



# **FORSYTH COUNTY**

**AND THE MUNICIPALITIES OF BETHANIA,  
CLEMMONS, KERNERSVILLE, LEWISVILLE, RURAL  
HALL, TOBACCOVILLE, WALKERTOWN AND  
WINSTON-SALEM**

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## **10 YEAR SOLID WASTE MANAGEMENT PLAN**

**For the Planning Period of  
July 1, 2009 - June 30, 2019**

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**Prepared by the  
Winston-Salem/Forsyth County Utility Commission**



## **Statement of Conformance**

**This 10 Year Solid Waste Management Plan has been prepared and compiled in conformance with NC General Statute 130A-309.09A(b) and the Division of Waste Management's Ten Year Solid Waste Management Plan Guide dated 01/2009. It meets statutory requirements in its completeness and function as a local solid waste management planning tool. Every attempt has been made to incorporate the information and detail requested by the Division of Waste Management. There may be rare instances where the information is found in places other than where requested or omitted due to the inability of staff to gather it.**

## **Acknowledgements**

**Although this Solid Waste Management Plan bears the name of the Winston-Salem/Forsyth County Utility Commission, it is a result of the cooperation and collaboration between many political bodies, town administrators and government employees. Each town, village or city provided invaluable help in compiling and insuring the accuracy of the information contained herein. The Commission would like to thank:**

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## EXECUTIVE SUMMARY

This Update of the Forsyth County 10 Year Solid Waste Management Plan is for the planning period beginning July 1, 2009 and ending June 30, 2019. Forsyth County and all of its incorporated municipalities participated in the preparation of this Plan. A map showing the planning area is contained in Appendix C-1. The Winston-Salem/Forsyth County Utility Commission, also known as the City/County Utility Commission (CCUC), was the lead agency in preparing the Plan and conducting the public meeting at which public input was received. The most recent and complete solid waste management data available at the time of writing this Plan is from FY 2007-08 and is used throughout. When making comparisons with previous years, data from FY 2004-05 is used, which was the most recent and complete data available at the time the previous Plan was written.

Forsyth County generated<sup>1</sup> approximately 574,408 tons of solid waste in FY 2007-08. (See Table ES-1.) Of the total amount generated, 508,147 tons, or 88.5% were disposed. Municipal Solid Waste (MSW) made up the largest category of disposed waste at 422,214 tons followed by C & D waste at 85,933 tons. MSW made up 83.1% of waste that was disposed and 73.5% of all waste generated. C & D waste was 16.9% of the disposed category and 15.0% of all waste generated. Recycled/recovered and composted materials accounted for 66,261 tons, or 11.5%, of the total amount of waste generated. Composting accounted for 43,702 tons or 66% of all recovery while recycling programs accounted 21,738 tons or 32.8%. Small amounts of C & D waste and Household Hazardous Waste (HHW) were recovered, combined representing approximately 0.14% of total generation.

**Forsyth County Solid Waste Managed in FY 2007-08**

Management Practice	Tons	% Total	% Category
MSW Disposed	422,214	73.5%	83.1%
C & D Disposed	85,933	15.0%	16.9%
<b>Total Disposed</b>	<b>508,147</b>	<b>88.5%</b>	<b>100.0%</b>
Recycled/Recovered	21,738	3.8%	32.8%
C & D Recovered	603	0.1%	0.9%
Composted	43,702	7.6%	66.0%
Other (HHW)	218	<0.1%	0.3%
<b>Total Recycled/Recovered</b>	<b>66,261</b>	<b>11.5%</b>	<b>100.0%</b>
<b>Total Reported</b>	<b>574,408</b>	<b>100.0%</b>	

**Table ES-1**

When compared to data from the previous Solid Waste Plan (FY 2004-05), the total amount of waste generated in Forsyth County fell by 10,668 tons or 1.8% in FY 2007-08. (See Table ES-2.) Total solid waste disposed from Forsyth County in FY 2007-08 declined by 11,050 tons, or 2.1%. MSW disposal increased by 3.5%, C & D waste disposal decreased by 33%, and tire disposal by 5.8%. Recycling and recovery grew at 0.6% over the same period. The declines in

<sup>1</sup> Includes amounts reported on the FY 2007-08 Forsyth County Waste Disposal Report and other amounts from CCUC internal reports.

waste disposed and the small increases in other categories reflect the poor conditions of the economy. The CCUC has not experienced this kind of dramatic decrease in C & D disposal since record keeping began.

**Comparison of Forsyth County Solid Waste Managed  
FY 2004-05 vs. 2007-08**

Management Practice	FY 2004-05 Tons	FY 2007-08 Tons	Change	% Change
MSW Disposed	389,896	421,187	13,485	3.5%
C & D Disposed	128,211	85,933	-42,278	-33.0%
Tires Disposed	1,090	1,027	-63	-5.8%
<b>Total Disposed</b>	<b>519,197</b>	<b>508,147</b>	<b>-11,050</b>	<b>-2.1%</b>
Recycled/Recovered	23,380	21,738	-1,680	-7.2%
C & D Recovered	2,436	603	-1,833	-75.2%
Composted	39,818	43,702	3,884	9.8%
Other (HHW)	207	218	11	5.3%
<b>Total Recovered/Recycled</b>	<b>65,841</b>	<b>66,261</b>	<b>382</b>	<b>0.6%</b>
<b>Total Generated</b>	<b>585,038</b>	<b>574,370</b>	<b>-10,668</b>	<b>-1.8%</b>

**Table ES-2**

Estimated population<sup>2</sup> for Forsyth County was 338,679 in FY 2007-08, compared to 320,764 in FY 2004-05, an increase of 5.6% or 1.9% annually. Per capita waste disposal for FY 2007-08 was 1.5 tons, an increase of 11.9%, from the 1989 baseline year rate of 1.34 tons.

The disposal rate for Forsyth County decreased from 1.62 tons per capita in FY 2004-05 to 1.50 tons per capita in 2007-08. This decrease of 7.4% in the waste disposal rate moves Forsyth County in a positive direction toward achieving its waste reduction goal of 1.42 tons per capita by FY 2012-13 which was established in the 2006 Plan Update. In that Update, Forsyth County adopted the following waste reduction goals.

- *By FY 2012-13, achieve a disposal rate of 1.42 tons per capita, which is 6% above the 1988-89 baseline year rate.*
- *By FY 2015-16, achieve a disposal rate of 1.40 tons per capita, which is 4.5% above the 1988-89 baseline year rate.*

Many of the same conditions affecting waste disposal that existed three (3) years ago continue today. Specifically, a large percentage of waste is being transferred out of Forsyth County for disposal by private waste management companies thereby reducing revenues at publicly operated facilities and threatening the funding source for waste reduction programs. This practice also preempts the potential to recycle some of the waste through public programs within the County. Historically, tip fee revenues from CCUC operated disposal facilities have been used to fund waste reduction and recycling programs in Winston-Salem and Forsyth County. Over the last 3 years, the amount of waste transferred out of the county has risen by 36%.

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<sup>2</sup> NC Demographics website, estimated population as of July 1, 2007.

During the same time period, CCUC operated waste disposal facilities have seen their share of disposal drop by more than 8%. If large percentages of Forsyth County waste continue to be managed by organizations that are not required to develop or attempt to achieve waste reduction goals nor abide by other elements of the host county's Solid Waste Management Plan, these goals will be difficult, if not impossible, to achieve. Although NCGS 130A-309.09D(a) gives local governments the authority to implement solid waste regulatory controls such as mandatory recycling or local disposal bans, the lack of such controls in the planning area will continue to frustrate efforts to achieve the stated waste reduction goals.

Table ES-3 below shows historical per capita disposal rates and percentage changes in the per capita disposal rate from the baseline year of 1988-89 for the fiscal years 1996-97 through 2007-08. Since recycling and recovery programs have either grown or remained essentially the same over this time period, this table suggests that higher generation rates are the most influential factor in determining disposal rates.

Forsyth County has adopted the following waste reduction goals for the planning period July 1, 2009 – June 30, 2019, which take into consideration the continuation of factors affecting the County's ability to control its waste stream and fund diversion programs.

- ***By FY June 30, 2019, achieve a disposal rate of 1.27 tons per capita, which is 5.0% below the 1988-89 baseline year rate of 1.34 tons per capita.***

As stated in the 2006 Update to the Plan, these goals may be attained if a construction and demolition waste recycling facility is constructed to complement the CCUC's existing C & D waste management program at Old Salisbury Rd. Landfill. Unfortunately, with the dramatic economic downturn that is being experienced, the likelihood of such a facility being built in the near future is low unless outside funds become available. If such a facility were permitted and built, it is estimated that by FY 2012-13, approximately 35% of the C & D waste stream managed by the CCUC could be recycled. However, decreased housing starts and fewer demolition projects have resulted in significantly decreased volumes of C & D waste being received at OSR C & D Landfill and could have a negative impact on recycling volumes.

**Forsyth County Actual Disposal per Capita by Year**

Fiscal Year	Tons/Capita Disposed	Percent Change <sup>3</sup>
1988-89 (Baseline Year)	1.34	
...		
1996-97	1.49	+ 11.2%
1997-98	1.49	+ 11.2%
1998-99	1.49	+ 11.2%
1999-00	1.40	+ 4.5%
2000-01	1.52	+ 13.4%
2001-02	1.44	+ 7.5%
2002-03	1.59	+ 18.7%
2003-04	1.73	+ 29.1%
2004-05	1.62	+ 21.0%
2005-06	1.67	+24.6%
2006-07	1.68	+25.4%
2007-08	1.50	+11.9%

**Table ES-3**

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<sup>3</sup> Measured from baseline year.

# Section 1

## THE PLANNING PROCESS

### 1.1 Background

The City/County Utility Commission (CCUC) is a joint agency of the City of Winston-Salem and Forsyth County. Its members are appointed by members of the Winston-Salem City Council and the Forsyth County Board of Commissioners. Created in 1976 to govern and set policy for water and wastewater services for the City of Winston-Salem and Forsyth County, in 1989 it was given responsibilities over solid waste disposal services. CCUC staff provides solid waste services, both directly and indirectly through contractors, to the City of Winston-Salem, other municipalities, Forsyth County and the region. Staff in the Solid Waste Section of the Utilities Division prepared this Solid Waste Management Plan.<sup>4</sup> The following local governments participated in the development of this Plan:

- Bethania
- Clemmons
- Kernersville
- Lewisville
- Rural Hall
- Tobaccoville
- Walkertown
- Winston-Salem
- Forsyth County

Each local government listed is responsible for managing waste within its respective jurisdiction and has cooperated in the preparation of this 10 Year Solid Waste Management Plan. The original Plan, developed in 1997 in accordance with N.C. General Statute 130A-309.09A(b), was revised in 2000, 2003 and 2006. This is the fourth *update* to the Plan and covers the planning period from July 1, 2009 – June 30, 2019. In addition to the participants, the following organizations were consulted in developing this Plan:

- NC Division of Waste Management
- NC Division of Pollution Prevention and Environmental Assistance
- Keep Winston-Salem Beautiful
- Private MSW hauling companies and disposal facilities

Public comment was also solicited, accepted and considered in developing the Plan. The CCUC held a public meeting during its regularly scheduled meeting on May 11 to accept public comment on the Plan. The meeting was advertised in the Winston-Salem Journal, through the City of Winston-Salem's internet site and on cable television Channel TV 13. (See Appendix A for the Public Meeting Notice.) Comments were received during the meeting and accepted by CCUC staff in writing following the meeting. Prior to this meeting, draft copies of the Plan were placed for public review and comment in the CCUC Administrative Office, the Forsyth County

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<sup>4</sup> CCUC staff is employed of the City of Winston-Salem Utilities Division. References to CCUC staff and Solid Waste staff are synonymous and the terms are used interchangeably throughout this document.

Main Library, and all offices of the eight municipalities. Revisions to the Plan were made based on the appropriateness and accuracy of the information received during the public meeting and during the public comment period. There were no public comments received on the Plan. The revised final Plan was submitted for approval and adoption by the elected bodies of the seven smaller incorporated municipalities and by the Winston-Salem/Forsyth County Utility Commission, acting on behalf of the City of Winston-Salem and Forsyth County (based on their joint agreement). See Appendix B for copies of the Resolutions adopting the Plan.

## **1.2 Objectives**

The purpose of this planning document is to guide the Plan participants in meeting the following solid waste management objectives:

- To provide for the long-term management of the County's solid waste in a cost-efficient manner, meeting all applicable regulations
- To protect the public health and the environment
- To provide waste collection services where practical
- To provide education and support for waste reduction activities, including composting and recycling
- To set local solid waste reduction goals

## **1.3 Vision**

The long-term vision for the area's solid waste management programs is to be comprehensive in nature, environmentally sound, efficient and effective.

The publicly operated collection programs will provide the best service possible within the financial constraints of publicly funded budgets. Publicly operated disposal facilities will utilize the best technology possible to protect the environment and maximize the life of any capital investments while providing for disposal services to meet the needs of the service area. Governments that contract for collection and disposal services will strive to insure that those services are provided in a manner consistent with their public counterparts.

Reduction and recycling efforts will be utilized in order to increase the long-term disposal capacity for the area. These efforts will attempt to address the large, non-residential portion of the waste stream through education and support to area businesses.

These goals will be pursued in a professional and financially responsible manner to ensure that they are met using a well-planned and organized approach while maintaining competitive prices for the services provided.

## Section 2

# PLANNING AREA AND SOLID WASTE MANAGEMENT

### 2.1 Geographic, Economic and Demographic Profile

The planning area covers all of Forsyth County, which includes the unincorporated areas, as well as the municipalities of Bethania, Clemmons, Kernersville, Lewisville, Rural Hall, Tobaccoville, Walkertown and Winston-Salem. Appendix C-1 contains a map showing the planning area, the geographic distribution of the municipalities within the county and the major solid waste disposal facilities in the county. The distribution of the population, households and employers within the County plays an important role in determining where most of the solid waste is generated as well as how services can be efficiently provided.

Forsyth County is located in north-central North Carolina and covers 412.7 square miles of land area. Municipalities occupy 195.5 square miles or 47.37% of the total county area. The remaining area is unincorporated.<sup>5</sup>

Average employment in Forsyth County in 2007 was 176,141. Based on average employment, the three largest employment sectors are health care and social assistance (18%), manufacturing (13.4%) and retail trade (11.8%).<sup>6</sup> Table 2-1 shows the five (5) largest employers in the planning area. Taxable sales in the county in 2007-08 were \$4,232,998,891. The four largest population centers, Winston-Salem, Kernersville, Clemmons and Lewisville had combined taxable sales of \$3,789,027,835 or approximately 90% of the county total.<sup>7</sup>

**Largest Employers in Forsyth County in 2007<sup>8</sup>**

Business Name	Type	# Employees
Wake Forest Baptist Medical Center	Health Care/Education	11,539
Novant Health	Health Care	8,602
Winston-Salem/Forsyth County Schools	Education	6,692
Hanesbrands	Marketing and Sales	5,200
Reynolds American	Tobacco Products	4,100

**Table 2-1**

Forsyth County's total estimated population on July 1, 2007 was 338,679.<sup>9</sup> Between 1990 and 2007, the County grew at an annual rate of 1.5%. The U. S. 2000 Census shows that there were 133,093 housing units in Forsyth County with 123,851 of them being occupied.<sup>10</sup> Winston-Salem, the planning areas largest municipality, contains 82,593 housing units. Table 2-2 shows population estimates for each Forsyth County jurisdiction. On September 30, 2006, Winston-

5 Winston-Salem/Forsyth County Planning Department, internal email correspondence, March 2009.

6 NC Department of Commerce, EDIS query, Forsyth County, March 2009.

7 NC Sales and Use Tax Statistics Year 2007-08, NC Department of Revenue, September 2008.

8 NC Department of Commerce, EDIS query, Forsyth County, March 2009.

9 NC Demographics Website, County Population Estimates, July 2007.

10 US Census Bureau Website, Census 2000, Demographic Profile for Forsyth County, NC.

Salem annexed approximately 30 square miles of land area from unincorporated Forsyth County adding approximately 17,000 people to the City’s population.<sup>11</sup> This accounts for the large decrease in the population in unincorporated Forsyth County and the large increase in population in Winston-Salem since the last Plan was published.

**Estimated Forsyth County Populations by Jurisdiction, July 2007**

Jurisdiction	Population <sup>12</sup>
Winston-Salem	224,889
Unincorporated Area	49,306
Kernersville	21,961
Clemmons	17,902
Lewisville	13,378
Walkertown	4,793
Rural Hall	2,660
Tobaccoville	2,637
Bethania	382
Forsyth County Total	338,679

**Table 2-2**

## 2.2 County Waste Management Profile

On the following page, Table 2-3 shows the total amount of solid waste generated<sup>13</sup> (reported) in Forsyth County that was disposed, recycled, composted/mulched, or otherwise managed. In FY 2007-08, approximately 574,408 tons of solid waste were generated in Forsyth County. This is equivalent to 1.70 tons per capita per year, based upon the July 1, 2007, population estimate for Forsyth County. Nearly 89% of waste generated was disposed. Of the 508,147 tons that were disposed, 422,214 tons, or 73.5%, were MSW. C & D was the second largest category of waste disposed at 85,933 tons, or 15% of the total. Recycling, recovery and composting account for the difference in the amount of waste generated and disposed. In FY 2007-08, there were 66,221 tons, or 11.5% of the total generated, managed through recovery programs. A total of 21,738 tons were recycled or recovered through various government-sponsored programs. Curbside and drop-site recycling programs managed a total of 15,424 tons. The remainder was recovered white goods, tires, pallets and other wood waste and e-waste. WCA of High Point, a C & D waste recycling facility, recovered a total of 603 tons of C & D waste from Forsyth County in FY 2007-08. Compost programs accounted for the largest stream of recovered materials. Approximately 43,702 tons of yard waste were managed through four separate government programs in the county. Lastly, 218 tons of HHW were collected at The Enviro-Station, the county’s HHW collection and processing center.

11 Winston-Salem/Forsyth County Planning Department, interdepartmental email correspondence, March, 2009.

12 North Carolina State Demographics, Official 2007 Municipal Population Estimates.

13 The word *generated* is used interchangeably with *reported* and means all waste that has been reported through the NC DENR permitted facility annual reporting system.

**Solid Waste Management in Forsyth County, FY 2007-08<sup>14</sup>**

<b>Facility/Program</b>	<b>Tons</b>	<b>% of Category</b>	<b>% of Total</b>	<b>Tons Per Cap</b>
<b>MSW Disposed</b>				
Hanes Mill Rd. Landfill	239,573	56.7%	41.71%	<b>0.71</b>
Uwharrie Env. Regional Landfill	104,138	24.7%	18.13%	
BFI-Charlotte Motor Speedway Landfill	59,780	14.2%	10.41%	
Palmetto Landfill, SC	50	0.0%	0.01%	
Foothills Env. Landfill	17,806	4.2%	3.10%	
High Point Landfill	-	0.0%	0.00%	
Rowan County Landfill	-	0.0%	0.00%	
U. S. Tire Monofill	867	0.2%	0.15%	
<b>Total MSW Disposed</b>	<b>422,214</b>	<b>100.0%</b>	<b>73.50%</b>	<b>1.25</b>
<b>C &amp; D Disposed</b>				
Old Salisbury Rd. C & D Landfill	84,880	98.8%	14.78%	<b>0.25</b>
Coble's C & D Landfill	27	0.0%	0.00%	
WCA of High Point C & D Landfill	1,026	1.2%	0.18%	
Rowan County C & D Unit	-	0.0%	0.00%	
<b>Total C &amp; D Disposed</b>	<b>85,933</b>	<b>100.0%</b>	<b>14.96%</b>	
<b>Total Disposed</b>	<b>508,147</b>	<b>100.0%</b>	<b>88.46%</b>	<b>1.50</b>
<b>Recycled/Recovered</b>				
Curbside/Drop Site Programs	15,424	71.0%	2.69%	<b>0.06</b>
White Goods	867	4.0%	0.15%	
Tires	4,912	22.6%	0.86%	
Pallets/Other Wood	511	2.4%	0.09%	
E-waste	24	0.1%	0.00%	
<b>Total Recycled/Recovered</b>	<b>21,738</b>	<b>100.0%</b>	<b>3.78%</b>	
<b>C &amp; D Recoverd</b>				
PCM	-	0.0%	0.00%	<b>0.00</b>
WCA of HP	603	100.0%	0.10%	
<b>Total C &amp; D Recovered</b>	<b>603</b>	<b>100.0%</b>	<b>0.10%</b>	
<b>Composted</b>	<b>43,702</b>	<b>100.0%</b>	<b>7.61%</b>	<b>0.13</b>
<b>Other (HHW)</b>	<b>218</b>	<b>100.0%</b>	<b>0.04%</b>	<b>&lt;0.01</b>
<b>Total Recovered/Recycled</b>	<b>66,261</b>	<b>100.0%</b>	<b>11.54%</b>	<b>0.20</b>
<b>Total Reported</b>	<b>574,408</b>	<b>100.0%</b>	<b>100.00%</b>	<b>1.70</b>
<b>Population</b>	<b>338,679</b>			

**Table 2-3**

14 NC DENR Solid Waste Annual Facility Reports, FY 2007-08 for all named, permitted facilities. Data from programs was obtained from internal CCUC reports.

## 2.3 Municipal Waste Management Profile

Every local government in Forsyth County is either directly or indirectly through contractual arrangements with private waste haulers, responsible for the collection, transportation and disposal of *residential* solid waste. Table 2-4 shows the amounts of residential waste directly or contractually managed by local governments in FY 2007-08. Nearly all of this waste is from residential sources and collected on residential routes. Both the City of Winston-Salem and the Town of Kernersville do provide some commercial waste collection services within their respective jurisdictions using front loader vehicles, which is excluded from this discussion.

### Residential Solid Waste Managed by Forsyth County Municipalities, FY 2007-08<sup>15</sup>

Municipality	Managed	Disposed		Recycled		Composted		Diverted	
	Tons	Tons	%	Tons	%	Tons	%	Tons	%
<b>Bethania</b>	198	156	78.8%	42	21.2%	0	0.0%	42	21.2%
<b>Clemmons</b>	11,477	6,601	57.5%	1,135	9.9%	3,741	32.6%	4,876	42.5%
<b>Lewisville</b>	4,386	3,656	83.4%	730	16.6%	0	0.0%	730	16.6%
<b>Kernersville</b>	8,623	5,491	63.7%	1,181	13.7%	1,951	22.6%	3,132	36.3%
<b>Rural Hall</b>	1,084	930	85.8%	79	7.3%	75	6.9%	154	14.2%
<b>Tobaccoville</b>	1,005	890	88.6%	115	11.4%	0	0.0%	115	11.4%
<b>Walkertown</b>	1,688	1,569	93.0%	119	7.0%	0	0.0%	119	7.0%
<b>Winston-Salem</b>	92,808	50,298	54.2%	10,818	11.7%	31,692	34.1%	42,510	45.8%
<b>Totals</b>	121,269	69,591	57.4%	14,219	11.7%	37,459	30.9%	51,678	42.6%

Table 2-4

Municipalities in Forsyth County managed 121,269 tons of residential solid waste in FY 2007-08. Nearly 70,000 tons, or 57.4%, were disposed in landfills. Almost 52,000 tons, or 42.6%, were diverted through recycling and composting programs.

It is commonly estimated that 67% of all waste in large industrial centers like Forsyth County originates in the commercial, industrial and institutional (CII) sector of the economy. Applying this percentage to the total tons generated in Forsyth County (from Table 2-3) yields an estimated CII waste stream of 382,940 tons in FY 2007-08. However, subtracting the residential tons managed from Table 2-4 above from the total amount of waste reported in Table 2-3 yields a much different estimate for waste from the CII sector. [574,408 tons – 121,269 tons = **453,139 tons**] The difference of 70,199 tons is substantial especially considering that some of the waste included in Table 2-4 above is from small businesses in the CII sector, collected and reported by the City of Winston-Salem and the Town of Kernersville. This approach suggests that more than 78% of waste generated is from CII sources in Forsyth County.

<sup>15</sup> Residential waste only; some small business waste may be included. Solid Waste Management Annual Reports for FY 2007-08, for all named municipalities and CCUC internal reports for Winston-Salem.

Municipalities in Forsyth County are doing a very good job of diverting residential waste from disposal and reducing their respective disposal rates per capita. Table 2-5 below shows the per capita disposal rate for each municipality in the planning area. As indicated, some municipalities do better than others in waste diversion but most importantly, all of these disposal rates are well below the target goals set by the state or for the planning area as a whole. The huge difference between the 0.34 tons per capita disposal rate for all municipalities and the 1.50 tons per capita for Forsyth County suggests that a much greater emphasis needs to be placed on CII sector recycling and diversion programs in order to make progress in attaining our goals.

**Residential Waste Disposal Rates  
For Municipalities in Forsyth County FY 2007-08<sup>16</sup>**

<b>Municipality</b>	<b>Tons Disposed</b>	<b>Estimated Population</b>	<b>Disposed Per Capita</b>
<b>Bethania</b>	156	382	0.41
<b>Clemmons</b>	6,601	17,902	0.37
<b>Lewisville</b>	3,656	13,378	0.27
<b>Kernersville</b>	5,491	21,961	0.25
<b>Rural Hall</b>	930	2,660	0.35
<b>Tobaccoville</b>	890	2,637	0.34
<b>Walkertown</b>	1,569	4,793	0.33
<b>Winston-Salem</b>	50,298	224,889	0.22
<b>Totals</b>	97,983	288,696	0.34

**Table 2-5**

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<sup>16</sup> Residential waste only; some small business waste may be included. Tonnages from Annual Solid Waste Management Reports, FY 2007-08, for all named municipalities and from CCUC internal reports for Winston-Salem.

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## **Section 3**

# **WASTE STREAM EVALUATION**

### **3.1 Waste Stream Characterization Study**

In February 2007, the CCUC contracted with R. W. Beck to conduct a waste characterization study at the Hanes Mill Road Municipal Solid Waste Landfill and Old Salisbury Road Construction & Demolition Waste Landfill. A previous waste characterization study, performed in 1999 by CalRecovery, was outdated and not reflective of the most recent programmatic and policy changes affecting solid waste in the planning area. The goal of the new study was to identify major waste types from residential and commercial sources and to determine the quantity and composition of the wastes from each source. C & D waste at Old Salisbury Road Landfill was evaluated separately. Data from this study is presented in Appendix D.

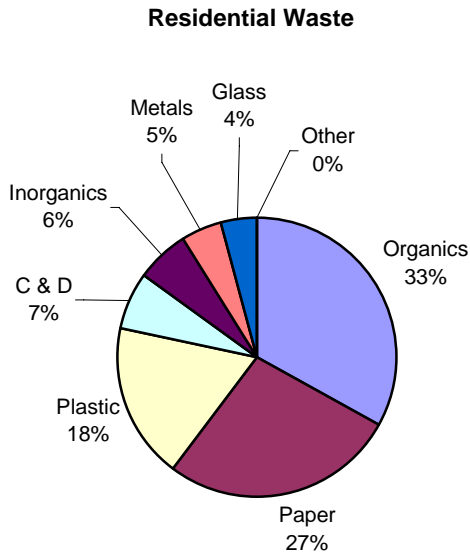
Since a significant portion of Forsyth County's waste was collected at the source by private haulers and delivered to private landfills for disposal during the time this study was conducted, the characterization of those waste streams was unable to be determined. The more specialized nature of the collection services provided by the private haulers suggests that those waste streams are more commercial/industrial in nature, so no extrapolation based on the characterization study conducted at Hanes Mill Road Landfill was performed. Therefore, the data presented in Appendix D is exclusive of any waste taken to privately operated landfills.

Organics (33%) make up the largest category of the residential waste stream at Hanes Mill Road Landfill. Paper (27.1%) followed by plastic (18%), together with organics, represents more than 78% of the total amount of waste received at Hanes Mill Road Landfill. Food waste (17.4%), other paper (9.6%) and film plastic (9.2%) are the largest subcategories of waste received. Refer to Figure 3-1.

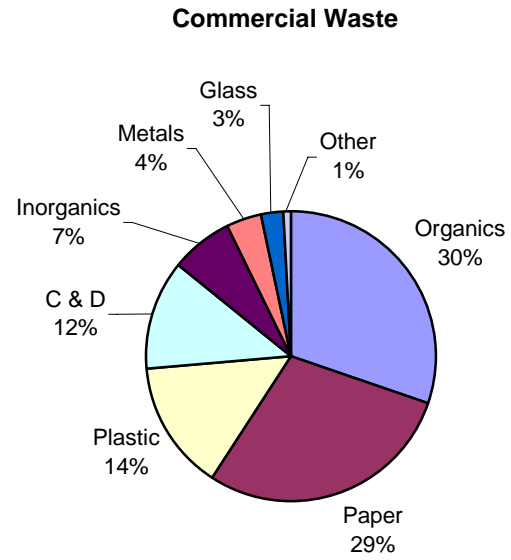
Likewise, in the commercial waste stream at Hanes Mill Road Landfill, organics (30.4%), paper (28.9%) and plastic (14.4%) are the three largest categories of waste received, making up nearly 74% of the total. Food waste and film plastic make up 12.5% and 6.3% of their respective categories. However, cardboard, as opposed to other paper in the residential waste stream, is a larger component of the commercial waste stream. Refer to Figure 3-2.

Non-treated wood (19.7%), asphalt shingles (10.9%) and non-reinforced concrete (10.4%) make up the three largest categories of waste received at Old Salisbury Road C & D Landfill. Together these three categories make up 41% of the total C & D waste stream. All three of these wastes have strong recycling markets making them good candidates for removal in a C & D waste recycling program. Cardboard (8.5%) also makes up a significant portion of the C & D waste stream and is another material with a strong market. Refer to Figure 3-3.

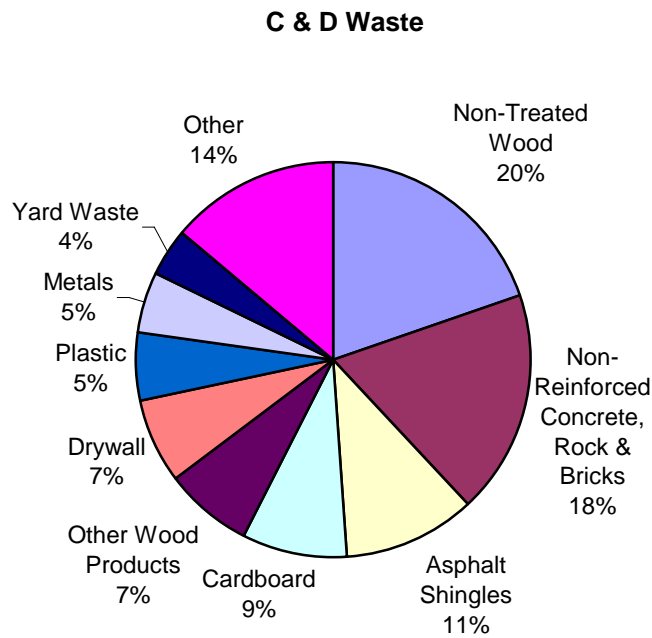
## Waste Stream Characterization Study Summary



**Figure 3-1**



**Figure 3-2**



**Figure 3-3**

## Section 4

# WASTE REDUCTION GOALS AND PLAN

### 4.1 Background

The Solid Waste Management Act of 1989, as amended by HB 1109 in 1991, and embodied in NCGS 130A Part 2A, established the following waste reduction goals for the State of North Carolina:

- Twenty-five percent (25%) reduction by June 30, 1993
- Forty percent (40%) reduction by June 30, 2001

These are State goals that are meant to be achieved collectively by all local governments in North Carolina through the efforts of their waste reduction programs. The *reduction* referred to in the statute applies to waste disposed, incinerated, converted to tire-derived fuel or converted to refuse derived fuel. Subsequent legislation and amendments have created several key statutes affecting the attainment and reporting of these goals. Among them are:

**NCGS § 130A-309.04(c)** It is the goal of this State to reduce the municipal solid waste stream, primarily through source reduction, reuse, recycling, and composting, by forty percent (40%) on a per capita basis by 30 June 2001.

**NCGS § 130A-309.09A(b)** Each unit of local government, either individually or in cooperation with other units of local government, shall develop a 10-year comprehensive solid waste management plan. Units of local government shall make a good-faith effort to achieve the State's forty percent (40%) municipal solid waste reduction goal and to comply with the State's comprehensive solid waste management plan. Each unit of local government shall develop its solid waste management plan with public participation, including, at a minimum, one advertised public meeting. The Department shall assist units of local government in the preparation of the plan required by this subsection if the unit of local government requests assistance. Each plan shall be updated at least every three years. In order to assure compliance with this subsection, each unit of local government shall provide the Department with a copy of its current plan upon request by the Department. Each plan shall:

- (2) Include a goal for the reduction of municipal solid waste on a per capita basis by 30 June 2001 and a goal for the further reduction of municipal solid waste by 30 June 2006. The solid waste reduction goals shall be determined by the unit or units of local government that prepare the plan, and shall be determined so as to assist the State, to the maximum extent practical, to achieve the State's forty percent (40%) municipal solid waste reduction goal as set out in G.S. 130A-309.04(c).

North Carolina has not achieved any of the waste reduction goals contained in these statutes. Although the waste reduction goals are statewide in scope, local governments are required to establish their own goals that will assist the State in attaining the statewide goal and to report those goals and progress toward meeting them in a 10 Year Solid Waste Management Plan to be

updated every three (3) years. The last statutorily required date for setting a goal was June 30, 2006. Local governments are to establish and measure the progress in attaining their goals against the baseline year of FY 1991-92, or an alternate year if approved by the State.

Many factors have an effect on waste generation and disposal. Local and State authorities recognize that circumstances arise over the course of time affecting the per-capita waste generation and disposal rate that may bear little relationship to the extent to which businesses, institutions and residents make progress in implementing waste reduction programs. Increased waste generation due to hurricanes and other natural phenomena, growth in construction starts, establishment of new manufacturing facilities, and an overall increase in the health of the economy are just a few such examples. As a case in point, in the current economic downturn, one of the most noticeable effects in the waste management industry is the significant decrease in C & D waste disposal. CCUC waste disposal facilities have seen waste declines never before experienced since record keeping began. On the other hand, competition from private waste companies forces the CCUC to keep disposal fees at its facilities low thus encouraging disposal. Disposal fees at all of its facilities are below the State average cost of disposal of \$37.28.<sup>17</sup> The low cost of disposal, relative to the cost of other forms of waste management, also encourages disposal.

In addition to the tangible factors that influence the flow and disposal of waste, it has become increasingly difficult to determine the actual amount of waste disposed by the county because of the complexity and shortcomings of the reporting system. With more waste being reported as transferred out of the county and disposed in the county's name, it has become more important to be able to track the waste accurately that originated within the county. In past years, when most county waste was disposed in the county, CCUC staff relied solely on the Forsyth County Waste Disposal Report prepared by the Division of Waste Management for this data. In recent years, however, CCUC staff has found it necessary to obtain Annual Facility Reports from all facilities that accepted Forsyth County waste in order to calculate the amount of waste disposed. Even so, because private facility owners will not give local governments access to their records showing where the waste originated, it is impossible to know with any certainty that the waste actually originated within its jurisdiction. The lack of transparency in reporting by the private sector frustrates local government attempts to confirm the origin of waste delivered to their facilities. Misunderstanding about calculating waste disposed from mixed waste processing facilities also plays a part in inaccurate reporting. For instance, the amount calculated by CCUC staff based on annual facility reports did not match the amount reported on the Forsyth County Waste Disposal Report for FY 2007-08.<sup>18</sup> This same kind of reporting inconsistency has occurred in prior years.

## **4.2 Forsyth County Goals**

In spite of the growth of recycling and other waste diversion programs since their inception in the early 1990's, the County as a whole has experienced an 11.9% increase in per-capita waste disposal since the County's baseline year of 1988 - 1989 (see Table 4-1). Forsyth County's best year for waste disposal reduction was 1999-00 at 1.40 tons/capita. Its worst year was 2003-04

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<sup>17</sup> N.C. Solid Waste Annual Report, FY 2007-08, Department of Environment and Natural Resources, p6.

<sup>18</sup> After discussions with staff in DWM Planning and Programs Branch and WCA of High Point, it was discovered that 1,026 tons of disposed C & D waste was being double counted.

when waste disposal was 1.73 tons/capita. These volatile changes suggest that population may have less to do with disposal rates than other factors, particularly since Forsyth County's population has grown by only 1.5% annually over the last 17 years. Per capita waste disposal *decreased* by 10.7% from 2006-07 to 2007-08, the most dramatic year to year change on record.

### Forsyth County Actual Waste Disposal Per Capita by Year

Fiscal Year	Tons/Capita Disposed	% Change From	
		Baseline Year	Previous Year
1988-89 (Baseline Year) <sup>19</sup>	1.34		
...			
1996-97	1.49	+ 11.2%	
1997-98	1.49	+ 11.2%	0.0%
1998-99	1.49	+ 11.2%	0.0%
1999-00	1.40	+ 4.5%	- 6.0%
2000-01	1.52	+ 13.4%	+8.6%
2001-02	1.44	+ 7.5%	-5.3%
2002-03	1.59	+ 18.7%	+ 10.4%
2003-04	1.73	+ 29.1%	+ 8.8%
2004-05	1.62	+ 21.0%	-6.4%
2005-06	1.67	+24.6%	+3.1%
2006-07	1.68	+25.4%	+0.6%
2007-08	1.50	+11.9%	-10.7%

**Table 4-1**

Although the disposal rate of 1.5 tons/capita is the lowest recorded since FY 2001-02 and represents a substantial decrease from previous years, it is driven more by lower generation than higher diversion from disposal. It is likely that economic conditions play a much more significant role in this reduction in disposal than any programmatic or policy changes implemented by local governments. Table 4-2 reinforces this conclusion by showing that while recovery rates have been very constant for the last eight (8) years generation and disposal rates have varied greatly. The standard deviation for generation (reported) and disposal is more than 6.5 times greater than the standard deviation for recovered. Although the trend of less disposal is expected to continue throughout the remainder of this year, an economic recovery will likely drive generation, and therefore disposal rates, back to previous levels, notwithstanding any programmatic or policy changes targeted at waste reduction, recycling or recovery. Despite the required use of a population-based metric for measuring and reporting waste reduction efforts, strong evidence indicates that disposal is more a function of economic conditions.

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<sup>19</sup> As allowed by NCGS 130A-309.04(c2) , Forsyth County is approved to use a baseline year of 1989-90.

### Forsyth County Waste Reported, Disposed and Recovered Per Capita

	FY 2001-02	FY 2002-03	FY 2003-04	FY 2004-05	FY 2005-06	FY 2006-07	FY 2007-08	Std Dev.
<b>Reported</b>	1.64	1.83	1.96	1.82	1.90	1.89	1.70	0.108
<b>Disposed</b>	1.44	1.59	1.73	1.62	1.67	1.68	1.50	0.106
<b>Recovered</b>	0.20	0.24	0.22	0.20	0.23	0.21	0.20	0.016

**Table 4-2**

As one of North Carolina’s largest metropolitan and economic centers, Forsyth County ranks low among peer counties in per capita disposal. Table 4-3 shows the per capita disposal rates of the 10 most populous counties in North Carolina. Forsyth County ranks ninth, surpassed only by Mecklenburg County, in per capita disposal. Compared to all 100 counties in the State, Forsyth County ranks 91<sup>st</sup> in per capita disposal. Compared to the State average of 1.24 tons/capita, Forsyth County’s disposal rate of 1.5 tons/capita is 11.9% greater. It should be noted that Forsyth County’s baseline year disposal rate is 1.34 tons/capita, not 1.14 tons/capita as reported in the North Carolina Solid Waste Management Annual Report for FY 2007-08. Forsyth County was granted approval to use the alternate baseline year of 1989-90 instead of the default baseline year of 1991-92. Therefore, from its baseline year, Forsyth County’s waste disposal has *increased* by 11.9% not 32% as reported.

### Waste Disposal Per Capita for North Carolina’s 10 Most Populous Counties<sup>20</sup>

County Name	Tons Disposed BL Year	Per Cap Disposed BL Year	Tons Disposed 2007-08	Pop 2007-08	Per Cap Disposed 2007-08	Rank
Gaston	165,100	0.93	241,022	200,972	1.20	1
Durham	218,972	1.17	307,725	254,740	1.21	2
Union	77,842	0.90	241,045	182,344	1.32	3
Cumberland	227,302	0.81	425,481	313,616	1.36	4
Guilford	471,541	1.35	629,665	460,780	1.37	5
Wake	569,622	1.29	1,151,050	832,590	1.38	6
New Hanover	157,647	1.28	267,292	189,922	1.41	7
Buncombe	159,040	0.90	331,932	225,609	1.47	8
Forsyth	304,290	1.14	508,310	338,679	1.50	9
Mecklenburg	677,573	1.29	1,442,987	863,147	1.67	10
<b>State Total</b>	<b>7,257,428</b>	<b>1.07</b>	<b>11,284,712</b>	<b>9,069,398</b>	<b>1.24</b>	

**Table 4-3**

Because of the factors described above and more, it is difficult to predict waste generation and disposal patterns into the future and consequently, it is even more difficult to project and set meaningful, long-term waste reduction goals. Forsyth County’s previous attempts at setting and achieving realistic waste reduction goals have met with little success. Although NCGS 130A-309.09D(a) gives local governments the authority to implement local solid waste regulatory controls such as mandatory recycling and local disposal bans, the lack of such policies in the

<sup>20</sup> North Carolina Solid Waste Management Annual Report, FY 2007-08, Appendix, pp 106-110.

planning area will continue to make it difficult to achieve the stated waste reduction goals. Following are the waste reduction goals set in previous Forsyth County Plans.

#### 1997 Solid Waste Management Plan Waste Reduction Goals

- *By June 30, 2001, the per capita amount of waste diverted by reduction, recycling or other means will total 20% of the total waste stream compared to the per capita level of the base year of FY 1988/89.*
- *By June 30, 2006, the per capita amount of waste diverted will total 40% of the total waste stream compared to the per capita level of the base year.*

As indicated by the figures presented in Table 4-1, Forsyth County did not meet its waste reduction goal for 2001. In the 2000 Plan Update, Forsyth County established what were thought to be more attainable and realistic goals pending completion of a solid waste characterization study and recommendations from the Solid Waste Task Force.

#### 2000 Solid Waste Management Plan Waste Reduction Goals

- *By FY 2005-06 reduce the per-capita solid waste disposal rate by 10%, thereby bringing the waste disposal rate to 5% above baseline levels.*
- *By FY 2009-10, reduce the per-capita solid waste disposal rate by 25%, thereby achieving a per-capita waste reduction rate of 10%.*

CCUC staff reviewed the 2000 goals and, in the 2003 Plan Update and, more in keeping with statutory guidance, restated the new goals in terms of per capita disposal and reduction from the baseline year of 1989-90.

#### 2003 Solid Waste Management Plan Waste Reduction Goals

- *By FY 2005-06 achieve a disposal rate of 1.41 tons per capita, which is 5% above the 1988-89 baseline year rate.*
- *By FY 2012-13 achieve a disposal rate of 1.14 tons per capita, which is 15% below the 1988-89 baseline year rate.*

Partly because of the recent significant increases in generation and disposal of solid waste from Forsyth County, the 2005-06 goal was not achieved. Consequently, the following goals were developed for the 2006 Plan Update.

#### 2006 Solid Waste Management Plan Waste Reduction Goals

- *By FY 2012-13 achieve a disposal rate of 1.42 tons per capita, which is 6.0% above the 1988-89 baseline year rate.*

- *By FY 2015-16 achieve a disposal rate of 1.40 tons per capita, which is 4.5% above the 1988-89 baseline year rate.*

Based on the format of previous Waste Reduction Goal Sheets, previous Plans reported two waste reduction goals – one intermediate goal and a long term 10 year goal. However, the goal sheet provided by DWM for this planning period requires only one goal to be set ten (10) years from the Plan due date. Forsyth County adopts the following waste reduction goal:

2009 Solid Waste Management Plan Waste Reduction Goal

- *By June 30, 2019 achieve a disposal rate of 1.27 tons per capita, which is 5.0% below the 1988-89 baseline year rate of 1.34 tons per capita.*

Appendix E-1 contains the completed Waste Reduction Goal Sheet for the period covered by this Plan Update. In addition, Appendix E-2 contains various waste reduction goals showing the amount of waste that would need to be diverted to attain each of them. This table was instrumental in helping Plan participants choose a realistic target disposal rate and year for the goal. All Forsyth County waste reduction goals are summarized in Table 4-4 below.

**Summary of Forsyth County Waste Reduction Goals**

Plan Year	Goal Date	Tons Per Capita	Percent Change <sup>21</sup>
1997	June 30, 2001	1.07	-20%
	June 30, 2006	0.80	-40%
2000	June 30, 2006	1.41	+5%
	June 30, 2010	1.01	-25%
2003	June 30, 2006	1.41	+5%
	June 20, 2013	1.14	-15%
2006	June 30, 2013	1.42	+6%
	June 30, 2016	1.40	+4.5%
<b>2009</b>	<b>June 30, 2019</b>	<b>1.27</b>	<b>-5%</b>

**Table 4-4**

**4.3 Waste Reduction Plan**

C & D waste received at CCUC facilities represents the greatest potential for recycling and targeted diversion activities designed to meet our waste reduction goal of 1.27 tons/capita by June 30, 2019. The Waste Characterization Study referred to in Section 3 provides valuable insights into which specific C & D wastes are strong candidates for diversion. The amount of waste disposed in FY 2007-08 would have to be reduced by approximately 60,000 tons in order

<sup>21</sup> As measured from baseline year.

to meet our chosen goal. (Refer to Appendix E-1) Table 4-5 shows how significant progress could be made toward reaching that goal by diverting targeted wastes from disposal at both Old Salisbury Road C & D Landfill and Hanes Mill Road MSW Landfill.

### Targeted Wastes for Disposal Reduction

Waste Material	Diversion Potential (tons)
Dimensional Lumber	21,835
Cardboard	20,773
Concrete/Bricks	12,053
Asphalt Shingles	11,034
<b>Total</b>	<b>65,695</b>

**Table 4-5**

The *diversion potential* shown in Table 4-5 is derived from data in the recently conducted waste characterization study performed at both CCUC landfills. The majority of these materials are being delivered to Old Salisbury Road C & D Landfill but considerable quantities of dimensional lumber and cardboard are also found entering Hanes Mill Road MSW Landfill. While it cannot be expected that 100% of these targeted wastes could be diverted from disposal, a 75% diversion would reduce waste disposal by approximately 49,271 tons annually. The CCUC is currently considering and investigating the construction of a C & D waste recycling facility at Old Salisbury Road Landfill. The proposed new C & D Landfill in northwest Forsyth County includes an integrated recycling system. In addition to investigating and planning for C & D waste recycling at OSR C & D Landfill and possibly the proposed C & D Landfill, the CCUC will continue to encourage local governments to implement policy and regulatory controls that will further reduce the amount of Forsyth County waste disposed both in-county and out-of-county.

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## Section 5

# SOLID WASTE PLANNING ELEMENTS

North Carolina’s revised Solid Waste Management Act requires local governments to assess the adequacy of local solid waste collection services and disposal capacity to meet current needs and protect human health and the environment, and to take actions as necessary to address identified service or capacity deficiencies. In addition, state law specifies that local governments assess current programs and identify intended actions with respect to:

- source reduction
- collection
- recycling and reuse
- composting and mulching
- incineration with and without energy recovery
- transfer of waste outside the planning region
- disposal
- education with the community and through the schools
- management of special wastes
- prevention of illegal disposal and litter management
- purchase of recycled materials and products
- disaster response

Appendix F summarizes some of the key characteristics of the solid waste collection and recovery programs for each jurisdiction in Forsyth County. Each of the various components of Forsyth County’s solid waste management system is discussed in greater detail below, followed by a discussion of intended actions pertaining to each waste management component. It is important to note that *all intended actions are subject to budgetary approval and are therefore tentative.*

### 5.1 Source Reduction

#### Current Programs

Governments within Forsyth County agree that source reduction is a priority method in managing our waste, although, in many applications, it is a concept that is difficult to describe, gain support for and implement. Source reduction programs are also more generator-active meaning that otherwise productive labor hours would be expended on these kinds of programs. It is very difficult to gain support for such programs in the business community when disposal costs are generally low and much lower than other forms of waste management.

City of Winston-Salem personnel provide information and assistance on junk mail reduction, “enviroshopping,” use of non-toxics in homes and businesses and provide support to local groups on these activities. On their website, the City provides a link to the Direct Marketing Association’s (DMA) website. The DMA sells names and addresses to direct marketing advertising firms that use 3<sup>rd</sup> class bulk mail as a primary means of print advertising. Through the DMA’s [www.dmachoice.com](http://www.dmachoice.com) web page, individuals can request that their names be removed

from direct marketing mailing lists thus reducing the amount of junk mail received. Staff from the City of Winston-Salem and the Towns of Kernersville and Lewisville makes presentations to community groups and schools to address source reduction. Keep Winston-Salem Beautiful, an agency partially supported by the City of Winston-Salem, also provides speakers on waste reduction. The Town of Kernersville began working with the Kernersville News in 2008 to publish a monthly column focused on waste reduction and related issues, entitled “Trash Talk”. Kernersville promotes commercial source reduction programs by providing free waste assessments to all local businesses and non-profit organizations.

To reduce the amount of paper used in printing and copying applications, the CCUC and the Winston-Salem City Council print their agendas double sided. Recently, the City of Winston-Salem’s IT Department made duplex printing the default setting on all supported printers that have this feature available. The Village of Clemmons also prints its Council agendas double-sided.

### **Intended Actions**

Although the real application of source reduction activities is limited, CCUC, municipal and county staff continues to investigate them as means to lower the overall disposal rate and achieve our waste reduction goals. Educational activities targeted toward businesses and industries will continue to receive the most attention in the coming years. The Town of Kernersville intends to continue developing inter-departmental, residential and commercial source reduction programs by increasing education in this area.

## **5.2 Collection**

### **Current Programs**

Solid waste collection in Forsyth County is performed by a number of different organizations. The two largest municipalities, Winston-Salem and Kernersville operate their own collection services while the remaining municipalities contract with private haulers. Using municipal crews, the Town of Kernersville and the City of Winston-Salem collect and transport wastes from all single-family and some multi-family homes within their jurisdictions. All other municipalities contract with private waste haulers to collect and dispose of residential wastes within their communities. Forsyth County franchises the collection and transportation of residential waste from the unincorporated areas of the county. The Town of Kernersville and the City of Winston-Salem also offer waste collection and transportation service for some commercial customers using dumpsters. Without exception, commercial, industrial and institutional waste generators that require roll-off container service, compactor service or other specialized waste collection services use private waste haulers.

There are fourteen (14) known private waste haulers, which are listed in Table 5-1, that operate in Forsyth County as independent contractors, transporting waste from private individuals or companies to disposal facilities. In addition, some commercial and industrial waste generators haul their own waste to disposal facilities.

## Private Waste Collection Companies Operating in Forsyth County, FY 2007-08

Company Name	Waste Type Managed
ABC Garbage Service	Residential (Franchised by County)
All Points Waste Services	Commercial/Industrial/C & D
Carolina Disposal	Commercial/Industrial/Residential
Green Day (Piedmont Paper Stock)	Commercial/Industrial
Kiser's Garbage Service	Residential (Franchised by County)
McKinney Disposal	Commercial/Industrial/C & D
Locklear's Garbage Service	Residential (Franchised by County)
North State Waste	Industrial/C & D
Piedmont Disposal	Commercial/Industrial/C & D
Republic Waste Services	Commercial/Industrial/C & D
Rural Garbage Service	Residential (Franchised by County)
WCA of High Point	C & D
Waste Industries	Commercial/Industrial/C & D
Waste Management	Commercial/Industrial/C & D /Residential

**Table 5-1**

As shown in Appendix F, residential waste is collected on a once-a-week basis in all of the municipalities. The City of Winston-Salem and Town of Kernersville provide both backyard and curbside residential waste collection. The residents of municipalities that contract with Waste Management, Inc. (WMI) for residential waste collection have curbside, rollout service. Bethania recently eliminated backyard waste collection service through their contractor, Kiser Garbage and Container. Kernersville, Rural Hall and Clemmons offer backyard service for those who can provide documented proof of a medical disability that prevents them from rolling the cart to the street.

The City of Winston-Salem Sanitation Division continues to have success with its voluntary curbside waste collection program. All Winston-Salem residents are offered backyard waste collection service but those who wish to participate in the curbside program are provided a 96-gallon rollout container. Currently there are 49,110 participating households. More recently, the Sanitation Division, through their contractor WMI, implemented a pilot program using fully automated collection vehicles for curbside recycling. Two (2) routes with high participation levels in the voluntary curbside waste collection program were chosen for the pilot program that has been in place since December 18, 2008. Since 2001 the Town of Kernersville has operated a mandatory curbside rollout program using 95-gallon containers. Each residence is assigned a serialized rollout cart that is tracked in a geodatabase.

The Village of Clemmons, the City of Winston-Salem and the Village of Tobaccoville provide annual bulky item collection; the Towns of Rural Hall and Kernersville provide bulky item collection on a weekly basis; and the Town of Lewisville collects bulky items three times each year at a drop-off location. Lewisville also provides three vouchers each fiscal year for its residents to take bulky items to Hanes Mill Road Landfill. Kernersville provides rental dumpster service to homes that have bulky items in excess of two (2) cubic yards in a given week, or that

have extra loose or bagged waste. This service has proven very useful for residents who are moving or doing small home renovations and has helped reduce litter in the community.

Forsyth County grants franchises to waste companies to collect and transport residential and small business waste in the unincorporated areas of the county. There are four (4) franchised waste companies providing service in the unincorporated areas of the county at this time. (Refer to Table 5-1) Rural Garbage Service continues to be the largest service provider based on households served with Waste Management, Inc., Locklear's Garbage Service and ABC Garbage Service following in descending size order. The current franchise period ends on October 12, 2010.

Commercial and industrial waste collection in Forsyth County is provided in one of several ways. Table 5-1 shows which companies provide these services.

- By municipal crews serving business customers in Winston-Salem and Kernersville
- By private haulers operating within Forsyth County (including within the boundaries of municipalities) using an open collection system
- By a private hauler under contract with one or more of the Forsyth County municipalities

Most commercial/industrial waste generators pay private haulers directly for solid waste collection service. The City of Winston-Salem and the Village of Tobaccolville afford some commercial generators the same amount of waste disposal paid for with tax revenues as it does its residential customers. These generators are typically small businesses that do not require dumpster or roll-off service. Any amounts of commercial waste exceeding this limit must be paid for by the generator and collected by a private hauler.

The Town of Kernersville charges all of its commercial customers bi-monthly based on the level of service and size of container they receive. Containers range from 8 cubic yard dumpsters to 95-gallon rollout carts for small businesses. Because small businesses are primarily serviced on residential routes, the Town is able to provide these locations with curbside recycling services as well. Corrugated cardboard collection is available for large commercial accounts that choose to participate.

The City of Winston-Salem and Town of Kernersville provide commercial collection service with front-end loader trucks. Neither of these municipalities provide roll off service, and therefore do not serve many of the larger waste generators in their respective jurisdictions. The frequency of collection depends upon the level of service for which the individual businesses have contracted. As is the case in most North Carolina communities, generators of solid waste in quantities unsuitable for collection in 8-cubic-yard or smaller containers (includes some commercial and institutional as well as most industrial waste) must make their own arrangements for solid waste collection. These generators either haul their own waste or contract with a private hauler for collection and disposal service.

## **Intended Actions**

It is generally recognized that residential solid waste collection costs would be substantially lower if service was provided at the curb instead of the backyard. A Citizens Efficiency Review Committee recommended a transition to this type of collection system in Winston-Salem several years ago. The City of Winston-Salem will continue to expand its voluntary curbside MSW collection program on an as-needed basis but will also continue to offer backyard collection service to its citizens.

CCUC staff continues to evaluate and discuss providing universal solid waste and recycling collection throughout Forsyth County, including all municipalities. By combining their service agreements into one contract and by considering inclusion of recyclables collection in the same contract, municipalities could possibly lower their per household waste collection rates than if each jurisdiction continues to contract for services independently. Such a system should also serve to reduce illegal dumping, reduce the self-haul traffic and associated handling costs at the Hanes Mill Road Landfill, as well as provide for more efficient collection and better economies of scale in the unincorporated areas. The Town of Kernersville will continue to expand its dumpster leasing and commercial front loader service for both refuse and cardboard on an as needed basis.

## **5.3 Recycling**

### **Current Programs**

#### ***Residential recycling***

Forsyth County residents who occupy single-family dwellings in incorporated municipalities are provided curbside recycling service through contracts with private waste management companies. In Winston-Salem and other communities, some multi-family dwellings are offered recycling collection service under these same contracts. There are 73 apartment and condominium complexes participating in Winston-Salem's multi-family recycling program. The Village of Clemmons also offers recycling services to multi-family communities using either carts or bins. The Town of Kernersville provides curbside recycling services to multi-family units where rollout containers can be utilized and adequate service vehicle access is present. Appendix F gives an overview of the types of recycling in each community.

In 2007, the City of Winston-Salem began the 'all-bottle' collection system in an effort to increase the amount of HDPE and PET bottles it collects. It also offers cell phone, inkjet cartridge and printer toner cartridge mail-in recycling to its residents. Four programs also collect old magazines (OMG) as a separate paper grade. The Town of Kernersville accepts rigid plastics and OCC as part of its single stream program. The City of Winston-Salem collects OCC and residential mixed paper (RMP) (including OMG, chipboard, telephone books, and junk mail) through its curbside and multi-family programs. In addition, the City has nine (9) drop-off centers for the collection of old corrugated containers (OCC) located at area fire stations. Kernersville has a similar OCC drop-off program at all Town fire stations and recently added eight OCC convenience sites at local businesses, such as convenience stores and shopping centers, to increase OCC diversion. The Town of Lewisville and the Village of Clemmons also

provide a central cardboard collection system for their residents and businesses. The Town of Kernersville utilizes a single stream curbside collection program that allows for the commingling of all acceptable materials for residential customers and small businesses.

Residents of unincorporated areas do not have access to curbside recycling services. To provide recycling for these residents, there are two staffed drop-off centers located on opposite ends of the county in Kernersville and Pfafftown. These centers are administered by the City of Winston-Salem Sanitation Division, staffed by personnel through a contract with WMI, and funded by the CCUC. The CCUC also operates a drop-off recycling center at Hanes Mill Road Landfill that is staffed by CCUC personnel. The three existing centers accept all materials collected through the City’s curbside recycling program.

With the exception of Kernersville, which is contracted to take its recyclables to FCR, Inc. in Greensboro, NC, all household recyclables collected through the above programs are taken to the Recycle America Materials Recovery Facility in Winston-Salem where the items are sorted and marketed. Twenty-eight percent (28%) of the revenue from the sale of recyclables collected through the Winston-Salem program is returned to the City. Revenue sharing arrangements among the other jurisdictions vary.

In addition to the curbside recycling and drop-off center programs, residents can participate in the special collection events listed in the following table.

**Special Recycling Collection Events in Forsyth County, FY 2007-08**

Event	Jurisdiction	Frequency
R-Day (fluorescent bulbs, packing peanuts, curbside materials, chipboard, OCC, household and auto batteries, small propane tanks, 6 pack rings & grocery bags).	Lewisville	2-3 times annually
Christmas OCC & gift boxes	Lewisville	Annual
Electronics Recycling Drive	Kernersville	Annual

**Table 5-2**

The amount of solid waste recovered through government-sponsored recycling programs in Forsyth County in FY 2007-08 was 21,738 tons (including white goods, tires, pallets and e-waste), or 3.8% of the entire county waste stream. Appendix G reflects a breakdown of the tonnage of each material type collected by each jurisdiction as reported in the FY 2007-08 Solid Waste Annual Reports. There are many variables affecting these figures. Three of these are: the number and types of materials targeted for recovery in each community, the number of households living in multi-family complexes not currently receiving recycling collection service, and the extent to which each community promotes participation in recycling. While such variables limit the extent to which direct comparisons can be made between Forsyth County communities, the substantial difference in per-household recycling rates in unincorporated Forsyth County relative to the incorporated areas is telling: unincorporated residents in Forsyth County do not recycle to the same extent as incorporated residents who receive curbside recycling service. Maximizing recovery of residential recyclables will entail increasing

participation, increasing the types of materials collected in some jurisdictions, and capturing more of the materials now targeted by existing recycling programs.

Since discontinuing its residential solid waste and recycling contract with WMI in March of 2005, the Town of Kernersville has seen a two-fold increase in its residential curbside recycling tonnages. The average tons collected from residents increased from 55 tons to over 100 tons per month, while the average tons of residential solid waste collected have decreased over the past three years. The average residential recycling rate rose from 9% to over 18% and continues to grow. Evidence suggests that continuing increases are largely the results of targeted education and communication with residents, and the availability of larger more convenient recycling rollout carts for a discounted fee. In 2008, the Town was awarded a grant from North Carolina Department of Pollution Prevention and Environmental Assistance (DPPEA) to purchase 230 additional 48-gallon recycling rollout containers for residents, which has been vital to the town's ability to provide these containers at approximately half price. The addition of two commodities to the single stream mix may also have contributed to increases: cardboard in 2005 and rigid plastics in 2008. Further increases in Kernersville's recycling totals are a direct result of a measured 67% weekly participation rate.

CCUC staff tracks and reviews load inspection sheets from Hanes Mill Road Landfill in an effort to determine companies and other organizations that are disposing of easily recycled materials such as cardboard and pallets. These organizations may be contacted and referred to recycling companies.

### ***Non-residential recycling***

Given that the majority of Forsyth County's waste stream comes from commercial, institutional and industrial (CII) sources, recycling non-residential waste is even more important, from a waste diversion standpoint, than recycling residential waste. However, far fewer public resources are directed at the CII waste stream for waste management in general and recycling in particular. All Plan participants reported that they have active in-house recycling programs in place.

The City of Winston-Salem continues to extend its curbside recycling program to selected small businesses. There are nearly 766 small businesses participating in this program. Small businesses may participate through either a bin-based or cart-based program, whichever is appropriate. The Town of Kernersville began its small-business curbside recycling program through grant funding from NC DPPEA in 2007. This program is available to customers that utilize the Town's small business waste collection services; each customer is offered up to two recycling rollout containers. The majority of small business customers participate in this program. Non-profit organizations that are Town customers also receive curbside recycling services, provided that they can prove their non-profit status and qualify for free or reduced-cost trash service. The Town also offers free cardboard recycling services to businesses that allow the public to utilize their cardboard dumpsters; public dumpsters at these businesses are labeled as public drop-off sites and are placed in easily accessible areas.

The CCUC budgets approximately \$72,000 and staff time annually for a school recycling program for all schools in the Winston-Salem/Forsyth County (WS/FC) School District. Acceptable materials include cardboard, paper and beverage containers. WMI is under contract with the CCUC to provide collection and recycling services for this program at 74 school campus and support facility locations. The program is voluntary and participation varies among schools. Some have strong programs that recycle cardboard, paper and beverage containers. Many utilize only the cardboard and paper components of the program. As new schools are built, the recycling program is expanded to include them. Although weights are not recorded by the contractor, it is estimated that this program diverts as much as 2,000<sup>22</sup> tons/year from disposal.

The Town of Kernersville provides OCC recycling services for businesses, a program that was started in 2002 as part of a DPPEA Solid Waste Reduction Assistance Grant. Kernersville delivers commercially collected OCC to Paper Stock Dealers in Winston-Salem. In 2008, the Town received grant funding from DPPEA to purchase sixteen (16) additional OCC dumpsters for use within the commercial sector to expand this program.

The implementation of the North Carolina Alcohol and Beverage Container recycling legislation has created an increased need for commercial single-stream recycling services in Kernersville, but the Town currently does not provide collection services to restaurants and bars. However, through NC DPPEA grant funding the Town published its first annual Business Recycling and Legislative Guide to assist ABC permitted establishments in creating their own recycling programs. The guide also provides information about upcoming landfill bans of pallets, oyster shells, and oil filters, advice on how to set up work-place recycling programs, and other key information.

Through its contract with WMI, the Town of Rural Hall extended its residential recycling services to churches within the community. This program uses 90-gallon carts instead of the 14-gallon bins.

### **Intended Actions**

City of Winston-Salem Recycle Today staff continues to evaluate means of increasing the number of multi-family complexes participating in the recycling program. It will also continue to promote and expand its small business recycling program.

Kernersville will continue to promote the conversion from 18-gallon bins to carts, in an effort to make the curbside recycling program fully automated; in four years over 1,200 households have voluntarily leased carts in lieu of bins. Kernersville will continue to expand its commercial OCC collection program. A pallet drop-off location is planned to address the October 2009 ban on landfill disposal of pallets; this service will be free for both businesses and residents.

On January 1, 2008, House Bill 1518 became effective requiring businesses holding ABC permits to recycle their empty beverage containers. A private company, Leisure Time Services, is collecting beverage containers from many ABC permit holders in Winston-Salem. Plan

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<sup>22</sup> Estimate based on data from CIWMB Public School Characterization Study.

participants will monitor the effectiveness of the recycling services provided to ABC permit holders in their respective jurisdictions to insure their needs are being met.

House Bill 1465, which becomes effective October 1, 2009, may create the demand for additional recycling services in the planning area. This bill prohibits landfill disposal of clean wood waste, electronic devices, used motor oil filters, plastic bottles, and wooden pallets. Any additional volume of rigid plastic containers from residential sources and pallets from all sources will be managed with current programs. Electronic waste (e-waste) is currently being managed through a producer take-back program sponsored by Dell Computers and Goodwill of Northwest North Carolina. In addition, it is anticipated that the new CCUC/3RC HHW Agreement will provide yet another outlet for e-waste from residential sources. 3RC is already providing this service at a fee for non-residential customers. See Section 5.10.5 for a detailed description of this program. Most automotive service centers already have recycling outlets for their used oil filters through the scrap metal companies currently in the area. It is unclear how individuals who change their own oil and filters will recycle filters unless the auto service centers or auto parts stores allow them to bring their used filters for recycling as many of them do for used motor oil and batteries. Calls to both area stores yielded mixed results.

## **5.4 Reuse**

### **Current Programs**

Forsyth County is home to several non-profit reuse organizations such as Habitat for Humanity ReStore, Goodwill Industries and the Shepherd's Center. Several for-profit reuse enterprises in the form of consignment and thrift shops also operate in the community.

Partly as a result of a very successful e-waste recycling day in Winston-Salem in 2006 and partly because of Dell Computer's manufacturing presence here in Forsyth County, Dell Computers and Goodwill Industries of Northwest North Carolina have partnered to create RECONNECT™, a computer and electronic reuse/recycling program. Through this program, any computer or related equipment can be taken to any attended Goodwill drop-off location in almost all western counties in North Carolina. In Forsyth County there are 20 locations participating in the program. Many of the computers and parts are reused by being resold to Goodwill Store consumers. Unusable parts are recycled. Although it is impossible to provide statistics on how much e-waste is being diverted through this program in Forsyth County alone, over 1,300 tons were recycled from all participating Goodwill locations in northwest North Carolina.

### **Intended Actions**

The CCUC encourages and supports extended producer responsibility (EPR) and product stewardship (take-back) programs offered by manufacturers for their products. It is the intention of CCUC staff to work with local businesses on reusing packaging and other materials as they work with them on reduction and recycling programs. However, additional staff will be needed in order for such efforts to be effective. Staff in the City of Winston-Salem Solid Waste Section and Sanitation Division will evaluate future needs for increasing efforts to encourage source reduction, reuse, and recycling in the business community.

The Town of Lewisville is held a reusable grocery bag give-away in May 2009 at a local grocery store to encourage shoppers to re-use them instead of using disposable paper or plastic bags.

## **5.5 Composting and Mulching**

### **Current Programs**

Composting and mulching programs in Forsyth County manage yard waste composed of grass clippings, leaves, brush and Christmas trees. They also accept wooden pallets in these programs. With the exception of pallets, most materials come from residential sources. See Appendix F for a summary of the characteristics of each municipality's yard waste collection program.

The largest publicly owned and operated compost facility in Forsyth County is the Overdale Yard Waste Facility followed by the recently opened Forum 52 Yard Waste Facility. Wrico Inc. operates both sites under contract with the CCUC, where it processes yard waste and pallets, which are sold for use as compost, mulch or boiler fuel. The City of Winston-Salem Sanitation Division as well as private landscape contractors and other private individuals deliver yard waste to the Overdale Yard Waste Facility. Built primarily for use by the City of Winston-Salem Sanitation Division during their annual leaf collection program, the Forum 52 Facility has additional capacity for the expansion of yard waste collection programs/services in the County.

The CCUC and the Town of Kernersville accept wooden pallets through their yard waste programs. In FY 2007-08, the CCUC accepted 511 tons of pallets that were ground and sold for boiler fuel.

Wrico also operates a leaf compost site on Reynolds Park Road and a leaf transfer site on Shorefair Drive. The Shorefair site is used exclusively for the temporary storage of leaves collected by the City of Winston-Salem Sanitation Division until they can be transported to the Reynolds Park Rd. Facility. The Forum 52 Facility is permitted for and capable of composting yard waste and leaves.

The Towns of Kernersville and Rural Hall and the Village of Clemmons also operate compost programs. Kernersville holds yearly sales of mulch and leaf compost for the public in the spring to generate revenue for the town. These soil amendment items are produced from yard debris and leaf collection and then managed by Public Works staff.

The City of Winston-Salem, the Towns of Kernersville and Rural Hall offer weekly residential yard waste collection to their citizens. The Village of Clemmons offers residential yard waste collection to its citizens on a schedule that is determined annually. Winston-Salem residents may purchase a 96-gallon yard waste cart for \$65 and pay an annual \$55 fee for weekly yard waste collection service. Kernersville residents may purchase a 95-gallon yard waste cart from the town for a one-time fee of \$60; there is no annual fee for this weekly service. Rural Hall residents pay a one-time \$60 fee for a 96-gallon yard waste cart. Likewise, the Village of Clemmons charges a \$50 annual fee for households wishing to receive weekly yard waste service. Approximately 17,000 households participate in the yard cart program in Winston-Salem. In addition, The Winston-Salem Sanitation Division collects brush every 2 weeks from any single-family households that place it at the curb. In FY 2007-08, the City of Winston-

Salem collected 21,200 tons of yard waste in carts and at the curb. All material collected from this program is taken to the CCUC's Overdale Yard Waste Facility. The Town of Kernersville processed 1,953 tons of yard waste at its facility in FY 2007-08. The Village of Clemmons processed 3,741 tons of mixed yard waste.

The City of Winston-Salem, the Towns of Kernersville and Rural Hall and the Village of Clemmons operate seasonal leaf collection programs. In FY 2007-08, The City of Winston-Salem collected 11,160 tons of leaves. Leaves from the City of Winston-Salem are taken to either the Reynolds Park Road Leaf site or the Shorefair Drive leaf transfer site. These leaves are either composted and given away to citizens in the spring and fall or used by the contractor in the production of compost for sale. The leaves in Kernersville, Rural Hall and Clemmons are taken to their respective compost facilities.

The Village of Clemmons and the Towns of Kernersville, Lewisville and Rural Hall and the City of Winston-Salem collect Christmas trees on a seasonal basis for inclusion in their compost/mulch programs.

Some Forsyth communities and the Cooperative Extension service have encouraged backyard composting and Grasscycling. The Town of Kernersville has sold home composting bins to its residents for the deeply discounted price of \$15 and has conducted composting and naturescaping workshops to promote backyard composting.

### **Intended Actions**

The CCUC and Wrico recently renewed their contract to operate the Overdale and Forum 52 Yard Waste Facilities. The CCUC monitors the performance of the contractor and always retains the option to solicit new proposals to operate the program.

The Town of Kernersville will continue to promote backyard composting through workshops, public education and outreach. The Town will also continue to mulch, manage and sell the yard waste collected within the community.

On October 1, 2009, provisions in HB 1465 will ban the disposal of pallets at landfills. The CCUC has in place the necessary resources to enforce this ban adequately at both Hanes Mill Road Landfill and Old Salisbury Road Landfill. Likewise, it possesses additional capacity at the Overdale Yard Waste Facility, where pallets are already accepted for recovery.

## **5.6 Incineration (With and Without Energy Recovery)**

### **Current Program**

MSW incineration is not part of Forsyth County's current waste management program. With or without energy recovery, it has not been perceived as a viable option at this time due to the high capital and operating costs, the lack of flow control, and public opposition. However, with increasing costs to cite, permit and build new MSW landfills, more attention is being given to a regional approach to WTE. Recently, the CCUC, in cooperation with Mecklenburg County, retained a consultant to conduct a survey of alternate waste conversion technologies including

combustion. A copy of the Executive Summary of this report is included in Appendix I.

Hanes Mill Rd. Landfill extracts and converts methane gas to electricity under contract with Winston Gas Producers. In FY 2007-08, the CCUC received over \$100,000 in gas sales and royalties from the contractor. In calendar year 2008, approximately 1,044,708 cubic feet of methane were extracted and converted to 37,279,453 kWh of electricity that was sold on the grid.

### **Intended Actions**

At this time, there are no further plans to investigate incineration as an alternative waste management method in Forsyth County. Future revisions to this Plan may include further consideration of incineration with and without energy recovery. As new cells in CCUC operated landfills are filled and closed, LFG extraction and recovery will continue to remain an option for the near future.

## **5.7 Transfers Outside Geographic Area**

### **Current Program**

There are two (2) privately owned transfer stations in Forsyth County. Most waste leaving Forsyth County is transferred through the Overdale Road Transfer Station, owned and operated by Republic Services, to their Uwharrie Environmental Landfill in Montgomery County or Foothills Environmental Landfill in Caldwell County. A C & D transfer station, owned by PCM Construction Services, is closed and no longer transfers waste. In FY 2007-08, over 36% of all Forsyth County waste was disposed in landfills outside the County. (Refer to Table 5-3.)

**Solid Waste Disposed In-County vs. Out-of-County, FY 2007-08**

<b>Facility</b>	<b>Tons</b>	<b>% of Category</b>	<b>% of Total</b>
<b>Disposed in County</b>			
Hanes Mill Rd. Landfill	239,573	73.8%	47.15%
Old Salisbury Rd. Landfill	84,880	26.2%	16.70%
<b>Total Disposed in County</b>	<b>324,453</b>	<b>100.0%</b>	<b>63.85%</b>
<b>Disposed Out of County</b>			
Uwharrie Env. Regional Landfill	104,138	56.7%	20.49%
BFI-Charlotte Motor Speedway Landfill	59,780	32.5%	11.76%
Palmetto Landfill, SC	50	0.0%	0.01%
Foothills Env. Landfill	17,806	9.7%	3.50%
Coble's C & D Landfill	27	0.0%	0.01%
WCA of High Point C & D Landfill	1,026	0.6%	0.20%
U. S. Tire Monofill	867	0.5%	0.17%
<b>Total Disposed Out of County</b>	<b>183,694</b>	<b>100.0%</b>	<b>36.15%</b>
<b>Total Disposed</b>	<b>508,147</b>	<b>100.0%</b>	<b>100.00%</b>

**Table 5-3**

There has been a near-constant increase in MSW disposed out-of-county since FY 2000-01. There has been a constant increase in the percentage of Forsyth County MSW disposed out-of-county since FY 2000-01. (See Figure 5-4.) Conversely, there has been a similar decrease in the amount and percentage of MSW disposed in-county. Since FY 2000-01 there has been a 34.2% decrease in MSW disposed in-county and a 2,375% increase in MSW disposed out-of-county. In FY 2007-08, in-county disposal was 239,453 tons or 47.2% of the total and out-of-county disposal was 183,694 tons or 36.2% of the total. Most of this increase in out-of-county disposal occurs at Uwharrie Landfill in Montgomery County and BFI/Charlotte Motor Speedway Landfill in Cabarrus County. The result an erosion of the share of Forsyth County waste that is disposed at Hanes Mill Rd. Landfill, which, in turn, reduces revenues needed to fund government recycling and waste reduction programs. It also pre-empts any diversion of the waste through publicly funded recycling programs.

**Municipal Solid Waste Disposed In-County vs. Out-of-County<sup>23</sup>**  
**FY 2000-01 to 2007-08**

	Fiscal Year Ending June 30,							
	2001	2002	2003	2004	2005	2006	2007	2008
<b>In-County</b>	363,772	325,667	339,933	309,760	266,731	255,328	265,004	239,413
<b>% In-County</b>	98.0%	95.1%	85.9%	70.3%	68.4%	60.2%	58.8%	56.8%
<b>Out-Of-County</b>	7,341	16,911	55,819	130,711	123,044	169,135	185,771	181,724
<b>% Out-Of-County</b>	2.0%	4.9%	14.1%	29.7%	31.6%	39.8%	41.2%	43.2%

**Table 5-4**

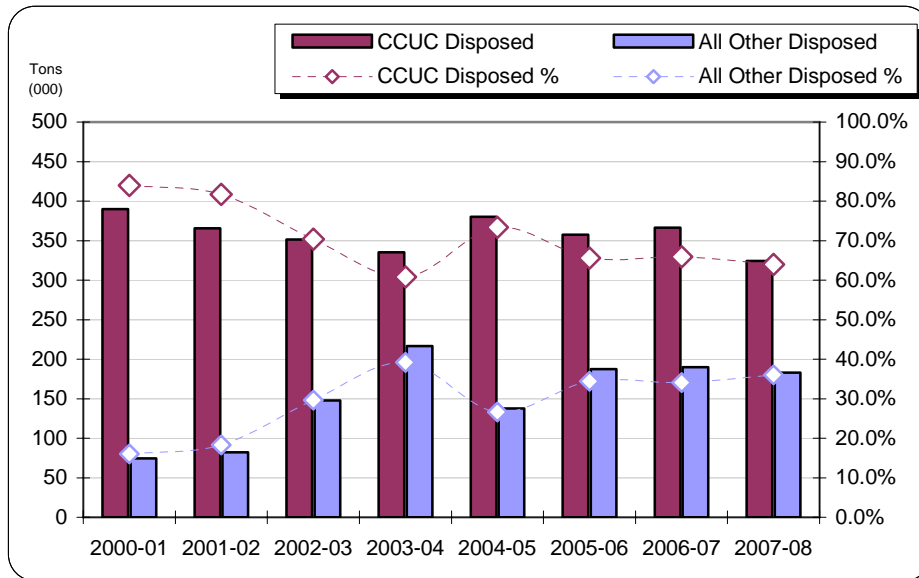
As Table 5-4 shows, publicly owned landfills in Forsyth County continue to lose market share. Competition from large, regional, private landfills forces smaller, publicly owned landfills to keep their tip fees artificially low in order to attract enough waste to pay the full costs of owning and operating the landfill. Forsyth County is within 65 miles of two (2) of the largest privately owned MSW landfills in the state, both of which include Forsyth County in their service area.

More recently, C & D waste has also been transported out of the county for recycling and disposal. WCA in High Point operates a hauling company in the area, which transports most of its collected C & D waste to their recycling facility and landfill in Guilford County. WCA recovers small amounts of C & D waste but most is disposed in their landfill. The chart in Figure 5-1 shows the amounts and percentages of all waste (MSW + CD) disposed in CCUC operated facilities versus all other facilities. The CCUC is now the only operator of MSW and C & D landfills in Forsyth County. This graphic, like the data in Table 5-4, also illustrates how dramatically CCUC facilities are losing market share to private interests that are hauling the waste out of the county.

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<sup>23</sup> MSW only, does not include C & D waste.

**Solid Waste Disposed In-County vs. Out-of-County<sup>24</sup>**  
**FY 2000-01 to 2007-08**



**Figure 5-1**

**Intended Actions**

None of the local governments participating in this Plan are actively investigating transfer options at this time.

**5.8 Disposal**

**Current Programs**

The CCUC operates the State’s second largest publicly owned MSW landfill and the eighth largest C & D Waste Landfill in Forsyth County (in terms of tons disposed/year). There are two (2) privately owned transfer stations in the County, one for MSW and one for C & D waste; the latter is now closed. Much of Forsyth County’s waste flows to or through these facilities for ultimate disposal outside the County. Appendix H gives a graphic overview of the flow of waste disposed from Forsyth County generators.

***Municipal solid waste***

Hanes Mill Road Landfill is owned by the City of Winston-Salem, operated by the CCUC, and permitted to accept waste from Forsyth, Davie, Stokes, Yadkin and Surry County sources. Currently the only out-of-county waste being received at Hanes Mill Road Landfill is from Stokes County. In FY 2007-08, HMR LF received 239,573 tons of solid waste from Forsyth

<sup>24</sup> Includes MSW & C & D waste.

County sources and 11,054 tons from Stokes County sources for a total of 250,627 tons. The amount received annually from Stokes County remains relatively constant although the amount from Forsyth County continues to decline.

Hanes Mill Road Landfill has one closed phase that is under post-closure care. It now operates in a new 347-acre expansion site adjacent to the original area. A total of 90 acres of the expansion area will be lined for waste disposal. Waste is currently being disposed in Cells 1 and 2, together consisting of 37 acres. The first cell began receiving waste in May 2005. The 90-acre expansion area is projected to reach capacity in approximately 24 years based on current airspace volume, projected in-place densities and projected incoming waste amounts. It was originally thought that the life of this expansion area might be shortened by two to three years when the Piedmont Sanitary landfill closed in 2005. However, with the opening of the Overdale Road Transfer station and the increased amount of waste being transferred out of the county for disposal, this may not occur.

Hanes Mill Road Landfill has Division of Waste Management approval to use an alternative daily cover called Posi-Shell<sup>®</sup> that aids in reducing the amount of air space consumed by conventional daily cover material (soil). As approved by the DWM, the CCUC continues to add latex paint that is screened by the local HHW program contractor to the Posi-Shell ADC mixture. This seems to have aided in adhesion of the ADC mixture to the waste and in deterring disease vectors from being present in the waste. Paint is not always available so some applications of the ADC do not have paint added. In FY 2007-08, nearly 95 tons of latex paint were reused in this manner.

### ***Construction and demolition waste***

Old Salisbury Road C & D Landfill is owned by the City of Winston-Salem and operated by the CCUC. It opened in September 1996, replacing the previous Land Clearing & Inert Debris landfill on Overdale Road. The site consists of 140 acres, 56 acres of which are used for waste disposal. The Old Salisbury Rd. Landfill has a remaining life expectancy of approximately 6 years, based on current supply projections. There were 84,880 tons of Forsyth County C & D waste disposed at OSR Landfill in FY 2007-08, a decrease of 32,239 tons or 27.5% from FY 2004-05.

There are 6 DENR permitted and 27 private Land Clearing and Inert Debris (LCID) landfills performing varying amounts of wood waste recovery, however no other C&D landfills operate in Forsyth County.

### **Intended Actions**

#### ***Municipal solid waste***

Forsyth County will continue to need reasonably priced waste disposal for the waste generated within its borders. The CCUC is attempting to create a sustainable funding system that will allow it to meet all the current operating and capital costs of waste disposal as well as invest money for the construction of a future landfill in the county or region.

### ***Construction and demolition waste***

It is recognized that diversion of materials from the C&D waste stream should be a priority focus of Forsyth County's non-residential waste recycling efforts, despite the recent economic woes causing dramatic decreases in the amount of C & D waste received. Toward this end, the Commission continues to consider C&D waste management alternatives, including:

- Establishment of a differential tipping fee at the C&D landfill to provide an economic incentive for source separation and recycling of selected C&D materials, such as clean wood waste
- Establishment of a receiving and materials preparation area for source-separated and marketable C&D materials at the C&D landfill site
- Permitting and constructing a new C & D landfill that will fully incorporate recycling and materials reclamation
- Permitting and construction of a C & D recycling facility at the Old Salisbury Rd. Landfill

## **5.9 Community Education and Outreach**

### **Current Programs**

A variety of recycling educational publications listing the locations of collection centers, acceptable materials and preparation instructions are produced and distributed within the planning area. Presentations are given to civic groups and in public schools and pre-schools by both the City of Winston-Salem and the Towns of Kernersville and Lewisville. Keep Winston-Salem Beautiful (KWSB) and Recycle Today (Winston-Salem's contracted recycling program) sponsor the following special educational events:

- Clean and Green School Campus Contest – A major environmental review of Forsyth County Public Schools. KWSB and the Forsyth County Garden Club Council judge schools on their beautification and environmental education programs. “Clean & Green” flags and certificates are awarded to outstanding schools and exemplary or role model schools also receive engraved plaques and trees.
- Earth Day Celebration – Each April KWSB and the CCUC offer to conduct presentations in Forsyth County schools and other local groups on recycling, litter prevention, composting and environmental education. The purpose is to increase awareness of environmental issues at an early age and to encourage children to appreciate our natural resources. Similar presentations are also conducted throughout the course of the year as requested. KWSB is a system-wide school partner.

City of Winston-Salem and KWSB programs are promoted at community events and fairs. Additionally, video and radio advertising are used to educate the public.

Kernersville promotes its programs and events through an annual calendar distribution. The Stormwater and Sanitation Divisions work together to create a residential packet of information that contains a magnetic calendar of events, stormwater information, and recycling and solid

waste information. This packet is distributed manually to each residence in the fall, and has improved the Town's method of communication with residents immensely and resulted in more efficiency and cost savings.

The Towns of Rural Hall and Lewisville promote waste reduction and recycling in their bi-monthly newsletters that are mailed to residents. The Town of Lewisville also has an active Recycling Committee. The Town of Lewisville participates in the Earth Day celebration by conducting programs at local schools, including Lewisville Elementary, Meadowlark Elementary, Vienna Elementary and Southwest Elementary.

The Town of Kernersville participates in several Town events, such as the Spring Folly and the Honey Bee festivals, to promote recycling, waste reduction, and general education to the public. Representatives from the recycling program set up booths at these events, give out prizes and answer the public's questions. The Town also provides commingled recycling services at these events. Kernersville held its first Earth Day event on April 22, 2009, which was focused on environmental issues, including waste reduction, reuse, recycling, and water quality. The event also promoted local businesses, and sustainability issues.

One of the primary tools for Kernersville's recycling education efforts has become data gathering and analysis to further increase quality participation in the recycling program. DPPEA grant funding allowed the Town to conduct a comprehensive curbside recycling participation study in the Spring of 2008 to determine which of its residential areas had the lowest recycling participation rates and worst contamination rates. The study was very successful in that it provided statistical evidence of disparities in recycling behavior between certain neighborhoods in the Town. In 2008, Kernersville standardized its recycling slogan and logo in order to create a fresh face to the program and create a distinct brand for the recycling program. The logo is printed on the Town's recycling fleet and on T-Shirts that are distributed at community events.

Many program providers, both public and private, have begun to use the resources of the internet in order to promote their waste management programs and services. The City of Winston-Salem has a quarterly on-line newsletter entitled *Cart and Bin* that is used to educate, promote and encourage appropriate waste management practices.

In addition to purely educational activities at county schools, the CCUC funds a comprehensive, voluntary recycling program for the entire Winston-Salem/Forsyth County School District. The CCUC contracts with WMI to collect cardboard, mixed office paper and beverage containers from all the public schools in the county. The program operates on 71 school campuses and at four (4) other support facilities. The CCUC spends approximately \$72,000 annually to fund this program and provides administrative services to operate the program. It is estimated that approximately 2,000 tons of recyclables are collected through this program each year.

### **Intended Actions**

The CCUC and the City of Winston-Salem consider educating the general public and business community on ways to reduce, reuse and recycle to be a high priority, and intend to make recommendations in support of these activities to City staff and the Utility Commission. Additional emphasis will be placed on using internet resources as a means to educate, promote

and encourage appropriate waste management practices.

The Town of Kernersville plans to conduct its participation studies semi-annually and use the data to create targeted education campaigns in areas with low participation rates. Particular attention will be paid to the non-English speaking populations as well as rental properties with high tenant turnover rates. The first of these targeted education campaigns began in the Spring of 2009, in which a control group and experimental group was studied before and after the distribution of targeted recycling promotional materials. Through this study, the Town will be able to see the impacts, if any, of its educational efforts.

## 5.10 Special Wastes

The programs for the management of special wastes cover tires, white goods, motor oil household hazardous waste, electronic waste (e-waste) and abandoned manufactured homes. All special waste programs are operated in partnership with the private sector. The amounts of special wastes being recycled are provided in Table 5-5. Programs for the management of these materials are discussed in the remainder of this section.

**Special Wastes Managed, FY 2007-08**

Waste Material	Amount Recycled
Scrap Tires	5,072 tons
White Goods	867 tons
Used Motor Oil	7,276 gallons
Household Hazardous Waste	218 tons
e-wastes	24 tons

**Table 5-5**

### 5.10.1 SCRAP TIRES

#### Current Programs

In North Carolina, discarded, whole, pneumatic, automobile and truck tires are banned from disposal in landfills. In Forsyth County, used tires are accepted at Hanes Mill Road Landfill for either disposal or recycling. All tires on which the North Carolina State excise tax has been paid are accepted free at the landfill. Tires that are considered ineligible for free disposal because they were not assessed the North Carolina excise tax are accepted at a rate of \$77.50/ton for passenger and truck tires and \$163.00/ton for off-road tires. Solid rubber tires are accepted and disposed free at the landfill then charged to the Scrap Tire Grant Program at \$34/ton. All other tires are accepted free and sent for recycling or disposal to U. S. Tire in Concord, NC.

Forsyth County residents are allowed to bring up to five tires per household per year at no charge. Under certain circumstances, Forsyth County property owners are allowed to dispose of more than five (5) tires per year through the Scrap Tire Cleanup Program. Tire clean-ups must be pre-authorized by CCUC staff before property owners bring the tires to the landfill. All commercial scrap tire generators in Forsyth County must submit a Scrap Tire Certification Form to the CCUC before tires will be accepted. Used pneumatic tires received at Hanes Mill Road Landfill are stored in trailers until full then transported to U. S. Tire in Concord, NC for processing.

The CCUC's Tire Recycling Program accepted 5,939 tons of used tires in FY 2007-08, 160 tons of which were solid rubber tires disposed at Hanes Landfill. The remaining 5,779 tons were transported to U. S. Tire for recycling/disposal. U. S. Tire estimates that it recycles 85% of all tires transported from Forsyth County and disposes of the rest. Based on this, approximately 4,912 tons of tires were recycled while the remaining 867 tons were disposed in the U. S. Tire monofill.<sup>25</sup> The total cost of managing used tires in FY 2007-08 was \$479,624 of which \$447,540 was reimbursed by the State through the Scrap Tire Disposal Tax and Scrap Tire Grant Program.

The Town of Kernersville pays the state tire disposal tax and is not charged for disposal of the approximately 45 tons of waste tires generated annually in house. Many of Kernersville's tires are retreaded and placed back on the market. Kernersville does not collect or dispose of tires from residents but refers them to the CCUC Tire Recycling Program.

### **Intended Actions**

Because the current used tire collection and management program in Forsyth County appears to serve the citizens well, there are no operational changes planned. The CCUC will continue its attempt to receive 100% State reimbursement for all costs of managing tires.

## **5.10.2 WHITE GOODS**

### **Current Programs**

Several municipalities in the planning area collect white goods as part of their residential solid waste services. The Town of Kernersville collects white goods from residents as needed and accepts scrap metal and white goods drop offs from Town residents at the Public Works site. This material is then picked up by a local scrap processor. The Town of Rural Hall collects white goods once per week. White goods containing Freon are taken to the white goods processing center at Hanes Mill Road Landfill. The remaining white goods are delivered to a local scrap processor. The Villages of Clemmons and Tobacoville and the City of Winston-Salem collect white goods as part of their annual bulky item collection service. The City of Winston-Salem provides this service from March through August of each year and collects once from each eligible residence in the service area during this period. White goods collected from these programs are taken to the white goods processing center at Hanes Mill Road Landfill.

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25 Scrap Tire Management Annual Report, July 1, 2007 - June 30, 2008, Forsyth County, NC. Estimated 85% recovery rate from personal conversation w/Scott Fowler, U. S. Tire, 3/20/2006.

White goods are accepted free at the white goods processing center located at Hanes Mill Road Landfill. The white goods processing center is a storage, staging and transfer facility that facilitates customer vehicle unloading, transfer trailer loading and Freon evacuation. In 2008, the CCUC executed a contract with a new vendor, Atlantic Scrap & Processing (ASAP) in Kernersville, to manage its white goods program. ASAP evacuates the Freon from the appliances while still at the white goods processing center. The white goods are then transported to their scrap metal processing facility in Kernersville for recycling.

In FY 2007-08, the white goods processing center at Hanes Mill Road Landfill received 808 tons of white goods. Under contract with ASAP, 487 pounds of refrigerant were removed from appliances and recycled. In FY 2007-08 the total cost of the White Goods Management Program was \$50,900 and gross revenues from the sale of the scrap metal were \$98,515 resulting in a net revenue of \$47,614. Forsyth County is currently ineligible to receive reimbursement for white goods management from the State.

### **Intended Actions**

The CCUC will continue to evaluate its new contractor for the management of White Goods. There are no plans to modify the program during the next three (3) years.

## **5.10.3 USED MOTOR OIL**

### **Current Programs**

Collection of used motor oil is provided free to residents of Forsyth County at the Enviro-Station (see the following section for a full description of the services provided by the Enviro-Station). During FY 2007-08, this program collected 7,276 gallons of used motor oil. Additionally, some auto parts stores and oil change service centers accept used motor oil as a part of their services. It is unknown whether these businesses charge a fee for the service. The Cooperative Extension Service operates an oil recycling program called HERO for Help the Environment, Recycle Oil. This program, targeted at the agricultural community, provides fact sheets and videos on the environmental consequences of improper disposal. Used motor oil and oil filters are collected from the Kernersville fleet and sent to a processor.

### **Intended Actions**

There are no plans to modify used motor oil management practices at this time.

## **5.10.4 HOUSEHOLD HAZARDOUS WASTE**

### **Current Program**

Household hazardous waste management in Forsyth County is administered by the CCUC through an agreement with 3RC, a local waste management company specializing in HHW and CESQG waste management. 3RC provides daily HHW collection services through the Enviro-Station, which is operated out of its own permanent facility located on Martin Luther King

Drive. Examples of items accepted at the Enviro-Station are as follows:

- Paint & related products
- Pesticides
- Fuels
- Aerosols
- Antifreeze
- Fertilizers
- Pool chemicals
- Used motor oil
- Acids
- Bases
- Batteries

In FY 2007-08, the Enviro-Station accepted 435,258 pounds of HHW from 779 participants. Paint and paint related products continue to make up over 50% of all HHW materials delivered to the facility. The total cost for this program in FY 2007-08 was \$336,872.

The CCUC has approval from the Division of Waste Management to use screened latex paint from the Enviro-Station as an additive to its ADC, Posi-Shell. Tests showed that the inclusion of latex paint did not adversely affect the performance of the ADC and may actually help it better adhere to the waste. This arrangement allows the CCUC to better manage and beneficially reuse the large latex paint waste stream from the HHW program. In FY 2007-08, almost 95 tons of latex paint were used in this program.

### **Intended Actions**

The CCUC is currently amending its contract with 3RC, the contractor that operates the Enviro-Station, to accept more materials and reduce unit costs. Under the proposed new contract, the Enviro-Station will begin accepting e-waste, including console TVs, an extremely problematic e-waste for which there are few safe disposal outlets available. This was done in anticipation of the conversion to all digital television broadcasts in June, 2009 which may create a large increase in the number of old television sets to be disposed. The CCUC and all local governments will continue to promote the existence and use of the Enviro-Station in all of their educational and outreach materials targeted to residential customers. The new contract will also allow for increased amounts of latex paint to be used at Hanes Mill Road Landfill as an ADC additive.

### **5.10.5. ELECTRONIC WASTE**

#### **Current Programs**

Dell Computer, in conjunction with the City of Winston-Salem and other local sponsors, held an e-recycling day for all Forsyth County residents on June 25, 2005. This event served 680 participants (vehicles) and collected 46 tons of various electronic materials for recycling.

Partly as a result of the extremely successful e-waste recycling event held in 2005, Dell Computers and Goodwill of Northwest North Carolina have partnered to create ReConnect, a computer and electronic reuse/recycling program available to all of northwestern North Carolina including Forsyth County. Through this program, any computer or related equipment can be taken to any attended Goodwill drop-off location in the area served by Goodwill of Northwest North Carolina. In Forsyth County alone, there are 20 locations participating in the program. Many of the computers and parts are reused by being resold through Goodwill Stores. Unusable parts are recycled through a local electronic recycling facility.

For the past seven (7) years, the Town of Kernersville has held an e-recycling event every January to collect electronic devices, CRT's, and batteries. In 2009, Kernersville collected e-waste from 660 residents and businesses over the course of two weeks, and diverted over 30 tons of material from the landfill. All materials collected at these events were shipped to electronic recycling companies for recovery and reclamation of parts. Since 2006, the CCUC has provided partial funding to Kernersville e-waste program as a means to offset the costs of the program resulting from the participation of residents outside the Town limits. This partnership may continue until a more permanent e-waste management solution for the entire county is found. In anticipation of final approval of a new contract between the CCUC and 3RC, e-waste is now being collected by the Enviro-Station.

### **Intended Actions**

The CCUC is negotiating a new contract with 3RC the current vendor for the HHW Program. Please see Intended Actions under 5.10.4 for details about the management of e-waste under the proposed changes to the HHW Program. The CCUC and the City of Winston-Salem strongly encourage residents to use the services provided through the ReConnect Program offered by Dell Computers and Goodwill of Northwest North Carolina.

The Town of Kernersville will continue to hold its e-recycling drop-off event for town and county residents in January. Kernersville plans to create a year-round electronics recycling drop-off program beginning in FY10.

### **5.10.6 ABANDONED MANUFACTURED HOMES**

Presently, Forsyth County has chosen not to implement a plan to manage abandoned manufactured homes. When the County develops a plan for the management of abandoned manufactured homes, a copy will be submitted to the DENR regional office for inclusion in the Solid Waste Management Plan.

## **5.11 Illegal Disposal and Litter**

### **Current Programs**

#### ***Illegal disposal***

The Forsyth County Environmental Health program addresses illegal disposal matters especially in the form of investigating sites that have been reported by concerned citizens. Recently, there has been a substantial increase in the number of these sites reported and investigated by County staff. Many of these sites contain scrap tires or construction and demolition debris. In the City of Winston-Salem, the Department of Housing and Neighborhood Services handles complaints concerning vacant property with illegal dumping that are within the City boundaries.

### *Litter management*

The City of Winston-Salem has a policy for the prevention of litter in the form of the City Sanitation Code. The code incorporates language to reference litter in general. The policy also allows the police to cite people according to the state litter laws, while the City Code allows for a 30-day imprisonment. The CCUC has a covered loads policy for vehicles entering the landfills designed to prevent waste from being blown from loads in transit.

Keep Winston-Salem Beautiful (KWSB), the local affiliate of Keep America Beautiful, has as its primary focus litter prevention and beautification within the host community. By working closely with other City of Winston-Salem divisions and private businesses, KWSB coordinates and conducts many events held throughout the year that promote litter prevention and environmental education. Key programs are as follows:

- Clean and Green School Campus Contest - A major environmental review of Forsyth County Public Schools. KWSB and the Forsyth County Garden Club Council judge schools on their beautification and environmental education programs. “Clean & Green” flags and certificates are awarded to outstanding schools and exemplary or role model schools also receive engraved plaques and trees.
- Adopt-A-Street – Individuals, community and civic organizations and businesses adopt a section of one or more city streets and agree to collect litter at least six times per year. Signs are erected at each location, supplies are provided and trash is collected. Currently there are over 70 adopted streets in Winston-Salem. State maintained streets are similarly treated through the NCDOT Adopt-A- Highway Program.
- Adopt-A-Stream – A new program co-coordinated by KWSB and the City’s Storm Water Division, individuals, community and civic organizations and businesses adopt a section of a local waterway and agree to remove trash and bulky items at least two times per year and monitor the water quality. Signs are erected at each location, supplies are provided and trash is collected. Currently there are over 20 adopted waterways in Winston-Salem.
- Adopt-A-Park – A program in which individuals, community and civic organizations and businesses adopt a city park and agree to collect trash at least four (4) times per year. Signs with the group’s name are erected at each park, supplies are provided and trash is collected. Currently there are 20 adopted parks in Winston-Salem.
- Sign Sweepers – A program in which individuals, community and civic organizations and businesses adopt a section of a city street or streets and agree to remove and dispose of illegally placed signs along the public right-of-way or on utility poles throughout the year. Currently there are 12 adopted areas in Winston-Salem.

- Great Winston-Salem Clean Up – Annual cleanup in April is part of the national Great American Cleanup coordinated by Keep America Beautiful. Hundreds of volunteers select or are assigned to cleanup specific streets, parts or neighborhoods. In 2008, over 9,800 volunteers collected over 14 tons of trash and debris.
- Big Sweep – Held every fall, this annual event is conducted nationwide and utilizes volunteers to clean up the City’s creeks, streams, and lakes. In past years, the NC Big Sweep organization presented Forsyth County with the Outstanding Community Involvement Award for their volunteer turnout and volume, the largest in the state. In 2008, nearly 3,500 volunteers removed over 16 tons of trash and debris from local waterways.

KWSB also conducts an annual ‘Litter Index’ of Winston-Salem as required by the parent organization, Keep America Beautiful. The city is divided up into nearly 100 sub areas based on land usage. Teams drive through these areas and assign scores based on the presence or absence of litter along roadways. Winston-Salem received a score of 1.79 in 2008 with 1 being litter free and 4 being an illegal dump. This annual study is used to target future cleanup activities for KWSB events and ongoing programs.

The Town of Lewisville Beautification Committee coordinates an Adopt-A-Street program as well as an annual town-wide one-day event to pick up trash in right-of-ways and other public property. The Town also uses court-ordered community service workers to pick up litter from right-of-ways. The Village of Clemmons coordinates an Adopt-A-Street program as well as two annual Village-wide events to pick up trash in right-of ways and on other public properties. One pickup is in cooperation with service requirements for students and the other pickup is provided by volunteer groups.

The Town of Kernersville participates annually in the NC Department of Transportation Spring Litter Sweep Campaign. In 2007, it began working with volunteers and community groups to increase clean-up efforts and promote litter awareness. The 2009 Kernersville Earth Day celebration was used as a platform from which to promote litter sweep activities and distribute litter sweep supplies to conscientious citizens.

**Intended Actions**

***Illegal disposal***

To address illegal disposal and other issues, the County will seek the assistance of local law enforcement officials and decision-makers to address remaining problems and to assist in illegal dumping abatement program development. All reported illegal disposal sites will continue to be investigated and attempts made to identify the responsible party. One abatement measure that remains under review is providing solid waste collection service to unincorporated residents under a mandatory pay system which should help reduce unauthorized disposal practices as well as improve collection efficiencies in the rural areas of the county.

## *Litter management*

Keep Winston-Salem Beautiful continues to increase its litter prevention education programs in the schools and the community. The Town of Kernersville will continue to participate in the Spring Litter Sweep activities and explore ways to increase volunteerism in this program

### **5.12 Purchasing Recycled Products**

#### **Current Program**

As the result of a DPPEA grant, the Town of Kernersville has adopted an Environmentally Responsible Purchasing Policy (ERPP), which promotes the purchase of recycled content materials and environmentally preferable products by Town employees and officials, as well as contractor purchases. The Town of Kernersville Board of Aldermen passed a Town-wide resolution in 2005 to encourage environmentally preferable purchasing among all Town departments, including the practice of buying 30% post consumer recycled-content paper, recycled content products, and buying local products and services.

#### **Intended Actions**

The CCUC will continue to encourage the City/County Purchasing Division and area businesses to establish a policy to purchase supplies with recycled content if cost effective. Commission staff will utilize the resources of the Buy Recycled Business Alliance to promote and measure the effectiveness of these initiatives. The Town of Kernersville will continue promoting its ERPP among its departments.

### **5.13 Disaster Response**

#### **Current Program**

The current disaster response program provides for the efficient removal of debris from primary traffic thoroughfares, storing collected material in designated sites located in both the County and the City, and removing these materials for ultimate disposal or reuse. Storm debris is managed through the combined efforts of government and private agencies as well as citizens at large. In many cases, private collectors/haulers are contracted through government agencies to clean up storm debris from public right-of-ways and transport it to permitted sites for ultimate disposal or processing.

The CCUC has identified five (5) strategic locations where storm debris may be staged and/or processed. The Overdale Yard Waste Facility, the Forum 52 Yard Waste Facility and the Shorefair Drive Leaf Site, all of which are already permitted and used for other yard waste storage/processing, would be used for storm debris management. In addition two closed MSW landfills, Ebert St. Landfill, and Overdale Rd. Landfill, will be used for storm debris storage if the need arises. Any necessary permitting will be obtained prior to the use of these sites for storm debris management.

### **Intended Actions**

The CCUC will complete all necessary permitting documents to add the 2 additional disaster response sites to the DENR database and make them available for use in the case of a natural disaster in the planning area.

## **Section 6**

### **PRIVATE ENTERPRISE CONSIDERATION**

Forsyth County has numerous private waste management companies operating within its boundaries. Referring back to Table 5-1 shows the names and waste streams managed by the various companies. The municipalities in Forsyth County use a combination of publicly and privately operated programs to provide their services. Waste collection is provided by public operations in Winston-Salem and Kernersville and is contracted to private enterprise in the remaining municipalities and unincorporated areas of Forsyth County. With the exception of Kernersville, recyclables are collected solely by private companies, as are household hazardous wastes. Please see Appendix F for a more detailed listing of public/private participation in waste programs in Forsyth County.

Waste management facilities in Forsyth County are both publicly and privately operated. The CCUC operates a MSW and C & D waste landfill. Republic Services operates the Overdale Road Transfer Station for MSW. Wrico, a contractor to the CCUC, operates the Overdale Road and Forum 52 Yard Waste Facilities. In addition, the HHW Program, the White Goods Collection Program and the LFG Recovery system are all operated by private contractors on behalf of the CCUC. Appendix C-2 is a more detailed listing showing the level of private participation in waste disposal and processing services in Forsyth County.

The CCUC, Forsyth County and its municipalities will continue to consider opportunities to involve the private sector in managing solid waste and recycling programs.

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## **Section 7**

# **SOLID WASTE MANAGEMENT COSTS AND FINANCING METHODS**

North Carolina General Statute 130A-309.08 requires that counties and municipalities determine and report annually the full cost of solid waste management services in their service area to all residential and non-residential users of the services. The mechanism by which this is accomplished is most often through the Solid Waste Management Annual Report completed annually by each municipality and county. Part I of the Annual Report contains full cost data for solid waste collection, disposal, recovery, and mulching/composting programs. This section of the Plan provides a summary description and assessment of solid waste management costs as reported by the CCUC and each municipality based upon each jurisdiction's FY 2007-08 Solid Waste Management Annual Report, and updated information provided by selected jurisdictions. It also includes a summary of financing methods for CCUC operated programs and services.

The CCUC continues to have its Cost of Service Study, a full cost analysis (FCA) that was performed by an independent consultant and initially published in October 2004, updated periodically. The last update was published in 2006 and is currently being updated again. This FCA allocates all identified annual costs to 14 service centers (programs, services or facilities) over a 20+-year planning period. Capital and other multi-year costs are included and amortized over the life of the asset/facility or the planning period, whichever is most appropriate. Costs from the FCA are then used as a basis to construct a 20-year financial model, which shows projected operating results for all 14 service centers operated by the CCUC and fund balances. Included in this 20-year financial model are all planned capital projects that will assure adequate solid waste management capacity during the planning period and beyond. A benchmarking study, also written by an independent consultant and updated periodically, reports the effectiveness and efficiency of CCUC programs compared to their public and private counterparts.

### **7.1 Costs – Descriptions and Assessment**

Table 7-1 shows total annual solid waste management costs and per-household costs for each municipality included in the Plan. Annual costs reflect administrative, public education, and code enforcement costs as well as (for some communities) bulk container collection services not reflected in the per-household costs for specific services provided to residents of single family and low density multi-family dwellings. Costs for collecting waste and recyclables vary with the nature of services provided, the size of the town, and other variables so caution is advised if comparing costs between municipalities. Comprehensive data may be unavailable for all communities. As each jurisdiction refines its record keeping and accounting methods, reporting of more accurate and detailed cost information will be possible in future years.

## Municipal Solid Waste Management Costs by Program Type, FY 2007-08

Municipality	Total Annual Costs	Residential SW Collection & Disposal \$/hhld./mo.	Yard Waste Collection \$/hhld./mo.	Curbside Recycling \$/hhld./mo.
Bethania	\$33,587	\$9.75 (curb)	none	\$3.90
Clemmons	\$1,312,028	\$10.58	\$2.89 <sup>26</sup>	\$2.19
Kernersville	\$1,853,787	7.42	\$4.99 <sup>26</sup>	\$2.25
Lewisville	n/a	\$8.70	n/a	\$2.13
Rural Hall	\$174,000	\$8.77	\$0.62	\$2.78
Tobaccoville	\$140,175	\$7.88	none	\$2.65
Walkertown	\$280,963	\$10.12	none	\$2.30
Winston-Salem	\$11,965,310	\$9.25	\$4.25 <sup>26</sup>	\$2.23 <sup>27</sup>

**Table 7-1**

The CCUC operates an integrated solid waste management system for Forsyth County through a slate of 13 comprehensive services.<sup>28</sup> These 13 services and programs comprise four (4) major categories of expenses in the CCUC budget.

- **Administration** (provides administrative support for all solid waste services)
- **Disposal Services**
  - Hanes Mill Road MSW Landfill
  - Old Salisbury Road C & D Landfill
  - Ebert Road Landfill (closed)
- **Yard Waste Services**
  - Overdale Road Yard Waste Facility
  - Forum 52 Yard Waste Facility
  - Reynolds Park Road Leaf Site
- **Recycling Services**
  - HHW Collection Center
  - White Goods Processing
  - Tire Recycling
  - City of Winston-Salem Curbside Recycling
  - County Drop-Off Recycling
  - School Recycling

Table 7-2 below shows the FY 2007-08 actual costs and FY 2009-10 budgeted costs for all 13 existing programs offered by the CCUC. Figure 7-1 is a graphical illustration of how the four major expense categories are allocated across the entire solid waste budget.

<sup>26</sup> Yard waste cart purchase fee charged only to voluntary, participating households.

<sup>27</sup> Gross cost. Does not include recycling commodity revenue offset.

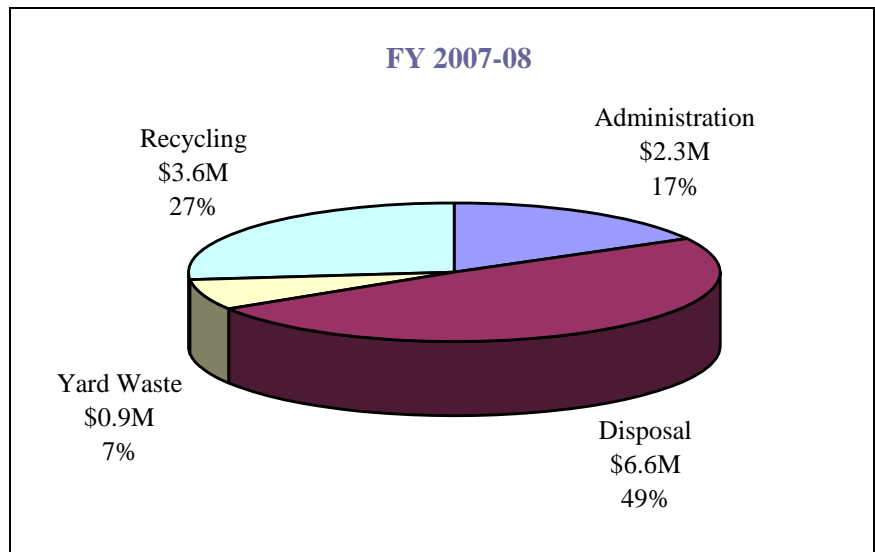
<sup>28</sup> These are not the same services and programs described in the Cost of Service Study

### Summary of Annual Operating Costs for CCUC Solid Waste Management Services

Service Description	Actual FY 2007-08	Budgeted FY 2009-10
Administration	\$2,263,558	\$2,294,890
Hanes Mill Road MSW Landfill	\$5,013,989	\$5,013,060
Old Salisbury Road Landfill	\$1,555,709	\$1,906,120
Ebert Road Landfill (closed)	\$24,183	\$64,140
Overdale Yard Waste Facility	\$564,103	\$638,490
Forum 52 Yard Waste Facility	\$113,067	\$144,020
Reynolds Park Road Leaf Site <sup>29</sup>	\$267,971	\$27,540
HHW Collection Center	\$332,053	\$322,460
White Goods Processing	\$8,776	\$0
Tire Recycling	\$498,613	488,030
City of W-S Curbside Recycling	\$2,500,878	\$2,736,720
County Drop-Off Recycling	\$170,704	\$218,030
School Recycling	\$68,164	\$75,000
<b>Total</b>	<b>\$13,371,768</b>	<b>\$13,928,500</b>

**Table 7-2**

### Annual Operating Expenses For CCUC Solid Waste Management Services



**Figure 7-1**

<sup>29</sup> In FY 2007-08, leaf transfer costs of \$246,366 were reimbursed by the Sanitation Division leaving a net cost of \$21,605. In future years, the Sanitation Division will pay for the leaf transfer costs directly.

In addition to these annual operating expenses, the CCUC has budgeted capital expenses in FY 2009-10 of approximately \$2.3M. Table 7-3 provides a breakdown of the capital expenses related to existing and future solid waste programs offered by the CCUC. These listed capital expenses are only for one year and the amounts vary greatly from year to year based on project schedules. The Forum 52 yard Waste Facility opened recently in 2007 so most capital expenses for it occurred in earlier years. The largest capital expenses for Hanes Mill Road Landfill are typically for cell construction in the years when it occurs. All capital expenses, except for closure and post closure care, are paid for with a combination of cash reserves and bond proceeds. Closure and post closure care costs are paid for using funds out of a separate, restricted account.

**Summary of Capital Expenses  
For CCUC Solid Waste Management Services**

Facility/Service/Program Name	Actual FY 2007-08	Budgeted FY 2009-10
Hanes Mill Road Landfill	\$68,307	\$1,172,000
Old Salisbury Road Landfill	\$1,805	\$625,275
Future C & D Landfill	\$46,184	\$500,000
Forum 52 Yard Waste Facility	\$276,450	\$0
<b>Total</b>	<b>\$392,747</b>	<b>\$2,297,275</b>

**Table 7-3**

## **7.2 Financing Methods**

The solid waste collection programs for the municipalities in Forsyth County are funded by property taxes that pay for the cost of collection and disposal, with one exception. The City of Winston-Salem charges user fees to cover the cost of collecting and disposing of bulk container (dumpster) waste, all of which comes from multi-family housing units, businesses or institutions. The recycling programs of the smaller municipalities are also tax supported. The City of Winston-Salem curbside recycling and the County drop-off recycling programs (2 sites, not including the one at Hanes Mill Road Landfill) are funded by the CCUC.

The implementation of SB1492 in 2008 imposed a \$2/ton State tax on all disposed waste in North Carolina. This tax applies to two CCUC operated facilities, Hanes Mill Road Landfill and Old Salisbury Road Landfill. Every permitted solid waste disposal facility in North Carolina is required to make quarterly remittances to the State of \$2/ton for every ton of waste disposed or transferred out of the State. Subsequently, the State Department of Revenue makes a quarterly distribution of a portion of the collected funds to the cities and counties based on population. Table 7-4 shows the first quarterly distribution amounts of the Solid Waste Disposal Tax returned to local governments in Forsyth County. These funds will be used to help pay for and expand existing solid waste programs and add new ones.

### Solid Waste Disposal Tax Distributions

Local Government	For Quarter Ending 12/31/2008
Bethania	\$54
Clemmons	\$2,548
Kernersville	\$3,135
Lewisville	\$1,903
Rural Hall	\$378
Tobaccoville	\$375
Walkertown	\$683
Winston-Salem	\$31,996
Forsyth County	\$8,311

**Table 7-4**

The CCUC's largest revenue source is landfill tip fees. Other sources include commodity revenues, inter-governmental transfers, property rental, gain/loss on sale of assets and investments. Prior to FY 2008-09, investments provided a significant source of revenue to the CCUC and helped assure a healthy fund balance. However, recent economic events have created losses in these same investments.

Tip fees are charged at four (4) of the CCUC's solid waste facilities: Hanes Mill Road Landfill, Old Salisbury Road Landfill, Overdale Road Yard Waste Facility and Forum 52 Yard Waste Facility. A two-tier tip fee system is employed at Hanes Mill Road Landfill where large, commercial customers who deliver at least 700 tons of MSW to the landfill per month pay \$30/ton while all others pay \$34/ton. Customers of Old Salisbury Road Landfill pay \$28/ton.<sup>30</sup> Citizens who deliver waste in cars, cars with trailers or pickup trucks to either facility pay a minimum flat fee based on estimated weights for vehicles; they are not weighed. The tip fee at both Overdale Road Yard Waste Facility and Forum 52 Yard Waste Facility was \$27/ton in FY 2007-08 and is now \$29/ton. Table 7-5 presents funding sources for CCUC Solid Waste Management Programs. Daily operating costs at the landfills operated by the CCUC are entirely supported by tipping fees. Until recently, the fees covered daily operations, construction, future site development, closure and post-closure care. Due to substantial increases in costs for non-disposal related services funded by the CCUC and a dramatic reduction in incoming tonnages at both landfills, fund balances are declining rapidly and diminishing the ability to build cash reserves to finance future waste disposal resources.

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<sup>30</sup> The new \$2/ton solid waste disposal tax applies to Hanes Mill Rd. Landfill and Old Salisbury Rd. Landfill, which is added to the tip fees at both of these facilities.

### Sources of Funding for CCUC Solid Waste Programs

Source of Funds	Actual FY 2007-08	Budgeted FY 2009-10
Facility Use Fees (Tip Fees)	\$11,347,903	\$8,741,640
NC Tire Tax Income	\$474,303	\$466,460
NC White Goods Tax Income	\$0	\$0
NC Solid Waste Disposal Tax Income	\$0	\$161,200
Recycling Commodity Sales	\$445,920	\$182,330
Resource Recovery <sup>31</sup>	\$244,982	\$106,280
Investment Income	-56,500	\$-4,260
Miscellaneous Revenues <sup>32</sup>	\$48,488	\$33,230
<b>Total</b>	<b>\$12,505,096</b>	<b>\$9,686,880</b>

**Table 7-5**

Given that substantial tip fee revenue received at these facilities is ultimately paid by the municipalities, the Utility Commission utilizes some of the revenue to support recycling programs and facilities benefiting all jurisdictions, namely the recycling centers at the Hanes Mill Road Landfill, Kernersville, and Pfafftown, the City of Winston-Salem's curbside recycling program, and the Enviro-Station HHW collection program. State excise taxes and landfill tipping fees fund the tire management program. The CCUC absorbs any net expense for the white goods program because it is currently ineligible to receive funds from the White Goods Management Account.

The current mechanisms for financing the county's integrated waste management system are insufficient to assure the continuation of programs that do not have their own dedicated funding source. Fee-based services are working fairly well overall, however the current economic downturn has created serious challenges while operating within tight budgets. FY 2007-08 was a year in which the CCUC had to appropriate \$785,500 of fund balance in order to cover expenses. Fund balance appropriations for FY 2008-09 and 2009-10 are projected to be significantly higher. Hanes Mill Road Landfill generates revenues that cover current operations as well as sufficient reserves for construction and maintenance of the landfills and post-closure requirements. However, almost all other solid waste programs in Winston-Salem and other municipalities are dependent upon general fund and landfill tip fee revenues. As more waste is sent to out-of-county landfills, the ability of the CCUC to continue to fund non-disposal related programs will diminish.

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31 Includes revenue from the sale of methane gas & charges for the reuse of latex paint at HMR LF.

32 Includes revenue from rental property and gain/loss on sale of assets.

## **APPENDIX A**

### **Notice of Public Meeting**

#### **PUBLIC MEETING NOTICE**

The Winston-Salem/Forsyth County Utility Commission will hold a public meeting Monday, May 11 on the Forsyth County 10 Year Solid Waste Management Plan Update. The purpose of this meeting is to receive public comment on the three-year update to the Plan. This public meeting will be held during the Utility Commission's regularly scheduled meeting beginning at 2 p.m. in the Winston-Salem City Council Chamber, Room 230, City Hall, 101 N. Main Street, Winston-Salem, NC.

Draft copies of the update to the 10 Year Solid Waste Management Plan will be available for review at all municipal town halls in Forsyth County; the main branch of the Forsyth County Library, 660 W. Fifth St. Winston-Salem; and at the City/County Utilities Division Administrative Offices, 101 N. Main Street, Suite 357, Winston-Salem, NC.

For more information, call the Utilities Division at 747-7320.

## **APPENDIX B**

### **Resolutions from Participating Local Governments Adopting the Plan**

RESOLUTION OF CITY/COUNTY UTILITY COMMISSION  
ADOPTING THE 2009 SOLID WASTE PLAN UPDATE FOR  
THE CITY OF WINSTON-SALEM AND UNINCORPORATED FORSYTH COUNTY

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WHEREAS, in August 1996, the State of North Carolina adopted a statute that required all governmental units to develop a Solid Waste Management Plan that would attempt to meet the State's goal of reducing waste; and

WHEREAS, in 1997, 2000, 2003 and 2006, the Utilities Staff developed a 10 Year Solid Waste Plan for Forsyth County addressing these concerns; and

WHEREAS, the Commission approved these Plans in June 1997, June 2000, June 2003 and June 2006, respectively; and

WHEREAS, as required by the above reference statute, this Plan needs to be updated and submitted to the State every three (3) years; and

WHEREAS, Utilities Staff has collaborated and worked with all political jurisdictions within Forsyth County to update the Plan; and

WHEREAS, a public meeting was held by the Utility Commission on May 11, 2009 during which to receive public comment; and

WHEREAS, the staff recommends that the Commission approve this updated Plan.

NOW, THEREFORE, BE IT RESOLVED by the City County Utility Commission, a joint agency of the City of Winston-Salem and Forsyth County, finds that the 2009 Solid Waste Management Plan Update will provide appropriate guidance for the future development of solid waste needs for the City of Winston-Salem and Forsyth County, and that the Solid Waste Management Plan is hereby approved and adopted.

<p><b>ADOPTED</b></p> <p><b>June 8, 2009</b></p> <p>City/County Utility Commission</p>
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**RESOLUTION TO APPROVE THE WINSTON-SALEM/FORSYTH COUNTY  
SOLID WASTE MANAGEMENT PLAN**

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

**WHEREAS**, the Town of Bethania adopted a solid waste management plan on May 18, 2006; and


**WHEREAS**, the Town of Bethania, in cooperation with the Winston-Salem/ Forsyth County Utility Commission, realizes the need for a 3-year update to the 10 Year Solid Waste Management Plan,

**NOW, THEREFORE, LET IT BE RESOLVED** that the Board of Commissioners of the Town of Bethania hereby adopts the Forsyth County 10 Year Solid Waste Management Plan (SWMP) for the planning period of July 1, 2009 to July 1, 2019.

Adopted this 11<sup>th</sup> day of June 2009.

  
Deborah Stoltz Thompson, Mayor

ATTEST:

  
Karen Keller, Town Clerk



**Resolution Number 2009-R-09**

**RESOLUTION ACCEPTING AND ENDORSING  
THE SOLID WASTE MANAGEMENT PLAN OF 2009  
FOR THE VILLAGE OF CLEMMONS**

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 Village of Clemmons recognizes its role in the encouragement of recycling markets by purchasing recycled products;

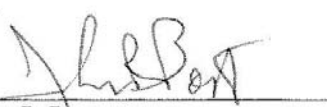
WHEREAS, involvement and education of the citizenry is critical to the establishment of an effective local solid waste program;

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

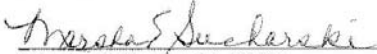
WHEREAS, NC General Statute 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other units of local government, to update the Ten Year Comprehensive Solid Waste Management Plan at least every three years;

WHEREAS, the City-County Utilities 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 VILLAGE COUNCIL that the 2009 Ten Year Comprehensive Solid Waste Management Plan is accepted and endorsed and placed on file with Clerk to the Council on this 8th day of June, 2009.

  
John R. Bost  
Mayor

ATTEST:

  
Marsha E. Sucharski, CMC  
Village Clerk



RESOLUTION NO. R-2009-15

RESOLUTION APPROVING THE WINSTON-SALEM FORSYTH COUNTY  
SOLID WASTE PLAN

**WHEREAS**, adequately planning for solid waste management and waste reduction will protect public health and the environment, provide for improved solid waste collection and disposal, better utilize our natural resources, and control the cost of solid waste management; and

**WHEREAS**, N.C General Statute 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with other units of local government to develop a 10-year comprehensive solid waste management plan; and

**WHEREAS**, the City-County Utilities Commission compiles the Plan with contributions from all municipalities within Forsyth County.

**NOW, THEREFORE, BE IT RESOLVED** that the Board of Aldermen of the Town of Kernersville hereby, approves the Winston-Salem/Forsyth County Solid Waste Management Plan.

Adopted this day June 2, 2009

  
Dawn Morgan, Mayor

ATTEST

  
Dale Martin, Town Clerk



**RESOLUTION 2009018 OF THE LEWISVILLE TOWN COUNCIL  
ADOPTING THE *SOLID WASTE MANAGEMENT PLAN*  
OF FORSYTH COUNTY AND THE MUNICIPALITIES OF FORSYTH COUNTY**

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

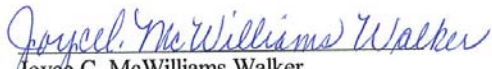
**WHEREAS**, the Winston-Salem/Forsyth County Utility Commission has prepared a draft *10 Year Solid Waste Management Plan* for the planning period of July 1, 2009 to June 30, 2019; and


**WHEREAS**, the draft plan has been reviewed by the Lewisville town staff;

**NOW THEREFORE BE IT RESOLVED THAT THE LEWISVILLE TOWN COUNCIL** adopts the draft Solid Waste Management Plan as adopted by the Winston-Salem/Forsyth County Utility Commission for submission to the State.

Adopted this 11<sup>th</sup> day of June 2009.

ATTEST:

  
Joyce C. McWilliams Walker  
Town Clerk

  
Dan R. Pugh  
Mayor



**A RESOLUTION TO APPROVE THE WINSTON-SALEM/FORSYTH COUNTY  
SOLID WASTE MANAGEMENT PLAN**

**WHEREAS**, better planning for solid waste will help protect 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,

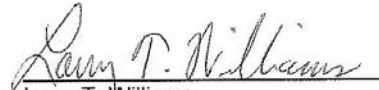
**WHEREAS**, North Carolina General Statute 130A-309.09A(b) requires each unit of local government, either individually or in cooperation with our units of local government, to develop a ten-year comprehensive solid waste management plan; and,

**WHEREAS**, the Town of Rural Hall requested to be represented by the Winston-Salem/Forsyth County Utility Commission; and,

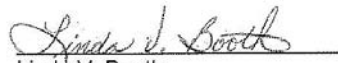
**WHEREAS**, Forsyth County is required by North Carolina statute to update the Solid Waste Management Plan every three years, due no later than June 30, 2009.

**NOW, THEREFORE, BE IT RESOLVED** that the Town Council of the Town of Rural Hall hereby approves the three-year update of the Winston-Salem/Forsyth County Solid Waste Management Plan.

Adopted this the 8<sup>th</sup> day of June, 2009.

  
Larry T. Williams  
Mayor

ATTEST:

  
Linda V. Booth  
Town Clerk

RECEIVED

JUN 12 2009

VILLAGE of TOBACCOVILLE

UTILITIES DIVISION

**RESOLUTION ACCEPTING and ENDORSING  
THE WINSTON-SALEM/FORSYTH COUNTY  
SOLID WASTE MANAGEMENT PLAN of 2009**

**WHEREAS**, better planning for solid waste will help protect public health and the environment, provide for an improved solid waste management system, better utilize our natural resources, and control the cost of solid waste management; 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 develop a 10-year comprehensive solid waste management plan and to perform updates to the plan every three years; and

**WHEREAS**, the Village of Tobacconville requested to be represented by the Winston-Salem/Forsyth County solid waste staff;

**NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE VILLAGE OF TOBACCOVILLE** that the Winston-Salem/Forsyth County 2009 Ten Year Comprehensive Solid Waste Management Plan is hereby adopted and placed on file with the Clerk to the Council, this the 4th day of June, 2009.

ATTEST:

*Robin S. Key*  
Robin S. Key  
Village Clerk



*Billy W. McHone*  
Billy W. McHone  
Mayor Pro Tem

**TOWN OF WALKERTOWN**

STATE OF NORTH CAROLINA  
COUNTY OF FORSYTH  
TOWN OF WALKERTOWN



**RESOLUTION #09-017**  
**JUNE 25, 2009**

**RESOLUTION: TO ADOPT THE FORSYTH COUNTY 10-YEAR SOLID WASTE MANAGEMENT PLAN UPDATE FOR THE PERIOD OF JULY 1, 2009 – JUNE 30, 2019**

**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 original Plan, which covered Forsyth County and all incorporated municipalities, was developed by; the City/County Utility Commission in 1997; and,

**WHEREAS**, in June, 2006, the Town of Walkertown, by resolution 06-030, approved the Forsyth County 10 Year Solid Waste Management Plan Update prepared for Forsyth County and all incorporated municipalities; and

**NOW, THEREFORE, BE IT RESOLVED** that the 2009 Solid Waste Management Plan Update as prepared by City-County Utility Commission for the period of July 1, 2009 - June 30, 2019 is approved and adopted by the Walkertown Town Council subject to our previous resolution opposing the currently proposed Construction and Demolition landfill.

**RESOLVED AND ADOPTED** this, the 25<sup>th</sup> day of June, 2009.

**ATTEST BY:**

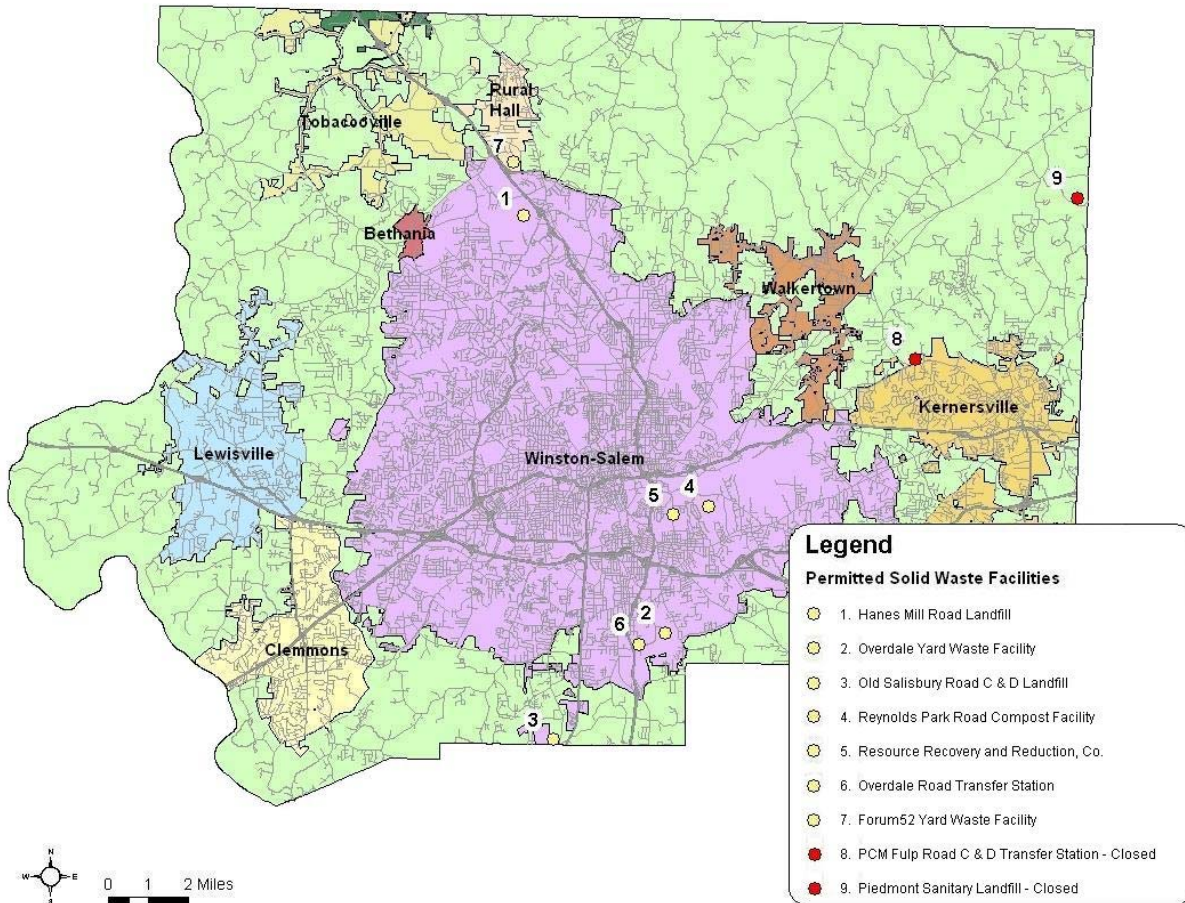
**TOWN OF WALKERTOWN**

By: Lynn McKinnie  
Lynn McKinnie  
Town Clerk

By: Kenneth R. Davis  
Kenneth R. Davis  
Mayor

# APPENDIX C-1

## Map of Planning Area Location of Municipalities Included in the Solid Waste Management Plan Location of Primary Solid Waste Management Facilities



### Forsyth County, North Carolina

## APPENDIX C-2

### Solid Waste Management Facilities in Forsyth County (Excludes LCID)

Facility Name/Type	Permit #	Owner	Operator
Hanes Mill Road Landfill MSW	3402	CCUC	CCUC
Piedmont Sanitary Landfill MSW - Closed	3406	Waste Management	Waste Management
Overdale Yard Waste Facility Compost	3409	CCUC	Wrico
Overdale Road Transfer Station MSW	34-16-T	Republic Services	Republic Services
Old Salisbury Road Landfill C & D	3412	CCUC	CCUC
Enviro-Station (3RC) HHW	3415	3RC	3RC
R. J. Reynolds Landfill Industrial	3405	R. J. Reynolds	R. J. Reynolds
Atlantic Scrap & Processing Landfill MSW	3413-TE	ASAP	ASAP
Vulcan Materials Compost	3414	Vulcan Materials	Vulcan Materials
PCM C & D MWP Facility/Transfer Station - Closed	3416-T	PCM Construction Services	PCM Construction Services
Forum 52 Yard Waste Facility Compost	SWC-34-23	CCUC	Wrico
Reynolds Park Road Leaf Site Compost	3413	CCUC	CCUC

Note:

In addition to the sites listed above, the City of Winston-Salem has DENR approval to use a leaf transfer site on Shorefair Drive. All the leaves accumulated at Shorefair Drive are ultimately transferred to the Reynolds Park Road leaf site and are accounted for there.

## APPENDIX D-1

### Waste Composition at Hanes Mill Rd. Landfill – Residential

Material Categories	% Comp.	Material Categories	% Comp.
<b>Organic Materials</b>		Non-Reinforced Concrete	0.3%
Food Waste	17.4%	Asphaltic Shingles	0.2%
Textiles	6.7%	Aluminum	0.1%
Wood (Not C&D)	3.7%	Linoleum	0.1%
Other/Composite Organic	3.5%	Rock	0.0%
Yard Waste	1.3%	Gypsum Board	0.0%
Manures	0.5%	PVC	0.0%
Ag. Crop Residues	0.1%	Asphaltic Concrete	0.0%
Tires	0.0%	<b>Total C&amp;D</b>	<b>6.7%</b>
<b>Total Organic Materials</b>	<b>33.1%</b>	<b>Inorganics</b>	
<b>Paper</b>		Electronics	3.0%
Other Paper	9.6%	Soil and Fines	2.1%
Cardboard	3.9%	Other HHW	0.5%
Newspaper	3.9%	Other Inorganic	0.3%
Chipboard	3.7%	Paint	0.2%
Magazines/Glossy	2.4%	Oil/Oil Filters	0.0%
Office Paper	1.8%	<b>Total Inorganics</b>	<b>6.1%</b>
Mixed Paper	1.3%	<b>Metals</b>	
Telephone Books	0.5%	Other Ferrous	1.9%
<b>Total Paper</b>	<b>27.1%</b>	Tin/Steel Cans	1.5%
<b>Plastic</b>		Aluminum Cans	0.7%
Film Plastic/LDPE	9.2%	Other Non-Ferrous	0.5%
Other Composite Plastic	4.2%	Other/Composite Metals	0.2%
PET Bottles and Jugs	1.9%	White Goods	0.1%
Expanded Polystyrene	1.4%	<b>Total Metals</b>	<b>4.8%</b>
Colored HDPE Bottles and Jugs	0.9%	<b>Glass</b>	
Natural HDPE Bottles and Jugs	0.4%	Clear Bottles/Containers	1.9%
<b>Total Plastic</b>	<b>18.0%</b>	Brown Bottles/Container	1.3%
<b>C&amp;D</b>		Green Bottles/Containers	0.6%
Dimensional lumber	1.6%	Other/Composite Glass	0.2%
Pressboard and other sheet lumber	1.2%	Flat Glass	0.1%
Carpet	0.9%	<b>Total Glass</b>	<b>4.2%</b>
Plywood	0.7%	<b>Special Waste</b>	
Reinforced Concrete	0.5%	Special Waste	0.0%
Other C&D	0.4%	<b>Total Special Waste</b>	<b>0.0%</b>
Ferrous Metal	0.4%	<b>Total</b>	<b>100.0%</b>
Brick	0.3%		

## APPENDIX D-2

### Waste Composition at Hanes Mill Rd. Landfill – Commercial

Material Categories	% Comp.	Material Categories	% Comp.
<b>Organic Materials</b>		Plywood	0.3%
Food Waste	12.5%	Gypsum Board	0.2%
Wood (Not C&D)	6.0%	Rock	0.1%
Other/Composite Organic	5.1%	Linoleum	0.1%
Textiles	4.9%	Aluminum	0.1%
Ag. Crop Residues	0.8%	PVC	0.0%
Yard Waste	0.7%	Asphaltic Concrete	0.0%
Manures	0.2%	Reinforced Concrete	0.0%
Tires	0.2%	<b>Total C&amp;D</b>	<b>12.2%</b>
<b>Total Organic Materials</b>	<b>30.4%</b>		
		<b>Inorganics</b>	
<b>Paper</b>		Electronics	2.6%
Cardboard	10.0%	Other HHW	1.7%
Other Paper	7.5%	Soil and Fines	1.4%
Chipboard	3.2%	Paint	0.6%
Office Paper	2.9%	Other Inorganic	0.6%
Newspaper	1.9%	Oil/Oil Filters	0.0%
Magazines/Glossy	1.9%	<b>Total Inorganics</b>	<b>6.9%</b>
Mixed Paper	1.1%		
Telephone Books	0.4%	<b>Metals</b>	
<b>Total Paper</b>	<b>28.9%</b>	Other Ferrous	1.9%
		Tin/Steel Cans	1.1%
<b>Plastic</b>		Aluminum Cans	0.5%
Film Plastic/LDPE	6.3%	Other Non-Ferrous	0.4%
Other Composite Plastic	4.1%	Other/Composite Metals	0.0%
Expanded Polystyrene	1.6%	White Goods	0.0%
PET Bottles and Jugs	1.4%	<b>Total Metals</b>	<b>3.9%</b>
Colored HDPE Bottles and Jugs	0.6%		
Natural HDPE Bottles and Jugs	0.3%	<b>Glass</b>	
<b>Total Plastic</b>	<b>14.4%</b>	Clear Bottles/Containers	1.3%
		Brown Bottles/Container	0.7%
<b>C&amp;D</b>		Other/Composite Glass	0.3%
Carpet	4.8%	Green Bottles/Containers	0.2%
Dimensional lumber	1.5%	Flat Glass	0.0%
Pressboard and other sheet lumber	1.3%	<b>Total Glass</b>	<b>2.5%</b>
Brick	0.9%		
Other C&D	0.9%	<b>Special Waste</b>	
Non-Reinforced Concrete	0.8%	Special Waste	0.8%
Asphaltic Shingles	0.8%	<b>Total Other</b>	<b>0.8%</b>
Ferrous Metal	0.4%		
		<b>Total</b>	<b>100.0%</b>

## APPENDIX D-3

### Waste Composition at Old Salisbury Road C & D Landfill

Material Categories	% Comp.
<b><u>C&amp;D</u></b>	
Non-Treated Wood	19.7%
Asphaltic Shingles	10.9%
Non-Reinforced Concrete	10.4%
OCC	8.5%
Drywall/Sheetrock	7.0%
Plastic (Other Plastic Products)	5.4%
Bricks	4.4%
Pressboard and Other Sheet Lumber	4.2%
Yard Waste	3.9%
Rock	3.6%
Treated Wood	3.1%
Insulation	2.8%
Ferrous	2.8%
Plastic Film/Wrap/Bags	2.7%
Non-Ferrous	2.3%
Other	1.8%
Paper (Other than OCC)	1.5%
MSW	1.4%
Dirt/Fines	1.3%
Carpet	0.8%
PVC	0.4%
Linoleum	0.3%
Glass	0.2%
Durables (Electrical Appliances/Compa	0.1%
Tile	0.1%
Other C&D	0.1%
Asphaltic Concrete	0.1%
Aluminum	0.0%
Tires	0.0%
Food Waste	0.0%
HHW	0.0%
Rubber	0.0%
Reinforced Concrete	0.0%
<b>Total</b>	<b>100.0%</b>

## APPENDIX E-1

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

Local government name **Forsyth County and included municipalities**

Previously established FY 2012-2013 waste reduction goal - 15%

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

Establish a new waste reduction goal -5.0%

### WASTE REDUCTION CALCULATIONS

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

CALCULATION	FY 2018-2019
1. Baseline year disposal rate - 1989-1990 (tons/per capita)	1.34
2. Percent disposal reduction goal from baseline year (per capita)	-5%
2. Targeted disposal rate (tons/capita)	1.27
4. Estimated population for July 2019 (persons)	352,041
5. Calculated disposal at baseline disposal rate (tons)	471,735
6. Targeted annual disposal to meet goal (tons)	448,148
7. Targeted annual disposal reduction to meet goal (tons)	23,587
9. FY 2007-08 year disposal (tons)	508,147
10. Per capita disposal rate for FY 2007-08 (tons)	1.50
11. Percent disposal reduction from FY 2007-08 to meet goal (per capita)	15.15%
10. Targeted annual disposal reduction from FY 2007-08 to meet goal (tons)	59,999

### WASTE REDUCTION PLAN

See Section 4.3 in Plan

## APPENDIX E-2

### Various Waste Reduction Goals for Planning Purposes

1. Baseline year disposal rate - 1989-1990 (tons/per capita)	1.34	1.34	1.34	1.34	1.34
2. Percent disposal reduction goal from baseline year (per capita)	-10%	-5%	0%	5%	10%
2. Targeted disposal rate (tons/capita)	1.21	1.27	1.34	1.41	1.47
4. Estimated population for July 2019 (persons)	352,041	352,041	352,041	352,041	352,041
5. Calculated disposal at baseline disposal rate (tons)	471,735	471,735	471,735	471,735	471,735
6. Targeted annual disposal to meet goal (tons)	424,561	448,148	471,735	495,322	518,908
7. Targeted annual disposal reduction to meet goal (tons)	47,173	23,587	0	-23,587	-47,173
9. FY 2007-08 year disposal (tons)	508,147	508,147	508,147	508,147	508,147
10. Per capita disposal rate for FY 2007-08 (tons)	1.50	1.50	1.50	1.50	1.50
11. Percent disposal reduction from FY 2007-08 to meet goal (per capita)	19.62%	15.15%	10.69%	6.22%	1.76%
10. Targeted annual disposal reduction from FY 2007-08 to meet goal (tons)	83,586	59,999	36,412	12,825	-10,761

## APPENDIX F

### Summary of Local Government Solid Waste Collection Programs

Program	Bethania	Clemmons	Kernersville
<b>Residential Curbside Recycling</b>	Govt. contract w/Kiser Weekly collection	Govt. contract w/WMI Weekly collection	Municipal Staff Weekly collection
<b>Drop-Off Recycling</b>	None	Cardboard	Cardboard at public & private sites
<b>Special Waste Programs</b>	None	None	e-recycling 1X/year for 2 weeks
<b>Commercial Waste Recycling</b>	Private contract	Private contract & govt. contract w/WMI for M/F units	Private contract & Municipal Staff
<b>Bulky Item Collection</b>	Private contractor Drop-off 1X/year	Municipal staff 1X/year	Municipal staff 1X/week
<b>Yard Waste &amp; Leaf Collection</b>	None	Per schedule Xmas trees	1X/week
<b>Resid. Waste Collection (1x Week)</b>	Govt. contract w/Kiser	Govt. contract w/WMI	Municipal staff
<b>Commercial Waste Collection</b>	Private contract	Private contract & govt. contract w/WMI for M/F units	Municipal staff Private contract
<b>Industrial Waste Collection</b>	Private contract	Private contract	Private contract

### Summary of Local Government Solid Waste Collection Programs

Program	Lewisville	Rural Hall	Tobaccoville
<b>Residential Curbside Recycling</b>	Govt. contract w/WMI, Weekly collection	Govt. contract w/WMI Weekly collection	Govt. contract w/Kiser, Bi-weekly collection
<b>Drop-Off Recycling</b>	Cardboard at Town Hall	None	None
<b>Special Waste Programs</b>	3 R-day collection days/year	None	None
<b>Commercial Waste Recycling</b>	Private contract	Private contract	Private contract
<b>Bulky Item Collection</b>	Volunteers, R-day events 3X/year	1X/week	1X/year, assisted by Village of Clemmons
<b>Yard Waste &amp; Leaf Collection</b>	None Xmas trees	Yes, Xmas trees, pallets	None
<b>Resid. Waste Collection (1x Week)</b>	Govt. contract w/WMI	Contract w/WMI	Govt. contract w/Kiser
<b>Commercial Waste Collection</b>	Private contract	Private contract	Private contract, 96 gal/week paid for by Village
<b>Industrial Waste Collection</b>	Private contract	Private contract	Private contract

### Summary of Local Government Solid Waste Collection Programs

Program	Walkertown	Winston-Salem	Forsyth Co.
<b>Residential Curbside Recycling</b>	Govt. contract w/WMI, Bi-weekly collection	Govt. contract w/WMI, Weekly collection	None
<b>Drop-Off Recycling</b>	None	9 OCC sites at fire stations	3 staffed centers, Pfafftown, Kernersville, Hanes Mill Rd. Landfill
<b>Special Waste Programs</b>	None	Used oil	Used oil collection Permanent HHW collection
<b>Commercial Waste Recycling</b>	Private contract	Private contract & Govt. contract w/WMI	Private contract
<b>Bulky Item Collection</b>	None	Municipal staff 1X/year	None
<b>Yard Waste &amp; Leaf Collection</b>	None	Yard waste, weekly Leaves, seasonal Xmas trees, seasonal	Processing only, no collection Xmas trees, pallets
<b>Residential Waste Collection (1x Week)</b>	Contract w/Waste Industries	Municipal staff	Private contract
<b>Commercial Waste Collection</b>	Private contract	Municipal staff Private contract	Private contract
<b>Industrial Waste Collection</b>	Private contract	Private contract	Private contract

## APPENDIX G

### Municipal/County Recycling Tonnages by Material Type, FY 2007-08<sup>33</sup>

Material	Bethania	Clemmons	Kernersville	Lewisville	Rural Hall
<b>Glass</b>	12.30	196.34		150.40	16.57
<b>PETE</b>	4.75	56.77		21.49	2.37
<b>HDPE</b>	3.10	22.71		28.65	3.94
<b>Mixed Plastic</b>					
<b>Al Cans</b>	4.00	34.06		14.32	1.58
<b>Steel Cans</b>	3.75	34.06		28.65	3.16
<b>White Goods</b>			58.05		
<b>Other Metal</b>					
<b>ONP</b>	14.00	680.97		429.71	47.33
<b>OCC</b>		8.05			
<b>OMG</b>		56.77		28.65	3.94
<b>Office Paper</b>					
<b>Mixed Paper</b>		11.35			
<b>Other Paper</b>		34.06		14.32	
<b>Electronics</b>			23.59		
<b>Commingled</b>			1,157.09		
<b>Total</b>	<b>41.90</b>	<b>1,135.14</b>	<b>1,238.73</b>	<b>716.19</b>	<b>78.89</b>

<sup>33</sup> Solid Waste Management Annual Report for FY 2007-08, for all named local governments.

## APPENDIX G

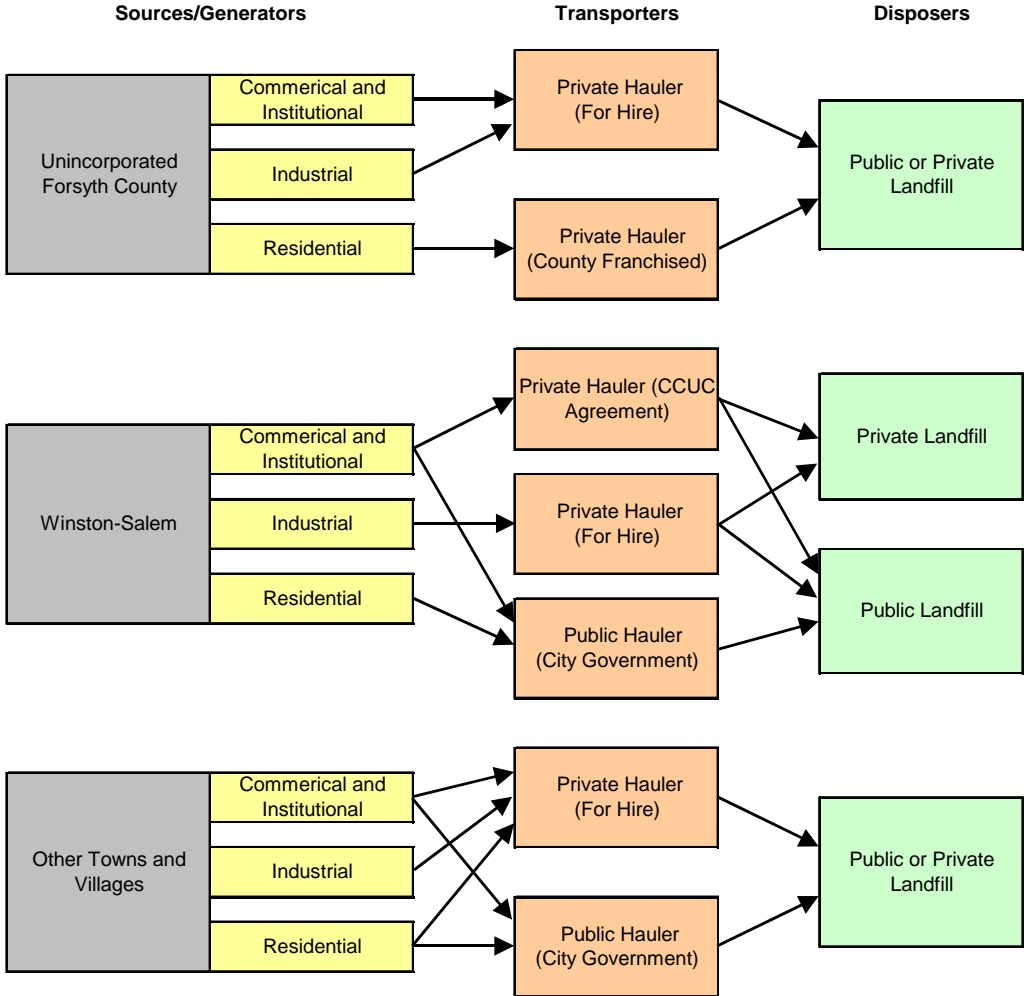
### Municipal/County Recycling Tonnages by Material Type, FY 2007-08<sup>34</sup>

Material	Tobaccoville	Walkertown	Winston-Salem	Forsyth Co. Drop-Off	Totals
<b>Glass</b>	22.51	21.99	1,794.42	189.13	2,403.66
<b>PETE</b>		4.92	242.16		332.46
<b>HDPE</b>			209.12		267.52
<b>Mixed Plastic</b>	11.16		47.61	73.38	132.15
<b>Al Cans</b>	2.3	1.99	99.06	9.31	166.62
<b>Steel Cans</b>	7.54	5.94	176.13	21.38	280.61
<b>White Goods</b>				808.50	866.55
<b>Other Metal</b>	6.38				6.38
<b>ONP</b>	59.76	84.21	7,133.87	322.14	8,771.99
<b>OCC</b>			455.43	193.30	656.78
<b>OMG</b>			352.29		441.65
<b>Office Paper</b>					
<b>Mixed Paper</b>	11.57		308.23	396.18	727.33
<b>Other Paper</b>					48.38
<b>Electronics</b>					23.59
<b>Commingled</b>					1,157.09
<b>Total</b>	<b>121.22</b>	<b>119.05</b>	<b>10,818.32</b>	<b>2,013.32</b>	<b>16,282.76</b>

<sup>34</sup> Solid Waste Management Annual Report for FY 2007-08, for all named local governments.

# APPENDIX H

## Flow of Disposed Waste from Forsyth County Generators



## **APPENDIX I**

### **Municipal Solid Waste Conversion Technologies Report Executive Summary**

## EXECUTIVE SUMMARY

As a part of the 2009 Solid Waste Management Plan Update process, a “Screening Study” of Municipal Solid Waste (MSW) Conversion Technologies was jointly conducted for the Mecklenburg County Department of Land Use and Environmental Services (LUES) and the Winston-Salem/Forsyth County City/County Utility Commission (CCUC).

The purpose of the study was to provide the Solid Waste Management Departments of both jurisdictions with an up-to-date report on alternative waste conversion technologies.

The municipal solid waste conversion technologies (MSWCTs) targeted for investigation are designed to process mixed municipal solid waste (MSW) for energy and materials recovery and are based on the following eight processes:

- Combustion,
- Gasification (with production of a syngas, ethanol or methanol)
- Plasma Arc Gasification,
- Pyrolysis,
- Hydrolysis/Fermentation (Waste-to-Ethanol),
- Composting,
- Anaerobic Digestion, and
- Autoclave/Mechanical Processing.

The *Screening Study* consisted of a review and assessment of recently-published literature, reports, and presentations. A description of each of the technologies is provided below, followed by a summary table comparing the technical viability, sustainability, environmental impacts and economics of each technology. For the sake of brevity, the references for the information presented in this Executive Summary have been omitted. However, they are included in the full study report.

### **Combustion**

Waste-to-Energy (WTE) facilities rely on the process of combustion to process non-hazardous MSW and generate electricity and/or steam. They also stabilize and reduce the volume of waste requiring landfill disposal.

WTE plants work much like fossil fuel-fired power plants, with the difference being that WTE plants use garbage – not fossil fuels like coal, oil, or natural gas – as the boiler fuel. The same steps are used to make electricity in a WTE plant as in a coal-fired power plant.

## Municipal Solid Waste Conversion Technologies

Energy from WTE facilities is generally recovered in the form of hot water, steam, or electricity. Hot water is used primarily in district heating application; steam may be used in various industrial processes (including heating and cooling) or passed through a conventional turbine-generator to produce electricity.

The combustion of MSW in WTE facilities is considered a commercially proven technology in the U.S., with documented environmental performance and costs reported for dozens of facilities over the last 30 years. Tipping fees for new facilities can be expected to be in the \$100-\$150 per ton range.

### Gasification

Gasification is a commercially-proven manufacturing process that converts hydrocarbons such as coal, petroleum coke, and biomass to a synthesis gas (syngas), which can be further processed to produce chemicals, fertilizers, liquid fuels, hydrogen, and electricity.

In a gasification facility, hydrocarbon feedstock is injected with air or oxygen and steam into a high temperature, pressurized reactor until the chemical bonds of the feedstock are broken. The resulting reaction produces the syngas. The syngas is then cleansed to remove impurities such as sulfur, mercury, particulates, and trace minerals.

Because the syngas is cleaned before combustion, gasification plants produce significantly fewer quantities of criteria air pollutants such as nitrogen oxides (NO<sub>x</sub>) and sulfur dioxide (SO<sub>2</sub>). The cleaned syngas – which is composed primarily of carbon monoxide and hydrogen – can be used to generate steam and/or electricity. It can also be used to produce methanol, ethanol, and other fuel liquids and chemicals through an add-on chemical process.

Waste gasification technologies vary in a number of important ways:

- **Feedstock Preparation** – Some gasification technologies require waste to be processed for size reduction and/or removal of materials, while others process waste on an as-received basis.
- **Furnace Type** – Gasification furnaces include fixed bed and fluidized bed reactors. In addition, some technologies rely on plasma arc heating units for gasifying the waste. (Plasma arc gasification is reviewed in the following section of this report.)
- **Supplementary Fuels** – Some technologies require that supplementary fuels, such as coke, be injected into the furnace.
- **Energy Products** – Some gasification technologies are designed to produce a cleaned syngas for either combustion or conversion to liquid fuels, such as ethanol or methanol, while others are designed for syngas combustion only.

There are no commercially operating MSW gasification facilities in the U.S. One recent consultant study on gasification technologies has concluded that this technology is “unproven on a commercial scale for

MSW in the United States.” Tipping fees for U.S. MSW gasification facilities are likely to be on the order of \$300 per ton.

### **Plasma Arc Gasification**

The plasma arc technology is a heating method that can be used in both pyrolysis and gasification systems. This technology was developed for the metals industry in the late nineteenth century. Plasma arc technology uses very high temperatures to break down the feedstock into elemental by-products.

For applications in which MSW is processed, the intense heat actually breaks up the molecular structure of the organic material to produce simpler gaseous molecules such as carbon monoxide (CO), hydrogen (H<sub>2</sub>), and carbon dioxide (CO<sub>2</sub>). The inorganic material is vitrified to form a glassy residue. A main disadvantage of the plasma arc systems is that a large fraction of the generated electricity is required to operate the plasma torches, which reduces net electrical output of the facility.

A significant requirement for the MSW plasma arc gasification process is that the MSW must be preprocessed before being fed into the plasma arc gasifier. As an example, for one process, the waste must be shredded to a 2-inch particle size. Also, the process appears to require the use of supplemental fuels to moderate and control the gasification process.

There are no commercially operating MSW plasma arc gasification facilities in the U.S. and only 1 worldwide. One national consulting engineering firm has concluded that, for at least one MSW plasma arc technology, the vendor “has not yet proven their system will function in full-scale commercial application on MSW.” Tipping fees for MSW plasma arc gasification facilities in the U.S. are likely to be upwards of \$300 per ton.

### **Pyrolysis**

Pyrolysis is a process that involves the thermal decomposition of feedstock at high temperatures (750°F to 1500°F) in the absence of air. The resulting end product is a mixture of solids (char), liquids (oxygenated oils), and gases (methane, carbon monoxide, and carbon dioxide) with the proportions of each determined by operating temperature, pressure, oxygen content, and other conditions. The oils and fuel gases can be used directly as boiler fuel or refined for higher quality uses such as engine fuels, chemicals, adhesives, and other products. The solid residue contains most of the inorganic portion of the feedstock as well as large amounts of solid carbon or char.

Gases produced during the pyrolysis reaction can be utilized in a separate reaction chamber to produce thermal energy. The thermal energy can be used to produce steam for electricity production. It can also be used to heat the pyrolytic reaction chamber or dry the feedstock entering the reaction chamber. If pyrolytic gases are combusted to produce electricity, emission control equipment is needed to meet regulatory standards.

## Municipal Solid Waste Conversion Technologies

As with other gasification technologies, MSW pyrolysis technologies appear to require a pre-processing step to remove non-organic recyclables and to size reduce the waste. They also require a drying process to evaporate moisture from the waste feedstock.

There are no commercially-operating MSW pyrolysis facilities in the U.S. There are 12 commercial facilities in Japan and Germany that process Japanese municipal and industrial waste and are in the size range of 100-400 TPD. One consulting firm has recently concluded that MSW pyrolysis facilities can be characterized as having “previous failures at scale, uncertain commercial potential; no operating experience with large scale operations.”

Tipping fees for MSW pyrolysis facilities in the U.S. can be expected to be on the order of \$300 per ton.

### **Hydrolysis/Fermentation**

Fermentation is an anaerobic biological process through which microorganisms metabolize sugars and produce alcohols as a by-product. In addition to producing alcohols such as beer and wine for consumption, fermentation can be used to produce fuel liquids such as ethanol and other chemicals.

Cellulosic feedstocks, including the majority of the organic fraction of MSW, must undergo a pretreatment step, referred to as “hydrolysis”, to break down cellulose and hemicelluloses to simple sugars that can be metabolized by the yeast and bacteria for the fermentation process. MSW must first be processed through an MRF to separate, shred, and dry the cellulosic fraction.

There are no commercial hydrolysis/fermentation facilities in the world today and therefore no basis on which to realistically estimate the tipping fees associated with this technology.

### **MSW Composting**

MSW composting involves the controlled decomposition and conversion of MSW into a marketable or useful end product. MSW composting is a biological process that is aerobic (i.e., requires oxygen to occur). The process involves the metabolism of waste by microscopic organisms such as bacteria and fungi.

A major distinction among the MSW composting technologies is whether the compost process occurs in a vessel (in-vessel) or an open area. In reality, even in-vessel systems require further composting and curing of the waste in windrows following the in-vessel process. Another major difference is whether the windrows are located outdoors or within a building (to control process condition and odors).

A recent trade magazine article indicated that the number of operating facilities in the U.S. dropped from 21 in 1992 to 13 in 2007.

## Municipal Solid Waste Conversion Technologies

MSW composting is considered a commercially proven technology. However, major concerns persist, including the marketability of the compost product and facility siting due to potential odor issues. A recent analysis of tipping fees for U.S. compost facilities found that they average \$87 per ton.

### **Anaerobic Digestion**

Anaerobic digestion is the bacterial breakdown of biodegradable organic material in the absence of oxygen. It can occur over a wide temperature range from 50°F to 160°F.

Anaerobic digestion of MSW can occur naturally (as in a landfill) or in a controlled environment such as an MSW anaerobic-digestion facility. In the latter, MSW is first processed for removal of inorganic and recyclable components, reduced in size, and then placed in an airtight vessel called a digester, where the process occurs. Biogas can be used as fuel for engines, gas turbines, fuel cells, boilers, and industrial heaters. It can also be used in other processes and in the manufacturing of chemicals.

There are no commercially operating MSW anaerobic digestion facilities in the U.S. However, there are a number of such facilities worldwide, including 13 in Spain, 16 in Germany and Switzerland, and one in Israel. Most of these facilities process source-separated or pre-processed MSW and other types of organic wastes.

Tipping fees for MSW anaerobic digestion facilities are likely to be in the \$150 per ton range.

### **Autoclave/Mechanical Processing**

The autoclave subjects the wastes to high temperature (usually with superheated steam) under high pressure for a sufficient length of time to kill all the bacteria and pathogens that might be in the waste. Some vendors then separate out the paper pulp for recycling as a raw material for paper manufacturers.

The process involves several steps. After minimal pre-processing, the wastes are shredded and ferrous metals are removed by magnets. These partially processed wastes are then fed to an autoclave to kill any pathogens. Non-ferrous metals are removed after the wastes leave the autoclave, and the waste stream passes through a grinder to produce an end product – called “fluff” – which, as the name implies, is a light, dry downy material. The fluff is relatively homogeneous and has a high organics content, although it also contains all the glass and plastics (and other non-organic materials not removed by the ferrous and non-ferrous metal separators) that were in the original waste stream.

There are no commercially operating MSW autoclave/mechanical processing facilities in the world today. One consulting study estimated that tipping fees for a U.S. facility would be on the order of \$85 per ton.

## Municipal Solid Waste Conversion Technologies

Municipal Solid Waste Conversion Technologies – Summary Information							
Technology	Commercial Facilities		Sustainability	Environmental Impacts	Siting	Economics/Financing	
	U.S.	World				Tipping Fee (\$/Ton) – New Facilities	Capital Costs (\$ per TPD Design Capac.)
Combustion (WTE)	89	650	<ul style="list-style-type: none"> <li>Over 50% of MSW is biogenic</li> <li>Metals recovery from ash</li> </ul>	<ul style="list-style-type: none"> <li>Less envir. impact than coal or oil-gener. electricity</li> <li>Net reduction in GHGs</li> </ul>	<ul style="list-style-type: none"> <li>Stack Emissions</li> <li>Negative Public Perception</li> </ul>	\$81 - \$104 per ton	\$110,000-\$200,000
Gasification	0	38	<ul style="list-style-type: none"> <li>Over 50% of MSW is biogenic</li> <li>Metals recovery from ash</li> </ul>	<ul style="list-style-type: none"> <li>Lower air emissions than WTE</li> <li>Net reduction in GHGs</li> </ul>	<ul style="list-style-type: none"> <li>Stack Emissions</li> <li>Unknown Public Perception</li> </ul>	\$300/ton range	\$275,000 range
Plasma Arc Gasification	0	1	<ul style="list-style-type: none"> <li>Over 50% of MSW is biogenic</li> <li>Metals recovery from ash</li> </ul>	<ul style="list-style-type: none"> <li>Lower air emissions than WTE</li> <li>Net reduction in GHGs</li> </ul>	<ul style="list-style-type: none"> <li>Stack Emissions</li> <li>Unknown Public Perception</li> </ul>	\$300 plus/ton range	\$275,000 plus range
Pyrolysis	0	12	<ul style="list-style-type: none"> <li>Over 50% of MSW is biogenic</li> <li>Metals recovery from char</li> </ul>	<ul style="list-style-type: none"> <li>Lower air emissions than WTE</li> <li>Net reduction in GHGs</li> </ul>	<ul style="list-style-type: none"> <li>Stack Emissions</li> <li>Unknown Public Perception</li> </ul>	\$300/ton range	\$275,000 range
Hydrolysis/ Fermentation	0	0	<ul style="list-style-type: none"> <li>Recovery of biodegrad. MSW only</li> <li>Metals recovery from residue</li> </ul>	<ul style="list-style-type: none"> <li>Unknown</li> </ul>	<ul style="list-style-type: none"> <li>Unknown Public Perception</li> </ul>	Unknown	Unknown
MSW Composting	12	Numerous	<ul style="list-style-type: none"> <li>Recovery of biodegrad. MSW only</li> <li>Metals recovery from residue</li> </ul>	<ul style="list-style-type: none"> <li>Volatile organic compound (VOC) emissions</li> <li>Some reduction in GHGs</li> </ul>	<ul style="list-style-type: none"> <li>Large Site</li> <li>Odor Issues</li> </ul>	\$40-\$100 per ton	\$30,000 - \$60,000
Anaerobic Digestion	0	29	<ul style="list-style-type: none"> <li>Recovery of biodegrad. MSW only</li> <li>Metals recovery from residue</li> </ul>	<ul style="list-style-type: none"> <li>Hydrogen sulfide emissions</li> <li>Some reduction in GHGs</li> </ul>	<ul style="list-style-type: none"> <li>Large Site</li> <li>Odor Issues</li> </ul>	\$130 per ton range	\$110,000 range
Autoclave/ Mech. Processing	0	0	<ul style="list-style-type: none"> <li>Recovery depends on follow-on process for "fluff" recovery</li> <li>Metals recovery from residue</li> </ul>	<ul style="list-style-type: none"> <li>Dependent on utilization of fluff product</li> </ul>	<ul style="list-style-type: none"> <li>Typical MSW facility siting issues</li> </ul>	\$85 per ton range	\$40,000 range