will begin accepting waste in 2012, and has already has commitments from a variety of commercial waste streams including, Wal-Mart, BlueCross BlueShield, Palmetto Health, Pontiac Foods, McEntire Produce, and others (Columbia Business Report, 2011.)

## Process Description

A number of different process configurations have been used to digest MOSW. Commercially-available digestion systems can generally be classified according to three major characteristics:

- Continuous or batch;
- "Dry" or "Wet" feedstock; or
- One-stage or two-stage.

A "dry" system requires waste with a total solids content of more than 15-20 percent by weight, while a "wet" system treats slurries with less than 15 percent solids. Dilution of waste with process water can be used to adjust the incoming MOSW to the needed consistency. Single-stage systems are simpler to operate and cheaper to construct than two-stage systems, but two-stage systems can tolerate higher loading rates (California Integrated Waste Management Board [CAIWMB], 2008).

The most common system for the digestion of MOSW in Europe is the continuous, single-stage "dry" process (CAIWMB, 2008; Lane CoG et al., 2009). Assuming that the MSOW is separated at the source, the only pre-treatment required for these systems is a size reduction step (screening and/or grinding) to remove large solids, and possibly dilution with process water to achieve the necessary consistency (CAIWMB, 2008). Such systems are available from several commercial vendors, each of whom has dozens of operating installations worldwide (but none in the United States). A schematic of three of the most common processes is shown in Figure 1. Further information about the Dranco and Kompogas processes is attached to this memorandum.

## Cost

The 2011 *Wake County, North Carolina Waste Characterization Study* prepared by SCS Engineers indicates that food waste, defined as meats, vegetables, food, and byproducts, comprises 19 percent of the <u>commercial</u> MSW received by the County, or 32,000 ton/yr. If a collection program for commercial food waste were created that could capture 10 percent of this amount, an annual input of 3,200 tons of food waste would be made available for digestion.

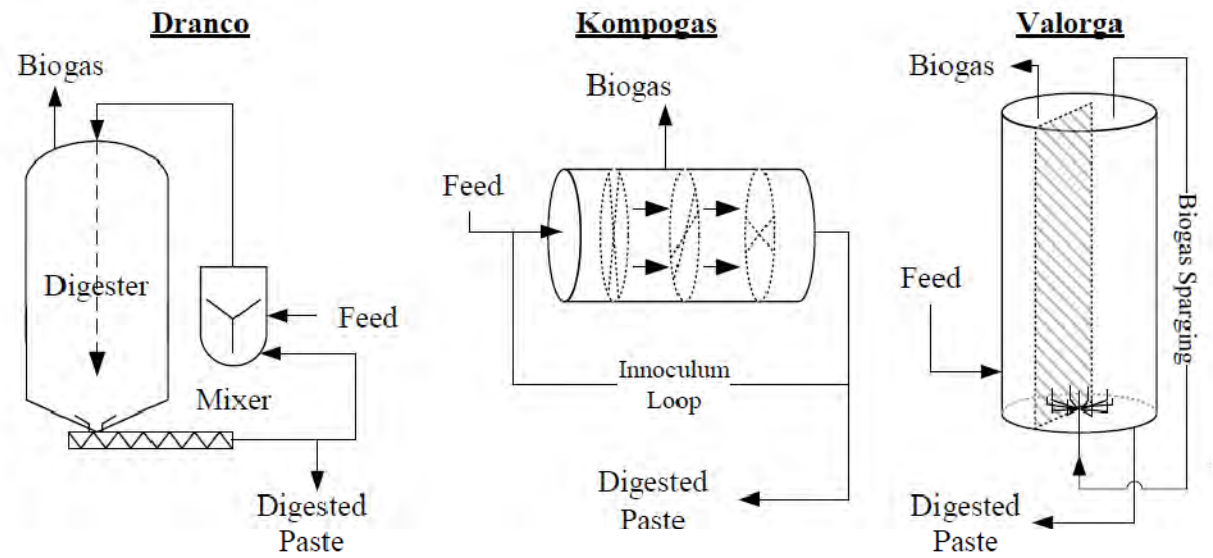



**Figure 1: Most common single-stage, dry, plug flow digester designs for digestion of municipal organic solid waste**. (Source: California Integrated Waste Management Board, 2008).

While this input represents a considerable amount of waste, a digestion facility constructed to handle it would be very small relative to a typical installation. Nearly all the operating installations utilizing the Dranco, Kompogas, or Valorga processes have capacities in the tens of thousands of tons per year or more. Because of the scale difference and the fact that the majority of full-scale digestion systems are installed in Europe, estimating the capital cost for a comparable facility in the U.S. is difficult. Several studies summarized in a report by the California Integrated Waste Management Board (2008) suggest that the capital cost for this size facility may be on the order of $3-5 million. The 52,910 ton W2E Organic Power facility being constructed in Columbia, SC is reported to cost anywhere from $12 to $23 million, according to several conflicting press releases and reports (Columbia Business Report, 2011; ZeroWasteZone, 2011).

Operating costs can also vary widely, and decrease considerably as the scale of the facility increases. For such a small facility, the operating cost may be as much as $100 - $150/ ton, or $320,000 - $480,000/yr (CAIWMB, 2008).

## Revenue Potential

Digestion of food waste could potentially provide revenue to Wake County through the sale of electricity produced from biogas. Tipping fees are another potential source of revenue; however because food waste is currently accounted for in the landfill tipping fee , additional revenue

would not be realized unless a higher tipping fee was charged at the food waste digestion facility.

It is difficult to estimate energy generation potential of food waste because the yield of the digestion process is highly dependent on the characteristics of the waste being digested. Data published by various AD system vendors lists yields of 1.3 – 5.8 standard cubic feet (scf) of biogas per pound (lb) of wet MOSW treated, with an average of 3.6 scf/lb. Table 1 shows that given this range, the quantity of biogas generated could potentially be used to generate between $38,000 and $172,000 in annual revenue from the sale of electricity. The actual revenue generated will depend heavily on the price of electricity, including any applicable tax credits or incentive programs.

| Parameter | Food Waste Loading Rate (lb/yr) | Biogas Production Rate (scf/lb) | Biogas Produced (scf/day) | Annual Electricity Generated[1] (MWh) | Annual Revenue from Electricity[2] |
|---|---|---|---|---|---|
| Min | 6,400,000 | 1.3 | 32,000 | 500 | $38,000 |
| Avg | | 3.6 | 90,000 | 1,520 | $106,000 |
| Max | | 5.8 | 144,000 | 2,450 | $172,000 |

*1 Assumes a biogas heating value of 600 BTU/scf and an electrical generation rate of 109 kWh/MMBTU*
*2 Assumes a wholesale price of electricity of $0.07/kWh*

**Table 1. Estimated amount of biogas, electricity, and energy revenue from a 3,200 ton per year AD facility.**

## Co-Digestion of Food Waste and Sludge

The low energy prices in the U.S. make it unlikely that a dedicated MOSW digestion facility would be cost-effective without substantial incentives, subsidies, or possible credits associated with the sale of renewable energy. However, several municipalities in the U.S. have demonstrated that MOSW can be successfully blended with sewage sludge and treated in existing digesters at wastewater treatment plants.

Co-digestion offers several potential benefits. First and foremost, if existing excess digester capacity can be used, it minimizes the up-front capital and permitting costs needed to implement MOSW digestion. Secondly, digestion of multiple feedstocks has been found to

result in a higher methane yield than separate digestion of the individual feedstocks (Lane CoG et al., 2009). Wastewater sludge also tends to have a higher alkalinity than food waste, which helps the process maintain a more stable pH during the acid-forming stages of digestion. At the East Bay Municipal Utility District in San Francisco, the addition of sorted, ground food waste to wastewater sludge resulted in a 3.5-fold increase in methane production during AD (Lane CoG et al., 2009).

In the *City of Raleigh Biosolids Management Master Plan* prepared by CDM Smith and Hazen & Sawyer in 2008, the construction of 9.25 million gallons of anaerobic digestion capacity at the Neuse River WWTP was recommended by 2023 to meet future residuals demands. It is possible that excess digestion capacity will be available in the interval between construction of these facilities and the time when wastewater flows meet future projections. The *Master Plan* is currently being updated and may include revised projections that would suggest an opportunity for co-digestion of food waste.

## Food Waste Pilot Program Parameters

CDM Smith spoke with three local businesses and a representative from the Orange County Solid Waste Department to help define pilot program parameters that could be supported by local businesses. Based on these discussions, the key components for a food waste diversion pilot program include:

- identifying large volume food waste generators that can provide a clean (i.e., uncontaminated with non-organics) and continuous waste stream;
- providing containment and transport that minimizes odor and maintains sanitary conditions at the food waste source; and
- providing economic incentives for food waste generators to participate in the program.

When considering a food waste diversion pilot program the County should look to large volume commercial and institutional customers such as grocery stores, universities, schools, restaurants and hospitals. These customers are typically able to provide a consistently high quality stream of food waste void of materials contaminated by plastics, glass, styrofoam, metals and foils. As previously discussed, Brooks Contractor currently contracts with several businesses in Wake County that are successfully providing food waste that meets these requirements.

Food waste diversion requires special consideration for containment and transport. Waste containers should be adequately sealed and frequently cleaned to minimize odors. Brooks Contractor provides specialty containers with their collection service. These containers are cleaned with a high pressure hot water, degreaser, and deodorizer system built-in to the service vehicles. MSW waste haulers do not currently provide specialized food waste pick-up with cleaning; however, a discussion with a representative of one local waste management firm

suggests that they are capable of providing the required containers and would be interested in supporting a program provided the opportunity.

The current impediment to food waste diversion, similar to other diversion initiatives is low cost landfill disposal compared to the high cost of processing. Wake County's current tipping fee is $32 per ton at the landfill, whereas food diversion may be in excess of three times the tipping fee. Although there are large volume customers working with Brooks Contractors that have justified these costs based on their overall business model, most commercial businesses cannot justify the added costs of food waste diversion. To subsidize the extra costs, the County may consider grant funding or other incentive-based programs. Orange County's food diversion program is completely funded by the County, provided businesses meet a 2 ton per month minimum. The program costs the County $80 per ton, which is $23 more per ton than the landfill tipping fee. If Wake County invested in a similar program at the same price, the difference in food waste diversion and landfilling would be $48 per ton.

An economical approach to a pilot program would be for the County to build upon the food waste diversion that is currently being done in Wake County through Brooks and the haulers delivering food waste to McGill. The County could attempt to expand the number of participants by inviting commercial businesses along existing food waste disposal routes to join the program and by offering to subsidize a portion of the costs.

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OWS
Organic Waste Systems
“A true all-rounder in anaerobic digestion
of solid and semisolid organics”

## Organic Waste Systems

*Organic Waste Systems (OWS) is a world leading company in the construction and operation of anaerobic digestion plants for solid and semisolid feedstocks, in the biodegradability testing of biopolymers, and in waste management consultancy.*
*OWS has three main areas of activity:*

### 1 Construction of anaerobic digestion plants

Our activities and services range from design to turnkey construction and start-up, to operation and maintenance, and sometimes even financing of anaerobic digestion plants for solid and semisolid organic feedstocks.
Our experience and mechanical and biological know-how has resulted in the development of innovative and patented designs, with a digester concept adapted to each type of solid and semisolid feedstock:

- The DRANCO process: *vertical* fermenters for digestion of household waste organics
- The DRANCO-FARM process: *vertical* fermenters for digestion of pure organic feedstocks such as energy crops and industrial organic waste
- The BES process: an anaerobic process with *horizontal* fermenters (plug-flow digestion) for digestion of food waste and energy crops
- The SORDISEP process: a wet separation process for digested municipal or residual waste coming from the DRANCO process

### 2 Biogas consultancy & support

OWS provides biogas consultancy and support to biogas plant operators not only for digestion plants constructed by OWS, but also for digesters constructed by others:

- One-stop shop for biological supervision, mechanical assistance and automation
- Supervision and improvement of digestion of household waste organics, energy crops, food waste, manure and industrial organics

### 3 Biodegradation testing and waste management consultancy

OWS performs standard testing and support analyses to obtain labels for biodegradability and compostability and provides services for waste management by means of biological treatment and recycling.

**Leading the way in the digestion of solid and semisolid organics for over 25 years**

## Biogas consultancy and support

All-round consultancy and support based on 25 years of experience:

- biological supervision and analytical assistance
- electromechanical supervision, maintenance and repairs
- process control: increased performance
- automation

*At present OWS is supervising more than 20 plants treating municipal solid waste organics, energy crops, food waste, manure or industrial organics, of which 10 plants are constructed by third parties.*

The biogas supervision laboratory consists of:

- more than one hundred digesters
- batch or continuous operation
- operation under dry or wet conditions
- temperatures ranging from 30 °C to 60 °C
- automated gas analyses for daily biogas composition
- more than 40 vessels for aerobic composting of digestate

**Currently more than 20 plants under all-round supervision**

**More than 500 clients and more than 2.000 materials tested for biodegradability**

## Biodegradation and composting laboratory

*Our ISO-17025 certified and accredited laboratory is the worldwide leader in biodegradability and compostability testing of biopolymers. Other activities include:*

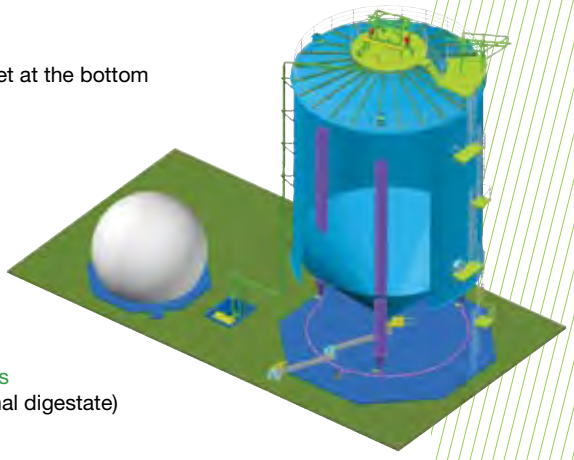
- characterization of substrates for digestion and composting: dry matter, C/N-ratio, biogas production potential, etc.
- quality assessments of digested and composted residues
- various biodegradation tests on a wide range of products and materials
- performance of standard test methods
- sorting analyses
- international studies concerning biological treatment of specific waste streams, home composting, etc.

## The DRANCO process

*The patented DRANCO process is unique because of the vertical design, the high-solids concentration and the absence of mixing inside the digester. These three principles combined with more than 25 years of experience make the DRANCO process the most efficient way to digest solid and semisolid feedstocks.*

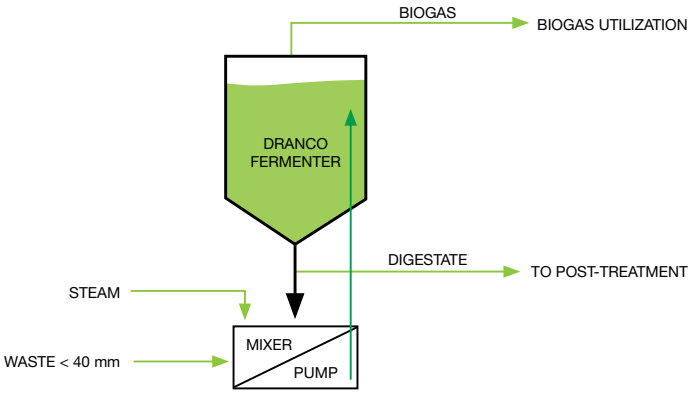
### DRANCO process characteristics

- vertical fermenter: feeding at the top and extraction through conical outlet at the bottom
- single-phase digestion with intensive recycling of digestate
- thermophilic or mesophilic operation
- small, well-insulated digesters with minimal heating requirements



### Advantages of the DRANCO digestion

- produces a significant amount of renewable energy
- minimal surface requirements
- minimal or no wastewater production possible
- no mixing equipment or moving parts in the digester
- no scum layer formation or settling of glass, sand, etc. in the digester
- ideal for partial stream digestion and codigestion with dewatered sludges
- high dry-solids content in the digester (up to 40-45% dry solids in the final digestate)




# The best way to digest household waste organics

## The BES process

OWS offers a horizontal plug-flow fermenter designed and constructed according to the same high OWS standards as our other digesters. The fermenter is equipped with slow-turning paddle stirrers on the inside, developed to treat agro-industrial waste, energy crops, crop residues, biowaste and manure.

### Characteristics and advantages of the BES digestion

- limited height of fermenter (<11m)
- intensive recycling of digestate
- slow-turning paddle stirrers
- thermophilic or mesophilic
- high dry-matter content
- robust and industrial system
- horizontal concrete tank:
  short time of construction, modular concept

# DRANCO references

The DRANCO process is one of the most proven technologies for digestion of household waste organics. The first full-scale plant was put into operation in 1992 and is still operating. Since then, more than 20 other installations have been constructed in Europe and Asia, treating source-separated organics (biowaste) and residual municipal solid waste.

## DRANCO applied to biowaste / food waste

The DRANCO process can efficiently treat biowaste, food waste, restaurant and market waste, and dewatered sludges. Moreover, these plants deliver an outstanding quality of compost.

| | |
|---|---|
| **Project** | Terrassa (Spain) |
| **Digestion capacity** | 25.000 ton/year |
| **Digester volume** | 1.626 $m^3$ |
| **Start-up** | 2006 |
| **Installed power generation** | 2 engines of 610 kW |
| **Compost production** | 7.500 ton/year |
| **Partial stream digestion** | no wastewater production, digestate mixed with green waste prior to aerobic composting |

## The DRANCO process has excellent references all over the world

## DRANCO applied to biowaste / non-recyclable wastepaper and disposable diapers

The DRANCO process can efficiently treat biowaste including non-recyclable wastepaper, cardboard as well as disposable diapers.

| | |
|---|---|
| **Project** | Brecht (Belgium) |
| **Digestion capacity** | 70.000 ton/year |
| **Digester volume** | 3.150 $m^3$ + 800 $m^3$ |
| **Start-up** | 1992, extension in 2000 |
| **Installed power generation** | 3 engines of 625 kW + 1 engine of 290 kW |
| **Compost production** | 28.000 ton/year meeting stringent Flemish quality standards |
| **Full-stream digestion** | all organics digested after removal of plastics and reduction to less than 40 mm |
| **Wastewater treatment** | biological and physicochemical treatment |

## DRANCO applied to residual municipal solid waste

The DRANCO process is ideally suited for the treatment of highly contaminated organic fractions derived from the pretreatment of mixed or residual municipal solid waste. OWS constructed several plants treating MSW or residual waste.

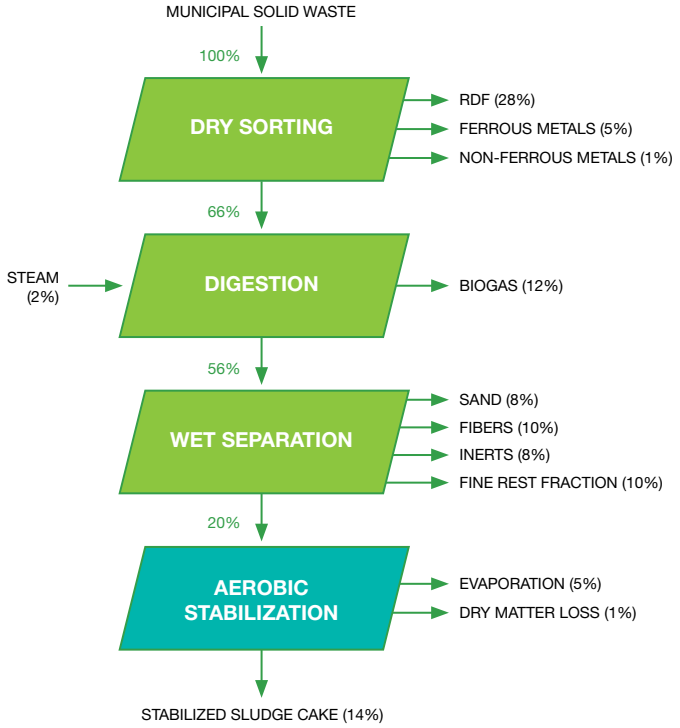
| | |
|---|---|
| **Project** | Münster (Germany) |
| **Digestion capacity** | 24.000 ton/year |
| **Digester volume** | 1.640 $m^3$ |
| **Start-up** | 2005 |
| **Installed power generation** | 1 engine of 469 kW |
| **Compost** | stabilized end product to landfill |
| **Partial stream digestion** | mixing of digestate with 14.000 ton of fresh organics |
| **Biogas usage** | biogas engine of 469 kW and RTO (regenerative thermal oxidation) |

## The SORDISEP process

In order to increase the recycling rate or landfill diversion, OWS offers total treatment concepts such as the SORDISEP process (SORting, DIgestion and wet SEParation) for the treatment of residual municipal solid waste. In a first phase, conventional dry sorting techniques are applied to remove large components, ferrous and non-ferrous metals, and inerts. The organics are subsequently digested in a DRANCO digester for the recovery of biogas. This removes about 65% of the biodegradable volatile solids in the residual waste, making the digestate free of easy to degrade and often odorous and sticky organic components. The digestate is further subjected to a wet separation to produce several fractions which can be recycled or disposed of at a lower cost.

The wet separation basically consists of:

- mixing the digestate with high amounts of water
- screening over fine screens to remove glass, stones, plastics and other impurities
- further separation and screening to produce various fractions, such as sand, fibers, small glass and stones, and fine sludge
- washing and upgrading to produce high-quality end products




**Maximum separation and recovery:**
**recycling rates of 50 % and landfill diversion rates of 85 % possible for residual municipal waste**

DRANCO-SORDISEP plant, Bourg-en-Bresse (France) for 105.000 ton/year

# 25 years of waste digestion experience applied to bio-energy production

## The DRANCO-FARM process

*The DRANCO-FARM technology combines the advantages and experience of the DRANCO technology for organic solid waste and applies them to pure feedstocks such as energy crops, food waste, crop residues and solid industrial organics.*

### The DRANCO-FARM advantages

**Dry anaerobic digestion**
- no need for water or liquid manure addition
- no phase separation in the digester

**Integrated post-digestion**
- maximum biogas production
- stabilized end product

**No mixing, stirring or gas injection in the digester**
- no maintenance or failures inside the digester
- less energy consumption for mixing

**Intensive recirculation**
- well-controlled external inoculation
- optimum mixing of feedstock with digestate

**Thermophilic temperature (48-57 °C)**
- higher biogas yield
- kill-off of pathogens and seeds

**Robust and industrial system**
- automated process control
- operational safety
- high reliability

DRANCO-FARM plant, Nüstedt (Germany) on energy crops, 750 kW

## Organic Waste Systems

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- BIOGAS ENERGY SYSTEMS (BES), Lemgo (Germany)

# THE DRANCO TECHNOLOGY: A UNIQUE DIGESTION TECHNOLOGY FOR SOLID ORGANIC WASTE

***Organic Waste Systems nv***

**Luc De Baere (Luc.De.Baere@ows.be)**

## Accelerated Landfill Degradation

The Dranco digestion technology is a digestion technology that was developed by studying and optimizing the spontaneous 'dry' digestion that takes place in a landfill. Municipal solid waste is dumped in a landfill, containing a sizeable amount of biodegradable waste. During a limited period, oxygen is present so that decomposition occurs by means of aerobic bacteria. This may cause an accumulation of acids and an increase in temperature. After several weeks or months, depending on the rate of filling and depth of the waste, the oxygen has been consumed and decomposition subsequently has to take place under anaerobic conditions and at the rather 'dry' conditions in terms of fermentation that exist inside a landfill. Anaerobic bacteria take over the role of the aerobic bacteria at total solids concentrations of 50% or more in the waste that has been dumped in the landfill. Biogas or what is called landfill gas is being produced during this stage. Anaerobic decomposition in a landfill is uncontrolled and very slow. Biogas production in the landfill may occur for about 20 to 50 years, and even longer depending on the moisture present in the landfill.

The Dranco technology was developed by optimising the digestion parameters of the "dry" and "static" anaerobic digestion that takes place in a landfill. At first, batch experiments were carried out which allowed the digestion process to be essentially completed in 2 to 5 years. Subsequent improvements led to batch digestion times of 6 months, then 3 months until a digestion time of 2 to 3 weeks was made possible by using a continuous process. Once this was reached, a totally new design of digester needed to be conceived which could handle an incoming feedstock of more than 40% total solids, as such "dry" digesters did not exist at the time.

## Basic digestion scheme

The basic scheme for a Dranco digester is as follows:

1) The organic fraction must be reduced in size to less than 40 mm. For the treatment of municipal solid waste, this means that large components such as plastics and textiles must be screened off or reduced in size by means of a shredder. Ferrous and non-ferrous metals can be recovered for recycling purposes. Stones, glass and hard plastics should be eliminated as much as possible, but efficiencies of 50 to 80% or even less are

sufficient in most cases. The Dranco process can handle high concentrations of pollutants and non-degradables in the organic fraction sent to the digester, but removal of these components may reduce energy consumption and abrasion. The cleaner the feedstock, the less complicated the pretreatment.

2) The pretreated organic fraction of less than 40mm in size is subsequently mixed with a large amount of digested residue coming from the digester. The mixing ratio is usually around 1 ton of feedstock with 6 to 8 ton of digested residue. This takes place in the mixing part of the feeding pump. A small amount of steam is added to the mixture in order to raise the temperature to 35 – 40℃ for mes ophilic operation and to 50 - 55℃ for thermophilic operation.

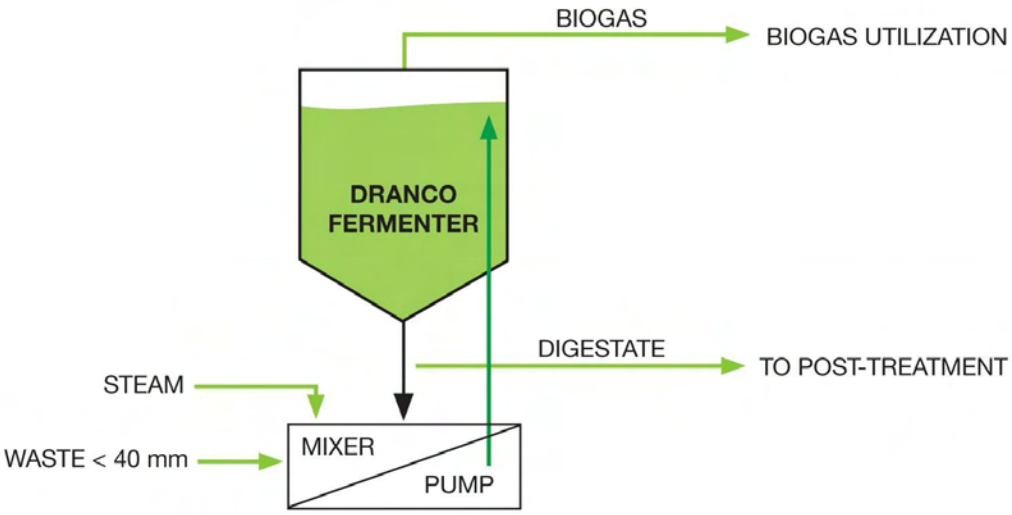



**Figure 1: Basic Dranco process scheme**

3) The preheated mixture of fresh organics and digested residue is then pumped to the top of the digester through feeding tubes. These feeding tubes cut through the cone in the bottom of the digester and reach to about 1m distance from the roof inside the digester. The material is pushed out of the feeding pipes and flows into the upper part of the digesting mass in the digester.
   The internal feeding tubes have a diameter of about 1m in order to minimize friction and energy consumption during pumping. The distance and height over which the material is pumped, is also minimized through the internal feeding, while the weight on top of the roof is also greatly reduced in comparison to feeding through the top of the roof by using external feeding pipes.
4) Once the material enters into the main body of the digester, it takes about two to four days depending on the feeding rate to reach the bottom of the digester. The digesting mass descends through the digester by gravity only. No mixing equipment or gas injection is needed in the inner part of the digester. Biogas rises and exits the digester through the roof and flows towards the gas storage and treatment.
5) The digested residue is extracted from the bottom of the digester by means of screws hanging underneath the conical outlet. The largest part of the extracted material is recycled in the process and screwed to the mixing part of the pump for mixing in with the fresh incoming feedstock. The remaining part is deviated towards further treatment. The average retention time in the digester is around 20 days with a pass-through time every 2 to 4 days.

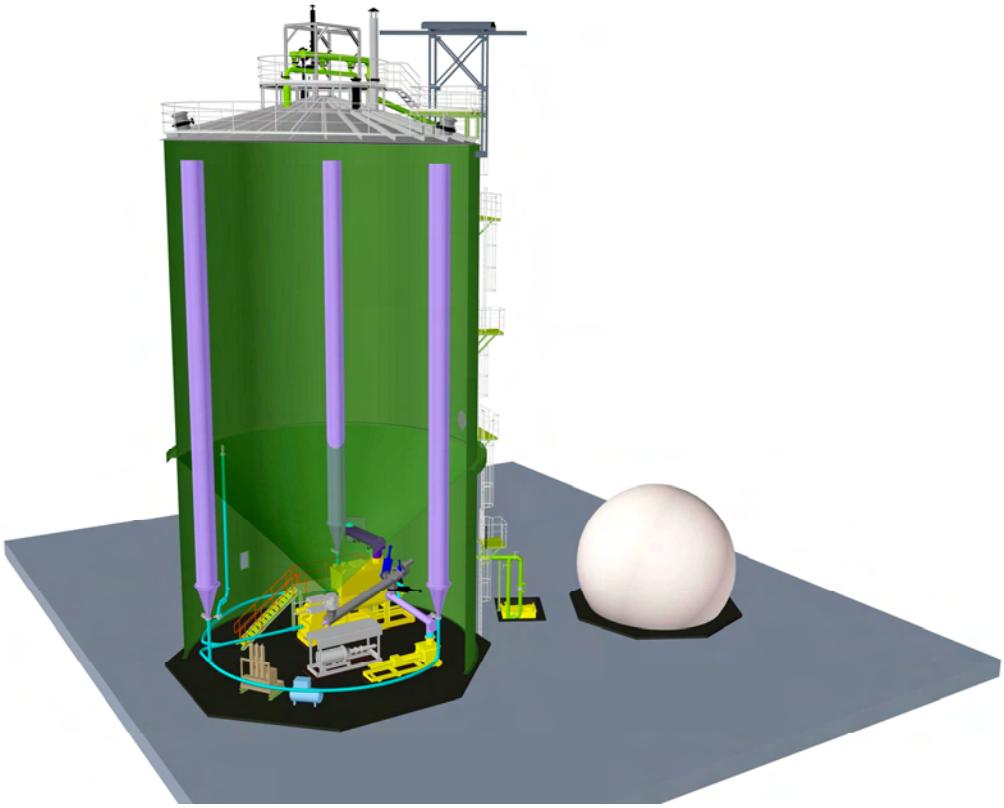


**Figure 2: View of a Dranco digester with internal feeding tubes and with feeding pump under the digestion tank**

## Advantages of the Dranco digestion

The patented Dranco process has a few significant advantages over conventional “wet” and other “dry” digestion systems.

1) High-rate ‘dry’ digestion
   The Dranco process can operate at total solids concentrations of up to 45 to 50% going into the digester, and with total solids concentrations up to 40% for the digested residue coming out of the digester. These very concentrated operating conditions are possible because the mass moves in a vertical direction through the digester, i.e. from top to bottom. Digestion systems, in which the digesting mass moves horizontally through the digester, require a higher level of flowability. They operate at total solids concentrations that are about 10 percentage points less than the Dranco system. They are also typically equipped with mixers or gas injection nozzles to move the material forward. This is not needed in high solids vertical digestion. Such a high concentration of solids also allows for high biogas production rates. In full-scale plants, biogas production rates of up to 10 $m^3$ of biogas per $m^3$ of active digester volume per day can be maintained as annual averages for organic feedstocks. This minimizes the required volume needed and as a consequence the number of digesters. A single digester of 3 150 $m^3$ of total volume can treat 50 000 ton per year of organic waste, yielding 7.4 million $m^3$ of biogas containing 55% of methane. Conversion of all the biogas in internal combustion engines yields 9 to 10 million kWh per year.

2) No scum or settling in the tank
Operation at a sufficiently high dry matter content prevents scum formation or settling of heavies in the bottom of the digester. Heavy particles less than 40 mm, such as sand, as well as any remaining glass and stones passing through the screen of 40 mm can be handled. Concentrations up to 22% of glass have been found in the digested residue of mixed waste. The heavy components present in the waste cannot sink through the concentrated mass in the digester, nor can light materials, such as wood, styrofoam etc. float.

3) Minimal heat requirements
The temperature of the digester is maintained by injecting steam in the mixing part of the digester. The heat requirements are kept to an absolute minimum because only the incoming fresh feed needs to be heated up to the operating temperature. Heat losses are minimal in the digester because of the high solids concentration that greatly reduces convection losses. The digester therefore only needs to be insulated in order to maintain the temperature in the digester for several days without slowing down the biological process. High solids digesters operating at high loading rates can actually be observed to rise in temperature due to the exothermal energy released during anaerobic decomposition. This amount of exothermal energy will be rather limited to a couple of degrees Celsius but nonetheless measurable. No danger exists for overheating however, as is the case in aerobic decomposition of organics.

4) Thermophilic operation
As is the case with most dry fermentation systems, the Dranco process can easily be operated under thermophilic temperatures. Thermophilic operation typically yields a higher production per ton of waste treated and can reach significantly higher loading rates. An added benefit to operating in the 50°-temperature level is the fact that human pathogens are killed off at these temperatures, thereby improving hygienisation and kill-off of weed seeds.

## Energy from organic solids in practice

The Dranco technology has been applied to a wide range of substrates. These vary from rather wet wastes such as mainly restaurant and food waste, to dewatered sludges, source separated organics with or without the addition of non-recyclable paper/cardboard to organics produced in the pretreatment of mixed municipal or residual waste (after removal of recyclables and often also after separate collection of the clean compostable fraction).

1) Source separated organics at the facility of IGEAN in Brecht, Belgium
The largest Dranco facility was built in Brecht, Belgium, and has been functioning for 10 years. The plant was designed for a capacity of 42 500 ton per year, but was able to reach a capacity of more than 50 000 ton per year after the first 3 years. The incoming feedstock is composed out of source separated organics, such as garden, kitchen and food waste and to which also diapers and non-recyclable paper or cardboard can be added. This plant was built for the intermunicipality of IGEAN, an association of 26 municipalities around the city of Antwerp, who owns and operates the plant. On the same site, another older Dranco facility was revamped, which is treating an additional 20 000 ton per year, so that a total of 70 000 ton per year can be treated on the site.
The source separated organics are first sent to slowly rotating homogenizing drums with a retention time of 4 to 6 hours in total. The material is screened and the organics which pass through the sieve of 40 mm are sent to the digester after ferrous metals are removed by means of an overband magnet. The organics are digested in a digester of 3150 m³ of volume, and which has a height of 25 m and a diameter of 15m. During 2006,

7 million m³ of biogas were produced and consumed in three gas engines with an electrical power output of 625 kW each. The net electrical production amounted to 9.1 million kWh, enough to provide power to up to 2 500 homes. The gas engines operated during 97% of the time during the year.
The digested residue is dewatered by means of a screw press to a dry matter concentration of at least 45%, and is composted aerobically for a period of 2 to 3 weeks. During the first week of aeration, temperatures of more than 60° are reached so that any remaining pathogens are killed off. The dewatered cake is converted to a well-stabilized compost during this period, which can be used in agricultural applications. The plant produces 20 000 ton of compost, meeting the Flemish regulations for high quality soil amendment. The excess wastewater is centrifuged and sent to the wastewater treatment plant on site, designed to treat the wastewater from both digestion plants and from the adjacent landfill and green waste open-air composting plant.

**Figure 3: Dranco installation Brecht (I & II), Belgium**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|
| **FEEDSTOCK (T/Y)** | | | | | | | | |
| - BIOWASTE | 45 394 | 45 691 | 51 229 | 52 946 | 52 943 | 46 750 | 43 813 | 42 757 |
| - OTHER | 966 | 1 776 | 2 525 | 2 126 | 2 030 | 1 446 | 2 161 | 2 262 |
| TOTAL | 46 360 | 47 467 | 53 754 | 55 072 | 54 973 | 48 196 | 45 974 | 45 019 |
| **PRODUCTION OF BIOGAS** | | | | | | | | |
| - M³ BIOGAS (IN MILLIONS) | 5.8 | 6.0 | 6.9 | 6.9 | 7.0 | 5.8 | 5.6 | 6.0 |
| - M³ BIOGAS/TON INCOMING | 125 | 126 | 128 | 125 | 127 | 120 | 121 | 133 |
| - M³ BIOGAS/M³r/DAY | 6.8 | 7.2 | 7.4 | 7.2 | 7.6 | 6.1 | 6.0 | 6.3 |

**Table 1: Digestion results of the Brecht-II plant**

2) Residual waste digestion

The Dranco process is well suited for the treatment of highly contaminated organic fractions derived from the pretreatment of mixed or residual household solid waste. Residual waste is pretreated in order to recover recyclable components, such as ferrous and non-ferrous metals but also for any paper or plastics that can be removed from the residual waste for recycling or minimization of the further disposal costs.

The Dranco process is ideal for partial stream digestion due to its very high total solids concentration in the digested residue. This is the process whereby only a fraction of 50 to 70% of the total organic fraction is actually digested, while the remaining 50 to 35% is bypassed and is not subjected to anaerobic decomposition. The digested residue is then intensively mixed with the non-digested organics. The dry matter concentration of 45% in the resulting mixture of the two fractions allows for efficient aeration and rapid aerobic decomposition. The energy for reaching high temperatures and for drying during the aerobic phase is mainly provided by the fraction that was not digested. Partial stream digestion avoids the costly need for dewatering and wastewater treatment.

A plant treating 100 000 ton per year of residual solid waste is recovering recyclables and producing burnable fractions. About 28 000 ton per year of organics are diverted to digestion, to which also about 7 000 ton per year of non-digested dewatered sewage sludge is added. No wastewater is produced at the plant.

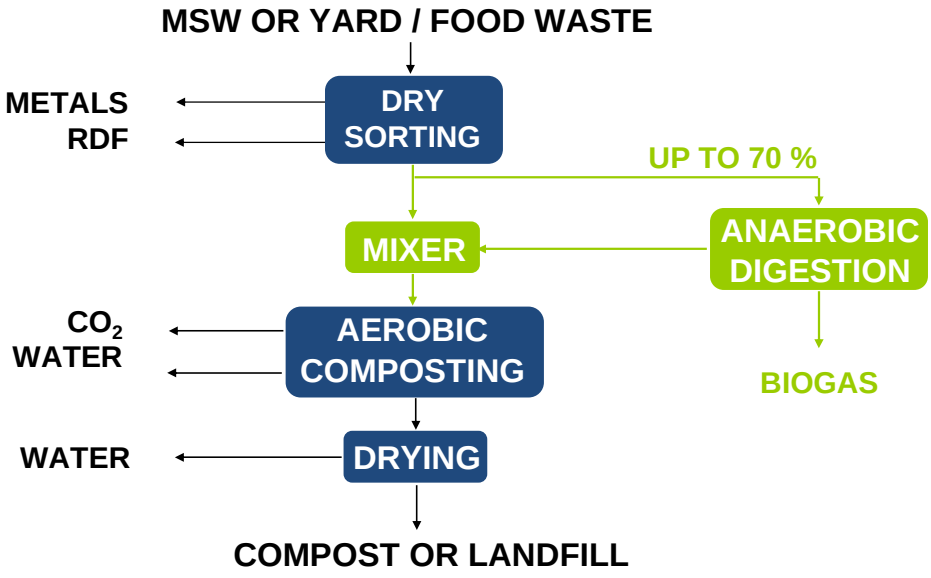



**Figure 4: Partial stream digestion**

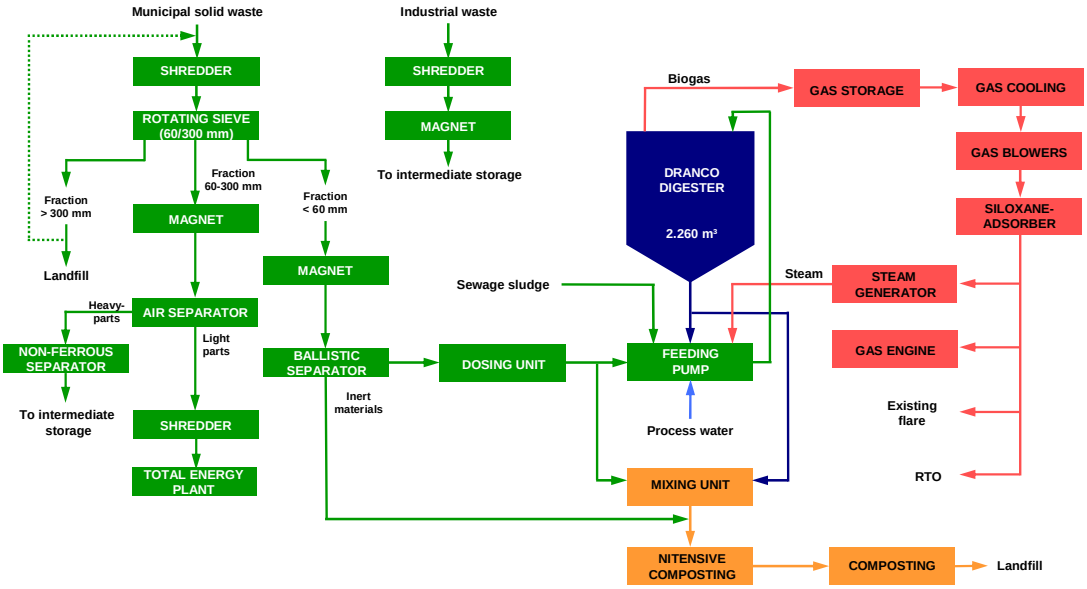



**Figure 5: Flow scheme Pohlsche Heide using partial stream digestion**

In case fullstream digestion is used, as described in Figure 6, then a wet posttreatment process can be applied to the digested residue. About 50 to 60% of the volatile solids, representing the easily degradable and often wet and sticky organic components of the waste are already converted to biogas in the digester. This results in a digested residue that can be easily separated by means of screens and other wet separation equipment, as developed in the Sordisep process. Sand, fibers and inerts can be recovered and cleaned in order to produce marketable endproducts. This increases landfill diversion up to 85% and recovery of materials out of mixed waste to 50%.

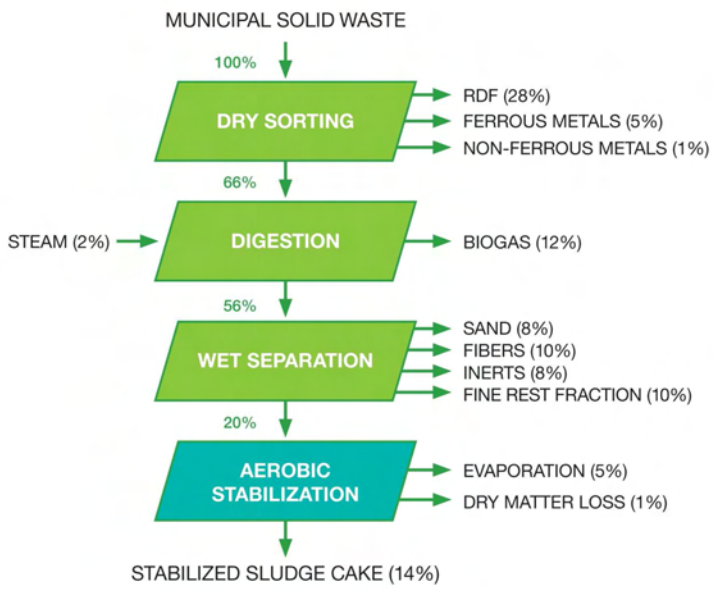
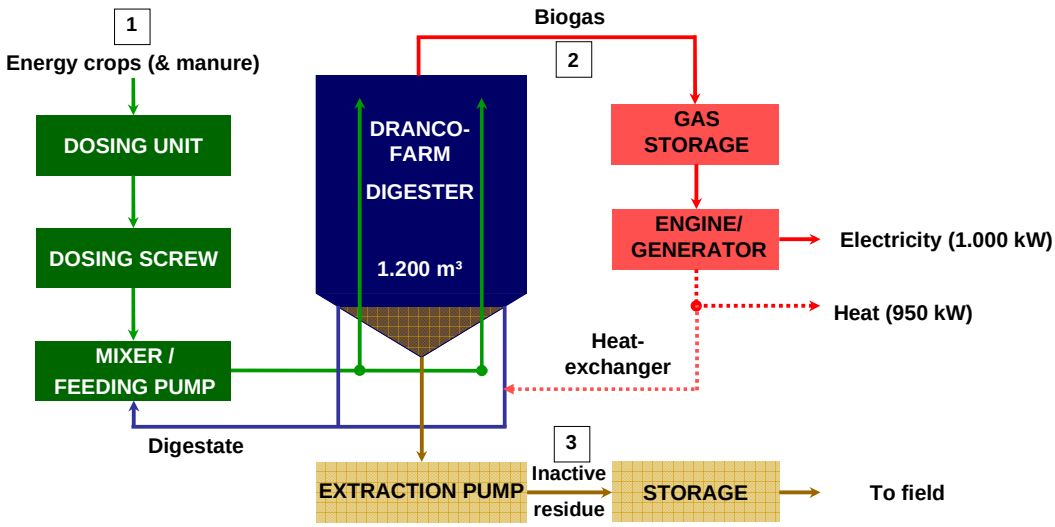



**Figure 6: Sordisep for maximum recovery of recyclables and landfill diversion**

3) Energy crops

The Dranco technology is ideally suited for the digestion of energy crops such as corn. Corn (maize) is harvested with a dry matter content of around 32% and is chopped during the harvesting to a size of less than 20 mm. This means that the total plant as harvested can be fed to a Dranco digester without any further pretreatment or even any addition of water. The corn can be stored as silage during the winter months and gradually fed to the digester.
The digested residue from corn digestion is extracted at a solids content of 20 % and can either be dewatered or simply returned to the fields, on which the energy crop was grown. Compared to ethanol or biodiesel, the net energy yielded per hectare is significantly higher. For biodiesel, for every ton of fossil fuel consumed in the production, about 2 ton of renewable fuel is produced, while this amounts to 2.5 to 3 for ethanol plants. Biogas from corn can yield 6 to 8 ton of renewable fuel per hectare for every ton of fossil fuel put into the crop growing, harvesting etc.




| | 1 | 2 | 3 |
|---|---|---|---|
| Ton/jaar | 21.200 | 5.800 | 15.400 |

**Figure 7: Flow scheme of DRANCO-FARM plant for the digestion of energy crops in Nüstedt (Germany)**

## CONCLUSION

**The Dranco technology is unique because of the vertical design, the high solids concentration and the absence of mixing inside the digester. This permits small digester volumes and the operation of a plant without excess wastewater production.**

**24 DRANCO plants have been constructed, treating a wide range of feedstocks: source separated organics (with and without non-recyclable paper/cardboard), mixed waste organics, residual waste organics, sewage sludge, …**
**Even energy crops, such as corn, can be efficiently digested at a high rate and will provide a source of renewable energy for the future.**

# The Kompogas® Process

## Mechanical-Biological Waste Treatment (MBWT)

**The purpose of a mechanical-biological waste treatment system is on the one hand to use the residual waste to produce a fraction with a high thermal value for generating energy, and on the other hand to generate a biogenous fraction for biological treatment and biogas production.**

### Mechanical pre-treatment

The residual waste is delivered to an enclosed building and subjected to mechanical processing. This process consists of a size reduction stage, the removal of ferrous metals plus the separation of the components that can be used for energy generation. This includes on the one hand the fraction with a high thermal value for thermal treatment and on the other hand the biodegradable fraction for biological treatment.

### The Kompogas® process

Biogenous waste has been treated in Kompogas installations for over 19 years now. At present, over 50 Kompogas facilities are successfully processing biogenous waste. The extremely varied composition of the waste delivered to these plants and the operation of the company's own installations has allowed vast experience to be accumulated in this field.

### Fermentation

The biodegradable fraction obtained from screening in the mechanical pre-treatment section is placed in intermediate storage, which ensures a continuous supply of material to the fermentation process. From intermediate storage, the material is transferred to the feeder, where a homogeneous, pumpable mixture is produced. Passing via heat exchangers, the substrate is pumped to the horizontal Kompogas fermenters. The fermentation process inside the fermenters is based on anaerobic-thermophilic dry fermentation at a temperature of about 55° C. The retention time in the fermenter is about 14 days. One metric ton of fermenter input generates an average of 100 $Nm^3$ biogas.

As a result of anaerobic fermentation, a significant part of the biogenous substances are decomposed. In the downstream final composting section, the fermented residues undergo final stabilisation.

Kompogas systems are built on the basis of compact modular units. This allows a large range of plant sizes to be covered (5000 to 100 000 metric tons annually) and ensures high operational reliability thanks to several fermentation units.

### Goals of mechanical-biological waste treatment

- Maximum weight and volume reduction of the residual matter to be disposed of.
- Reliable compliance with landfill disposal parameters and therefore utilisation of landfill capacities.
- Reliable compliance with emission limits.
- High biogas production rate thanks to biological treatment in the Kompogas process.
- Low capital cost and processing expenses.
- High operational reliability.

# MBWT Process and Balances

## Final composting

The dewatered fermentation residues undergo further treatment in an enclosed final composting section over 3 to 4 weeks. This enables the odour and TOC emissions to be selectively captured and directed to the exhaust air purification system. Before the material is transferred to the landfill, it is stabilised for another 2 or 3 weeks without aeration. Investigations conducted by the "Arbeitsgemeinschaft Leichtweissinstitut" of the Technical University of Braunschweig, Germany, and the "Ingenieurgemeinschaft Witzenhausen", Germany, have shown a 3-week final composting stage with aeration and turning to be sufficient for reliable compliance with the required stability criteria.

## Biogas utilisation

The biogas obtained in the fermentation process is transformed into electrical power and thermal energy in the co-generation system, ensuring autonomous operation with a considerable energy surplus. As an alternative, biogas can be upgraded to natural gas quality for use as a vehicle fuel, or it can be fed into the natural gas network. Both alternatives have already been implemented in several Kompogas facilities.

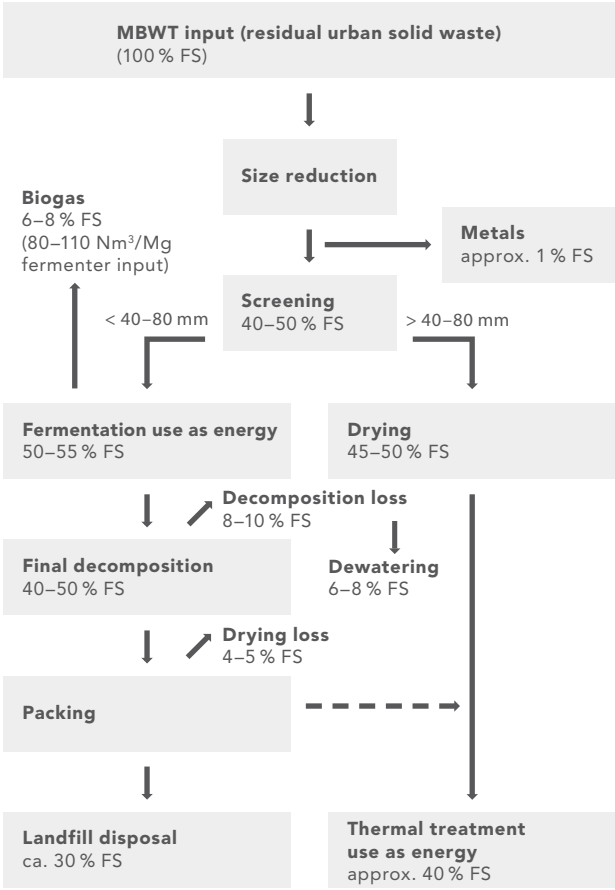
## Advantages of the Kompogas facilities

- Consistently high gas production and therefore optimised utilisation of the co-generation plant.
- High energy surplus from biological and thermal treatment.
- High plant availability.
- Only low water volumes in circulation.
- Only modest preliminary size reduction is needed.
- No special subsoil requirements (can be constructed on the landfill site itself).
- Extensions are possible thanks to modular design.
- Short construction time.
- Low capital cost and operating expenses.
- Profitability even with small plant sizes.

## Exhaust air treatment

The exhaust air volumes produced during fermentation are minimised by recirculation and treated until they have reached the required limits.

## Process operations and mass balance




FS = fresh substance/input

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# Memorandum

*To:* *Mr. Lowell Shaw*
*Mr. John Roberson, P.E.*

*From:* *CDM Smith*
*Date:* *February 1, 2012*

*Subject:* *Wake County, North Carolina*
*Solid Waste Management Plan Update*
*Subtask 5.3 – Construction and Demolition (C&D) Waste Evaluation*

As a component of the 2012 Solid Waste Management Plan Update, Wake County is interested in identifying opportunities to increase the amount of C&D waste recovered and/or recycled from within Wake County. This memorandum summarizes CDM Smith's investigation into C&D waste processing and recycling within Wake County and provides recommendations for improving C&D waste recycling. As part of the process CDM Smith:

- reviewed the 2011 South Wake Landfill (SWLF) Waste Characterization Study (SCS, 2011);
- met with C&D waste processors to define current impediments to increasing C&D waste reuse and recycling; and
- identified opportunities for increasing C&D reuse and recycling.

## Introduction

C&D waste is generated during the removal of existing structures and the building of new structures and renovations. While the waste types of demolition and construction activities are similar – lumber, metal, concrete, drywall, shingles, etc. – the ability to segregate and recover materials is different. Construction waste offers greater potential for recovery since excess material can be easily stockpiled according to material type. Demolition waste is typically more difficult to recover for several reasons. The materials have been combined and may not be easily segregated and, depending on the age of the structure, some of the materials may be hazardous and require special handling. Understanding these differences helps better define the waste stream and understand potential opportunities and markets.

## C&D Waste in Wake County

In Fiscal Year (FY) 2010-2011, Wake County generated 326,600 tons of C&D waste (NCDENR, 2011), representing 36 percent of the total waste generated within the County. During this same

period, C&D waste processing accounted for the recovery of 7.6 percent of the C&D waste stream, or 24,700 tons (NCDENR, 2011). It should be noted that 7.6 percent represents the material in the waste stream, and does not account for the recovery, recycling and reuse of materials by the contractor at the construction site.

In 2011, Wake County conducted a solid waste characterization study to determine the quantity of C&D waste in the County's municipal solid waste (MSW) stream going to the SWLF. According to this study, the percentage of C&D waste in the County's MSW stream was 0.6 percent. The low percentage generally represents small quantities of C&D waste generated by residential customers performing home renovation projects and is expected since commercially generated C&D wastes are not accepted at the SWLF.

## Current C&D Waste Processing

There is currently one C&D waste processing facility located within Wake County - WCA Material Reclamation Facility. The WCA facility processes C&D waste for concrete, cardboard, metal, shingles and wood. According to NCDENR's 2010-2011 Waste Disposal Records, the WCA Material Reclamation Facility received just over 50,000 tons of C&D waste and processed for recycling approximately 23 percent of waste received, or 11,300 tons.

There are four permitted C&D transfer stations in Wake County that receive and transport C&D waste to C&D landfills. They include the Apex C&D Waste Transfer Facility, Capital Waste C&D Transfer Station, Thornton Road Transfer Station and WCA Wake Transfer Station. According to NCDENR's 2010-2011 Waste Disposal Report, three of the four transfer stations reported significant reductions in the tons of waste received at the facility and the tons waste transported to a C&D landfill as shown in Table 1. These significant reductions represent C&D processing for recyclables that is occurring on the tipping floor of the transfer station prior to transport.

**Table 1. C&D Waste Received and Transported at Wake County C&D Transfer Stations**

| Facility | Waste Received | Waste Transported | Percent Waste Reduction |
|---|---|---|---|
| **Apex C&D Transfer Facility** | 35,849.41 | 28,773.76 | 19.7 percent |
| **Capital C&D Waste Transfer Station** | 18,399.21 | 16,153.64 | 12.2 percent |
| **Thornton Road Transfer Station** | 42,522.58 | 38,826.91 | 12.2 percent |
| **WCA Transfer Station** | 19,304.31 | 18,986.58 | 1.7 percent |

*Values as reported in the 2010-2011 NCDENR County Waste Disposal Report

## C&D Waste Recycling Impediments

Growth of C&D waste processing for recyclables in the County is hindered by the depressed recycling market and the large capacity of C&D landfills within Wake County, which is estimated to be between 50 and 70 years (GBB, 2008). The abundance of C&D landfill capacity is expected to keep disposal rates low into the foreseeable future requiring processing facilities, which are more labor intensive than landfills, to rely on recycling markets to compete with the landfill tipping fees.

Even when recycling markets increase, C&D processing facilities face the difficult challenge of competing directly with contractors for valuable materials. In the current market, most contractors monitor recycling markets and segregate materials with marketable value from C&D waste at the construction site. These materials are then transported directly to recyclers, bypassing the processing facility. In contrast, when market values recede, materials return to the processing facility.

In addition to these challenges, C&D recovery rates are also impeded by the low market value of large volume waste materials including wood waste and drywall. Where wood waste provides some opportunities in the composting and energy market, processors have yet to find a way to effectively recycle drywall. The drywall that enters processing facilities is ultimately disposed in a landfill.

## C&D Waste Recycling Drivers

Even with the impediments facing processing facilities, C&D waste recycling is occurring in Wake County and as recycling markets expand and material values increase, C&D waste recycling has the potential to expand. Recycling markets and material values are the primary driver for C&D recycling; however, based on conversations with professionals in the C&D waste/recycling business, recycling can be positively impacted through new legislation, program initiatives, and education.

### Legislation

Legislation, when properly enacted, can help increase recycling, but is generally not a favorable option, unless the technologies, markets, and materials are already available. An example of legislation in North Carolina that has increased recycling of C&D waste is the 2009 ban of wooden pallets in landfills. The legislation discontinued landfilling pallets and take advantage of available manufacturing processes to stimulate a market for pallet recycling that has reduced the amount of virgin resources required for new pallet construction.

### Program Initiatives

The LEED Certification Green Building Rating System for new construction and major renovations is a program initiative that rewards construction projects for reuse of existing structures and for developing waste management plans to ensure material reuse and recycling

of construction materials. According to processors, implementation of this program has helped the C&D recycling market by providing more flow from construction to processing.

### Education

A number of C&D waste processors expressed a need for more education and believed that beyond material value and available markets, education would enhance C&D waste recycling, which is a theme recently adopted by the Wake County Sustainability Task Force. Currently there are limited education materials that inform contractors of recycling opportunities. The ability to locate relevant information regarding C&D waste recycling options on the County's website could be improved.

## References

Gershman, Brickner, and Brattor (GBB), 2008. Wake County, North Carolina C&D Waste Assessment.

NCDENR, 2011. County Waste Disposal Records.

SCS Engineers, 2011. Wake County, North Carolina Waste Characterization Study Summary of Results, May 2011.

# Memorandum

*To:* *Mr. Lowell Shaw*
*Mr. John Roberson, P.E.*

*From:* *CDM Smith*

*Date:* *February 24, 2012*

*Subject:* *Wake County North Carolina*
*Solid Waste Management Plan Update*
*Subtask 5.4 – Energy-from-Waste Evaluation*

Through the recent opening of the South Wake Landfill (SWLF), Wake County and its municipal partners have secured a long-term and cost effective disposal option for solid waste generated within Wake County. Nevertheless, the inherent difficulties associated with identifying, selecting, siting, permitting, and constructing the next waste disposal alternative, once the SWLF begins to reach capacity, suggest that it is never too early to begin planning for the future. With that in mind, Wake County, as a component of the 2012 Solid Waste Management Plan Update, asked CDM Smith to begin investigating certain aspects of energy from waste (EfW) technologies, under the assumption that these waste conversion technologies may provide a feasible alternative to traditional landfill disposal for Wake County and several potential regional partners in the future. This memorandum summarizes CDM Smith's investigation into the following aspects of EfW:

- The level of waste separation (pre-processing) required prior to various EfW technologies;
- The financials of an EfW (mass-burn type) facility; and
- The conversion of specific materials, namely scrap tires, construction and demolition (C&D) wood waste, dirty plastics, yard waste and sewage sludge into energy through combustion.

Section 1.0 discusses pre-processing requirements for a variety of EfW technologies. Section 2.0 presents the results of an EfW financial model that was developed and used to estimate the base economics of a modern mass-burn EfW facility. Section 3.0 provides a summary of options for using EfW technology to convert select materials into energy.

## 1.0 Level of Pre-processing Prior to Waste Conversion

Energy from waste (EfW) technologies are increasingly being considered as a potential key part of an overall integrated solid waste management system. The role of EfW technology is to

provide a system that can process the remaining portion of the waste stream after recycling, composting, and reuse into an alternative form of energy (e.g., syngas, electricity, solid and liquid fuels). Several of the green energy fuel (GEF) technologies being evaluated by various communities are: mass-burn, gasification, pyrolysis, and anaerobic digestion. The value of EfW is that the portion of the waste stream that has typically been thrown away in a landfill can be used to generate usable energy.

Waste conversion facilities (other than mass-burn) can be sensitive to the makeup of the feedstock, both in composition and physical characteristics. Any reuse or recycling efforts that remove valuable materials and difficult to handle or problematic materials prior to the EfW facility will help reduce the pre-processing effort and consequently the costs associated with pre-processing.

The future of waste conversion is sure to include a role for material recovery facilities (MRFs) that accept the full waste stream. These "full-service" MRFs will function as both a materials recovery and fuels processing facility, similar to previous refuse derived fuel (RDF) plants; however, these MRFs will have a stronger emphasis and function on removing recyclable material not captured at the curbside.

**Figure 1** provides a graphical representation of the key process steps involved in converting municipal solid waste (MSW) to alternative forms of energy. The sorting and fuel preparation steps are the areas where waste separation and pre-processing occur prior to the waste conversion process.

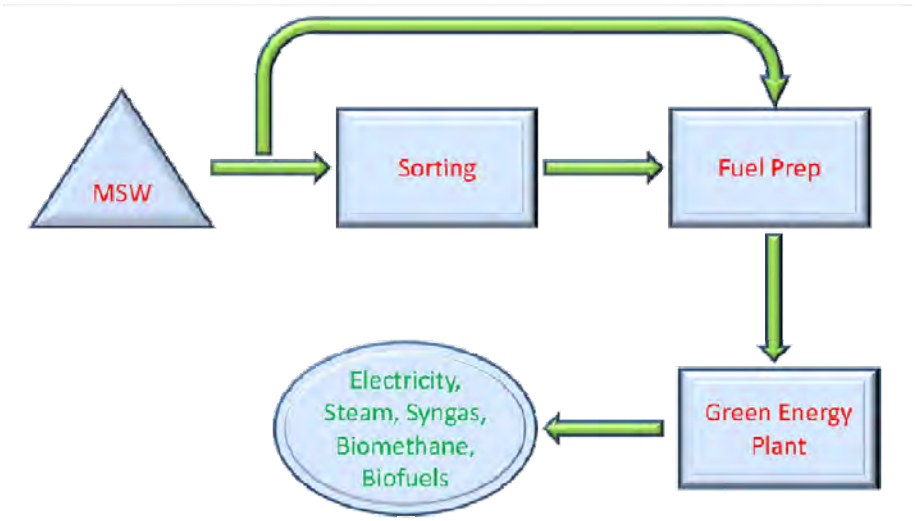



**Figure 1. General Steps in Waste Conversion**

## 1.1 Use of MSW as a Waste Conversion Feedstock

The existing mass-burn technology and emerging waste conversion processes that are being reviewed each have their own specific requirements on how the fuel needs to be processed, including maximum size requirements, composition, heating value (Btu/pound heat content), and moisture content. The key challenges in utilizing MSW are providing a consistent feedstock quality, composition, and supply for the conversion process to operate efficiently over the project life-cycle.

Mass-burn technology along with an emerging Thermoselect fixed bed gasification technology offered by Interstate Waste Conversion can both handle unprocessed MSW, with the exception of bulky and non-processible materials. Bulky materials, which are waste with dimensions greater than 4 feet in size (e.g. white goods, 55-gal drums, rolls of carpets, large tree stumps) are typically removed from the process to avoid plugs in the feeding system or ash expellers. Other GEF technologies require some form of pre-processing for residential waste, or prefer more homogenous commercial, industrial, or institutional types of waste.

Most of the existing technologies will require preparing the waste feedstock material to a specification smaller than the average waste container size. In order to accomplish the waste size reduction required by some of the waste conversion technologies, shredding may be required as a part of the pre-processing step.

Raw MSW typically does not require sorting other than the possible upfront removal of bulky items and inerts such as glass, ceramics, and metals. Several of the gasification processes, which also employ vitrification, do not require upfront sorting of these materials as they may be vitrified into an inert slag and metal pellets that can be separated and marketed. Current mass-burn (advanced combustion) facilities also do not require pre-sorting as the process can accept most waste materials with the exception of bulky and oversized materials, much like the Thermoselect process described above. The combustion process also liberates many of the metals and allows for removal of these recyclable materials from the residual ash in a post-combustion process.

## 1.2 Pre-processing Technology

Some conversion processes can take unprocessed MSW, whereas others may want plastics but not biomass, and still others may want biomass but not plastics. In addition to these issues, the moisture content of the feedstock can also cause problems or inefficiencies with certain conversion technologies.

Waste generated from residential, commercial, industrial, and institutional sources are collected and handled by a variety of haulers. Curbside garbage and recycling collection is the

initial step where valuable recyclable materials are removed from the waste stream. For communities without mandatory recycling (pre-processing activities), waste materials may be typically segregated for material recovery, shredding, and drying.

- Mixed waste processing – For communities without widespread curbside recycling, mixed waste processing facilities can provide a mechanism for separating out recyclable material and other non-organic material that may damage or impede a particular conversion process.

- Shredding – Size reduction of the waste material is a critical step for efficient operation of gasification and pyrolysis processes. For example, the Plasco Energy plasma arc gasification process requires that materials be shredded to particles less than two inches. The process of shredding MSW is a noisy, dusty, high-maintenance, and costly operation with the potential for dangerous explosions.

- Drying – Processes that require a pelletized engineered fuel, as a feedstock, often require that shredded material be dried to 10%-20% moisture content. Drying of feedstock materials may also be required for proper storage prior to use as a renewable fuel. Some waste conversion processes may also require drying of green vegetative wastes if they are acceptable for the process. Green vegetative waste is typically high in moisture content (50%).

**Table 1** lists some of the feedstock requirements for several GEF technologies.

# 2.0 Financial Evaluation of EfW Facility

## 2.1 Introduction

This section presents a conceptual financial model of an EfW facility sized to handle MSW generated within the Triangle region. Early in the evaluation, it was determined that a simple case study would not suffice as an effective evaluation tool primarily because no new EfW plants have not been built in the US since 1996, although there have been several expansions at existing EfW facilities in the past 7 years. In the meantime, the mass-burn technology, along with residue handling systems has improved over the past 20 years. The energy market, the conventional source of revenue for an EfW plant, has also evolved and no longer resembles the market two decades ago. Therefore, CDM Smith developed a conceptual financial model to more accurately reflect current market conditions for a green field EfW facility.

## 2.2 Wake County Regional EfW Financial Model

An EfW financial model was developed as a rough economic scoping tool to estimate the base economics of a modern mass-burn EfW facility which generates renewable electricity from the combustion of municipal solid wastes. A mass-burn facility was used for the financial model

**Table 1. Green Energy Technology Material Requirements**

| GEF Technology | Feedstock | Processing |
|---|---|---|
| Mass Burn | All MSW, moisture a minor issue | None |
| RDF (fluff & densified) | Mostly dry organics, no inerts | Sorting, shredding, and drying (if stored) |
| Gasification | All MSW, moisture an issue | Minus 24" or less |
| Plasma Arc/Vitrification | All MSW, moisture an issue | Minus 6" or less |
| Pyrolysis | All MSW, moisture an issue | Minus 6" or less |
| Anaerobic Digestion | Organics (no plastics), limited inerts and HHW | Sorting/shredding (minus 4" or less) |
| Engineered Biological | Syngas or Organics, limited inerts and HHW | Shredding (minus 4" or less) |
| Chemically Reactive | Syngas or MSW | Minus 6" or less |
| Size Reduction | Dedicated biomass, paper, plastic | Shredding and/or pelletizing (minus 6" or less) |

because the technology and associated costs are more mature and reliable compared to some of the alternative waste conversion technologies currently under development. The data for this model has been obtained from several relevant sources:

- Operating data from the Hillsborough County Resource Recovery Facility (HCRRF), which is comparable in size to a potential facility in Wake County or the Triangle region. The HCRRF was originally constructed in 1985–1987 as a 1,200 tpd facility with three combustion units capable of processing 400 tpd. An additional 600 tpd combustion unit was later added in 2007-2009 to account for local growth. Further information characterizing Hillsborough County's entire solid waste program, including costs, are provided in Exhibit A.

- "Benchmarking Mass-burn WTE Facility Performance" paper by Anthony LoRe (CDM Smith) and Kelsi Oswald (Pinellas County) presented at the 17th Annual North American Waste-to-Energy Conference (NAWTEC 17 Conferences) in 2009.
- Operating data from several operating mass-burn EfW facilities in the Tampa Bay area, including the Pasco and Pinellas County Resource Recovery Facilities.

### 2.2.1 Economic Model Input Data

The following section identifies the key parameters by which the EfW facility performance, cost, and benefits can be evaluated.

#### *2.2.1.1 Waste Generation Data*

The North Carolina Department of Environment and Natural Resources (NCDENR) Division of Waste Management provides an estimate of all waste generated within a county that was disposed of in landfills, either in NC or out-of-state. These numbers can provide an estimate of the overall amount of waste material within the three counties that is being taken to any landfill facility, and thus represents the maximum amount of waste available to potentially be directed to an EfW facility. The most recent estimates (FY2011) provided by NCDENR indicate the following:

- Wake – 933,849 tons
- Orange – 80,410 tons
- Durham – 270,303 tons

Approximately 1.28M tons of waste from the Triangle region is currently being disposed of in landfills annually, which equates to approximately 3,500 tpd.

Current population estimates, based on US Census 2010 for the three Triangle region counties are as follows:

- Wake County – 900,993 people
- Orange County – 133,801 people
- Durham County – 267,581 people

With a Triangle region total population of 1.3 million, the per capita waste generation rate is approximately 5.4 pounds per day.It was estimated that only 50% of the waste generated daily, based on NCDENR landfill disposal estimates, would be available for EfW processing, resulting in approximately 1,760 ton/day. The 50% assumption reflects the fact that private haulers who

also own and operate regional landfills control a sizeable portion of the Triangle region waste stream.Therefore, an 1,800 tpd EfW facility with an annual availability of 90% was selected for the base case financial analysis.

***2.2.1.2 EfW Cost and Revenue Parameters***

The following is a description of the cost and revenue parameters considered for an EfW facility. All the parameters were built into an Excel-based spreadsheet that considers operational cost, capital cost and revenues to produce an estimated initial year per ton cost based on the debt service requirements associated with the selected bond period. The financial analysis does not account for changes in operational costs and revenues past the 1st year. Many of the assumed values for this study have been compared to the HCRRF data and are shown in Exhibit B.

<u>Cost Parameters</u>

- The conceptual EfW facility design capacity has been assumed at 1,800 nominal tons of MSW to be processed per day. The HCRRF is rated at 1,800 nominal tons of MSW per day.

- The EfW facility annual availability has been assumed to be 90% of design capacity for annual MSW processed. Many of the private operators of first generation EfW facilities, including the HCRRF, were contractually bound to maintain the annual availability guarantee of 85%. The percent of time in which a modern EfW facility is available to process solid waste has steadily increased over the past decade due to advancements in the industry. Operational philosophies and consistent and proactive maintenance activities were implemented to reduce the number of unscheduled shutdowns. The usage of Inconel on boiler tubes and better refractory coverage also reduced the number of unscheduled shutdowns. In addition, more thorough waste inspections via restrictions on incoming wastes and the use of a spotter on the tipping floor for unacceptable waste (such as engine blocks and tree stumps, material that would upset the combustion process) are now practiced. In addition, optimized combustion firing techniques further reduced unexpected down time. The current annual availability for a mass-burn EfW facility is in the range of 90 – 92%, and is high compared to modern fossil power plant industry standards. This rate can be expected to be lower for those years in which major turbine generator (T-G) maintenance is performed (approximately every 5 years). An EfW facility annual availability of 88.5% of design capacity for annual MSW processed is typical for years 5, 10, 15, and 20 in which major T-G maintenance is performed. For comparison, the 25 year old HCRRF averaged over 95% availability for Fiscal Year 2011, which represents the success of the operator's proactive approach to

maintenance for combustion and air pollution control systems, along with the balance of plant equipment.

- Capital cost has been optimistically estimated at $250,000 per tpd of EfW design capacity. The first EfW in the past 15 years will soon break ground in Palm Beach County Florida in 2012. This facility is a large 3,000 tpd plant, and the unit capital cost for the successful contractor was approximately $222,333 per ton of daily capacity. As a result of this industry wide hiatus, there is some uncertainty in the capital cost estimate. The capital cost of EfW projects is highly dependent upon local, national, and global market conditions which affect the price of many of the components which are sourced from the global market. However, given the current economic downturn, and the national interest in stimulating the national and local economies with qualified projects, especially renewable energy projects, the market place for the EfW industry is expected to be competitive.

  The below assumptions for components of the capital cost are provided for reference.
  - The labor component of the capital cost is estimated at 36.50% of capital cost.
  - The equipment component of capital cost is estimated at 36.50% of capital cost.
  - The cost of civil site and infrastructure is estimated at 12.0% of capital cost.
  - The cost of other design, permitting, and project management activities is estimated at 15.0% of capital cost.

  Note: the costs for development of the EfW project have not been identified at this stage of conceptual analysis. Additionally, local adjustments to the above capital cost elements have not been factored for this analysis.

- Debt service period has been assumed to be 20 years. The Hillsborough County RRF, along with many of the first generation EfW mass-burn facilities were financed for 20 years. However, the EfW industry has evolved over the past 25 – 30 years, and many of these facilities continue to remain in operation today. The current estimated service life for modern EfW facilities is 45 – 50 years. A 25 year debt service period may be compatible with the reduced risk factors associated with the modern EfW industry.

- Debt service interest rate has been conservatively assumed at 5.0%. The current economic global conditions continue to keep interest rates lower than in the past, and it is likely that the above interest rate can be reduced if global economic conditions do not improve in the next five years. For reference, the Hillsborough County EfW project was financed at 7.6% interest in 1985, while the recent plant expansion project was financed at 4.75% in 2006.

Electrical Generation and Revenue Parameters

- The gross electrical generation rate has been assumed at 650 kWh/ton of MSW processed. The industry wide trend has been toward greater electrical output as boiler operating conditions (pressure / temperatures) have increased over the past years to result in higher gross electrical generation. In addition, the typical waste stream composition has changed over time. Yard waste, metals, and C&D materials in MSW have been reduced by recycling programs and waste segregation while plastic containers have become more prevalent, driving out the energy value of MSW. The most recent WTE facility publically procured in the US resulted in an estimated gross electrical generation of 736 kWh/ton. The HCRRF by comparison, is a first generation RRF facility constructed in 1985-1987 and produces only 432 kWh/ton. The recent Hillsborough County expansion combustion and energy recovery unit constructed in 2007 is a more efficient unit, and produces net 525kWh/ton.

- Internal use of electricity for EfW plant operations has been conservatively assumed at 13% of gross electrical generation. Often referred to as parasitic load, this portion of the electric generation is used to power the motors which are necessary to operate the EfW process equipment and supporting facilities. Typical parasitic loads range from 11 – 15%, depending upon the processes employed at the EfW facility. For reference, the HCRRF had 13% parasitic load in 2011.

- Net electrical energy generation rate for a modern EfW facility in Wake County has been calculated at 566 kWh/ton of MSW processed based upon the above two assumed parameters (650 kWh/ton gross electric generation and 13% parasitic load).

- Average electrical energy sales price of 6 cents per kWh has been assumed for this preliminary analysis. The average power purchase agreement executed by EfW projects varies widely, primarily affected by the current cost of electricity and demand for future additional electricity in the local community served by Investor Owned Utilities (IOUs). According to Edison Electric Institute, in June of 2011 the average cost of electricity per kilowatt-hour in North Carolina was approximately 9.48 cents for residential customers, 7.43 cents for commercial customers, and 5.83 cents for industrial customers. States such as North Carolina, with mandates for renewable energy and anticipated growth in population, may result in future higher rates of payment or premiums for renewable electricity. A federal energy policy with a strong mandate for renewable, green, or low carbon electricity could significantly benefit future EfW projects, both nationally and at the state and local levels. There are a myriad of contracting strategies for the sale of renewable energy that are beyond the scope of this analysis, therefore an average overall price per kWh of electricity sold is used in this preliminary analysis.

As a reference case, the HCRRF recently renewed its electric power purchase agreement after the initial 22 year agreement expired. At the end of the first power purchase agreement term in 2010, the total energy and capacity payment yielded approximately 9 cents/kWh. However, due to the current state Public Service Commission rules and low demand for additional electrical capacity in Florida, the new power purchase agreement is significantly lower. Hillsborough County is currently paid approximately 6 cents/kWh under the terms of a new 15-year agreement. The first power purchase agreement provided both Capacity (escalating over time) and Energy payments (which float against the local monthly cost to generate power). The second negotiated agreement (March of 2010) only provides an energy payment based upon actual power delivered to the local utility. There are additional nuisances associated with power purchase agreements, such as annual facility availability, restrictions on when planned outages can occur, and other issues which can affect the terms, conditions, and payments that is beyond the scope of this analysis. Electrical sales revenue sharing had been traditionally been used as a method to help provide economic incentive to the private operations and management contractor. A ratio of 90% to the municipality and 10% to the contracted operator is the current arrangement for revenue sharing at other Florida EfW plants.

- Renewable Energy Credit (REC) payments represent the value of the environmental attributes of EfW and have been conservatively assumed at zero ($0.00 per REC). The additional revenues from the sale of RECs have been considered in one of the sensitivity analysis scenarios. In North Carolina, GreenPower is a statewide green power program designed to encourage the use of renewable energy, and offers production payments for grid-tied electricity generated by solar, wind, small hydro (10 megawatts or less) and biomass resources. Payment arrangements for RECs generated by most renewable energy projects may be available by submitting proposals for consideration when NC GreenPower issues an RFP. RECs are also purchased by local utilities such as Duke and Progress energy (which are merging together) as a part of a bundled package of electricity and RECs, or by firms such as GreenCo Solutions Inc., which represent the North Carolina's electric cooperatives.

  Unfortunately, there is often a debate as to whether, or which fraction of the electricity derived from EfW is considered acceptable for REC and green energy payments. By definition, a REC has been assigned the value of one megawatt hour of electricity, or 1,000 kWh. REC payments are highly subjective to local regulatory and market conditions.

Recovered Metals and Revenues

- Ferrous metal recovery rate has been assumed at 2.0% of processed MSW based upon modern EfW projects. For comparison, the HCRRF averaged 1.8% for FY 2011, whereas the industry average has been 1.9% based upon the LoRe/Oswald study.

- Ferrous metals sales price has been estimated at $150/ton based upon current market conditions. The price of recycled metal has fluctuated wildly over the past 25 years of EfW projects, however the recent trend has been for commodity prices to increase, or remain steady due to the global demand for resources.

- Non-Ferrous metal recovery rate has been assumed at 0.25% of processed MSW based upon modern EfW projects. Non-ferrous metal recovery systems have been adopted by more and more EfW facilities in response to reliable eddy-current separation technology which has evolved over the past decade, primarily in the scrap automobile metal recovery industry. Non-ferrous metals in the MSW stream originate from a wide variety of sources, many of which are not collected as a part of curbside recycling programs. These sources include: appliances, automobile parts, patio furniture, and household components.

- Non-Ferrous metals sales price has been conservatively estimated at $1,000/ton. As noted above, the price of non-ferrous metals has fluctuated wildly over the past and is strongly affected by the global demand for aluminum. Due to the continuing global population growth and increase in the standard of living, the long-term outlook for non-ferrous metals is positive.

There are also options to improve the revenues from recovered non-ferrous metals by sorting techniques to separate the higher valued red metals (brass, bronze, copper) from the white metals (aluminum). Other options for additional revenue include coin recovery from the recovered non-ferrous metals. Additional processing of EfW ash to remove non-ferrous "fines" is also practiced in European EfW facilities which can be marketed to cement kilns and special aluminum smelters. None of these advanced recycling options are included in this conceptual economic analysis as they do not represent significant revenues.

EfW Operation and Maintenance Costs – Reagent Usage

- Lime is typically slaked and used to remove acid gas constituents and control sulfur dioxide emissions from the combustion flue gas. For this analysis, a Pebble Lime consumption rate has been conservatively assumed at 20 pounds/ton MSW processed. As a reference, the HCRRF consumed 14.3 lb/ton of MSW processed during FY2011.

- Pebble lime cost has been estimated at $120 per ton delivered.

- Activated carbon consumption rate has been conservatively estimated at 1.00 pounds/ton MSW processed. Activated carbon is pneumatically injected into the flue gas stream to capture mercury and dioxin/furan emissions. As a reference, HCRRF consumed 1.05 lb/ ton of MSW processed during FY2011.

- Activated carbon cost has been estimated at $900 per ton delivered.

- Ammonia consumption rate has been estimated at 2 pounds/ton MSW processed. Ammonia is typically injected in dilute concentrations into the furnace and boiler sections of the combustion process to reduce the nitrogen oxide emissions. As a reference, HCRRF consumed 1.05 lb/ton MSW processed. Future more restrictive limits on the amount of nitrogen oxides emitted from EfW facilities are anticipated, hence the higher usage rate.

- Ammonia cost of $300 per ton delivered has been estimated.

<u>EfW Facility Operation and Maintenance Costs – Utilities Usage and Costs</u>

- Potable water consumption rate of 75 gallons/ton MSW processed has been assumed. This water supply is assumed for domestic potable uses and makeup supply for boiler water treatment system. The HCRRF used 47.3 gallons/ton MSW processed.

- Potable water cost of $7.50/1000 gallons has been conservatively estimated for this analysis. The trend within the EfW industry has been to reduce potable water by using lower quality waters for plant cooling needs. In many cases, where locally available, reclaimed water is used as makeup water for cooling towers, fire water storage tanks, and plant irrigation. The Hillsborough County RRF has used reclaimed water for cooling since its commercial acceptance in 1987. The rate for the cost of reclaimed water can be estimated at 50% of the cost of potable water. The most recent EfW project soon to break ground in Palm Beach County will use an air cooled condenser in lieu of an evaporative cooling tower to minimize the use of local water supplies.

- Wastewater disposal / treatment rate has been estimated at 100.0 gallons/ton MSW processed. For reference, HCRRF used 89 gallons/ton MSW processed.

- Wastewater disposal cost has been estimated at $7.50 / 1000 gallons for treatment by a typical local Publically Owned Waste Treatment facility.

<u>EfW Facility Operation and Maintenance Costs – Ash and Bypassed Waste Disposal Costs</u>

Ash is a byproduct of the combustion process and includes the bottom and fly ash. Bottom ash is heavy and is the bulk (~90%) of combustion ash, while fly ash are the finer particles (10%).

The combined ash is typically disposed in Subtitle D landfills.

- Ash generation rate has been assumed at 25.0% of MSW processed. For comparison, the FY 2011 combined ash generation rate at the HCRRF was 24.0%.

- Ash recycling rate of 0% has been assumed for the preliminary base case analysis. There are viable options for recycling ash residue as an alternate daily cover on existing lined landfills, along with other technologies for beneficial use of ash residue as construction aggregates or feedstock for production of Portland cement. None of these options were considered at this time.

- The landfill disposal tipping fee has been estimated at $20.00/ton for transportation and disposal of ash residue and any bypassed or non-processible waste. This value is based on the assumption that the municipality owns its own landfill and will only pay the cost of the contracted landfill operator processing fee for ash disposal. This value is low because EfW ash is often recycled as an alternate daily cover (ADC) in lieu of soil for daily cover and other approved uses on lined landfills. This beneficial use of ash residue can result in minor system wide cost savings, but has not been factored into this conceptual analysis.

<u>EfW Facility Operation and Maintenance (O&M) Costs – Labor Costs</u>

- The O&M fees at EfW facilities depend upon many variables, ranging from size of plant, risks shared between owner and operator, pass-through costs for utilities and reagents, sharing of revenues associated with the sale of electricity, steam, and recovered metals. The year 1 O&M contractor service fee has been estimated at $32.50/ton of MSW processed for the 1,800 TPD reference plant.

- Internal (Wake County or other managing entity) project management staff costs have been assumed at 0.05% of the EfW capital cost to cover the cost of special solid waste staff to administer the contract terms and conditions for the EfW facility operated by a private contractor.

- Environmental consultant fees estimated at 0.05% of EfW capital cost have been assumed for the contract services of a qualified consulting engineer to assist the solid waste staff with technical and contractual administration of the EfW project.

- Miscellaneous annual fee of $50,000 has been assumed for a Title V air permit fee which is administered by the state.

### 2.2.2 Preliminary Economic Analysis

Based upon the parameters noted above, the following Year 1 conceptual results have been estimated by the financial model:

EfW Performance

- EfW size = 1,800 tons per day @ annual availability of 90%
- Total MSW processed = 591,700 tons/year
- Total net electrical production (sold) = 334,600 MWh/year
- Total potential RECs based upon total electricity generated = 360,300 RECs
- Total ferrous metals recovered = 11,800 tons/year
- Total non-ferrous metals recovered = 1,200 tons/year
- Total ash residue generated for disposal = 147,900 tons/year
- Total ash residue diverted for beneficial reuse = 0 tons/year

EfW Revenues

- Revenue from sale of net electricity @ 6 cents/kWh & 90% revenue share = $18,069,000
- Revenue from sale of RECs = $ 0.00
- Revenue from sale of recovered ferrous metals @ $150/ton = $1,775,000
- Revenue from sale of recovered non-ferrous metals @ $1,000/ton = $1,479,000
- Revenue from sale of ash for beneficial reuse = $0.00
- Estimated total year 1 EfW revenues =$21,323,000 (base case)

EfW Cost

- EfW plant capital cost = $450,000,000
- Capital debt service cost of EfW facility = $36,109,000 (20 years at 5% interest)
- Capital debt service coverage = $7,222,000 (coverage at 20% of capital debt service cost of EfW facility)

- Operation & maintenance fee =$19,230,000/year (escalates thereafter against published indices)
- Ash disposal cost = $2,959,000
- Total reagents cost = $1,686,000
- Total utility cost = $1,695,000
- Total miscellaneous cost = $500,000
- Estimated total year 1 annual cost of EfW process = $69,401,000 (base case)

### 2.2.3 Base Case Economic Analysis

An 1,800 TPD mass-burn EfW facility has been selected as the base case option due to the large population and combustible waste stream that is present in the Triangle region, which is expected to experience continual growth over the near future. Based upon the above assumed parameters, the estimated net cost (after revenues) of the EfW facility is $48,078,000 at year 1. This equates to an average unit cost of $81.25 per ton of MSW processed, assuming 90% availability and 1,800 tpd. Similar unit costs per ton would be expected for subsequent years; however, they would be subject to fluctuations in many factors, including but not limited to inflation associated with the cost of labor and materials; the price paid for electricity; and the markets for recyclables. **Figures 2** and **3** graphically present the percentages of revenue sources and costs in year 1.

The 1,800 TPD EfW base case analysis does not include the following additional benefits and potential revenues:

- MSW tipping fees, in addition to the EfW process cost, to cover the additional costs associated with the entire solid waste management system;
- Sale of RECs or other environmental attributes to national or state markets;
- Value of avoided transportation and disposal of MSW to local landfills;
- Value of ash as ADC in lieu of purchase of dirt;
- Time value of money saved by extending the life of the host county's Subtitle D landfill (i.e. delaying the incurrence of capital construction costs);
- Financial assurance (reduced annual cost);

**Figure 2. Base Case Revenue Sources**

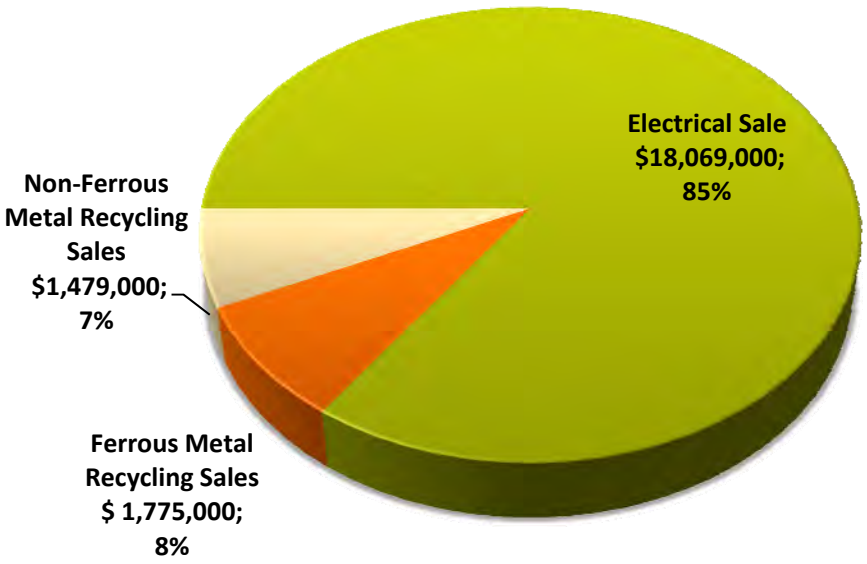
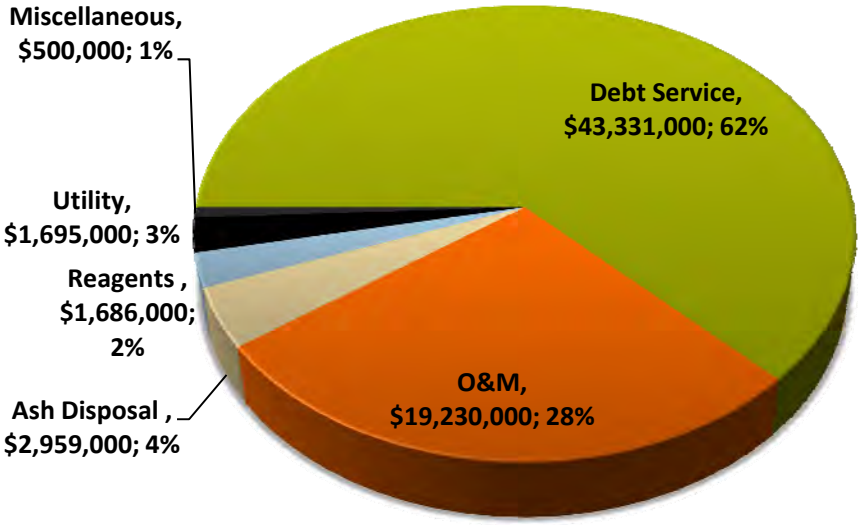



**Figure 3. Base Case Costs**



- Closure costs deferred (final cover system and closure plan) assuming that NCDENR does not implement partial closure requirements.

- Post-closure costs deferred (post-closure plan monitoring)

- Time value of money saved by extending the time needed to build a new landfill or contract to send out-of-county (land costs, permitting costs, design costs, construction costs); and

- Reduced operating costs (reduced personnel, equipment, equipment maintenance and gas costs, daily and final cover material, reduced litter control, reduced leachate, and reduced landfill gas)

### 2.2.4 Sensitivity Analysis

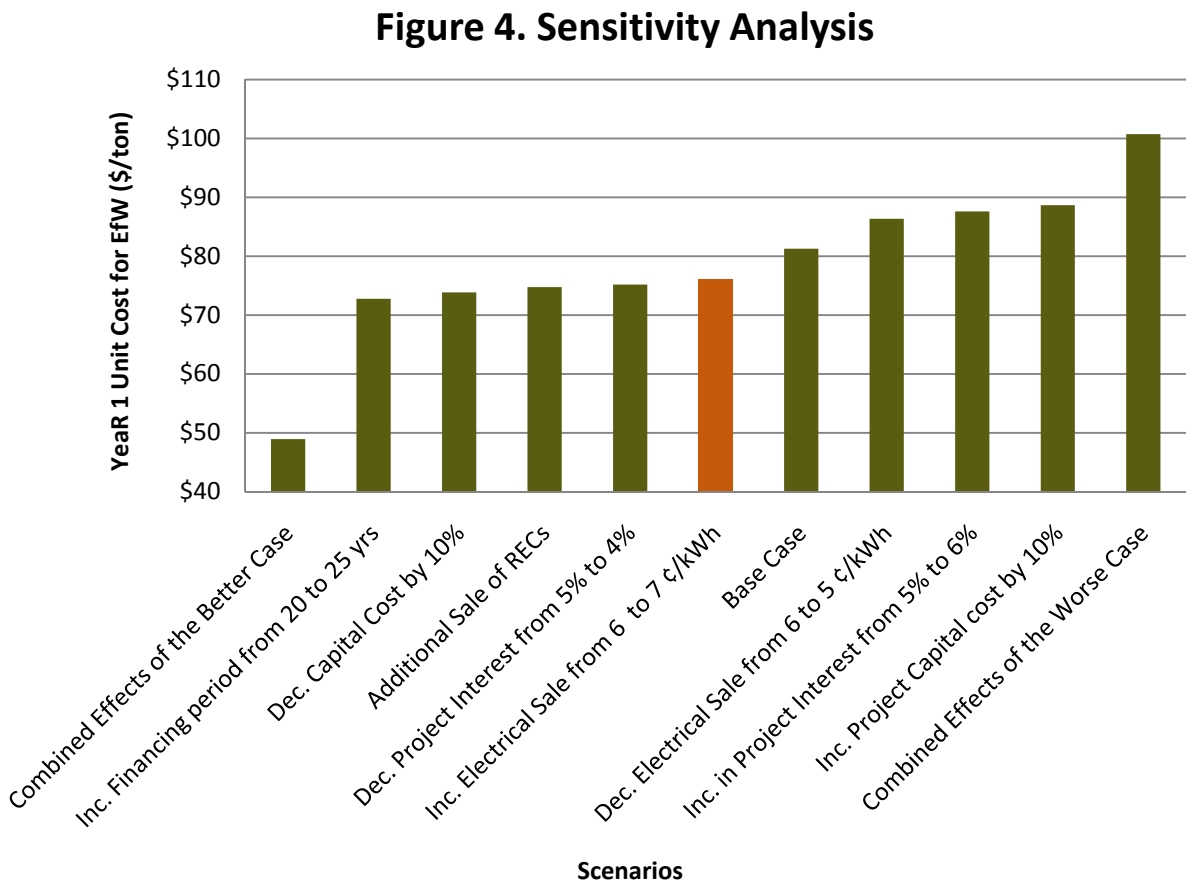
A series of better case and worse case alternate scenarios have also been analyzed for sensitivity of the average unit MSW processing cost ($/ton). These cases vary the parameters that would have major impact on the final cost per ton. For example, increasing the electrical sale rate from 6¢/kWh to 7¢/kWh decreases cost by approximately $5/ton to about $76/ton. The results are summarized in **Table 2. Figure 4** displays the values in a bar chart for cost comparison.

Additional analysis of the overall project solid waste management system on a life cycle basis would be necessary to calculate the overall cost and benefit of a regional EfW project. As an item of note, a recent report (December 2011) was published by the Applied Research Foundation (ARF) of the Solid Waste Association of North America (SWANA) titled "*The Economic Development Benefits of Waste-to-Energy Systems.*" This report evaluated the long-term performance of EfW facilities over a 40 year lifecycle compared to disposal at remote regional landfills. The analysis showed a significant overall lifecycle cost benefit due to the predictable nature of costs and benefits of EfW over a 40-year period. The retirement of the EfW project revenue bonds occurs at the mid-point of the project life, which translates into overall project benefits. In summary, the cost of processing MSW in a modern mass-burn EfW facility ranges between $50/ton to $100/ton.

Another example of the impact of retiring the debt of EfW facilities recently occurred in Kent County Michigan. The Kent County department of public works burned the mortgage for the EfW which it opened two decades ago. By paying off the debt, the county was able to reduce the tipping fee it charges waste haulers by 35%. On January 1, 2011, the rate per ton paid by haulers at the facility was dropped from $73.24 to $47.37 per ton.

## Table 2. Sensitivity Analysis

| Parameters | ***Base Case*** | ***Better Case*** | | ***Worse Case*** | |
|---|---|---|---|---|---|
| | Base Case Values | Parameter Variation from Base Case | Individual Variation Cost Difference ($/ton) | Parameter Variation from Base Case | Individual Variation Cost Difference ($/ton) |
| Electrical Sale Rate (¢/kWh) | 6 | 7 | $76.16 | 5 | 86.34 |
| Sale of RECs (% of net electric used for REC Sale) | None | 100% | $74.75 | None | 81.25 |
| Project Interest (%) | 5% | 4% | $75.17 | 6% | 87.59 |
| Project Capital ($/ton) | 250,000 | 225,000 | $73.85 | 275,000 | 88.65 |
| Financing Period (years) | 20 | 25 | $72.77 | N/A | |
| | Base Case Cost per ton with all parameters above ($/ton) | Better Case Cost per ton with all parameter variations above ($/ton) | | Worse Case Cost per ton with all parameters variations above ($/ton) | |
| | $81.25 | $48.93 | | $100.71 | |




## 2.3 Environmental Benefits of EfW

There are numerous environmental benefits which can be attributed to the implementation of EfW technology, and in particular, mass-burn EfW technology, including:

- Proven and robust waste combustion technology with over 500 installations world-wide.
- Demonstrated ability to meet continually restrictive environmental air emission limits.
- Requires a minimum of 10 - 20 acres of land, significantly reducing amount of land necessary for long-term sustainable waste management.
- Aesthetically pleasing, landscaped architectural design can enhance local property values and public acceptance.

- Extends useful life of existing landfill disposal capacity by factor of ten due to 90% volume reduction of MSW into ash residue.
- Creates a chemically benign and biologically inert ash residue with minimal leaching characteristics that approaches drinking water standards with exception of chlorides, and does not continue to be generated after landfill closure.
- Allows recovery of additional ferrous and non-ferrous metals which increase local recycling rates and provide source of additional project revenues.
- Net reduction of greenhouse gas emissions compared to MSW landfill disposal.

## 2.4 Economic Benefits of WTE

- Creates hundreds of high quality jobs and economic impact to local economy during 30 – 42 month construction period.
- Creates approximately 60-70 high quality full-time employment positions during long-term 45- 50 life of project.
- Creates a significant economic ripple effect upon local economy throughout the 45 – 50 year life of the project.
- Provides stable and predictable costs for long-term management of a community's waste.
- High annual reliability (> 90%) and base load renewable electrical production facility which helps local electric utilities plan and deliver reliable supply of renewable electricity at a price which helps offset the production of fossil power.
- If co-located at other facilities, such as a municipally operated POTW, it provides the possibility for a synergistic arrangement, where greater revenues can be generated if the electricity is sold at a lower cost than the adjacent facility could purchase it from the local utility (see Exhibit C for an example of this at the HCRRF).

# 3.0 Feasibility of Alternative Fuel Sources

A final aspect of EfW that was examined pertains to the conversion of scrap tires, C&D wood waste, dirty plastics, yard waste and sewage sludge into energy through combustion. The following sections provide a summary of the potential advantages, and disadvantages of burning these materials in an EfW facility.

Higher heating value (HHV) has the biggest impact on the feasibility of alternative fuels. For reference, MSW is generally estimated at 4,800 – 5,000 Btu/pound. The fraction of plastics in the MSW stream potentially impacts the HHV value the most. The characteristics of each fuel are described below.

## 3.1 Scrap Tires

The US EPA recognizes that the use of tire-derived fuel (TDF) is a viable alternative to the use of fossil fuels. There are approximately 100 facilities throughout the United States that burn scrap tires for energy recovery. These facilities include cement kilns, fossil coal power plants which employ grate combustion systems, industrial and institutional boilers, dedicated tire-to-energy plants, and facilities which combust both tires and biomass. Most of these facilities import scrap tires from the regional counties surrounding the facility. A radius of 100 miles is generally regarded as the most economical range for tire derived fuel. The approximate HHV of scrap tires is about 15,000 – 16,000 Btu/pound. For each ton of tires processed at an EfW facility, approximately 3 tons of MSW will be displaced. For facilities which are not at full capacity, the addition of tires is beneficial. However, for facilities at capacity, tires will reduce the amount of MSW that can be processed. For maximum burnout, scrap tires should be chipped or quartered. Whole tires do not burn well in mass-burn EfW facilities due to the limited residence time and the downward angle of the grate.

As previously noted, 1 ton of MSW generates approximately 650 kWh/ton of electricity. Given that one ton of scrap tires has the equivalent heat content of 3 tons of MSW, a simple economic analysis reveals that the combustion of one ton of tires results in the generation of 1,950 kWh of electricity and approximately $117.00 in electrical revenues, assuming electricity is sold at 6 cents/kWh. The economic viability of using scrap tires as an alternative fuel source is heavily dependent upon the revenues which can be derived from their combustion.

As an example, Hillsborough County processes approximately 9,000 – 10,000 tons per year of tires which are deposited at their citizen drop off centers. The tires are shredded into approximately 2" pieces and stockpiled on the landfill. On a regular basis, the chipped tires are then delivered to the mass-burn EfW facility via transfer truck for energy recovery. The estimated cost of processing waste tires in this fashion is approximately $60/ton, which is approximately 50% of the electrical revenues which can be derived from the combustion of used tires. The Pasco County EfW facility also employs the same process at their mass-burn EfW facility. The photo at the end of this section illustrates the size of the chipped tires processed by Pasco County.

## 3.2 C&D Wood Waste

The HHV of C&D wood waste ranges from 7,000 – 8,000 Btu/pound as these materials often contain dry dimensional lumber, pallets, and other engineered wood products, all of which are

highly combustible materials. These materials, while being suitable for mass-burn EfW facilities will likely require size reduction to limit the potential for waste plugs in the feed hoppers and allow for efficient mixing with other MSW stored in the refuse pit. C&D wood wastes are not typically delivered to modern EfW facilities primarily due to the cost of special handling, transportation, and the cost of EfW tipping fees. Properly sized C&D wood wastes may be well suited for processing at future gasification and pyrolysis waste conversion facilities. One particularly attractive process which may use C&D wood waste is called torrification. This is a pyrolysis process in which heat is used to drive off the volatile gasses from the wood wastes, resulting in a carbon rich char that can be used as an alternate to coal in fossil power plants. This technology is not commercially proven in the United States at this time.

A simple mass-balance analysis reveals that every ton of C&D wood waste is equivalent to approximately 1.8 tons of MSW in terms of electricity generating potential,. The combustion of one ton of C&D wood waste results in 1,170 kWh of electricity and approximately $70.20 in electrical revenues, based upon the sale of electricity at 6 cents/kWh. It will be economically viable to process C&D wood waste as long as the cost to receive, transfer, process, and transport the wood waste is less than the revenues which can be derived from their combustion. If the proper incentives are provided, it may be economical to process C&D wood wastes at an EfW facility.

## 3.3 Dirty Plastics

Dirty, or reject plastics which are removed from curbside recycling facilities, along with other non-marketable grades of plastics (rigid and heavy plastics) can also be processed in modern EfW facilities. Plastics are similar to tires in their heating value, ranging from 14,000 – 18,000 Btu/pound. Plastics are a significant component of the mixed MSW waste stream which is routinely processed at the EfW facility. The addition of "dirty plastics" and other non-marketable heavy plastics from recycling programs will generate similar energy revenues as used tires. Again, it will be economically viable to process dirty plastics as long as the cost to receive, transfer, process, and transport the tires is less than the revenues which can be derived from their combustion.

## 3.4 Yard Waste

Yard and wood waste (also known as biomass) can also be processed in modern EfW facilities. Prior to the era of curbside recycling and source separated recyclables, yard and wood waste were typically co-mingled and collected from the curbside in many communities. Biomass waste heating values can range widely as noted below:

- Mixed greens: 2,700 Btu/pound
- Green wood and vegetation: 4,000 Btu/pound

- Dry leaves and wood: 8,000 Btu/pound

The addition of yard and wood waste from recycling programs will generate energy revenues similar to those with MSW. For facilities which are not at full capacity, the addition of yard waste is beneficial. However, for facilities operating at full capacity, yard waste will reduce the amount of MSW that can be processed and alternate recycling and/or energy conversion processes should be considered. Alternate waste conversion processes include stand alone biomass EfW facilities and waste to biofuels conversion processes. There are currently two competing waste to biofuels processes, one which employs a wet fermentation of sugars which are released from the hydrolysis of biomass, and one which employs gasification to produce syngas which can be converted by catalysts and/or biological organisms into a variety of alcohol fuels, including methanol and ethanol. There arecurrently no commercially proven waste to biofuel facilities in the United States; however several facilities are currently under construction and should commence commercial scale operation in the next several years.

As an item of note, several of the EfW facilities in Florida are currently operating at less than full capacity due to the economic downturn and reduced generation of solid waste. Many of these facilities have decided to divert a significant portion of their municipal yard waste to the EfW facilities to avoid the payment of "put or pay" penalties to the operator of the EfW facility, and to generate additional electrical revenues. When available, the preferred yard waste will be vegetative (branches, limbs, and trunks) that have been reduced in size (3 – 6") and screened of sand and dirt.

## 3.5 Sewage Sludge

Sewage sludge is typically not burned at an EfW plant for the primary reason that sewage sludge needs to be about 50% solids to be energy neutral. Typical sewage sludge is produced at 16 -20% solids and are low in heating value (~1,200 Btu/pound), requiring additional drying before the sludge is suitable for an EfW plant. Bone dry sludge is estimated to have an 8,490 btu/lb heat value, with lower reported values around 6,500 btu/lb for digested sludge.

Combustion of sewage sludge is not likely to be a revenue enhancement option. If sewage sludge is to be combusted in EfW facilities, special sludge receiving facilities are generally needed unless the sludge is dried to greater than 50% solids. As an example, the Lancaster, Pennsylvania mass-burn EfW facility does process sewage sludge along with MSW; however, the processing necessitates a premium tipping fee.

# Exhibit A
# Hillsborough County, Florida Solid Waste Program Data

Below are the major services and features of the Hillsborough County, Florida integrated solid waste management system.

- 1,800 TPD Resource Recovery Facility (EfW, mass-burn)
- Two Transfer Stations with citizen drop off facilities for bulky waste, white goods, yard and wood waste
- Central processing facility for yard and wood waste (recycled as mulch, soil amendment or biomass fuel)
- Community Collection Centers (5) for drop off of solid waste materials
- Household Chemicals and Electronics Collection Centers (3) for citizen drop of materials (not available to commercial customers)
- Waste Tire Processing Program (shredded into chips <2" in size) for recycling as alternate daily cover or supplemental fuel at the EfW facility
- Class I raw waste landfill (179 acres)
- The following collection services are provided by three private franchised contractors throughout the unincorporated areas of the County:
    - Residential collection of solid waste twice a week
    - Residential collection of yard waste once a week
    - Residential collection of curbside recyclables once a week (cardboard, newspaper, and mixed paper; plastic and glass bottles, steel and aluminum containers)
- The posted FY 2011 full costs for the Solid Waste Management System are:
    - Residential collection: $136.3 /household/year
    - Residential disposal: $94.94 /household/year
    - Residential recycling: $10.89 /household/year
    - Landfill disposal tipping fee: $63.96 / ton
    - Tire disposal: $82.61 / ton
    - Yard and wood waste disposal: $31.52 / ton

# Exhibit B
# Basis for Wake County Financial Analysis Model Assumptions

| Model Input Assumptions | Wake County Analysis (Base Case) | Hillsborough County RRF Data (FY 2011) |
|---|---|---|
| **Population and Waste Generation Data** | | |
| Population | 1,302,000 (regional) | 894,000 (2010 data) |
| Per capita MSW generation rate | 5.4 pounds/person/day | 5.5 pounds/person/day |
| **Financial Data – Debt Service** | | |
| Debt service period | 20 years | 23 years original facility<br>27 years expansion facility |
| Debt service interest rate | 5.0% | 7.6 % original facility (1985 bonds)<br>4.75% expansion (2008 bonds) |
| Debt Service Coverage | 20% | 20% |
| **Financial Data – Electrical Generation and Tipping Fee Revenues** | | |
| Gross electrical generation rate | 650 kWh/ton MSW | 540 kWh/ton actual |
| Internal use of electricity | 13.0% | 14.9% |
| Net electrical generation rate | 566 kWh/ton MSW | 469 kWh/ton actual<br>434 kWh/ton guarantee |
| Average electric energy sales price | $0.06/kWh | $0.06/kWh (average) |
| Base MSW tipping fee | TBD $/ton MSW | FY 2010 collection = $128.93/year<br>FY 2010 disposal = 93.35/year |
| **Financial Data – Recovered Metal Revenues** | | |
| Ferrous metal recovery rate | 2.0% of MSW processed | 1.8% actual |
| Ferrous metal recovery sales price | $150/ton | |
| Non-ferrous metal recovery rate | 0.20% | 0.12% actual |
| Non-ferrous metal sales price | $1,000/ton | |

| Model Input Assumptions | Wake County Analysis (Base Case) | Hillsborough County RRF Data (FY 2011) |
|---|---|---|
| **WTE Facility Operation & Maintenance Cost - Reagents** | | |
| Pebble lime consumption rate | 20 pounds/ton MSW processed | 16.3 pounds/ton actual<br>21.7 pounds/ton guarantee |
| Pebble lime cost | $200/ton | $210 (Pinellas County) |
| Powered activated carbon consumption rate | 1.0 pounds/ton MSW processed | 1.2 pounds/ton actual<br>3.0 pounds/ton guarantee |
| Powered activated carbon cost | $1,100/ton | $1,110 (Pinellas County) |
| Ammonia consumption rate | 2.0 pounds/ton MSW processed | 1.2 pounds/ton actual<br>3.0 pounds/ton guarantee |
| Ammonia cost | $300/ton | |
| **WTE Facility Operation & Maintenance Costs - Utilities** | | |
| Water consumption rate | 50 gallons/ton | 54 gallons/ton actual<br>115 gallons/ton guarantee |
| Water cost | $7.50 / 1,000 gallons | |
| Wastewater disposal rate | 100 gallons/ton | 102 gallons/ton actual<br>315 gallons/ton guarantee |
| Wastewater cost | $7.50 / 1,000 gallons | |
| Natural gas consumption | 35,000 MMBtu | 35,278 MMBtu actual<br>15,000 MMBtu guarantee |
| Natural gas cost | $4.00/MMBtu | $4.00 / MMBtu |
| **WTE Facility Operation & Maintenance Costs – Ash Disposal** | | |
| Ash Generation (%) | 25% | 24% actual |
| Landfill ash tipping fee | $20.00/ton | ~$15.00/ton |
| **WTE Facility Operation & Maintenance Costs – Labor and Markups** | | |
| Base O&M contractor service fee | $32.50/ton | $34.76 Fiscal year 2011 |
| Wake County (or other managing entity) project management staff | $225,000/year | |
| Consulting fees | $225,000/year | |
| **WTE Facility Data and Capital Costs** | | |
| WTE facility design processing capacity | 1,800 tpd | 1,800 tpd |
| WTE facility annual availability percentage – normal maintenance cycle | 90% | 85% contractual<br>92 - 94% Actual |

# Exhibit C
# Hillsborough County Florida RRF Success Story
# Internal Use of Electricity

An example of the internal use of renewable energy has been demonstrated in Hillsborough County, Florida. In late summer of 2009, approximately 2 MW of electricity from the Hillsborough County Resource Recovery Facility (RRF) was connected to an adjacent 8 MGD advanced wastewater treatment plant (AWWTP). In this synergistic arrangement, the solid waste department generates greater revenues than if they sold renewable energy to the local utility, while the water resources department saves money by avoiding the purchase of higher cost electricity (~4 cents/kWh) at the full commercial rate from the same local utility. This win-win arrangement for internal use of renewable energy generated from wastes is anticipated to save local rate payers approximately $700,000 per year.

In order to avoid "demand charges" imposed by the local utility if the AWWTP facility remained connected to the grid, a backup electric power system was provided at the AWWTP to ensure uninterrupted electric service for the critical infrastructure. The Hillsborough County AWWTP has 100% backup diesel generation to ensure that this vital municipal service will operate when the RRF facility is temporarily out of service for planned or unplanned maintenance. Figure 1 below is a recent aerial photograph of the two adjacent municipally owned facilities.

Figure 1. Hillsborough County, Florida WTE Facility provides 2 MW of Renewable Electricity to adjacent 8 MGD AWWTP

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# Memorandum

*To:* *Mr. Lowell Shaw*
*Mr. John Roberson, P.E.*

*From:* *CDM Smith*

*Date:* *February 28, 2012*

*Subject:* *Wake County North Carolina*
*Solid Waste Management Plan Update*
*Subtask 5.5 – Pay-as-You-Throw (PAYT) Evaluation*

As a component of the 2012 Solid Waste Management Plan Update, CDM Smith performed a preliminary evaluation of a PAYT program for single-family residential customers in Wake County. This memorandum presents the results of this effort, and evaluates the feasibility with regard to the following criteria:

- The institutional feasibility considers the local jurisdictions current "appetite" for operating under a PAYT approach. It was assessed through discussions with County, City, and Town solid waste managers, and considers the likelihood of acceptance by residents.

- The technical feasibility considers issues, obstacles, and limitations which must be overcome or addressed in order to implement a PAYT program. Similar programs already in place throughout North Carolina are presented as examples.

- The financial feasibility considers how various pricing systems might be used to support a PAYT program and ensure a sufficient revenue stream for the implementing jurisdiction.

## 1.0 Introduction

Wake County and its municipal partners maintain a shared vision for managing solid waste that, among other things, *provides for the maximum opportunity practicable for waste reduction, reuse, and recycling using appropriate incentives, disincentives, and policies to motivate residents, institutions, and businesses*. PAYT is one such incentive that encourages citizens to reduce waste. PAYT – through variable rates, volume-based fees, or unit-based pricing – is an approach whereby the generator of the waste pays in proportion to the amount of waste set out for collection. Most businesses, industries, and public institutions in Wake County already operate under a PAYT system, as their vendor-provided service costs are based on the frequency of

collection and the size/number of dumpsters. Commercial waste disposal pricing is typically not set to discourage waste generation however, but to maximize profits for the vendor providing the service.

PAYT programs can most easily be described by the collection method, collection unit, and pricing system.

***Collection Method*** - Can be curbside, as is more typically done in municipalities and urban settings, or drop-off, as is more typically done in rural, unincorporated areas.

***Collection Unit*** - Can be volume or weight based. Volume-based, which is the easiest to implement and most common, relies on the sale and use of bags, stickers, or tags, or through the use of different size cans or carts. Weight based programs are the most equitable since landfill tipping fees are typically weight based, but require the collector to weigh the waste at the curb or drop-off center. The cost of scales and specialized equipment limit the use of weight-based systems.

***Pricing Systems*** – The most common PAYT pricing system is a *two-tiered* system. Two fees are used to recover costs of solid waste management. One fee is tied to fixed costs, such as equipment, staffing and other program costs (such as household hazardous waste collection, if offered). It is typically recovered through utility bills or taxes. The second fee is set to recover the variable costs such as collection and disposal. Other pricing systems, such *fully variable* and *limited base service* are less commonly used. *Fully variable* systems recover all costs for solid waste management through unit fees paid by the users. *Limited base service* systems require that users pay for a basic level of service, such as one 32-gallon cart, and are charged extra for waste that does not fit into the cart.

One community in Wake County, the Town of Cary, already has a volume-based *limited base service* type of PAYT system in place. All residents are provided with a 95-gallon cart for a flat rate. The flat rate is a component of the overall $14/month solid waste fee that residents pay (via their utility bill) for trash collection and disposal; recycling; and yard waste. Approximately $10/month of the $14/month fee covers costs associated with trash collection and disposal.

For residents who generate more waste than will fit into a 95-gallon cart on a weekly basis, the Town offers a second, 95-gallon cart for an additional charge of $3.50 per month. Residents who commonly generate more waste than will fit into the first 95-gallon cart must choose this option as the Town will, after a warning, not pick-up extra waste unless it is in a Town-provided container. Residents may also request a special collection to pick up excess trash that does not fit inside their cart for a $10 fee. The Town reports that 665 households (about 1.5 percent of all households) currently pay the additional $3.50 monthly charge for a second 95-gallon cart. Cary's system tends to discourage excessive waste generation, but does not necessarily

encourage waste reduction and minimization since the default 95-gallon collection container offered is appropriately sized to accommodate nearly all residents.

## 1.1 Benefits and Drawbacks

PAYT programs have a number of commonly recognized benefits as well as drawbacks. Some of the benefits include:

- **Equity** – Solid waste fees are partially or fully, depending on the program type and pricing system, linked to the amount of waste generated for disposal. Similar to pricing systems for electric, water and sewer rates, residents pay proportionately for the amount of waste generated. Under the current fee based systems used by Wake County local governments, a family of 2 which might generate 1,000 pounds of waste for disposal pays the same annual fee as a family of 6, which might generate 3,000 pounds of waste for disposal, in a year.

- **Reduced Disposal Tonnage Resulting in Lower Costs and Longer Landfill Life** – The pricing incentive to generate less waste results in reduced collection and disposal costs. Significant reductions in residential waste may lower collection costs through reduced time spent on collection routes, less overtime, and possibly less equipment needs. At the landfill, savings are directly realized through lower tipping fees. Reduced volume also equates to less airspace use and extends the lifespan of the publicly-owned South Wake Landfill (SWLF).

- **Increased Recycling Resulting in Additional Revenue** – The reduction in waste destined for disposal is usually accompanied by an increase in recycling. Given today's favorable market rates for recycling (approximately $60/ton), the several local governments which perform their own recycling collection (e.g. Cary, Raleigh, and Fuquay-Varina) may directly benefit from an increase in recycling tonnage. For example, if the Town of Fuquay-Varina's recycling rate increased by 15 percent (an increase of 155 tons of recyclables over one year), they would realize an additional $9,315 in annual revenue, assuming a $60/ton rate for recyclables. Because the increase in recycling would likely correlate directly with a reduction in waste disposed at the landfill, the Town would also see a decrease in disposal fees of $4,968. The combined annual increase in revenue and savings from lower tipping fees would total $14,283.

Some of the potential drawbacks of a PAYT system may include:

- **Cost of Implementation** – Depending on the type of PAYT program implemented, there may be costs associated with switching from a fixed fee based system. Costs may be associated with purchasing new equipment (e.g. different sizes of carts); running a public education campaign to gain support, buy-in and inform citizens; and adding staff resources (e.g. administration and illegal disposal enforcement).

- **Illegal Disposal** – An effective enforcement program is necessary to deal with illegal disposal. While case studies and research suggest that illegal disposal does not significantly increase under a PAYT program, it remains a possibility. This includes the use of private (commercial and multi-family) dumpsters by residents as well as open dumping in vacant lots or other secluded areas.

- **Inconsistency in Approaches by Neighboring Communities** – Neighboring jurisdictions with drop-off centers may see an increase in usage from residents who are subject to a PAYT program. In Wake County, residents of municipalities might decide to dispose of their waste at one of the County-operated convenience centers, rather than pay for residential collection if their fee is based on weight, volume, or cart size. A coordinated effort between neighboring jurisdictions is necessary if PAYT is being considered.

The various types of PAYT programs, their potential advantages and disadvantages if used in Wake County, and examples of PAYT programs that are currently being used in North Carolina are further discussed in Section 4.0.

## 2.0 Institutional Feasibility and Acceptance

The institutional feasibility, or current "appetite" for implementing a PAYT system, was evaluated through discussions with solid waste managers of a majority of the Wake County local governments. The solid waste managers were generally questioned as to whether their residents, City/town administration, and elected leaders would support and/or welcome a PAYT system. The consensus response was that, given the current situation and trends in solid waste management, there is need or reason to change to a price incentive-based system now, or in the near future. Some of the factors influencing this common position include the following:

- The availability of a local, long-term (20+ years) disposal option, the South Wake Landfill (SWLF);

- The current low cost of landfill disposal, as reflected by a SWLF tipping fee ($32 per ton) that is amongst the lowest in the State;

- The operations contract for the SWLF, which due to a tiered structure, results in lower per-ton operating cost to the SWLF Partnership, as the amount of waste disposed increases;

- The approximately 4-year trend of declining waste generation rates in Wake County;

- Effective municipal recycling programs, which have been improved in recent years through the use of larger, roll-out carts and increases in the types of materials collected; and

- Outside City and town limits, the availability of 11 County-operated convenience centers, which allow all County residents to dispose of household garbage free-of-charge.

These factors tend to fuel the "*if it's not broken, why fix it?*" mindset, especially among residents. However, even with these factors, a properly developed and managed PAYT system has the potential to offer benefits to the County, City and/or towns, and is consistent with the overall vision of maximizing waste reduction through incentives, disincentives and policies.

The current situation in neighboring Orange County serves as an interesting comparison of the factors and environment which may influence and support the switch to a PAYT program. Unlike the situation with the SWLF in Wake County, the publicly owned Orange County landfill is quickly running out of airspace and neither the County nor its three municipalities have secured a low-cost, long-term disposal option. When the landfill closes on June 30, 2013, the local governments of Orange County are likely to direct haul their waste to the Durham Transfer Station, at a significant increase in cost. Given this situation, the switch to a PAYT program offers the potential to mitigate the expected increase in cost by lowering trash tonnage, and might be easily sold to residents who largely understand that costs will increase due to the loss of a local disposal option. Recognizing this, the Board of County Commissioners, at their June 20, 2012 meeting, promoted and advocated for the consideration of a PAYT program.

## 2.1 Sanford, Maine Case Study

Implementation of a successful PAYT system requires the buy-in of solid waste managers, elected officials, and the residents. Lack of support by any one of these groups may result in problems and/or the failure of the program. The recent attempt at moving to a PAYT in Sanford, Maine, demonstrates this well[1].

In early 2010, Sanford's town council voted to switch from a fixed-fee type of system to a PAYT system. For years, the Town's recycling rate languished in the single digits with only about one-fifth of households bothering to separate common recyclables from the rest of their trash. Beginning in July 2010, the Town required residents to place their waste in either 15 or 33 gallon bags purchased for $1.25 or $2.00 respectively. They were also allowed to throw out unlimited recyclables without sorting in any size container up to 32 gallons. During the first seven weeks under the PAYT system, the Towns' recycling rate jumped from 7.5 percent to 41 percent and the amount of waste that was delivered to the incinerator dropped to an average of 63 tons per week, compared to an average of 155 tons per week during the same period of 2009. By reducing their waste by 92 tons per week, the Town was looking at an annual disposal cost savings of $325,000.

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[1] Case study information from:

Quimby, B, 2010. *Recycling in Sanford: Incentive = can-do = big savings*. Maine Sunday Telegram. URL: http://www.pressherald.com/news/sanford-on-top-of-recycling-yes_2010-08-30.html

Todd, E.W, 2010. *One year after PAYT, Sanford's recycling rate is down*. Sanford News, November 17. URL: http://www.fosters.com/apps/pbcs.dll/article?AID=/20111117/GJNEWS03/711179683/-1/SANNEWS

While the new PAYT program appeared to be an unqualified success from the perspective of Town Council and administration, a majority of residents were not in favor of the new system. Opponents perceived PAYT as a new tax and said it put an additional burden on residents — especially the elderly, those on fixed incomes, and young families — during difficult economic times. A group of petitioners collected 919 valid signatures on a petition requesting that town officials repeal the PAYT trash program. On Nov. 2, 2010, voters repealed the PAYT program with a 61-percent majority.

Once the PAYT system was abandoned, recycling decreased — but not as much as Town staff feared it would. During the 16 weeks that PAYT was in effect, Sanford's average recycling rate jumped to 38.9 percent. In the year after the PAYT program ended, the recycling rate was 25.18 percent – still significantly better than the 7.5 percent prior to PAYT, but well below the rate achieved under the PAYT system.

This example demonstrates that the institutional feasibility, i.e. the collective "appetite" for PAYT, must be universal and have support throughout the community. An effective education program is paramount to eliminating confusion and dispelling myths about PAYT, such as the myth that residents are being subject to a new and/or increased tax. In the Sanford example, many residents did not understand that their annual solid waste fee, which was usually collected as part of their tax bill, was significantly reduced, and largely replaced by the cost of purchasing bags.

## 3.0 Technical Feasibility

The technical feasibility considers issues, obstacles, and limitations which must be overcome or addressed in order to implement a PAYT program in Wake County. The three service models currently used by the local governments of Wake County pose both common and unique issues and challenges for implementation of PAYT system. The two service models which use curbside collection are described as follows:

- **Self Provided Service**. In this model, governments own and maintain their own fleet of collection vehicles for most or all municipal solid waste (MSW, including trash, recyclables and yard waste), and use their own staff. Raleigh, Cary and Fuquay-Varina operate under this approach.

- **Contracted Service**. In this model, governments contract out MSW collection and disposal services to one or more private firms, typically under 3 to 5 year service agreements. The remaining nine towns in Wake County operate under this approach.

Wake County operates under the third service model. The County contracts with private firms to operate the 11 convenience centers. The private firms have responsibility for hauling trash from the convenience centers to the SWLF, and for hauling recyclables to a variety of destinations. The County does not offer curbside collection services in the unincorporated areas

of the County, but leaves it open for residents to contract individually with private firms, if they choose.

## 3.1 PAYT in North Carolina

There are approximately one dozen PAYT programs being used today in North Carolina – which is down from the late 1990's, when approximately 23 programs were in place[2]. Although these systems have proven to reduce waste and promote recycling, the economic incentive-based approaches to solid waste rate setting have lost traction in our State in recent years, generally due to public criticism brought about by perceived inconvenience. Macon County, for example, considered switching from a uniform fee to a PAYT system; however, the idea was so unpopular that security had to be called to ensure the safety of the solid waste director during a public meeting on the subject[3].

PAYT systems in North Carolina are most commonly used at rural, county-run drop-off sites and publicly operated landfills. In some instances, residents are required to purchase special bags or stickers. Others allow use of any bag, and charge a small fee based on size of the bag. Several fee examples are described in Table 1. These examples, and most North Carolina PAYT programs, use a two-tiered pricing system. In addition to the volume or weight-based fees, additional revenue necessary for the entire solid waste program is obtained through household fees, taxes, and/or the general fund. Some counties offer a credit toward the cost of garbage disposal by bringing in recyclables. In Gaston County, residents who also drop-off a 12 inch stack of newspapers or a bag of recyclables equal in size to their garbage bag receive a $1.00 credit (for each bag of recyclables).

**Table 1. PAYT Fee Examples in North Carolina**

| Jurisdiction | Fee System | Fee |
|---|---|---|
| Union County | Bag size-based | $0.25 up to 13 gallon bag<br>$0.75 14 - 55 gallon bag |
| Wilkes County | Bag size-based | $0.35 up to 13 gallon bag<br>$0.65 30 gallon bag<br>$1.15 over 30 gallon bag |
| Craven County | Prepaid Stickers | $2.50 (1 sticker) up to 33 gallons and <50 lbs<br>$5.00 (2 stickers) 34 to 64 gallons and <100 lbs<br>$7.50 (3 stickers) 65 to 90 gallons and <150 lbs |
| Gaston County | Number of bags | $2.00 for 1- 10 bags<br>$4.00 for 11 or more bags |

[2] NCDENR, 1999. *Pay-As-You-Throw Programs Fact Sheet*.
[3] Barrett, M. 2012. *Other WNC counties use fee to fund trash systems*. Asheville-Citizen Times. Feb 4, 2012.

## 3.2 PAYT Considerations for Convenience Centers and Drop-off Sites

### *3.2.1 Volume Based – Pre-Paid Bags, Tags and Stickers*

Volume based pre-paid programs would provide simple systems that are easily understandable and would allow the convenience center attendants to easily identify paying customers. These programs would also require minimal changes at the convenience centers, and could help the County better control bulky loads received at the convenience centers, which can sometimes cause handling delays. Although the pre-paid system would require additional processing by staff for customer payment and allocation, the process accounting costs are lower since no billing system is needed and the distribution, storage and inventory costs are lower compared to subscription programs. Of the volume based pre-paid programs, tag and sticker programs are generally less expensive and easier to implement compared to the bag program. Using the prepaid tag and sticker systems at the convenience center also allows the customer to track the tags and stickers from the time they are attached until disposal, unlike curbside programs, where tags and stickers may become lost between the time they are placed on the curb and collected.

Pre-paid programs depending on how they are implemented may be considered an inconvenience by the customers. With varying payment methods required to reach the entire citizen base, the County would be required to set-up cash and electronic payment options. Cash payment options would require enhanced security and handling. In addition pre-paid bag programs would require the County maintain a continuous inventory of bags for purchase, or work with local businesses to sell the bags at convenient locations.

Convenience centers are used by many for bulky disposal, including residents of incorporated areas. Where sticker and tag programs may allow the County to establish a program to monitor and allow bulky items on a prorated basis, bag systems would not conveniently allow the disposal of bulky items. Flat charges for bulky items might also be necessary.

The use of a volume-based pre-paid bags, tags, or stickers PAYT system at Wake County's convenience centers is considered technically feasible, however, there would be numerous obstacles to overcome.

### *3.2.2 Weight Based*

Weight based programs are easily understandable and have been proven to be more successful in waste reduction for all waste types. The weight based programs are also perceived by the public to be more fair and equitable that other methods. However, the use of weight based systems at the convenience centers would require the additional of scales and electronic accounting tools necessary to maintain accurate records. In addition, since payment is required at the time of disposal, the County would be required to set-up a secure facility for administering and collecting payment. The facility up-fits, added security and additional staffing required to implement a weight-based PAYT, compared to the current operations, which generally requires a single attendant, would be less favorable, especially given the low

relative tonnages received at the County's convenience centers. For these reasons, switching to a weight-based system at Wake County's 11 convenience centers would generally not be feasible.

## 3.3 PAYT Considerations for Curbside Collection

Some of the technical issues, obstacles and limitations that the Towns, which all offer curbside collection service under one of two service models, would need to address are described below by common program type.

### *3.3.1 Volume Based - Pre-Paid Bags, Tags and Stickers*

Bags, tags and stickers are incompatible with automated or semi-automated collection equipment when used alone. Automated and semi-automated collection equipment is used almost exclusively in Wake County by both government and private sector forces. Because this type of collection requires roll-out carts, pre-paid bags, tags and stickers would be largely hidden until the waste is dumped into the collection vehicle, thus hindering enforcement. Using a semi-automated collection vehicle, non-conforming waste lacking an appropriate bag, tag or sticker could potentially be removed from the collection vehicle's hopper and placed back in the cart; however, this increases the risk of injury to the operator. For these reasons, pre-paid bag, tag, and sticker systems would generally not be feasible for use in a curbside collection-based PAYT program in Wake County.

### *3.3.2 Volume Based - Subscription Container Programs*

Subscription container systems have a higher implementation cost, compared to bags, tags and stickers. Most municipalities in Wake County have standardized on the use of 96-gallon carts, although 32-, 48-, 65- and 72-gallon carts are also used in select jurisdictions. Offering two or three sizes of containers would require purchase and distribution of additional containers at additional cost. Some of the other issues and considerations include:

- Complexity is added to billing due to the need to track which residents receive and use which size of cart.
- Inventory and storage requirements are increased due to the need to maintain different sizes of carts.
- Contracted service costs would likely increase, as they pass along the cost of providing different size carts to the municipality, as well as their additional administration costs associated with tracking and billing.

Although there is added cost due to the need to purchase containers, a subscription container approach is feasible in Wake County, due to the near universal use of semi and fully-automated curbside collection methods.

#### *3.3.3 Weight-Based Programs*

Weight-based residential systems require specialized trucks and other equipment, which significantly increase costs. Complexity and cost is added to the billing process due to the need to track net weight and the potential for malfunctions and erroneous measurements increases the likelihood of billing disputes. Also, there is more incentive, compared to other methods, for residents to place trash in containers other than their own. For these reasons, weight based systems would not be feasible for use in a curbside collection-based PAYT program in Wake County.

# 4.0 Financial Feasibility

The financial feasibility is determined by the ability to switch to a PAYT program and pricing system while maintaining sufficient revenues required to provide a comprehensive suite of solid waste services. The likelihood of achieving the PAYT goals, namely reduced waste generation and increased recycling rates, is also an important component of evaluating the financial feasibility.

## 4.1 PAYT Rate Setting

Two common approaches described by the US EPA[4] to setting appropriate PAYT rates include drawing from comparable communities and using a six-step rate structure design (or similar) process. Under the first approach, communities of similar size with comparable disposal costs; collection-types and frequencies; PAYT-related goals; and complementary solid waste services are examined. These communities' pricing systems may provide a starting point for PAYT rate setting. The second approach focuses on a review of your program costs and other relevant factors to arrive at PAYT rates. The six general steps are:

1. **Forecast residential MSW amounts** once PAYT has been implemented.

2. **Determine the types of services to be provided,** including the type of collection, the type of containers to be used, and the billing options.

3. **Estimate net costs of MSW** by accounting for all costs associated with the forecasted amounts of refuse, recyclables, and considering other complementary types of services to be provided.

4. **Determine PAYT (and other) revenues** that you need to generate. This amount may be more or less that net MSW costs, depending on related goals and other financial resources.

5. **Calculate PAYT rates** you need to generate based on MSW costs and revenues.

[4] USEPA, 1999. Rate Structure Design – Setting Rates for a Pay-As-You-Throw Program. EPA530-R-00-006

6. **Adjust services and PAYT rates** if prices seem too high for public acceptance, or not high enough to encourage a level of waste reduction that meets or exceeds your goals.

## 4.2 Example PAYT Pricing System and Financials

While it is beyond the scope of this evaluation to go through the process of developing and recommending a pricing system and rate structure for one or more Wake County jurisdictions, a simplified example of how a PAYT system might look is presented for one local jurisdiction, to help evaluate the financial feasibility. The Town of Cary was selected for the example because it maintains its own fleet of collection vehicles for trash, recyclables, and yard waste, and therefore provides a more telling depiction of different PAYT financials. Towns which contract for their trash and recyclables collection can also implement PAYT; however, this poses a slightly different set of technical and financial issues that the Town and service provider must collectively consider.

The use of the Town of Cary's data, statistics, costs and revenues in the following example is not meant to suggest that they consider switching to a PAYT system, rather the data is simply used to evaluate the feasibility from a financial standpoint.

Table 2 provides a summary of MSW tonnages, costs, and revenues on a Town-wide basis and on a per household basis for FY2011 in the first column of numbers. The FY2011 data was taken directly from the Town's *Solid Waste and Materials Management Annual Report*. The second column of numbers presents that same data assuming the Town was operating under *two-tiered* pricing PAYT system that includes a nominal fixed fee to cover costs associated with recycling and yard waste, and a variable fee for trash, based on the size of trash collection cart selected by each household. The important assumptions that were made in this example include the following.

- The incentive to switch to a smaller trash cart for a reduced cost results in a <u>15 percent</u> reduction in the amount of trash collected and disposed in the landfill, compared to FY2011. The reduction in trash occurs through a combination of source reduction, an increase in recycling, and an increase in backyard composting. A national study[5] cited by the USEPA reported a 14 to 27 percent reduction in trash (by weight) in communities that switched to PAYT. Other studies cite research that suggests that PAYT systems decrease landfill tonnage by an average of 17 percent[6].

- A <u>12 percent</u> increase in the annual amount of recyclables collected occurs, compared to FY2011. The same study cited by the USEPA reported a 32 to 59 percent increase in the weight

[5] Miranda, ML and S. Lapalme, 1997. *Unit Pricing of Residential Solid Waste: A Preliminary Analysis of 212 U.S. Communities*. Nicholas School of the Environment, Duke University.
[6] Skumatz, L.A. and J. Freeman, 2008. Increasing Recycling Now! Implementing Recycling and Pay As You Throw (PAYT) Ordinances, Legislation, or Contracting. Skumatz Economic Research Associates, Inc.

**Table 2. Simplified Comparison between FY2011 and Estimated PAYT Year Program Costs and Revenues**

| *MSW Tonnage* | FY2011 | PAYT Year | Difference | Notes |
|---|---|---|---|---|
| Tons of Trash collected | 30,562 | 25,978 | -4,584 | Assumes 15 reduction in trash, by weight for PAYT year |
| Tons of Recyclables collected | 11,184 | 12,526 | 1,342 | Assumes 12 increase in recyclables, by weight for PAYT year |
| Tons of Yard Waste collected | 16,554 | 16,554 | 0 | No change assumed |
| *MSW Cost and Revenue* | FY2011 | PAYT Year | Difference | Notes |
| Trash Collection Cost | $4,410,573 | $4,190,044 | -$220,529 | Assumes 5% reduction in collection cost due to less tonnage |
| Trash Disposal Cost (@$32/ton) | $977,984 | $831,286 | -$146,698 | Savings due to lower disposal costs |
| Total Trash Cost | $5,388,557 | $5,021,331 | -$367,226 | Savings due to lower disposal and collection costs |
| Recyclables Collection Cost | $1,181,306 | $1,216,745 | $35,439 | Assumes 3% increase in collection costs due to more tonnage |
| Recyclables Revenue | $395,675 | $443,156 | $47,481 | Additional revenue from recyclables sale |
| Net Recyclables Cost | $785,631 | $773,589 | -$12,042 | |
| Recyclables Sale Price per Ton (Avg.) | $35.38 | $35.38 | $0.00 | No change assumed |
| Yard Waste Costs | $105,790 | $105,790 | $0 | No change assumed |
| **Net MSW Program Costs** | **$6,279,978** | **$5,900,710** | **-$379,268** | |
| *Household Figures* | FY2011 | PAYT Year | Difference | Notes |
| Number of Households (HH) | 44,855 | 44,855 | 0 | |
| Tons of Trash per HH | 0.68 | 0.58 | -0.10 | |
| Tons of Recyclables per HH | 0.25 | 0.28 | 0.03 | |
| Cost of Trash per HH per year | $120.13 | $111.95 | -$8.19 | |
| Cost of Recyclables per HH per year | $17.51 | $17.25 | -$0.27 | |
| Cost of Yard Waste per HH per year | $2.36 | $2.36 | $0.00 | |
| **Total Cost MSW per HH per year** | **$140.01** | **$131.55** | **-$8.46** | |
| Cost of Trash per HH per month | $10.01 | $9.33 | -$0.68 | |
| Cost of Recyclables per HH per month | $1.46 | $1.44 | -$0.02 | |
| Cost of Yard Waste per HH per month | $0.20 | $0.20 | $0.00 | |
| **Total Cost MSW per HH per month** | **$11.67** | **$10.96** | **-$0.70** | |

of recyclables which switching to PAYT. Other studies report recycling increases of 50 to 100 percent[4].

- The 15 percent reduction in the amount of trash generated results in 5 percent reduction in the cost of trash collection. This minor reduction would be expected to occur as a result of less fuel consumption, quicker completion of routes resulting in less overtime, and possibly fewer breakdowns and maintenance issues.

- The 12 percent increased in the amount of recyclables collected results in a 3 percent increase in the cost of recyclables collection. This minor increase would be expected to occur as a result of greater fuel consumption, longer time spent completing routes resulting in more overtime, and possibly more breakdowns and maintenance issues.

Using these assumptions, the middle part of Table 2 shows that total MSW program costs would decrease by approximately $380,000, or 6 percent of the FY2011 program costs. Most of the savings would come from reduced collection costs and tipping fees. Note that the average sale price for recyclables in this example is $35.38 per ton. At the beginning of FY2012, several

towns and Wake County were receiving approximately $67 per ton for recyclables. As such, any increase in recyclables, when market rates are high can result in additional revenues for the program.

The bottom part of Table 2 demonstrates that the monthly cost per household under the example PAYT system would be $0.70 less than the current system, in order to recover 100 percent of the solid waste costs shown.

To assess the sensitivity to several of the cost assumptions, the estimated decrease in collection costs was reduced in half, from 5 to 2.5 percent and the estimated increase in recyclables collection cost was doubled from 3 to 6 percent. Under these assumptions, the total MSW program costs would decrease by approximately $211,000, versus the $380,000 decrease previously estimated, and the monthly cost per household under the example PAYT system would be $0.39 less than the current system.

Table 3 presents the existing fee structure and a hypothetical PAYT fee structure. The Town of Cary currently assesses a $14.00 per month charge to each household for solid waste services (trash, recyclables, yard waste and related programs), which results in an annual revenue of $7.5M. Funding is also provided, as needed, through the Town's general fund; however, this additional revenue is not considered in this analysis. Under the example PAYT *two-tiered* fee structure, the Town would charge each household a fixed fee of $2.00 per month to cover the cost of recyclables and yard waste collection. Residents would then have the choice of (1) a 65-gallon trash cart for a monthly fee of $8.15 or (2) a 95-gallon trash cart for a monthly fee of $12.00. In this example, a 32 percent price reduction in the variable fee portion is offered if the resident chooses to use the 65-gallon cart, which is 32 percent smaller than the 95-gallon cart. The user of the 65-gallon cart would pay $46 less on an annual basis, compared to the user of the 95-gallon cart.

An important assumption in Table 3 deals with the number of households who would chose to switch to a lower cart. Because the cost savings is relatively minor, it is thought that two-thirds of the households would stick with the larger, 95-gallon cart and only one-third would decide to accept the smaller cart. However, in this example, using the $12.00 and $8.15 variable pricing rates, up to 68 percent of households could choose to switch to the smaller carts before the Town's solid waste program costs listed in Table 2 would exceed revenues. If 68 percent of households were to switch to smaller carts, the conservative assumptions of 15 percent reduction in trash by weight and 12 percent increase in recyclables by weight would likely not apply, however.

The Town of Cary PAYT example depicted in Tables 2 and 3 does not factor in costs associated with the following:

**Table 3. Current (FY2011) and Two-Tiered PAYT Fee Structure Examples**

| FY2011 Fee Structure and Financials | Value | Notes |
|---|---|---|
| Number of Households (HH) | 44,855 | |
| MSW Fee per HH per month | $14.00 | Covers trash, recycling & yard waste |
| **Annual Revenue from HH MSW fee** | **$7,535,640** | |
| **Net MSW Program Costs** | **$6,279,978** | from Table 2 |
| Surplus | $1,255,662 | |
| **Two-Tiered PAYT Fee Structure Example** | **Value** | **Notes** |
| Number of Households (HH) | 44,855 | |
| Fixed MSW Fee per HH per month | $2 | Covers recycling & yard waste |
| 95-Gallon Cart fee per HH per month | $12.00 | Covers trash |
| 65-Gallon Cart fee per HH per month | $8.15 | Covers trash |
| Fixed MSW Fee per HH per year | $24 | |
| 95-Gallon Cart fee per HH per year | $144.00 | |
| 65-Gallon Cart fee per HH per year | $97.80 | Provides an annual $46 savings per HH |
| Assumed 95-Gal Cart Usage Rate | 67% | 30,053 households |
| Assumed 65-Gal Cart Usage Rate | 33% | 14,802 households |
| Annual Revenue from Fixed MSW Fee | $1,076,520 | |
| Annual Revenue from 95-Gal Cart | $4,327,610 | |
| Annual Revenue from 65-Gal Cart | $1,447,650 | |
| **Total Annual Revenue** | **$6,851,781** | |
| **Net MSW Program Costs** | **$5,900,710** | from Table 2 |
| Surplus | $951,071 | |

- The purchase and distribution of 65-gallon carts to replace 95-gallon carts, where requested. An approximate cost to purchase 65-gallon carts for one-third of the residents would be $750,000, assuming each cart cost $50. Additional cost would be expected for delivery and change-out of the larger carts.

- Education for the public. As previously noted, the need to educate and inform is critical to the success of a PAYT program. Costs associated with running a public education campaign would be expected.

- Additional administration costs to implement and maintain the two-tiered pricing system would be expected.

- The potential loss of revenue that is shared back to the SWLF Partners on a quarterly basis, due to waste receipts at the SWLF that are in excess of a certain amount and the nature of the operations contract for the SWLF.

Similarly, there are additional cost-related benefits that are not listed in the Tables. Most importantly, the reduced waste flow to the SWLF extends its life and lengthens the time when funding is needed to develop the next generation waste management system (which is likely to cost significantly more than the current cost of disposal).

The PAYT example, although simplified, does demonstrate that a relatively simple, *two-tiered* pricing system could potentially be implemented in a manner that results in an overall decrease in solid waste-associated costs for residents while creating an incentive for waste reduction and increases in reuse and recycling.

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# Memorandum

*To:* *Mr. Lowell Shaw*
*Mr. John Roberson, P.E.*

*From:* *CDM Smith*
*Date:* *February 1, 2012* ***(Updated March 14, 2012)***

*Subject:* *Wake County, North Carolina*
*Solid Waste Management Plan Update*
*Subtask 5.6 – Special Waste Evaluation*

A variety of special wastes are received at the South Wake Landfill (SWLF), such as mattresses, creosote poles, used car bumper, and other bulky items. These items take additional time to handle and dispose, causing delays at the working face, and consume a disproportionate amount of valuable landfill space due to their inability to be well compacted. Wake County is interested in identifying options to either divert, process, recycle, or charge extra for these problematic materials. This memorandum summarizes CDM Smith's evaluation of special wastes received at the SWLF through review of the recent waste characterization study (SCS, 2011) and meeting with Waste Industries' Landfill Manager, and presents recommendations for future handling of these wastes.

## 2011 Solid Waste Characterization Study

Wake County conducted a solid waste characterization study in 2011. According to this study, the mean waste composition for mattresses in the County's overall municipal solid waste (MSW) stream was 0.9 percent. No other waste materials identified in the Solid Waste Characterization Study met the definition of special waste as defined above.

## Meeting with Waste Industries

CDM Smith met with Wake County staff and the Waste Industries SWLF Manager to discuss current operations at the SWLF and identify special wastes. Waste Industries' SWLF Manager indicated that the most problematic materials are disposed in relatively small, manageable loads, and therefore do not create significant operational problems. A few exceptions to this are car bumpers, mattresses and large cushions. Car bumpers, for example, come in large quantities and are light weight. This combination results in low tipping fees but similar disposal costs, when considering the operational requirements, compared to typical loads of MSW. Mattresses and large cushions are not only light weight – again generating a low tipping fee – but they are also bulky, relatively incompressible, and require additional handling, which increases the disposal costs compared to other MSW.

The County receives approximately 80 mattresses per day at the SWLF, with most arriving in bulk loads from commercial businesses. Assuming the average mattress consumes 20 cubic feet of airspace, it is estimated that mattresses consume approximately 15,400 cubic yards of airspace each year. Assuming waste is compacted to 0.6 tons per cubic yard, the current value of airspace at the SWLF is $18 per cubic yard. At the current mattress disposal rate, the value of airspace consumed by mattresses is approximately $277,000 annually. Unfortunately, there are no cost effective disposal alternatives for mattresses, other than landfilling, at present. In 2009 Wake County teamed with North Carolina State University to perform a mattress recycling pilot program. The program was unable to define a process that could be economically implemented at full scale and was discontinued. Buncombe County, North Carolina conducted a similar study in 2009, but discontinued the program after finding the process to be labor intensive, costly and posed unsanitary conditions for the workers.

## Recommendations

Based on the lack of viable recycling options for the current items identified as problematic special wastes (i.e., mattresses), CDM Smith recommends the County consider (1) structuring the tipping fee schedule to include a minimum fee per load for light weight materials and, (2) imposing a surcharge on bulky materials such as mattresses. Using the above estimates, the County would need to receive approximately $13 per mattress, to provide a disposal rate equivalent to the current tip fee (calculations attached to end of memo). Consideration should also be given to lowering rates for materials such as shredder fluff and contaminated soils that could be used for daily cover in-place of clean soil cover.

Providing a varied tipping fee structure or imposing surcharges is not uncommon at landfills. For example, Orange County requires a minimum charge of $10 for cars and $22 for trucks to manage light weight materials and small loads. The same rates are applied to cars and trucks carrying mattresses. Catawba County charges a triple fee of $90/ton for bulky wastes and wire/cable.

In addition to providing revenue for the landfill that is commensurate with the operational requirements necessary, increasing fees for special wastes “levels the playing field” for alternatives to landfilling thus providing incentives for the generator to consider other options. Under the current fee structure, even if mattress recycling was an option, the labor intensive process would not be competitive with landfilling.

## References

SCS Engineers, 2011. Wake County, North Carolina Waste Characterization Study Summary of Results, May 2011.

| | | | | | |
|---|---|---|---|---|---|
| **Calculation Form (Excel)** | | **Job #** | **6172-84878** | **Calc By:** | WMB |
| **Client:** | **Wake County** | **Checked By:** | **J. Boyer** | **Date:** | **2.28.2012** |
| **Project:** | **10-Year SWM Plan** | **Date:** | **3.14.2012** | **Calc.No.** | _____ |
| **Detail:** | **Special Waste - Mattress** | **Reviewed By:** | _____ | **Revision#** | _____ |
| | | **Date:** | ____/___/___ | **Date:** | ____/___/___ |

## Calculation Brief Title: Mattress Disposal Volume

## 1.0 Purpose/Objective

- Determine the airspace consumed annually by mattresses.

## 2.0 Procedure

- Estimate the quantity of mattresses received annually
- Estimate the airspace consumed annually from mattress disposal
- Estimate the airspace value lost to mattress disposal and the cost per mattress to provide an equivalent disposal rate to the current landfill tipping fee.

## 3.0 References/Data Sources

- Waste Industries Landfill Manager

## 4.0 Assumptions and Limitations

| | | | |
|---|---|---|---|
| -Daily mattress disposal rate | **80** per day | | |
| - Average twin mattress dimensions | **39** " Wide | **80** " Long | **10** " Thick |
| - Average queen mattress dimensions | **60** " Wide | **80** " Long | **10** " Thick |
| - Mattress Compression | **0%** to | **25%** | |
| - Average in-place waste compaction | **0.6** tons per day | | |
| - Tipping Fee | **$30** per ton | | |

## 5.0 Calculations

Quantity of Mattresses Received (Annually)

Total=#/day x 5 days/week x 52 weeks/year

**Total** **20800 #/year**

Mattress Volume

Mattress Volume (In Landfill) = Length x width x thickness x (1-%compression)

| | | |
|---|---|---|
| Volume - Twin | 18 to | 14 cubic feet |
| Volume - Queen | 28 to | 21 cubic feet |
| Ave Volume = | 23 to | 17 cubic feet |

**Average Volume for Calculations** **20 cubic feet**

| | | |
|---|---|---|
| **Calculation Form (Excel)** | **Job #** 6172-84878 | **Calc By:** WMB |
| **Client:** Wake County | **Checked By:** J. Boyer | **Date:** 2.28.2012 |
| **Project:** 10-Year SWM Plan | **Date:** 3.14.2012 | **Calc.No.** _____ |
| **Detail:** Special Waste - Mattress | **Reviewed By:** _____ | **Revision#** _____ |
| | **Date:** ____/___/___ | **Date:** ____/___/___ |

Landfill Airspace Consumed

Airspace Consumed = #/year x volume

**Airspace Consumed** **416000 cubic feet** **15400 cubic yard**

Annual Costs for Mattress Disposal

Cost = Volume x average in-place waste compaction x tipping fee

**Annual Cost =** **$277,200**

Cost per Mattress

Cost per Mattress = Annual cost / # mattresses/year

Cost per Mattress = **$13**

## 6.0 Conclusions/Results

- Based on the calculations above, Wake County disposes approximately 20,800 mattresses per year. To recover the airspace consumed, the County would need to charge approximately $13 per mattress.

# Appendix I

Electronics Recycling Certifications and Agreements

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aqa INTERNATIONAL

ACCESSIBLE. UNDERSTANDABLE. REGISTRATION.

# *CERTIFICATE OF REGISTRATION*

*AQA International, LLC attests that*

## Synergy Recycling LLC

320 South Gibson Drive
Madison, North Carolina 27025

*with a scope of :*

Single Source Service in Removal of Excess and Obsolete Electronic Equipment, Specializing in all Phases Including Collecting, Processing, and Recycling of Such Materials

**The organization is found to be in conformance with all requirements of the Recycling Industry Operating Standard®**

## RIOS:2006

*"The organization has been audited by a certification body that is in conformance with ISO/IEC 17021 requirements and applicable ANAB requirements."*

| | |
|---|---|
| Certificate No.: | US00011834 |
| Initial Registration: | 05/10/2011 |
| Registration Date: | 05/10/2011 |
| Expiration Date: | 05/09/2014 |
| Last Modified: | 05/10/2011 |

CEO, AQA INTERNATIONAL

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*with a scope of :*

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**The organization is found to be in conformance with all requirements of the Responsible Recycling© Standard**.

## Responsible Recycling© (R2):2008

*"The organization has been audited by a certification body that is in conformance with ISO/IEC 17021 requirements and applicable ANAB requirements."*

| | |
|---|---|
| Certificate No.: | US00011833 |
| Initial Registration: | 05/10/2011 |
| Registration Date: | 05/10/2011 |
| Expiration Date: | 05/09/2014 |
| Last Modified: | 05/10/2011 |

CEO, AQA INTERNATIONAL

**World Headquarters**
501 Commerce Drive, NE
Columbia, SC 29223 USA
www.aqainternational.com

ANAB ACCREDITED

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ACCESSIBLE UNDERSTANDABLE REGISTRATION

# *CERTIFICATE OF REGISTRATION*

*AQA International, LLC attests that*

## Creative Recycling Systems of North Carolina, LLC
## 619 Distribution Drive
## Morrisville, NC 27560

*with a scope of :*

Scope of Supply is Electronics Recycling – the Diversion of End-of-Life/Surplus Electronic Devices from the Waste Stream by the Re-use and/or Recycling of such Electronic Devices

has established an Environmental Management System that is in conformance with the International Environmental Standard

# ISO 14001:2004

*"Further clarifications regarding the scope of this certificate and the applicability of ISO 14001:2004 requirements may be obtained by consulting the organization."*

| | |
|---|---|
| Certificate No.: | US00012559 |
| Initial Registration: | 09/05/2008 |
| Registration Date: | 09/05/2011 |
| Expiration Date: | 09/04/2014 |
| Last Modified: | 09/05/2011 |

CEO, AQA INTERNATIONAL

**World Headquarters**
501 Commerce Drive, NE
Columbia, SC 29223 USA
www.aqainternational.com

ANAB ACCREDITED

Certificate CA10/55589

The management system of

# Creative Recycling Systems of North Carolina LLC

619 Distribution Drive
Morrisville, North Carolina, 27560, U.S.A.

has been assessed and certified as meeting the requirements of:

# ISO 9001:2008

The scope of registration is as follows:

**The recovery, recycling, re-deployment, and final disposition of electronic devices; marketing and sale of electronic devices by reuse and/or recycling.**

Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2008 requirements may be obtained by consulting the organization.

This certificate is valid from 18 February 2010 until 17 February 2013 and remains valid subject to satisfactory surveillance audits.
Re certification audit due before 17 January 2013
Issue 1.

Signed for and on behalf of SGS US Testing Company Inc.

Zachary C. Pivarnik
Accreditation Manager, North America
Accredited Office
201 Route 17 North, Rutherford, NJ 07070 United States of America
Certifying Office
6490 Vipond Drive, Mississauga, ON L5T 1W8 Canada
t 905-364-3757 t 1-800-636-0847 f 905-364-0345 www.sgs.com

ANAB ACCREDITED

Certificate US10/55591

The management system of

# Creative Recycling Systems of North Carolina LLC

619 Distribution Drive
Morrisville, North Carolina, 27560, U.S.A.

has been audited by a certification body that is in conformance with ISO/IEC 17021 requirements and applicable ANAB requirements. This organization is found to be in conformance with all requirements of :

# Responsible Recycling©:2008

The scope of registration is as follows:

**The recovery, recycling, re-deployment, and final disposition of electronic devices; marketing and sale of electronic devices by reuse and/or recycling.**

Further clarifications regarding the scope of this certificate and the applicability of Responsible Recycling©:2008 requirements may be obtained by consulting the organization

This certificate is valid from 18 February 2010 until 17 February 2013 and remains valid subject to satisfactory surveillance audits.
Recertification audit due a minimum of 30 days before the expiration date.

Authorized by

Zachary C. Pivarnik
Accreditation Manager, North America

SGS Systems & Services Certification
Division of SGS U.S. Testing Company Inc.
201 Route 17 North Rutherford, NJ 07070 USA
t 201-508-3000 f 201-935-4555 www.us.sgs.com

This certificate remains the property of SGS and shall be returned upon request.

Certificate US10/55592

The management system of

# Creative Recycling Systems of North Carolina LLC

619 Distribution Drive
Morrisville, North Carolina, 27560, U.S.A.

has been audited by a certification body that is in conformance with ISO/IEC 17021 requirements and applicable ANAB requirements. This organization is found to be in conformance with all requirements of:

## RIOS:2006

The scope of registration is as follows:

**The recovery, recycling, re-deployment, and final disposition of electronic devices; marketing and sale of electronic devices by reuse and/or recycling.**

Further clarifications regarding the scope of this certificate and the applicability of RIOS:2006 requirements may be obtained by consulting the organization.

This certificate is valid from 18 February 2010 until 17 February 2013 and remains valid subject to satisfactory surveillance audits.
Recertification audit due a minimum of 30 days before the expiration date.
Issue 1.

Signed for and on behalf of SGS Systems & Services Certification

Zachary C. Pivarnik
Accreditation Manager, North America

SGS Systems & Services Certification
Division of SGS US Testing Inc.
201 Route 17 North, Rutherford, NJ 07070
t 201-508-3000 t 1-800-747-9047 f 201-935-4555 www.sgs.com

This certificate remains the property of SGS and shall be returned upon request.

Certificate of Compliance CA10/55590

# CERTIFICATE OF COMPLIANCE

This is to notify that the Occupational Health and Safety System of:

# Creative Recycling Systems of North Carolina LLC

619 Distribution Drive
Morrisville, North Carolina, 27560, U.S.A.
has been assessed and found to be in compliance with the requirements of:

# OHSAS 18001:2007

The assessment covered the following scope:

**The recovery, recycling, re-deployment, and final disposition of electronic devices; marketing and sale of electronic devices by reuse and/or recycling.**

This certificate is valid from 18 February 2010 until 17 February 2013
Re certification audit due before 17 January 2013
Issue 1.

Signed for and on behalf of SGS US Testing Company Inc

Zachary C Pivarnik

Zachary C. Pivarnik
Accreditation Manager, North America
Accredited Office
201 Route 17 North, Rutherford, NJ 07070 United States of America
Certifying Office
6490 Vipond Drive, Mississauga, ON L5T 1W8 Canada
t 905-364-3757 t 1-800-636-0847 f 905-364-0345 www.sgs.com

SGS OHSAS 01 0303

# Orion Registrar, Inc., USA
# Certificate of Registration

*This is to certify the Management System of:*

## Metech Recycling, Inc.
## 6200 Engle Way
## Gilroy, California 95020
## USA

*Has been assessed by Orion Registrar and found to be in compliance with the following Standard:*

## The e-Stewards Standard for Responsible Recycling and Reuse of Electronic Equipment®

*The Management System is applicable to:*

**Metech Collects and Dismantles Electronic Devices and Equipment into Commodities (Shredded or Sorted Scrap Materials) and Sells these Commodities into Recycled Materials Markets.**

**This Scope is Applicable to All Sites**

*The Certification period is from March 3, 2011 to March 2, 2014.*
*This Certification is subject to the company maintaining its system to the e-Stewards standard for responsible recycling and reuse of electronic equipment®, and applicable exceptions, which will be monitored by Orion.*
*Client ID 01619-00001. Certificate ID A0002510-3.*
*EAC / NAICS / SIC Code: 24 / 56292 / 9511*
*For Additional Sites See Appendix*

ANAB ACCREDITED

e·Stewards certified

Mr. Paul M. Burck, President — 1/25/2012 Date

Orion Registrar Inc. ★ PO Box 745070 ★ Arvada, Colorado 80006-5070 ★ 303-456-6010 ★ FAX 303-456-6681

To authenticate this certificate please visit www.orion4value.com

# Orion Registrar, Inc., USA
# Certificate of Registration

*This is to certify the Management System of:*

## Metech Recycling, Inc.
### Appendix

**Metech Recycling, Inc.**
**500 West 53rd Place**
**Denver, CO 80216**
**USA**

**Metech Recycling, Inc.**
**150 Blackstone River Road**
**Worcester, MA 01607**
**USA**

**Metech Recycling, Inc.**
**2150 N. Highway 56**
**Creedmoor, NC 27522**
**USA**

**Metech Recycling, Inc.**
**2350 West Bridger Road**
**Salt Lake City, UT 84104**
**USA**

**Metech Recycling, Inc.**
**4330 South 102nd Street**
**Omaha, NE 68127**
**USA**

## The e-Stewards Standard for Responsible Recycling and Reuse of Electronic Equipment®

*The Certification period is from March 3, 2011 to March 2, 2014.*
*Client ID 01619-00001. Certificate ID A0002510-3.*
*EAC / NAICS / SIC Code: 24 / 56292 / 9511*

ANAB ACCREDITED

e·Stewards certified

Mr. Paul M. Burck, President — 1/25/2012 Date

Orion Registrar Inc. ★ PO Box 745070 ★ Arvada, Colorado 80006-5070 ★ 303-456-6010 ★ FAX 303-456-6681
To authenticate this certificate please visit www.orion4value.com

aqa INTERNATIONAL

ACCESSIBLE. UNDERSTANDABLE. REGISTRATION.

# *CERTIFICATE OF REGISTRATION*

*AQA International, LLC attests that*

## American Greenz
## 2910 Weck Drive
## Durham, North Carolina 27709

*with a scope of :*

The recycling of used and end-of-life electronic equipment

**The organization is found to be in conformance with all requirements of the Responsible Recycling© Standard.**

# Responsible Recycling© (R2):2008

*"The organization has been audited by a certification body that is in conformance with ISO/IEC 17021 requirements and applicable ANAB requirements."*

| | |
|---|---|
| Certificate No.: | US00014170 |
| Initial Registration: | 09/30/2012 |
| Registration Date: | 09/30/2012 |
| Expiration Date: | 09/29/2015 |
| Last Modified: | 09/30/2012 |

CEO, AQA INTERNATIONAL

**World Headquarters**
501 Commerce Drive, NE
Columbia, SC 29223 USA
www.aqainternational.com

ANAB ACCREDITED

**NORTH CAROLINA**

**WAKE COUNTY**

**SERVICES AGREEMENT**
**UNDER $50,000**

THIS AGREEMENT, is made and entered into this 1st day of July, 2012 by and between Wake County, North Carolina (the "County") party of the first part; and Creative Recycling Services, Inc. (the "Provider"), party of the second part;

W I T N E S S E T H:

For the purpose and subject to the terms and conditions hereinafter set forth, the County hereby contracts for the services of the Provider, and the Provider agrees to provide the services to the County in accordance with the terms of this Agreement.

I.SERVICES TO BE PROVIDED

The services to be performed by the Provider shall be as indicated in Attachment A.

Provider shall not sub-contract all or any part of the services provided for in this Agreement without written approval of the County.

II.TERM

The services of the Provider shall begin on July 1, 2012, and shall be provided until June 30, 2015. At the County's discretion and upon mutual consent of the Provider, this Agreement may be extended for two one year periods upon execution of a new contract.

III.PAYMENT

As full compensation for the rights to collect, transport, market and dispose of electronics and televisions collected at sites designated by Wake County, the Provider agrees to make monthly payments by the 10th day of the month for electronics and televisions collected the previous month. Payments to Wake County shall be made in accordance with the unit payment rates indicated in Attachment A.

With each monthly payment, the Provider shall provide information regarding the quantity of televisions and electronics collected during the preceding month from all sites designated by Wake County. The information shall be submitted by the 10th day of the month for the previous month in a format provided to the Provider by Wake County.

IV. RELATIONSHIP OF PARTIES

Provider is an independent contractor of the County. Provider represents that it has or will secure, at its own expense, all personnel required in performing the services under this Agreement. Such personnel shall not be employees of or have any contractual relationship with the County. All personnel engaged in work under this Agreement shall be fully qualified and shall be authorized or permitted under state and local law to perform such services. It is further agreed that the Provider will obey all State and Federal statutes, rules and regulations that are applicable to provisions of the services called herein. Neither Provider nor any employee of the Provider shall be deemed an officer, employee or agent of the County.

## V.CANCELLATION

This Agreement may be canceled by Provider upon thirty (30) days' written notice to the County, and the County may terminate this agreement upon thirty (30) days' written notice to Provider.

## VI.INSURANCE REQUIREMENTS

The Provider shall obtain, at his sole expense, all insurance required in the following paragraphs and shall not commence work until such insurance is in effect and certification thereof has been received by Wake County's Finance Office.

Professional Liability Insurance – applicable to all services provided under this Contract with limits of no less than $1,000,000 each occurrence and $2,000,000 aggregate.

Workers' Compensation Insurance - with limits for Coverage A Statutory-State of North Carolina and Coverage B Employers Liability $500,000 each accident, disease policy limit and disease Each Employee.

Commercial General Liability - Combined single limits of no less than $1,000,000 each occurrence and $2,000,000 aggregate. This insurance shall include Comprehensive Broad Form Coverage including contractual liability.

Commercial Automobile Liability - with limits of no less than $500,000 Combined Single Limit for bodily injury and property damage. Evidence of commercial automobile coverage is only necessary if vehicles are used in the provision of services under this Agreement and/or are brought on a Wake County site.

All insurance companies must be licensed or authorized in North Carolina and carry a rating of "A-VII" or better in the current A.M. Best Key Rating Guide; or have reasonable equivalent strength to the satisfaction of the County's Finance Office.

Insurance with limits no less than those specified above and proof of rating if requested shall be evidenced by a Certificate of Insurance issued by a duly authorized representative of the Issuer. In the case of self-insurance, a letter of explanation must be provided to and approved by Wake County Risk Management.

The Provider shall be responsible for providing immediate notice of cancellation or non-renewal received during the term of this Agreement to the Wake County Finance Office. Copies or originals of correspondence, certificates, endorsements or other items pertaining to insurance shall be sent to:

Wake County Finance Office
Room 900 - WCOB
P. O. Box 550
Raleigh, NC 27602

## VII.INDEMNIFICATION

Provider agrees to defend, indemnify, and hold harmless the County, for all loss, liability,

claims or expense (including reasonable attorney's fees) arising from bodily injury, including death or property damage, to any person or persons caused in whole or in part by the negligence or misconduct of the Provider, except to the extent same are caused by the negligence or willful misconduct of the County. It is the intent of this section to require Provider to indemnify Wake County to the extent permitted under North Carolina law.

VIII.NO WAIVER OF SOVEREIGN IMMUNITY

Wake County and the Provider agree that nothing in this Agreement shall be construed to mandate purchase of insurance by Wake County pursuant to N.C.G.S. 153A-435; or to be inconsistent with Wake County's "Resolution Regarding Limited Waiver of Sovereign Immunity" enacted October 6, 2003; or to in any other way waive Wake County's defense of sovereign or government immunity from any cause of action alleged or brought against Wake County for any reason if otherwise available as a matter of law.

IX.NON-ASSIGNMENT

Provider shall not assign all or any portion of this Agreement, including rights to payments, to any other party without the prior written consent of the County.

X.ENTIRE AGREEMENT

The parties have read this Agreement and agree to be bound by all of its terms, and further agree that it constitutes the complete and exclusive statement of the Agreement between the parties unless and until modified in writing and signed by the parties. Modifications may be evidenced by telefacsimile signatures.

XI.NON-APPROPRIATION

Provider recognizes that Wake County is a governmental entity, and the contract validity is based upon the availability of public funding under the authority of its statutory mandate.

In the event that public funds are not available and not appropriated to purchase the services specified in this Agreement, then this Agreement shall automatically expire without penalty to Wake County and without the thirty (30) day notice requirement set forth in Section VI.

In the event of a legal change in Wake County's statutory authority, mandate, and mandated functions which adversely affects Wake County's authority to continue its obligations under this Agreement, then this Agreement shall automatically expire without penalty to Wake County and without the thirty (30) day notice requirement set forth in Section VI.

XII.GOVERNING LAW

Both parties agree that this Agreement shall be governed by the laws of the State of North Carolina.

**WAKE COUNTY, NORTH CAROLINA**

By: _____
Wake County Department Head

Date: _____

**PROVIDER**

By: _____

Date: 6-20-12

8108 Krauss Blvd.
Suite 110
Tampa FL 33619
(Mailing Address)

This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

_____
FINANCE DIRECTOR

The person responsible for monitoring the contract performance requirements is

Lowell Shaw

_____ Department Head Initials

## ATTACHMENT A

### SCOPE OF SERVICES

Provider shall:

1. Provide trailers, pallets, gaylords, shrink wrap and hauling at no charge for up to (4) locations (current locations in Apex and North Raleigh).
2. Provide staff training to Wake County on material separation, preparation, and loading as needed at no charge.
3. Provide four (4) one-day collection events, including transportation, supplies and staff (up to four (4) employees) at no charge.
4. Provider shall sort, inventory, and properly recycle all electronics received in adherence with all local, state and federal regulations including Senate Bill 887.
5. Provider shall provide a report indicating the count and weight as well as a certificate of recycling for all materials received.
6. Provider shall furnish a certificate of media sanitation for any media containing devices.
7. Provider shall submit inventories, certificates, and checks to Wake County by the tenth ($10^{th}$) business day of the month following the service month.

Electronics are to be collected at the following locations:

North Wake Multi-Material Recycling Facility

9029 Deponie Drive, Raleigh, NC 27614

South Wake Multi-Material Recycling Facility

6130 Old Smithfield Road, Apex, NC 27502

Wake County reserves the right to add up to two additional collection locations. Wake County also reserves the right to add, delete or change materials collected and will negotiate with the vendor on revenue rates for service.

### RATES

| Description | Revenue Rate Per Pound |
|---|---|
| Desktop Computers | $0.07 |
| Laptop Computers | $0.07 |
| Televisions – Flat Screen | $0.07 |
| Computer Monitors – Flat Screen | $0.07 |

| | |
|---|---|
| Televisions – CRT's | $0.00 |
| Computer Monitors – CRT's | $0.00 |
| CD's, DVD's VHS Tapes | $0.00 |
| Cell Phones | $0.07 |
| Rechargeable Batteries (Prepped Per DOT Transport Requirements) | $0.07 |
| Miscellaneous Electronics | $0.07 |
| Circuit Boards | $0.07 |
| Miscellaneous Wire | $0.07 |

| Description | Cost Rate Per Pound |
|---|---|
| Alkaline Batteries | $0.55 |

*This page intentionally left blank to facilitate double-sided printing*

Printed on 100% Post-Consumer Recycled Paper