

BROOME COUNTY

SOLID WASTE MANAGEMENT PLAN UPDATE



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Update January 21, 2020

BROOME COUNTY

LOCAL SOLID WASTE MANAGEMENT PLAN UPDATE

Draft Report Submitted to:

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1.0 INTRODUCTION

1.1 GENERAL DESCRIPTION OF THE LOCAL SOLID WASTE MANAGEMENT PLAN UPDATE

The Broome County Division of Solid Waste Management (the Division) currently provides for the planning, implementation, management, and funding of Broome County's (the County) Integrated Solid Waste Management Program. The original Solid Waste Management Plan (the Plan) was developed in 1989 and covered a 20-year planning period, from 1990 through 2010, and designated Broome County as the responsible planning unit (the Planning Unit) for implementation and management of the Plan. The Plan was developed in compliance with New York State Solid Waste Management Policy as defined under the Solid Waste Management Act of 1988 (Chapter 70) and regulated under Title 6 of the New York State Code of Rules and Regulations, Subpart 360 (6 NYCRR Part 360 Solid Waste Regulations). When this plan was drafted under the 6 NYCRR Part 360 requirements, a planning unit must prepare a Local Solid Waste Management Plan, including updates every 10 years, which must specifically consider and address current New York State Solid Waste Management Policy. The goal of the State program is to promote consistent strategies among municipalities in the management of municipal solid waste, including efforts to promote and implement actions to reduce, reuse, and recycle both pre-consumer and post-consumer waste products. In addition, State regulations require that all permit applications for new or expanded solid waste management facilities, made by or on behalf of a municipality in a planning unit, be in compliance and consistent with the local Solid Waste Management Plan in effect at the time of the application. A permit application will not be deemed complete if a Local Solid Waste Management Plan has not been adopted.

Beyond State regulations, the Broome County Solid Waste Management Plan has allowed the County to establish program objectives and goals over the past 20 years that have resulted in consistent and reliable levels of service to the public, fiscally responsible fund management, and recycling levels of nearly 50 percent. As part of the original Plan, the County has expanded and developed new programs and made modifications and additions to local laws. Solid waste practices in the plan that were not feasible were the development of waste districts, potential purchase of the recycling facility, development of a solid waste authority, and the expansion of composting beyond yard waste.

Today, the Division of Solid Waste Management provides integrated services to the residents of Broome County related to disposal of various waste streams, environmental compliance, recycling, public education, procurement and contract management, budget preparation, fund management, technical assistance, community public relations, grant preparation, and integration and coordination with private and institutional facilities.

However, the Division also recognizes that the development and implementation of a dynamic Local Solid Waste Management Plan allows the County to optimize services and revenue by critically reviewing opportunities in a timely fashion and adjusting efforts as necessary – in reaction to changing public demands, private sector participation, and regulations. For example, the solid waste business and related markets have recently been influenced by some significant events, such as emerging technologies, reduced solid waste disposal options, New York State’s growing interest in organics diversion, the downward turn of recycling markets and the court decision in New York State regarding flow control of municipal solid waste. The court decision provides the legal authority to the Planning Unit to enact a local law that requires all solid waste generated within a planning unit to be processed or disposed of in accordance with the requirements of the planning unit. Given these considerations, the Division also completed a self-evaluation of current programs and planning objectives. As a result, this document, the 2010 *Local Solid Waste Management Plan Update* (the “Plan Update”), was developed and will be submitted to the New York Department of Environmental Conservation (NYSDEC) for review and acceptance after receipt of public comment. The Plan Update follows the recommended format of the “Plan Contents Outline” developed by NYSDEC as described in 6 NYCRR Part 360-15: Comprehensive Solid Waste Management Planning, with some minor variations since this update was submitted under the old regulations and is an update to an existing plan.

1.2 OBJECTIVES OF THE PLAN UPDATE

The objectives of this Plan Update are to evaluate new or expanded solid waste management program options available to the County, assess the impacts thereof, obtain public input related to existing and new programs, recommend the preferred course(s) of action, and specify the action plan required to implement the selected program. Key elements of the Plan include:

- A description of the Planning Unit, including changes to current waste generation or factors that may influence solid waste generation.
- A review of current solid waste generation within the Planning Unit, including an updated characterization of the recycling stream processed in the County.
- A review of existing solid waste management programs and facilities.
- Development of future planning projections and solid waste generation.
- An evaluation of technologies that could increase waste diversion opportunities.

- A review of program enhancement opportunities for waste diversion and selection of initial priorities.
- A proposed implementation schedule related to planning objectives.
- Considerations for new or revised Local Laws.
- Certification of solid waste disposal capacity.
- Current administrative structure and program cost considerations.
- A summary of program enhancements that further supports New York State policy objectives (the Solid Waste Management Hierarchy).
- A summary of comments and views expressed by governmental, environmental, commercial, industrial, and public interests (stakeholders) with respect to the recommended program enhancements. *(To be completed after public comments.)*

1.3 COMPLIANCE WITH NEW YORK STATE SOLID WASTE MANAGEMENT POLICY

New York State has established solid waste management policy objectives under a “preferred hierarchy” that is generally described as follows (in order of descending preferences):

- First, to reduce the amount of waste generated within New York State.
- Second, to reuse material for the purpose for which it was originally intended or recycle material that cannot be reused (composting is considered a form of recycling).
- Third, to recover, in an environmentally acceptable manner, energy from solid waste that cannot be economically and technically reused or recycled.
- Fourth, to dispose of solid waste that is not being reused or recycled, or from which energy is not being recovered, by land burial or other methods approved by the NYSDEC.

Broome County manages solid waste consistent with the policies set forth in the New York State Solid Waste Management Plan. The Division of Solid Waste is responsible for compliance with State and Federal rules and regulations regarding the management and long-term obligations of closed solid waste management facilities and currently operating

facilities under their direct control.

The Division's responsibilities also include education and public outreach efforts to encourage, support, and foster participation by the public with respect to reducing, reusing, and recycling portions of the existing solid waste stream. Historically, the County's solid waste programs have relied on both public and private participation to manage a variety of waste streams and recyclable products. These efforts have resulted in current recycling rates between 48 and 50 percent.

The mission of the Division of Solid Waste is to "provide our constituency (residents and businesses) with a comprehensive program for managing solid waste, which is consistent with New York State's Hierarchy for solid waste management, in an economically sound and environmentally safe manner." To this end, potential program expansion elements under this Plan Update will build off of the following existing efforts:

- Safe and reliable disposal of municipal solid waste (MSW).
- Recyclables acceptance and processing through contracts with private companies.
- Continued efforts with local municipalities and private haulers for residential MSW and recyclables transfer stations.
- Yard waste composting in support of the local ban on yard waste disposal to the landfill.
- Periodic household hazardous waste collection for residents and small businesses.
- Periodic electronics recycling for residents and small businesses.
- Development of guidelines and educational materials in support of the County's programs, including a web site.
- Public outreach and assistance to businesses and institutions to assist in setting up recycling programs.
- Purchasing and distributing recycling yellow bin containers.

- Assistance with backyard composting, including compost bins for sale and distribution.
- Beneficially reusing “auto fluff” at the landfill as daily cover.
- Tracking and monitoring of recycling participation through mailers and telephone surveys.

2.0 PLANNING UNIT DESCRIPTION

2.1 GENERAL DESCRIPTION OF BROOME COUNTY

Broome County is located in the southern tier of central New York and consists of approximately 714 square miles. The County is bordered on the south by the State of Pennsylvania and along its remaining boundaries by the Counties of Tioga, Cortland, Chenango, and Delaware in New York. Figure 2-1 shows the location of Broome County with respect to these locations. The County is divided into 24 municipalities, 16 of which are towns, 7 are villages, and 1 is a city. The Village of Deposit is partially located within Broome County and partially within Delaware County. There have been no changes to the planning unit membership. Table 2-1 lists the municipalities within the County.

TABLE 2-1
BROOME COUNTY MUNICIPALITIES

Town of Barker	Town of Maine
City of Binghamton	Town of Nanticoke
Town of Binghamton	Town of Sanford
Town of Chenango	Village of Deposit (partially)
Town of Colesville	Town of Triangle
Town of Conklin	Village of Whitney Point
Town of Dickinson	Town of Union
Village of Port Dickinson	Village of Endicott
Town of Fenton	Village of Johnson City
Town of Kirkwood	Town of Vestal
Town of Lisle	Town of Windsor
Village of Lisle	Village of Windsor

Figure 2-2 shows the location of these municipalities within the County.

2.2 TRANSPORTATION ROUTES

There are several major transportation routes within the County as shown in Figure 2-3. The major north-south routes include Interstate 81, Route 41, and Route 26. Interstate 81 connects Broome County to areas both north and south of the County (i.e., the Syracuse area to the north and Pennsylvania border to the south). Interstate 81 passes through the approximate center of the County, traversing the Towns of Lisle, Triangle,

FIGURE 2-2
BROOME COUNTY MUNICIPALITIES

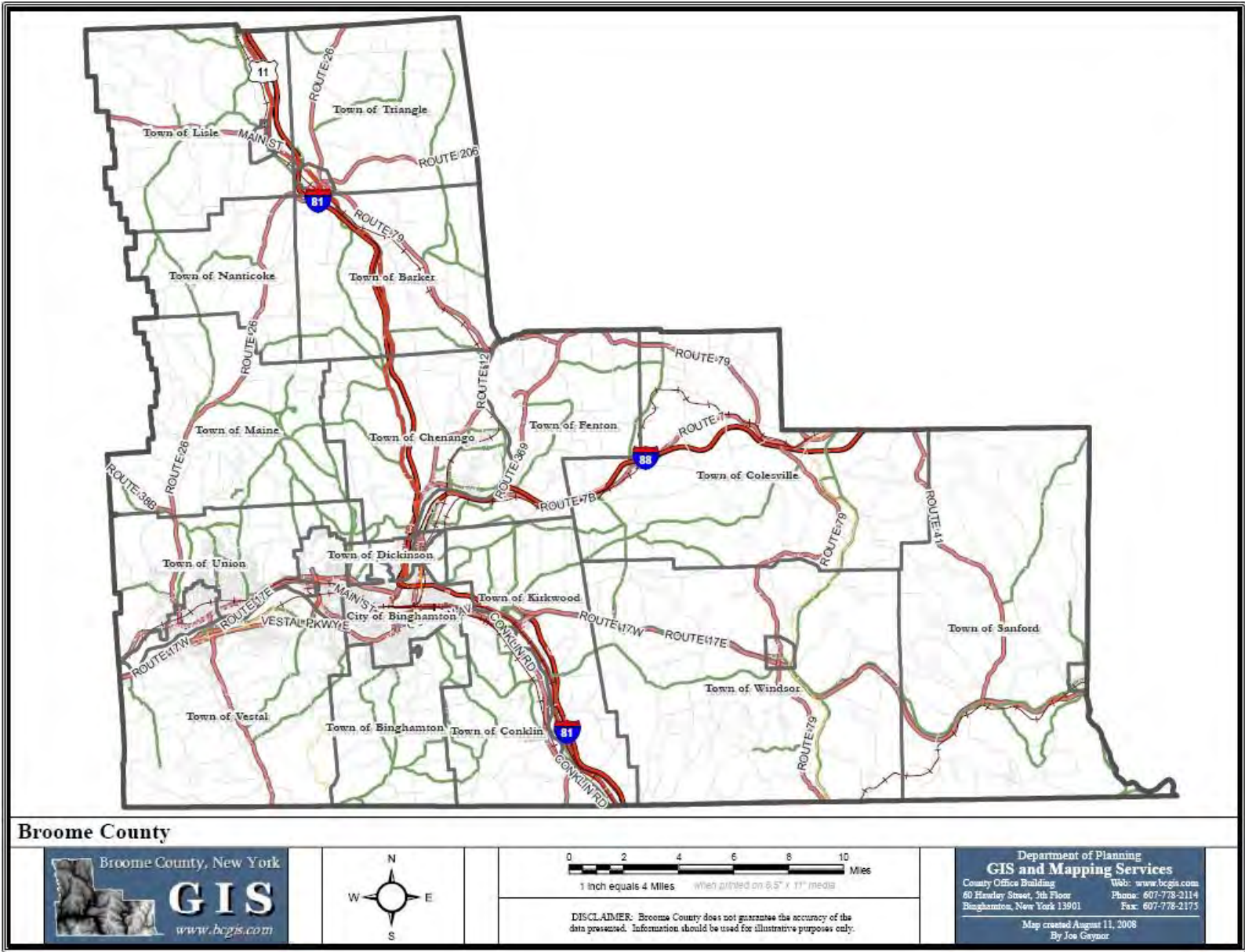


FIGURE 2-1

NEW YORK STATE COUNTIES



FIGURE 2-3
MAJOR TRANSPORTATION ROUTES WITHIN BROOME COUNTY



Barker, Chenango, Dickinson, Binghamton and Kirkwood. Route 11 parallels Interstate 81 and is the alternate route for north-south travel in the County. Route 26 is the north-south route in the western part of the County. This route passes through the Towns of Triangle, Barker, Maine, Nanticoke, Union, and Vestal. Route 41 is the north-south route in the eastern portion of the County and is located primarily in the Town of Sanford.

East-west transportation is predominately through Route 17 (future Interstate 86) and Route 79. Route 17 services the southern portion of the County, while Route 79 services the northern towns. Route 79 passes through the Towns of Lisle, Triangle, Barker, Fenton, Colesville and Windsor. Route 17 passes through the Towns of Union, Vestal, Dickinson, Kirkwood, Windsor, Sanford, and the City of Binghamton. Interstate 88 also serves as an east-west route for the towns east of Binghamton.

Town railroads also serve the County. The Norfolk Southern and Delaware and Hudson (D&H) Railroads service the southern portions of the County, while the New York Susquehanna and Western (NYS&W) services the central and northern portions of the County.

The County airport is located in the Town of Maine.

Table 2-2 lists the major transportation routes and railroads in each town.

2.3 POPULATION OF THE COUNTY

Table 2-3 lists the current population in the County for each municipality. These populations are based on 2000 Census data. The total County population is approximately 200,500. A large portion of the population (55 percent) is located in the City of Binghamton, the Town of Union, and the Town of Vestal. These municipalities are the most urbanized areas in the County. The remainder of the County is mainly rural areas with sparse populations. Table 2-3 also lists the number of households in each municipality in the County. The number of households is the number of occupied year-round housing units. This data is also based on the 2000 Census. Figure 2-4 illustrates the population distribution in the County.

TABLE 2-2
MAJOR TOWN TRANSPORTATION ROUTES

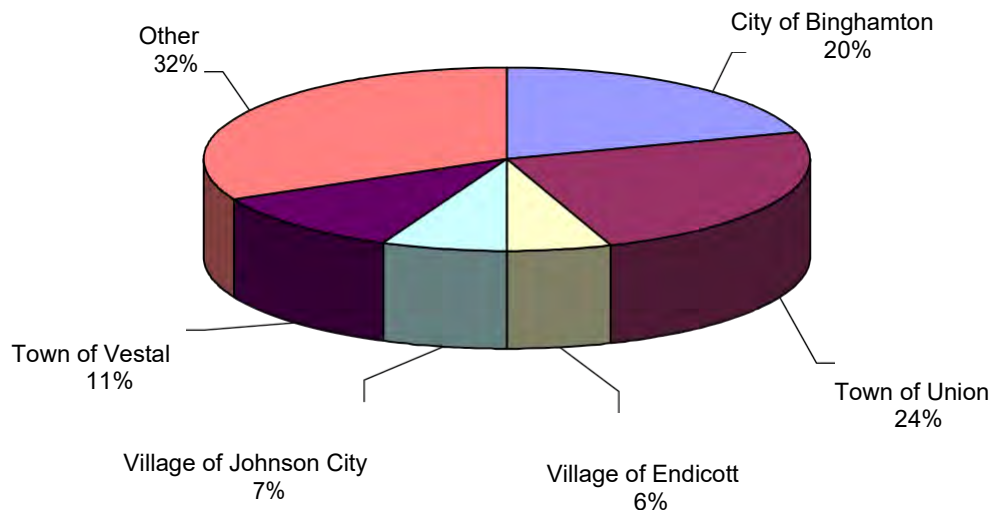
MUNICIPALITY	NORTH-SOUTH TRANSPORTATION ROUTE	EAST-WEST TRANSPORTATION ROUTE	RAILROAD
Town of Barker	I-81, R-11	R-79	NYS&W
City of Binghamton	I-81, R-11	R-17(future I-86)	D&H
Town of Binghamton	Park Avenue	None	None
Town of Chenango	I-81, R-11	None	NYS&W
Town of Colesville	R-79	I-88, R-7	D&H
Town of Conklin	R-7	None	D&H
Town of Dickinson	I-81, R-11	I-88	D&H
Town of Fenton	R-369	I-88, R-7	D&H
Town of Kirkwood	I-81, R-11	R-17(future I-86)	Norfolk Southern
Town of Lisle	I-81, R-11	R-79	NYS&W
Town of Maine	R-26	None	None
Town of Nanticoke	R-26	None	None
Town of Sanford	R-41	R-17	Norfolk Southern
Town of Triangle	I-81, R-79, R-11	R-206	NYS&W
Town of Union	R-26	R-17	Norfolk Southern
Town of Vestal	R-26	R-206	None
Town of Windsor	R-79	R-17, R-434	None

TABLE 2-3
EXISTING POPULATION AND HOUSING UNITS

MUNICIPALITY	POPULATION	PERCENT OF COUNTY	NUMBER OF HOUSEHOLDS	PERCENT OF COUNTY
Town of Barker	2,738	1.4	993	1.1
City of Binghamton	47,380	23.6	21,089	26.1
Town of Binghamton	4,969	2.5	1,813	2.2
Town of Chenango	11,454	5.7	4,519	5.5
Town of Colesville	5,441	2.7	1,944	2.3
Town of Conklin	5,940	3	2,249	2.7
Town of Dickinson	3,638	1.8	1,246	1.4
Village of Port Dickinson	1,697	0.8	734	0.8
Town of Fenton	6,909	3.4	2,763	3.3
Town of Kirkwood	5,651	2.8	5,547	6.8
Town of Lisle	2,404	1.2	855	1.1
Village of Lisle	302	0.2	116	0.1
Town of Maine	5,459	2.7	2,036	2.4
Town of Nanticoke	1,790	0.9	629	0.7
Town of Sanford	778	0.4	267	0.2
Village of Deposit	1,699	0.8	716	0.9
Town of Triangle	2,067	1	734	0.9
Village of Whitney Point	965	0.5	397	0.5
Town of Union	27,725	13.8	11,561	14.3
Village of Endicott	13,038	6.5	5,996	7.4
Village of Johnson City	15,535	7.8	6,981	8.6
Town of Vestal	26,535	13.2	8,525	10.6
Town of Windsor	5,520	2.8	1,970	2.4
Village of Windsor	901	0.5	369	0.6
Total for County	200,536	100	80,749	100

FIGURE 2-4

BROOME COUNTY POPULATION DISTRIBUTION



2.4 FACTORS IMPACTING SOLID WASTE GENERATION

2.4.1 Population Density and Land Use

Existing land use in the County is of very rural nature. In 1976, approximately 60 percent of the County was classified as woodlands. Based on 2000 Census data, there are approximately 283.6 people per square mile in the County. The population is not uniformly distributed, creating areas with a low population density and other areas with a high population density. The City of Binghamton, the Village of Endicott, and the Village of Johnson City represent areas of high population density. These areas contain over half of the County's population. As of 2012 roughly 12,800 acres of agricultural land were lost. Roughly half of this land is no longer farmed and is now considered vacant land. The largest land use in the County is residential followed by vacant land.

2.4.2 Population Demographics

The County population is projected to show a 2.56 percent increase in population between 2010 and 2030. The aging of the County population will limit growth, and the retention of young adults continues to be a challenge. According to Cornell Institute for Social and Economic Research (CISER) projections, by 2030, the population will be skewed toward older women. This reflects the aging population and greater life expectancy of females. The exception is the non-aging segment of the 15 to 24 age range associated with the

student body of Binghamton University. In general, the profile of the County population in 2030 will be very similar to the nation as a whole.

Demographic changes may affect the types of goods purchased by consumers and therefore the characteristics of materials entering the solid waste stream. The estimated student body of Binghamton University is 6,924 and SUNY Broome is 4,920.

2.4.3 Industries and Institutions

Large industries and institutions generate substantial quantities of solid waste. Large industries in the County include Lockheed Martin and Frito Lay Corporation. Binghamton University is the largest institution in the County and accounts for seasonal variation in population. It is anticipated there will be continued commercial/industrial development in the Kirkwood industrial area and the Broome Corporate Park in the Town of Conklin. Large grocery stores in the County include Wegmans, Weis and Price Chopper. Each grocery store chain has an internal system set-up to manage recyclable materials and organics generated at their locations. The largest shopping mall in the County is the Oakdale Mall located in the Village of Johnson City. The stores located in the mall contract for collection of solid waste. In the recent years there has been an increase in vacant store fronts at the mall.

3.0 SOLID WASTE QUANTITY AND TYPES

3.1 GENERAL INVENTORY OF SOLID WASTES

Solid waste generated in the County can be classified into six general categories.

- *MSW* - Typically consists of rubbish and garbage.
 - Residential Waste* - Rubbish and garbage characteristic of households.
 - Commercial Waste* - Generated by establishments such as stores, offices, shopping centers and local businesses.
 - Institutional Waste* - Generated by schools, hospitals, prisons, and nursing homes.
- *Non-Hazardous/ Industrial Waste* - Variety of discarded materials consisting of paper, wood, metal, and plastic generated by local industries.
- *C&D Debris Waste* – Generated by residential and commercial establishments consisting of waste from construction, renovation and demolition projects.
- *Biosolids* – Generated by local wastewater treatment facilities.
- *Organic Waste* – Any waste product that is biodegradable or can be stabilized through biological digestion, such as food waste, municipal sewage sludge, yard waste, and other carbon-based products (paper products). Food waste is generally classified as “pre-consumer food waste” (prior to purchase or consumption by the public) which is generally comprised of a higher percentage of organic matter, and “post-consumer food waste” (after use or consumption by the public) which generally contains higher percentages of inorganic materials such as plastics (will not decompose).
- *Special Waste* - Special wastes consist of wastes such as regulated medical wastes and household hazardous wastes, tires and waste oil.

Residential, commercial, institutional, non-hazardous industrial, most organic waste, and special wastes (except for municipal sewage sludge and regulated medical waste) are disposed at the Broome County landfill. In 2007, the County generated approximately 220,000 tons of these wastes based on weighing records at the landfill.

To further define solid waste management programs and subsequent participation levels, various waste streams are characterized under two broad-based management headings: upstream and downstream. The definition of these terms is as follows.

- *Upstream Waste* – Refers to those waste streams that are managed or processed privately (not by Broome County) and do not require disposal at the County's landfill.
- *Downstream Waste* – Refers to those wastes that are delivered to the County at the landfill that can be further processed, recycled, or diverted from the landfill.

3.2 RECYCLABLES AND SOLID WASTE CHARACTERIZATION

To broaden the County's current programs to increase recycling participation, it is important to identify a baseline as a reference point to measure and track performance as a result of future actions. In addition, milestones should be identified and tracked in a parallel fashion where specific data is unavailable or where actions are required to support public and private participation for new or expanded programs. As indicated on Table 3-1, the year 2007 was selected as the baseline for examining current waste generation in the County as well as presenting an overall recycling rate of 48 percent for the year. With respect to MSW generated and recorded at the landfill, there were approximately 164,000 tons delivered to the landfill in 2007 (no hauler or other entity reported any MSW being hauled elsewhere). This is very close to the U.S. Environmental Protection Agency (USEPA) estimate of per capita waste generation (4.6 lbs/capita-day) based on a population of 200,000.

To determine the approximate waste composition of the MSW delivered to the landfill, a separate waste composition analysis was used from a community similar in size and character to Broome County. The Cedar Rapids/Linn County Iowa Waste Composition Analysis was completed by R.W. Beck (a project team member) and was used to estimate the type of materials that may be contained within the MSW delivered to the Broome County landfill. The analysis can be found in Appendix A. Table 3-2 presents an estimate of the waste characteristics of the County's MSW based on the Linn County study. The purpose of this exercise is to identify if there are materials within the waste stream that could be removed for recycling or through diversion opportunities.

The next step was to quantify those waste products and materials that were already being removed from the MSW and recycled or reused. Based on County reporting, approximately 215,850 tons of materials were recycled through the combined efforts of local municipalities and private companies. In addition, the County tracked and recorded other materials that were not categorized as MSW such as construction and demolition (C&D), sludges, yard waste, tires, and alternative daily cover. These materials were considered in determining the total amount of waste and recyclables that are generated in the County. Table 3-3 presents a summary of all waste generated

TABLE 3-1

BROOME COUNTY REPORTED WASTE COMPOSITION IN 2007

WASTE STREAM	TONNAGES	DIVERTED
Landfill Disposal		
MSW	163,828	
WWTP sludge	7,089	
Alternative daily cover	36,975	
C&D debris	28,878	
Yard waste	2,280	2,280
Tires	1,499	1,499
Subtotal Landfill Disposal	240,549	3,779
Recycling		
Paper	32,698	32,698
Plastic	687	687
Metals	134,649	134,649
Glass	293	293
Mixed recyclables	12,002	12,002
Co-mingled containers	200	200
Tires	1,103	1,103
Organic	2,714	2,714
Yard waste	12,137	12,137
C&D debris	3,215	3,215
HHW	2,521	2,521
Electronics	272	272
WWTP Sludge	8,422	8,422
Subtotal Recycling	210,912	210,912
Total County Waste	451,461	214,691
Total Diversion		48%

TABLE 3-2

BROOME COUNTY MUNICIPAL SOLID WASTE CHARACTERIZATION

MATERIAL GROUP	MSW COMPOSITION⁽¹⁾	BROOME COUNTY 2007 MSW⁽²⁾
Total paper	25.2%	41,285
Total plastic	15.0%	24,574
Total metals	6.0%	9,830
Total glass	2.3%	3,768
Total textiles and leathers	3.3%	5,406
Total tires	0.2%	328
Total yard waste	1.6%	2,621
Total food waste	12.4%	20,315
Total other organics	1.2%	1,966
Total wood	10.3%	16,874
Total C&D debris	8.9%	14,581
Total HHW	0.5%	819
Total durables (E-waste)	4.3%	7,045
Total miscellaneous MSW	8.8%	14,417
Total		163,828

(1) MSW composition taken from R.W. Beck study.

(2) Broome County 2007 MSW total tonnage that entered the landfill as municipal solid waste, as shown on Table 3-1.

TABLE 3-3

BROOME COUNTY ESTIMATED WASTE GENERATED IN 2007

MATERIAL	RECYCLED	AT LANDFILL	IN MSW	TOTAL	PERCENT OF WASTE STREAM
Total paper	32,698		41,285	73,983	16%
Total plastic	687		24,574	25,261	6%
Total metals	134,649		9,830	144,479	32%
Total glass	293		3,768	4,061	1%
Commingled containers	12,202			12,202	3%
Total textiles and leathers			5,406	5,406	1%
Total tires	1,103	1,499	328	2,930	1%
Total yard waste	12,137	2,280	2,621	17,038	4%
Total food waste			20,315	20,315	4%
Total other organics	2,714		1,966	4,680	1%
Total wood			16,874	16,874	4%
Total C&D debris	3,215	28,878	14,581	46,674	10%
Total HHW	2,521		819	3,340	1%
Total durables (E-waste)	272		7,045	7,316	2%
Total miscellaneous MSW			14,417	14,417	3%
WWTP sludge	8,422	7,089		15,511	3%
Alternative daily cover		36,975		36,975	8%
Total	210,912	76,721	163,828	451,461	100%

TABLE 3-3B

BROOME COUNTY ESTIMATED WASTE GENERATED 2008-2018

YEAR	RECYCLED	LANDFILLED	TOTAL
2008	199,605	186,445	386,050
2009	183,442	200,378	383,820
2010	149,275	170,609	319,884
2011	91,837	212,856	304,693
2012	56,859	167,436	273,922
2013	42,091	152,505	194,956
2014	111,143	181,211	292,954
2015	63,655	186,426	250,081
2016	78,447	181,211	259,658
2017	78,006	169,465	247,471
2018	91,297	183,540	274,837

* Recycling tonnages are calculated using scale weights and figures from area recyclers and local businesses. Not all businesses provide tonnages.

within the County and indicates the portion that was recycled, as well as a breakdown of the MSW delivered to the landfill in order to classify and quantify different types of materials. The results show that approximately 456,400 tons of waste materials are generated and tracked by Broome County.

Table 3-4 presents the estimated “baseline composition” of waste generated and managed within the County and compares it to recycling and diversion capture rates for the year 2007. The following observations were noted:

1. There is a very high capture rate of metals within the waste stream (approximately 90 percent). This is likely due to the market value of metals during 2007. However; like other commodities, the value of metals is prone to significant price fluctuations.
2. The remaining “yellow bin” type recyclable materials, including paper, plastic, glass, and co-mingled materials, are being captured at about a 40 percent rate. These numbers support the County’s desire to pursue targeted commercial, institutional, industrial, and multi-family recycling (CII&M) recycling efforts to increase the capture of these materials.
3. Food waste and yard waste currently account for 9 percent of the total waste stream (although other organics such as paper could also be considered as organic waste) and offer opportunity for diversion through private and public composting efforts.
4. Sludges from wastewater treatment facilities are organics that can also be composted for reuse as a soil amendment. Although composting of sludges (biosolids) by local municipalities has occurred in the past, it has grown burdensome in some cases and the County is evaluating potential coordination efforts for a central composting facility. The volume of sludges produced in the County on an annual basis is over 15,000 wet tons with a potential for higher production in the future.
5. C&D debris volumes fluctuate from year to year but contribute to approximately 15 percent of the total waste stream on an average annual basis. This is clearly a source that can be targeted for diversion potential and beneficial reuse of products, but also comes with program management challenges.

6. HHW and E-waste does not comprise a large portion of the waste, but it is a waste stream that should be kept out of the landfill. Current public participation with the HHW and E-waste is relatively low and the County has targeted this waste for increased participation and diversion opportunities.
7. The County currently takes significant advantage of alternative daily cover materials for the landfill in lieu of purchasing soil materials. Although these efforts fall under the State's Beneficial Reuse Program, it is not considered a recycling or diversion program since these materials are ultimately placed in the landfill.

TABLE 3-4

**BROOME COUNTY ESTIMATED WASTE
GENERATED AND CAPTURED IN 2007**

SUBGROUP	MATERIAL	MATERIAL CURRENTLY CAPTURED AND DIVERTED	PERCENT OF WASTE STREAM	MATERIAL IN WASTE STREAM	PERCENT OF WASTE STREAM
Recyclables	Total paper	32,698	7.2%	73,983	16%
	Total plastic	687	0.2%	25,261	6%
	Total metals	134,649	29.5%	144,479	32%
	Total glass	293	0.1%	4,061	1%
	Commingled containers	12,202	2.7%	12,202	3%
	Total textiles and leathers	-	0.0%	5,406	1%
	Total tires	2,602	1.7%	2,930	1%
	Recyclables Subtotal	183,132	41%	268,322	60%
Organics	Total yard waste	14,416	3.2%	17,038	4%
	Total food waste	-	0.0%	20,315	4%
	Total other organics	2,714	0.6%	4,680	1%
	Organics Subtotal	17,130	4%	42,032	9%
C&D debris	Total wood	-	0.0%	16,874	4%
	Total C&D debris	3,215	0.7%	46,674	10%
	C&D Debris Subtotal	3,215	1%	63,548	14%
HHW and E-waste	Total HHW	2,521	0.6%	3,340	1%
	Total durables (E-waste)	272	0.1%	7,316	2%
	HHW and E-waste Subtotal	2,792	1%	10,656	2%
Landfilled material	Total miscellaneous MSW	-	0.0%	14,417	3%
	WWTP sludge	8,422	1.8%	15,511	3%
	Alternative daily cover	-	0.0%	36,975	8%
	Landfilled Material Subtotal	8,422	2%	66,903	15%
	TOTAL	214,691	48%	451,461	100%

4.0 EXISTING PROGRAM DESCRIPTIONS

4.1 SOLID WASTE MANAGEMENT FACILITY INVENTORY

4.1.1 Solid Waste Collection

The collection and transportation of waste in the County is managed by public and private haulers and individual citizens, depending on the municipality. Commercial generators commonly use private haulers. The Town of Union, City of Binghamton, and the Villages of Endicott and Johnson City have municipal (public) collections. The collection and transportation in these municipalities is managed by either a Department of Public Works or a Highway Department. These communities make up 51.7 percent of the County's population and generate 24 percent of the residential waste, based on data from the 2000 U.S. Census and the Broome County 2007 Executive Summary, respectively. The remaining towns and villages use private haulers. In most cases, residents contract directly with their hauler. The Villages of Lisle, Whitney Point, and Windsor contract with private haulers for village-wide service. The waste is usually hauled directly to the Broome County Sanitary Landfill, except for that from the City of Binghamton and the Town of Chenango, which utilize transfer stations to collect and compact waste before going to the landfill.

4.1.2 Landfill Operations

The majority of waste generated in the County is disposed at the Broome County Sanitary Landfill, which occupies land in the Towns of Nanticoke, Barker and Maine. This landfill is the only permitted sanitary landfill in the County. The County also used the Colesville Sanitary Landfill as a major landfill site until 1984. The Town of Fenton was the last municipality to operate its own sanitary landfill, but it was closed for solid waste disposal on October 1, 1989. This site is currently being used for the composting of leaves and yard wastes. The Broome County Sanitary Landfill is currently operating under NYSDEC Part 360 and USEPA and RCRA Subtitle D. The permit was modified in 2017 and will expire in 2021.

4.1.3 Solid Waste Management Facilities

The NYSDEC lists 50 active solid waste management facilities in Broome County (Table 4-1), most of which manage small quantities of specific wastes outside the oversight of the County. Of those, 15 facilities are identified on the NYSDEC Environmental Navigator website, as shown on Figure 4-1. A solid waste management facility as defined in 6 NYCRR Part 360 as any facility used beyond the initial solid

TABLE 4-1

NYSDEC LISTING OF SOLID WASTE MANAGEMENT FACILITIES

FACILITY NAME	LOCATION ADDRESS	CITY	STATE	ZIP CODE	PHONE NUMBER	OWNER TYPE	ACTIVITY DESCRIPTION
A & T Consultants T.S.	29 N. Broad Street	Binghamton	NY	13904	6077243805		Transfer station - regulated
A&W Recycling; Inc.	Box 549	Chenango Bridge	NY	13745	6076483766		Source separated solid waste recyclables
Adams Transfer Station	Box 549	Chenango Bridge	NY	13745	6076484863	Private	Transfer station - regulated
Alan Lee White	6647 NYS Route 79	Chenango Forks	NY	13746			Vehicle dismantling
Beagell's Plumbing & Heating	RR 79	Harpursville	NY	13787			Land Application - Septage and food processing - registered
Ben Weitsman & Son Inc.	10 Brandywine Street	Binghamton	NY	13901	6077243244	Private	Vehicle dismantling
Binghamton Tran. Sta.(C)	13 - 17 1/2 Broad St	Binghamton	NY	13901	6077727021	Municipal	Transfer station - regulated
Blaison; Ken	6 Emma St	Binghamton	NY	13905-2508			Vehicle dismantling
Bodek Septic & Excavating Service Inc	195 Brooks Road	Binghamton	NY	13905	6077779974	Private	Land Application- Septage
Broome County Landfill	286 Knapp Road	Binghamton	NY	13902	6077782250	County	Landfill - mixed solid waste
Broome County Landfill	286 Knapp Road	Binghamton	NY	13902	6077782250	County	Household hazardous waste
Broome County LGRF	286 Knapp road	Binghamton	NY	13905	8024966504	Private	Landfill gas recovery
Broome Recycling Inc.	29 Broad Street	Binghamton	NY	13904	6077243805	Private	Source separated solid waste recyclables
Cgreen	71 Frederick Street	Binghamton	NY	13901	6072271768	Private	C&D processing - registered
Chenango (T) Compost	1529 NY RT 12	Binghamton	NY	13901	6077241472		Composting - biosolids/other
Chordas	1451 Front Street	Binghamton	NY	13901	6072215968	Private	Vehicle dismantling
Colpitts Construction/DBA P.B Pumping Service	130 East Windsor Rd.	Windsor	NY	13865	6076553279	Private	Land Application -Septage and food processing - registered
Cook Enterprises	331 Mix Road	Chenango Forks	NY	13746	6076485677	Private	Land Application -Septage and food processing - registered
Cook Enterprises	331 Mix Road	Chenango Forks	NY	13746	6076485677	Private	Land Application -Septage and food processing - registered
David & Marian Colpitts	126 Abbey Hill Road	Windsor	NY	13865	6077752203		Vehicle dismantling
Deposit Garbage Collection	Borden St	Deposit	NY	13754	6074673770	Private	Source separated solid waste recyclables

TABLE 4-1 (continued)

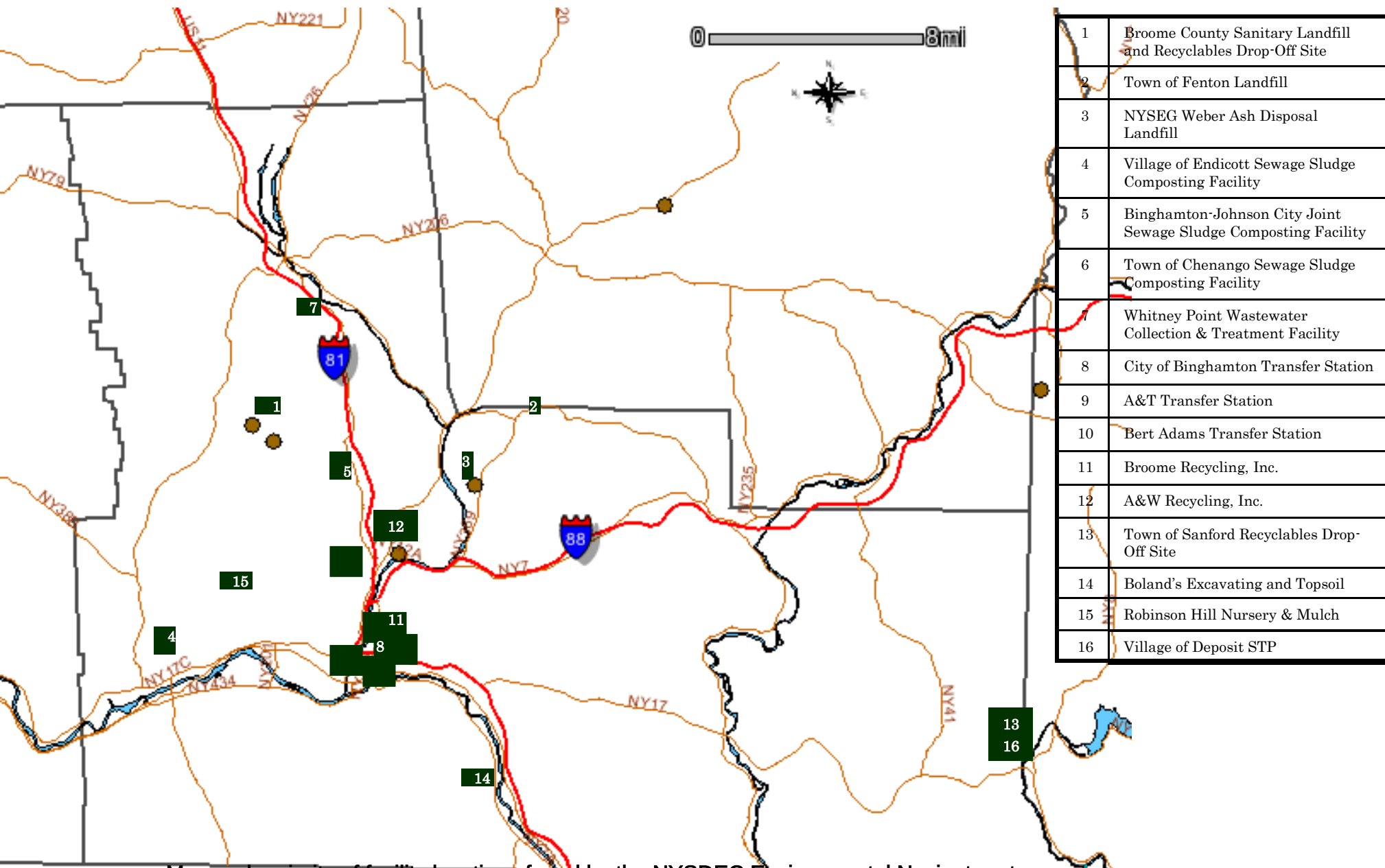
FACILITY NAME	LOCATION ADDRESS	CITY	STATE	ZIP CODE	PHONE NUMBER	OWNER TYPE	ACTIVITY DESCRIPTION
Deposit Wastewater Treatment Plant	Mill Street	Deposit	NY	13754	6074671118	Municipal	Transfer station - registered
Don's Automotive Mall Inc	216 Colesville Road	Binghamton	NY	13904	6077751542		Vehicle dismantling
Dunham Farms Septic	25 Northrup Ave.	Lisle	NY	13797	6076924167		Land Application -Septage and food processing - registered
Ed's Auto Parts	1650 Route 11	Castle Creek	NY	13744	6077224124		Vehicle dismantling
Edna Ramey	1259 Trim Street	Windsor	NY	13865	6077755074		Vehicle dismantling
Empire Recycling Corp.	100 Corliss Avenue	Johnson City	NY	13790		Private	Source separated solid waste recyclables
Endicott (V) Biosolids	1009 E. Main St	Endicott	NY	13760	6077572423		Composting - yard waste - registered
Endicott (V) Biosolids	1009 E. Main St	Endicott	NY	13760	6077572423		Composting - biosolids/other
Endicott (V) Wastewater Treatment Plant	1009 E. Main St	Endicott	NY	13760	6077572451		Composting - yard waste
Endicott Auto Wrecking Co	13 Dietrich Street	Endwell	NY	13760	6077852831		Vehicle dismantling
Faith Protheroe Lynch	415 Fox Farm Road	Windsor	NY	13865	6077751414		Vehicle dismantling
Frank's Garage	1 Mill Street	Deposit	NY	13754	6074672119		Vehicle dismantling
Gary's U-Pull It Inc	230 Colesville Road	Binghamton	NY	13904	6077752934	Private	Vehicle dismantling
Geodis Global Solutions USA; Inc.	1701 North Street	Endicott	NY	13760	6074294287		Electronics recycling
Higgins Auto Inc	507 Cloverdale Road	Chenango Forks	NY	13746	6076569576		Vehicle dismantling
Joe's Service	220 Stella Ireland Road	Binghamton	NY	13905	6077973140		Vehicle dismantling
Larry Mills	123 Gulf Summit Road	Windsor	NY	13855	6074673353		Vehicle dismantling
Pendell Farm & Septic	212 Smith Hill	Lisle	NY	13797	6078496102	Private	Land Application -Septage and food processing - registered
Penn Recycling Inc	2525 Grenton Avenue	Williamsport	PA	17701	5703269041		Vehicle dismantling
Randall's Auto Parts	87 Ridge Road	Harpursville	NY	13787	6076931775	Private	Vehicle dismantling

TABLE 4-1 (continued)

FACILITY NAME	LOCATION ADDRESS	CITY	STATE	ZIP CODE	PHONE NUMBER	OWNER TYPE	ACTIVITY DESCRIPTION
Ray Lantz Garage Inc	Box 193, 230 Tiona Road	Maine	NY	13802	6078623350		Vehicle dismantling
Ray's Auto Service	17 East Clinton Street	Binghamton	NY	13904	6077223000	Private	Vehicle dismantling
Robert's Scrap Processing	135 Hemlock Hill Rd	Whitney Point	NY	13862	6076927510	Private	Vehicle dismantling
Suburban Septic and Excavating Service; Inc.	332 Main St.	Kirkwood	NY	13795	6077753693	Private	Transfer station - registered
Suburban Septic and Excavating Service; Inc.	332 Main St.	Kirkwood	NY	13795	6077753693	Private	Land Application -Septage and food processing - registered
Sunstream Corporation	6 Spring Forest Avenue	Binghamton	NY	13905	6077244400	Private	Transfer station - regulated
SUNY at Binghamton	WR2 Tissue Digester	Binghamton	NY	13902	6077772224	State	Regulated medical waste - onsite treatment
The Computer Shop	118 West Main Street	Endicott	NY	13760	6074849033	Private	Electronics recycling
Twining Trailer Parks Inc.	2079 NY Rt. 26	Endicott	NY	13760	6077856966	Private	Land Application -Septage and food processing - registered
Wood's Auto Recyclers Inc	2828 Route 79	Harpursville	NY	13787	6076931125	Private	Vehicle dismantling

FIGURE 4-1

BROOME COUNTY SOLID WASTE FACILITIES



Map and majority of facility locations found by the NYSDEC Environmental Navigator at www.dec.ny.org.

waste collection process to manage solid waste including, but not limited to: storage areas of facilities; landfills; disposal facilities; compost facilities; surface impoundments; waste oil storage; reprocessing and refining facilities; recyclables handling and recovery facilities and waste tire storage facilities.

The following sections provide an overview of the 16 solid waste management facilities shown on Figure 4-1 which most directly impact the County's Solid Waste Management Program.

A. **Broome County Sanitary Landfill.** The Broome County Sanitary Landfill is a County owned and operated landfill and has been in operation since 1969. The landfill is currently the primary disposal site for the County's solid waste. A tipping fee of \$45 per ton is charged for solid waste disposal at the site. The landfill is located in the Towns of Nanticoke, Barker, and Maine and occupies an area of approximately 1,300 acres. The actual fill area occupies approximately 145 acres which are closed landfill. The remaining 20 acres of Section III closed in 2011. Another 99 acres are permitted as Section IV. Section IV Cell I is 12 acres and was used from 2009-2012, Cell II is approximately 7 acres and was used from 2012-2016 and Cell III is approximately 7 acres and started accepting waste in early 2016. Currently Cell IV is under construction.

The landfill is divided into several sections due to various lateral expansions constructed over the years. Section I is the original landfill site and consists of approximately 105 acres of the site. The landfill does not have a single type of lining system since it was continuously expanded during a time when State regulations regarding the design and construction of landfills were changing. Section II was constructed in 1985 and occupies 18 acres of the total site. This section is lined with a single composite system.

The design for Section III of the landfill was approved after extensive negotiations with the NYSDEC. The 20-acre double composite lined cell was constructed in 1993. Section III was closed in the spring of 2011.

In preparation for Section III closure, the County made provisions for a new landfill Section IV. Detailed design work began in 2000, with a permit application submitted to the NYSDEC in mid-2001. Construction activity began in 2001 and was completed by December 2002. As part of the construction of Section IV, two 2,200,000-gallon leachate storage tanks were constructed for storing leachate generated from Section IV. The leachate was subsequently pretreated and transported via the sewer line to the Endicott sewage treatment plant or trucked to the Ithaca treatment plant. Raw leachate was also trucked to i3 located in Endicott, NY. The leachate is then treated and discharged. There are 57 groundwater monitoring wells at the landfill.

Figure 4-2 is an aerial photo of the landfill. The old landfill and Section I are shown in the front of the photo, covered in grass, with the leachate pretreatment facility at the far end of the section. Beyond the first tree line are the partially capped Sections II/II and the two leachate storage tanks. Section IV, partially covered with a rain cap, is beyond the leachate storage tanks.

The landfill accepted approximately 220,000 tons of solid waste for disposal in 2007. There is a significant seasonal variation in the waste stream during the spring and fall due to the increase in yard work and construction activities. Leaf and yard waste was banned from the landfill in 1989; a separate area has been designated for composting these materials. White goods are also collected at a specially designated area at the landfill where certified staff removes refrigerants from any units; refrigerant is sent out for recovery and the units are transported to a local scrap metal dealer for recycling. Tires are stockpiled at the landfill and hauled by a private company for recycling. Since 1990, newspaper, kraft, corrugated cardboard, office paper, metals, glass, recyclable plastic, tires, and batteries were banned from the landfill. The landfill also houses a permanent household hazardous waste facility that operates year ground. The facility is open to Broome County and Tioga County residents (April-November) through an intermunicipal agreement. The facility also accepts electronics for recycling. Conditionally Exempt Small Quantity generators can utilize the facility, but must obtain a permit and pay a disposal fee.

B. The Town of Fenton Landfill. The Town of Fenton landfill is a town-owned and operated site and occupies an area of approximately 50 acres. Figure 4-1 illustrates the location of the landfill within the town. Actual fill area occupies approximately 10 acres of the 50-acre site. The landfill has not accepted solid waste for disposal other than yard waste since October 1, 1989. In addition, leaves were composted at the site. Before closing, the landfill was used solely for the disposal of residential solid waste. During 1988, it was estimated that approximately 3,700 tons of solid waste was disposed at the site. The town reached an agreement with the NYSDEC to close the landfill according to 6 NYCRR Part 360 regulations. A hydrogeological investigation was conducted and biological treatment of leachate was implemented. Other portions of the closure plan, such as the final cap and the gas control system, were funded through New York State to build a gas venting and collection system, and barrier and topsoil layers at the 6.5-acre Spencer Road site.

C. NYSEG Weber Ash Disposal Landfill. The Weber ash disposal landfill was a 16-acre site located in the Town of Fenton (as illustrated in Figure 4-1) and was owned and operated by the New York State Electric and Gas Company (NYSEG). The site was used for approximately 12 to 15 years for the landfilling of by-products generated from

FIGURE 4-2
AERIAL PHOTOGRAPH OF BROOME COUNTY LANDFILL (2002)



the combustion of coal. It is estimated that approximately 1,200 to 1,500 tons per year were landfilled at the site.

AES NY, LLC entered into an Asset Purchase Agreement with NYSEG dated August 3, 1998. In October 1999, AES Creative Resources, LP entered into a consent order with the NYSDEC to resolve alleged violations of water quality standards in the groundwater downgradient of the Weber ash disposal site. The consent order included a suspended civil penalty and a requirement to submit a work plan to initiate closure of the landfill by October 8, 2000. The consent order also called for a site investigation, which was conducted and indicated a possibility that groundwater remediation at the site may be required. Further compliance with this order included a closure investigation report which was submitted to the NYSDEC in the spring of 2000, and a closure plan which was submitted to the NYSDEC in January 2001. The latest part of the consent order was implemented during the 2001 spring/summer construction season when the work scope for covering the site and carrying out the future monitoring of the site per the Closure Plan was implemented.

D. Village of Endicott Sewage Sludge Composting Facility. The Village of Endicott sewage sludge composting facility is owned and operated by the Village. As illustrated in Figure 4-1, the facility is located at the village's sewage treatment plant; it was constructed during 1982-1983 and became operational in 1984. The facility processed 4,860 dry tons of sewage sludge in 2007 and 840 tons of compost. Sawdust and compost are used as feed materials in the composting process. Since the Endicott wastewater treatment plant also services the Town of Union and portions of the Town of Vestal, sewage sludge from these municipalities is processed at the Endicott sludge composting facility.

E. Binghamton-Johnson City Joint Sewage Sludge Composting Facility. The Binghamton-Johnson City Joint Sewage Treatment Plant (BJCJSTP) is under New York consent order to expand its wastewater treatment facilities to meet effluent limits for discharge to the Susquehanna River, a Chesapeake Bay tributary. The plant upgrade is necessary to increase secondary treatment capacity up to 70 million gallons per day (mgd) during peak storm weather flows.

Planned upgrades included procurement of the biological aerated filter (BAF) system equipment, upgrades to two plant influent pump stations, including three new 200 HP pumps and four 150 HP pumps at the Village of Johnson City's terminal pump station, variable speed controls, and flow meters for each provided pump. A new flow distribution structure was constructed to replace the two Parshall flumes to provide even flow distribution to the six existing primary settling tanks, and piping for four additional

primary clarifiers. Modifications were made to the existing SCADA system to incorporate flow information from the new pumps.

The existing sludge control buildings were retrofitted to comply with current electrical and fire codes, and a new addition was added to house the required boilers. Two existing sludge thickeners were retrofitted with a new distribution box, density baffles, sludge pumps, grinders, and controls. Two scum and grease pumping stations were designed to collect and transport grease and scum to the digester complex.

In 2006, there was a fire in the digesters at the existing sludge composting facility. As a result, the sludge generated is being lime stabilized and taken to the Broome County landfill for disposal. Binghamton-Johnson City has no current plans to reopen the sludge composting facility.

F. Town of Chenango Sewage Sludge Composting Facility. The Town of Chenango sewage sludge composting facility is owned and operated by the town. This three-basin facility is an expansion of the two-basin CASS™ Sequencing Batch Reactor Project originally commissioned in January 1993. The expansion took the plant from a design flow of 0.5 mgd to 0.8 mgd.

Due to increased flow and loading, the town upgraded its treatment facility in 1997. The upgrade required an expansion of the sludge dewatering operations. The 1997 upgrade included a new gravity belt thickener followed by the original relocated belt dewatering press and addition of a third basin. The facility processes approximately 4 dry tons per week.

The Town of Chenango biosolids composting facility is currently operating except in the summer months, due to odor complaints (see Section 5.4 on page 5-4). Based on their annual report for 2009, the facility received 730 cubic yards of sludge at 16 percent solids and 1,400 cubic yards of wood chips and sawdust (bulking agent), and produced 790 cubic yards of compost using the aerated static pile method. The 2009 quantities are much less than those for 2006, when the facility received approximately 1,580 cubic yards of biosolids (at 16.3 percent solids) and 3,000 cubic yards of wood chips, an approximate 46 percent reduction in the amount of biosolids composted. The facility is permitted to receive up to 230 dry tons of biosolids per year from the Northgate, Quinn Estates, and Pennview WWTPs, and may compost using a containerized system or the aerated static pile method (when the containerized system is inoperable).

G. Whitney Point Wastewater Collection and Treatment Facility. The Whitney Point wastewater collection and treatment facility became operational in November

2007 and will eventually provide service to approximately 350 homes and businesses in the area. The facility is owned by the Village of Whitney Point. Preliminary layout of the project began in the spring of 1997; however, obtaining adequate funding to make the project affordable took several years. The \$8.3 million project consisted of the development of a new wastewater collection and treatment system including approximately 36,000 lineal feet of gravity sewers, 4,000 feet of force mains, four collection system pump stations, and a 150,000 gallons per day (gpd) sequencing batch reactor treatment plant to serve a population of 1,100 people. The facility is not currently composting, but may do so in the future.

H. **City of Binghamton Transfer Station.** The Binghamton Transfer Station is a City-owned and operated facility which has been in operation since 1984 under a permit from the NYSDEC. The facility is used for the transfer and compaction of solid waste from smaller collection vehicles to larger vehicles that transport the waste to the Broome County Sanitary Landfill. Residential, commercial, and industrial wastes are processed through this facility. Specific quantities of waste processed at the facility have not been measured, but it is estimated that approximately 16,831 tons per year of the City of Binghamton's municipally collected solid waste passes through the facility.

I. **A&T Transfer Station.** The A&T Transfer Station is owned and operated by Bert Adams Disposal and is located in the City of Binghamton. The facility is operating under an original permit issued in February 1998 from the NYSDEC which will expire on June 30, 2019. Waste is currently being transferred to the Broome County for disposal.

J. **Bert Adams Transfer Station.** The Bert Adams Transfer Station is owned and operated by Bert Adams Disposal and is located in the Town of Chenango. The facility is operating under a permit from the NYSDEC which was issued in March 2017 and will expire December 2027. The facility is predominantly used for the storage of refuse collection vehicles owned by Bert Adams. On Saturdays, the transfer station accepts refuse for disposal from town residents. The volume of refuse collected at the facility is very small. The waste disposed consists solely of residential waste.

K. **Broome Recycling, Inc.** Broome Recycling, Inc. is a private materials recovery facility located in the City of Binghamton. In 1991, the County entered into a 10-year contract with Broome Recycling, Inc for recycling services, which expired in 2001. The facility is owned and operated by Bert Adams Disposal and Taylor Garbage Service. Currently, the facility process approximately 3,550 tons per year. The facility processes recyclable materials accepted as part of the County's program. It is a single stream facility.

L. **A&W Recycling, Inc.** A&W Recycling is located in Chenango Bridge. It is owned and operated by Bert Adams Disposal. The facility processes approximately 4,000 tons

of recyclables from Broome County. The facility collects and processes material in two streams.

M. **Town of Sanford Recyclables Drop-Off Site.** The Town of Sanford recyclables drop-off site is partially supported by the County. The site collects recyclables from residents only. The County supplies and services a roll-off container. The town is responsible for general supervision and maintenance of the site and for providing a platform on which residents can access the container. In 2006, an agreement was made with the town to progressively take over the costs of operating the site and then either contract out for services or provide services on its own. The contract stated that from 2006 to 2010, the town will pay an increased percentage of costs until the full cost is attained in 2010. The County no longer provides services for this drop-off.

N. **Boland's Excavating and Topsoil.** Boland's Excavation and Topsoil is a privately owned and operated soil and landscaping business located in Conklin, NY. Leaves and yard waste are accepted from several municipalities in the County, as well as private generators. A processing fee is charged based on the quantity of material delivered to the facility. The material is shredded and then composted in an aerated in-vessel composting system. The end product is used for the business's landscaping needs. The facility processes less than 3,000 cubic yards of material on an annual basis.

O. **Robinson Hill Nursery & Mulch.** Robinson Hill Nursery & Mulch is a privately owned and operated business located at 1000 Robinson Hill Road, Johnson City, NY, employing a staff of approximately one to four. The facility sells retail and wholesale nursery supplies which includes a variety of mulches and decorative stones. Yard waste is accepted from some municipalities in the County. A processing fee is charged based on the quantity of material delivered to the facility.

4.2 EXISTING EFFORTS TO RECOVER RECYCLABLES

4.2.1 Municipal, Commercial, Industrial and Private Efforts

The County is currently managing a long-term recycling plan that will maximize the reduction, reuse, and recycling of materials to the extent that is technically and economically practicable. The County's residential recycling program began in October 1987 as the Broome Recycling Project, which was a two-year program piloted to assess the effectiveness of a recycling program. Three municipalities (Village of Endicott and the Towns of Vestal and Chenango) were involved in the original program. The project was funded by monies from Broome County, the 1972 Environmental Quality Bond Act, and the New York State Energy Research and Development Authority.

The Broome Recycling Project consisted of the recycling of newsprint, brown kraftpaper, cardboard, and glass. These materials were placed in 5-gallon plastic pails for curbside collection in Vestal and Endicott. Due to its rural population, the Town of Chenango utilized drop-off centers for these materials. State funding for the demonstration project ended in May 1989, and the program is now being funded by the County.

Effective December 1990, certain materials were banned from land burial and incineration, including newspaper, kraftpaper, corrugated cardboard, magazines, office/computer paper, metals, glass, batteries, recyclable plastic, tires, and white goods. In addition, leaves were banned from the landfill in the fall of 1987, and yard wastes in September 1989.

The Division of Solid Waste Management is responsible for the overall program administration, including public education, procurement, consultant and vendor contract management, budget preparation, technical assistance, community public relations, and grant preparation.

4.3 MARKETS FOR RECOVERED RECYCLABLES

There has been an overall increase in value for recovered recyclables from the mid-1990s through 2007, including steel, aluminum, glass, old corrugated cardboard (OCC 11), old newspaper pulp (ONP 8), and mixed paper. However, in response to the downturn of the global economy (at the end of 2008 and again in 2017), the market for all of these and other recovered recyclables suddenly and drastically dropped in price. Because of the overall value drop of materials, a site-specific evaluation of potential markets with cost analysis will not be completed at this time. However, Broome County currently contracts for recyclables processing and the current program has not been impacted to date.

4.3.1 Information Review of Potential Markets

The materials collected from residents, commercial, industrial, and institutional establishments and separated for sale in secondary markets include:

- Paper (OCC, ONP, mixed paper, old boxboard (OBB), old magazines/catalogs (OMG), household office paper and mail (HOMP), phone books, and beverage boxes.
- Plastic (1-7 including polyethylene terephthalate (PET) and high density polyethylene (HDPE).

- Metals (aluminum, steel).
- Glass (flint and colored).

4.3.2 Potential Recyclables Market Survey

Reported prices for recyclables showed a slow increase of price from 2005 until around the fall of 2008 when the price dropped to a record low, or close to it, with varying degrees of recovery during 2009. Different types of plastic and paper in 2010 were still at low prices while metal and white goods had prices of at least 75 percent of the four-year high price. Different types of glass had also decreased in 2008 and have not recovered. In 2017 China General Administration of Customs announced the National Sword program. The program banned 24 types of solid waste and recyclables and reduced the contamination to 0.5%. This impacted the markets and pricing dropped and has remained depressed.

4.3.3 Recyclables Processing

Figure 4-3 illustrates a mix manual process system with a worker removing certain items from the conveyor and dropping them into the bins beside him. The private recycling companies in Broome County collect either fiber or containers to process and market out of a local facility. Southern Tier Recyclers collects some material from Broome County, but is based out of and processes material in Tioga County. Recyclables also go to a private facility called Broome Recycling, Inc. located in Binghamton, NY. Material from the recycling drop-off located at the landfill is currently processed by Southern Tier Recyclers.

FIGURE 4-3

MIX MANUAL PROCESS SYSTEM



4.3.4 Market Services for Recyclables

All residential and CII&M recyclables in the County are handled through municipal/private haulers. There are two privately operated facilities for haulers to utilize. The County has been assured the two facilities have the capacity to accept all recyclables produced in the County. The County currently contracts with Southern Tier Recycling located in Tioga County to process and markets materials from the recycling drop-off at the landfill. All other municipalities and haulers contract directly with one of the recycling facilities.

4.3.5 Restrictions to Market Development

There are both physical and institutional restrictions to increasing recycling participation in the County. The first is reliance on the private sector, where they would have to expand their facilities and collection services. With recyclables taken out of the County or collected by outside organizations, the benefits to the County are compromised and market development is restricted. Institutional restrictions include the control, flow, and processing of solid waste within the County in order to fund expanded programs. Flow control is not currently legislated by the County.

4.4 EVALUATION OF UPSTREAM AND DOWNSTREAM DIVERSION OPPORTUNITIES

To increase recycling efforts, the County was interested in further examination of “upstream diversion opportunities” (capture, control, and processing of recycling streams prior to disposal) and “downstream diversion opportunities” (alternative disposal and diversion through waste conversion technologies). The following topics were selected for further consideration under upstream diversion opportunities and “Issue Papers” were then developed for each of the 10 topics listed below and are presented in Appendix B. A further description of the selection process is summarized in Chapters 6 and 7.

1. Environmentally Preferable Purchasing (EPP) Practices & Recycled Content - Policy that encourages communities to purchase materials and services that offer specific environmental benefits.
2. Increase CII&M Recycling Participation – A target strategy directed at the largest generators or under-served portion of the County with respect to recycling efforts.
3. C&D Recycling – Source separation of demolition debris to remove reusable and recyclable products.

4. Use of Alternative Daily Cover (ADC) Materials at the landfill – To beneficially reuse alternative materials in lieu of soils.
5. Franchising Collection Services – An option to further capture recyclables under a consistent collection system with uniform rate structures for customers.
6. Establishment of Collection Districts – An option that would allow the County to contract collection services by district in order to provide “best price” to customers and to specify collection and recycling requirements uniformly across the districts.
7. Expand the Existing Household Hazardous Waste (HHW) and Electronics Recycling – In consideration of growing demands for electronics disposal.
8. Pursue Zero Waste Options – A management philosophy that looks at materials and products from a cradle-to-grave approach to encourage 100 percent reuse.
9. Organics Diversion – Efforts to divert organics from the landfill through the participation of residents, businesses, and institutions.
10. Single Stream Recycling Collection Methods Bins Versus Carts – Consideration of larger recycling containers under a co-mingle collection system that could increase the participation and volume of recyclable products.

For downstream diversion opportunities, the following technologies were considered during an evaluation of alternative technologies:

1. Anaerobic digestion.
2. Thermal technologies, including gasification, pyrolysis, and plasma technologies.
3. Enhanced composting, including MSW composting.
4. Waste-to-energy.
5. Bioreactor landfill methods.

An evaluation of alternative technologies was then developed for each of the five technologies listed above and is presented in Chapter 6.

5.0 FUTURE PLANNING UNIT PROJECTIONS AND SOLID WASTES CHANGES

5.1 FUTURE POPULATION

The projected populations for the County for the 20-year planning period of 2010-2030 are listed in Table 5-1.

TABLE 5-1
BROOME COUNTY POPULATION PROJECTIONS⁽¹⁾

YEAR	POPULATION
2010	202,170
2015	203,770
2020	205,520
2025	206,770
2030	207,360

- (1) Population projections prepared by the Broome County Planning Department based on the Southern Tier East Region's Broome County Profile 2003.

The plan projections were prepared in 2003 by the Southern Tier East Regional Planning Development Board. The projections are based on existing and expected birth, death and migration rates. Figure 5-1 illustrates the population projections in graphical form.

FIGURE 5-1
**BROOME COUNTY POPULATION PROJECTIONS PLANNING PERIOD
2010 – 2030**

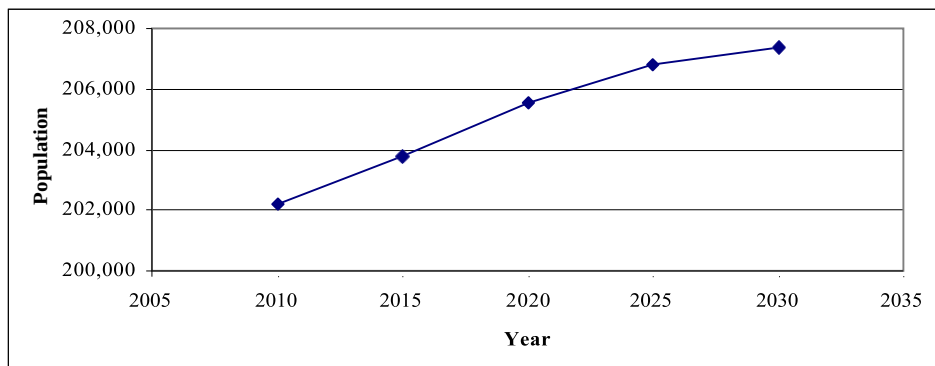


Table 5-2 lists the population projections for each municipality in the County. The town, village, and city projections were developed from the County projection utilizing local population and development trends.

TABLE 5-2

BROOME COUNTY MUNICIPALITY POPULATION PROJECTIONS

MUNICIPALITY	YEAR				
	2010	2015	2020	2025	2030
Town of Barker	2,760	2,782	2,806	2,823	2,831
City of Binghamton	47,768	48,149	48,559	48,854	48,993
Town of Binghamton	5,009	5,049	5,092	5,123	5,137
Town of Chenango	11,547	11,639	11,738	11,810	11,843
Town of Colesville	5,485	5,529	5,576	5,610	5,626
Town of Conklin	5,988	6,036	6,087	6,124	6,142
Town of Dickinson	5,378	5,421	5,467	5,500	5,516
Town of Fenton	6,965	7,021	7,080	7,123	7,144
Town of Kirkwood	5,697	5,742	5,791	5,827	5,843
Town of Lisle	2,729	2,751	2,774	2,791	2,799
Town of Maine	5,504	5,548	5,595	5,629	5,645
Town of Nanticoke	1,805	1,819	1,835	1,846	1,851
Town of Sanford	2,497	2,517	2,538	2,554	2,561
Town of Triangle	3,057	3,081	3,108	3,127	3,135
Town of Union	56,759	57,212	57,698	58,050	58,215
Town of Vestal	26,752	26,965	27,195	27,360	27,438
Town of Windsor	6,474	6,526	6,581	6,621	6,640
Total	202,174	203,786	205,520	206,772	207,359

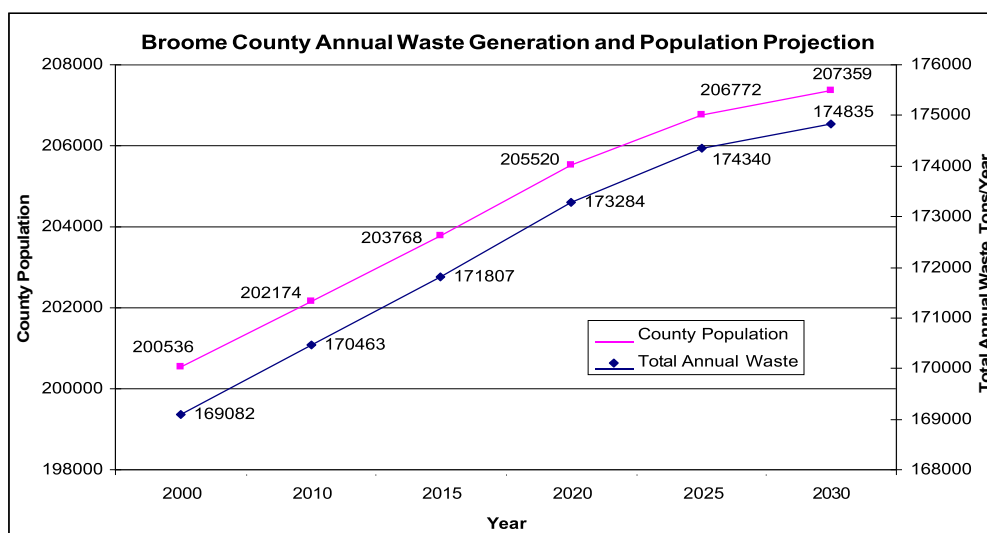
Projections based on information provided by the Broome County Planning Department.

The population projections for Broome County anticipate a net population growth of about 7,000 persons over the next three decades. The projections anticipate that the cycle of employment loss associated with the closing of major manufacturers over the past several decades will cease, largely because there are few such employers left. According to Cornell Institute for Social and Economic Research projections, by 2030, the population of Broome County will be very similar to the nation as a whole.

5.2 WASTE GENERATION

Broome County has projected a population increase of 2.56 percent over the next 20 years. The 20-year population projection is more fully described in Section 1.3. For each increase in population, there is an associated increase in waste generated per year. Over 2007, the USEPA estimated the average waste generation rate in the United States at 4.62 lbs/person-day. Using the USEPA waste generation rate, the projected population and annual waste generation in Broome County is shown in Figure 5-2.

FIGURE 5-2
BROOME COUNTY ANNUAL WASTE GENERATION
AND POPULATION PROJECTION



Broome County has completed permitting activities associated with the next 100-acre landfill expansion. Section IV will consist of 13 cells. Given the air space capacity (volume available for solid waste disposal) of the landfill, the anticipated waste generation per year, an average waste density of 1,700 lbs. per cubic yard based on historical data at the landfill, and consideration of daily cover and interim cover material, Section IV is expected to have a lifespan of over 40 years.

5.3 POTENTIAL PLANNING UNIT CHANGES

There are no anticipated changes to the Planning Unit.

5.4 SPECIAL CONDITIONS THAT MAY AFFECT THESE CHARACTERISTICS

Currently, the Village of Endicott, and Town of Chenango, are able to compost sewage sludge. The Town of Chenango currently processes sludge for part of the year when odor is not as likely, and suspends operations during the summer months. The Binghamton-Johnson City Joint Sewage Treatment Plant no longer composts their sludge. These communities have discovered that composting facilities are costly and difficult to manage on their own, and would prefer to haul the sludge to a regional compost facility or landfill.

5.5 PROJECTED CHANGE TO THE WASTE STREAM AND EFFECT ON CURRENT PRACTICES

If all the biosolids produced in the County were to be hauled to the landfill, the total yearly tonnage entering the landfill would increase by 8,500 to 13,500 tons. Currently, the County is not composting biosolids with yard waste, so the extra material would be directly disposed in the landfill. The effect of the biosolids in the landfill would be increasing the organic content of the waste, in turn increasing landfill gas production. However, wastewater sludges are difficult to handle in a landfill and also contribute to odors.

An anticipated societal change that can affect the waste stream characterization involves an increasing amount of electronics being discarded. Compared to 1989, electronics have a smaller lifespan and are more prevalent, people replace electronic equipment sooner, and the tonnage of disposed electronics is expected to continue to increase with time. It is anticipated the current HHW and E-waste recycling program will need to be expanded (refer to Chapter 6).

6.0 EVALUATION OF ALTERNATIVE TECHNOLOGIES

The objective of the alternative technologies evaluation is to analyze preferred downstream conversion technologies to determine their applicability to Broome County and its solid waste stream. The evaluation process included the following:

- Develop a list of technologies for initial screening.
- Conduct initial screening as part of a continuous improvement workshop with County staff.
- Identify a shortlist of alternative technologies as candidates for further review.
- Identify a set of screening criteria to apply to shortlist of technologies.
- Select two technologies for more detailed analysis.
- Develop recommendations concerning the implementation of these technologies.

6.1 INITIAL TECHNOLOGY SCREENING

The list of technologies identified by the County for initial screening included the following:

- Anaerobic digestion
- Pyrolysis/gasification/plasma technology
- MSW composting
- Landfill reclamation
- Waste-to-energy (WTE)
- Bioreactor landfills

At the July 2008 workshop with County staff, the project team provided an overview of these technologies, including a general description, industry status, and landfill diversion potential. Based on the discussions, the following technologies were identified for review:

- Anaerobic digestion and waste-to-ethanol
- Pyrolysis/gasification/plasma technology
- Enhanced composting, including MSW composting
- WTE (summary only)
- Bioreactor landfills (summary only)

6.2 DESCRIPTION OF SHORTLIST OF ALTERNATIVE TECHNOLOGIES

6.2.1 Overview of Anaerobic Digestion

Anaerobic digestion (AD) is one of the downstream technologies being considered by the County as an option for managing waste that is not targeted upstream to be reduced, reused, recycled or composted. AD is a technology that can potentially reduce methane emitted from agricultural waste and landfills through a biological process in which organic matter is broken down by bacteria. AD has the potential to reduce the volume of waste while producing methane and digestate (i.e., fibrous by-product and water). The co-products of the AD process are a medium-Btu content biogas and a slurry referred to as digestate. The biogas contains approximately 60 to 70 percent methane and is water saturated. The balance of the biogas mixture is carbon dioxide, and parts/million (ppm) of hydrogen sulfide. The digestate consists of undigested solids, cell-mass, soluble nutrients, other inert materials, and water.

A wide variety of engineered systems have been specifically developed for the rapid “in-vessel” digestion of the organic fractions of MSW (OFMSW) and other types of organic wastes. Most of these systems are located in Europe. Although the U.S. has been treating agricultural and municipal wastewater with anaerobic digesters for years, no commercial-scale solid waste digesters are operating today.¹ There are two AD facilities that currently process MSW located near Toronto, Canada.

Most AD systems are classified as either wet or dry, and each has its own benefits and constraints. Although hybrids exist, six basic types of AD systems reduce volume and recover energy from solid wastes: (1) wet single-step; (2) wet multi-step; (3) dry continuous; (4) dry sequencing batch; (5) dry multi-step; and (6) percolation (dry two-step). One-step wet systems are primarily designed to co-digest source-separated OFMSW with a liquid substrate, such as manure or sewage sludge. They are not typically used for the AD of the full OFMSW stream. Approximately 50 of the 90 wet systems in Europe co-digest the OFMSW with manure. Most of them are located in Germany, Sweden, Spain, and Denmark.² Generally, wet digestion is economically feasible when the residual liquids can be reused. If the MSW contains relatively high concentrations of heavy metals, this substrate may not be appropriate for beneficial use on agricultural fields.

¹ Source: “Current Anaerobic Digestion Technologies Used for Treatment of Municipal Organic Solid Waste,” Contractor’s Report to the California Integrated Waste Management Board, 2008.

² Source: “Anaerobic Digestion Feasibility Study for the Bluestem Solid Waste Agency and the Iowa Department of Natural Resources,” by R. W. Beck, Inc., 2004.

The dry systems have been effective for managing the OFMSW outside the U.S. without the need for a liquid substrate, such as manure. High solids digesters (dry) process a thick slurry requiring more energy input than low solids digesters (wet) to move and process the feedstock, but will typically have a lower land requirement due to the lower volumes of moisture in the process. Several dry continuous and batch technologies, including Linde, Dranco, and Valorga, are being successfully applied to manage the organic fractions within MSW in several locations in Europe.

A. **Feedstocks.** An ideal circumstance for quality feedstock is when the organic fraction can be collected at the source of generation, (e.g., manure, food processing industries, pulp and paper mills, etc.). In addition to the low degree of contamination, there is a more consistent composition of the waste over time that makes it easier to achieve a steady level of biogas production. This is optimal for conversion into a useful energy by-product. The following are possible organic components for feedstock to the AD facility:

- Green waste.
- Residential and commercial food waste.
- Non-recyclable, but compostable paper.
- Biosolids (wastewater sludge).
- MSW.
- Other organic sludges.

B. **Anaerobic Digestion Facility Components.** An AD facility will consist of an enclosed building, including an enclosed waste receiving and storage area, digester area, and ancillary equipment room; operations control center; utilities service area; biogas engine-generator area; and residue storage area. Windrow composting of the AD process residue will occur on a large concrete pad outdoors with stormwater control. The composted residue will require an on-site storage area. Initially, the facility should include digesters with available space to expand the waste receiving and storage enclosure, and potentially add another identical processing unit and biogas engine-generator. The selected site should exist near a major road for ease of access, water supply source, wastewater discharge point to treat wastewater, and electrical interconnection.

C. **Applicability to the Waste Stream.** Program experience in Europe and the U.S. has shown that comprehensive source separation of organics provides the best quality feedstock for AD, with a minimum of heavy metal and plastic contamination. Where source separation has been mandated in Europe, the results have been encouraging. The experience of some European communities indicates that 30 to 50 percent of the

total OFMSW can be successfully collected and managed separately. Moreover, industrial organics collected at the source of generation (e.g., food processing industries, pulp and paper mills, etc.) may provide an economically viable opportunity to apply AD for optimal conversion into a useful energy by-product. For Broome County to consider this alternative technology, a program would need to be implemented that minimizes contamination and ensures the collection of a significant proportion of the organic fraction of the disposed MSW to take advantage of needed economies of scale. In addition, a reliable market for the purchase of the biogas would need to be tapped.

D. Volume Reduction and Diversion Potential. Anaerobic digestion facilities can result in a 65 to 75 percent volume reduction of the organic solid waste received. Potentially, mixed MSW could be received at an AD facility, and a “dirty” materials recovery facility (MRF) could be integrated into the facility to process the non-organics. However, this approach creates greater risks related to the quality of the feedstock, directly impacts biogas production, increases the capital investment, and increases the quantities of residue.

E. Environmental Considerations. As with other solid waste processes, the AD facility may emit fugitive dust (particulate matter) and odors associated with the materials handling components of the process. Depending on the extent of potential fugitive dust, proper industrial ventilation design and control with a baghouse may be required. Organic emissions and odors in materials handling areas may also require local ventilation and control with activated carbon systems. Assuming that the process vents are completely leak-free, no air emissions or odor nuisances are likely to occur from the AD process since it is fully enclosed. A scrubber will remove hydrogen sulfide and moisture, directing the cleaned biogas (composed primarily of methane) to a low nitrogen oxides (NO_x) reciprocating engine to cogenerate electricity and/or thermal energy to heat the digesters. Combustion of the biogas will result in emissions of NO_x, carbon monoxide (CO), volatile organic compounds (VOC), particulate matter, and sulfur dioxide (SO₂).

The AD process will produce some wastewater which would need treatment and disposal. Proper process design and moisture management can minimize this by-product to a negligible level or eliminate this stream. In some instances, the moisture resulting from the process has been treated and used for irrigation or reintroduced into the composting process for the residue.

The AD facility will likely require, at a minimum, both air quality and solid waste permits to construct and operate.

F. **Residuals.** An anaerobic digestion facility can process approximately 95 percent by weight of the diverted organic wastes received. The preprocessing system mechanically separates unacceptable material, which is disposed of at the landfill. The system will employ bag breaking and screening. Depending on the volatile content and quality of the feedstock, the AD facility will produce combined residue that is 25 to 35 percent by weight of the material processed. After the digestion process, post-processing of the resulting residue will occur. The post-processing system includes mechanical dewatering followed by biological treatment by windrow composting outdoors for 10 to 15 days. The final product could be sold as soil conditioner.

6.2.2 Overview of Waste-to-Ethanol

Waste-to-ethanol is considered an emerging chemical/biological technology that uses hydrolysis and other processes to break down the organic fraction of the waste (paper, food waste, yard waste) into sugars, which are then distilled into ethanol. For implementation in the County, a waste-to-ethanol facility would most likely need a pre-processing step such as a MRF to remove contaminants from the organic portion of the waste stream.

There are several recently proposed U.S. waste-to-ethanol processing facilities including, but not limited to, the following:

- Fulcrum BioEnergy – Reno, NV
- Enerken – Pontotoc, MS
- Bluefire – LA. County, CA

One waste-to-ethanol facility that has been in the planning stages by Masada Oxynol LLC for more than six years is in Middletown, NY. Masada also has several projects in development in Latin America. Masada employs a process that uses strong acid hydrolysis to convert the cellulosic fraction of waste to sugars. The sugars are then fermented to ethanol using conventional yeasts. The non-cellulosic fraction of the waste is either recycled from a front-end materials recovery plant (plastics, metals, glass, etc.) or is burned to provide energy to the process. It is our understanding the project has secured most of the needed environmental permits, but construction has yet to be initiated.

6.2.3 Thermal-Based Conversion Technologies

Thermal-based conversion technologies utilize higher temperatures and have higher conversion rates when compared to other conversion pathways. In addition to the

traditional combustion technology of WTE, thermal conversion pathways also include emerging processes such as pyrolysis, gasification, plasma arc, and advanced thermal recycling. Each process operates within a specific temperature range and operating pressure. Pyrolysis and gasification are not new technologies, having been used in the coal industry since the early 20th Century. Attempts were made in the 1970s to apply pyrolysis to the processing of MSW waste at several facilities in the U.S., but the projects failed primarily due to difficulties with the front-end waste processing of the solid waste. While the application of these technologies to solid waste feedstocks is once again emerging in the United States, these technologies have been applied in other parts of the world, such as Japan and Europe. In most instances, the County would need to consider the import of applicable waste streams from outside the County to take advantage of the needed economies of scale for these options to be considered competitive.

For the purpose of this section of the Plan, the review of thermal technologies includes proven and emerging thermal technologies. The emerging thermal conversion technologies included pyrolysis, gasification; plasma arc; and advanced thermal recycling. The proven technologies include mass burn combustion in waterwall furnaces and refuse-derived firing in dedicated boilers (WTE). For WTE, we have provided a high level summary.

A. **Pyrolysis.** Pyrolysis is a process that produces pyrolytic oils and fuel gases that can be used directly as boiler fuel or refined for higher quality uses, such as engine fuels, chemicals, adhesives, and other products. Solid residues from pyrolysis contain most of the inorganic portion of the feedstock, as well as large amounts of solid carbon or char. Pyrolysis typically occurs at temperatures in the range of 750°F to 1,500°F and thermochemically degrades the feedstock without the addition of air or oxygen. Because neither air nor oxygen are intentionally introduced or used in the reaction, pyrolysis requires thermal energy that is typically applied indirectly by thermal conduction through the walls of the containment reactor. The reactor is usually filled with an inert gas to aid in heat transfer from the reactor walls and to provide a transport medium for removal of the gaseous products.

The composition of the pyrolytic product is changed by the temperature, speed of process, and rate of heat transfer. Lower pyrolysis temperatures usually produce more liquid products, and higher temperatures produce more gases. Slow pyrolysis is used to maximize the yield of solid char and is commonly used to make charcoal from wood feedstock. Fast or “flash” pyrolysis is a process that uses a shorter exposure time to temperatures of approximately 930°F. Typical exposure times for fast pyrolysis are less than 1 second. Rapid quenching of pyrolytic decomposition products is used to “freeze”

the decomposition products and condense the liquids before they become low molecular weight gaseous products. This process results in a product that is up to 80 percent liquid by weight.

Combustion of the gases produced during the pyrolytic reaction in a separate reaction chamber releases significant thermal energy. This thermal energy can serve multiple purposes, including producing steam for electricity generation, heating the pyrolytic reaction chamber, or drying the feedstock that enters the reaction chamber. If pyrolytic gases are combusted to produce electricity, air emission control equipment will be needed to meet regulatory standards.

The MSW feedstock typically requires shredding to a 12-inch maximum size prior to charging the pyrolysis reactors.

The net energy generation rate for the pyrolysis conversion technology can reportedly approach 700 kWh per ton of waste processed. Two facilities using MSW feedstock with WasteGen technology are operating in Germany, where the oldest facility has operated continuously for 22 years. The largest operating unit with over three years of experience processing MSW and similar waste is rated at 175 tons per day (TPD) in Hamm-Uentrop, Germany. A facility built by Brightstar Environmental in Wollongong, New South Wales, Australia, has had problems with the char gasification component of the process and corresponding financial problems with the plant. A proposed facility in the United States with the same conversion technology in Collier County, FL was canceled a few years ago. There are no full-scale facilities in commercial operation in the U.S. However, there are a few proposed U.S. projects that should be monitored in the near future.

B. Gasification. Two types of gasification technologies exist: (1) fluid bed gasification; and (2) two-stage (pyrolysis-gasification) fixed bed. The thermal conversion of organic carbon-based materials occurs in the presence of internally produced heat (typically at temperatures of 1,400°F to 2,500°F) and with a limited supply of air/oxygen (less than stoichiometric, or less than is needed for complete combustion) to produce a synthetic gas (syngas) composed primarily of hydrogen (H₂) and carbon monoxide (CO). Inorganic materials are converted either to bottom ash (low temperature gasification) or to a solid, vitreous slag (high temperature gasification that operates above the melting temperature of inorganic components).

Some of the oxygen injected into the system is used in reactions that produce heat, so that pyrolysis (endothermic) gasification reactions can initiate; after which, the exothermic reactions control and cause the gasification process to be self-sustaining.

Like pyrolysis, most gasification systems are closed systems and do not generate waste gases or air emission sources during the gasification phase. An important aspect of gasification is that the chemical reactions can be controlled for the production of different products. The gases produced by gasification can be cleaned to remove any unwanted particulates and compounds prior to use as fuel. After cooling and cleaning in an emission control system, the syngas can be utilized in boilers, gas turbines, or internal combustion engines to generate electricity or to make chemicals. Synthetic gases can produce methanol, ethanol, and other fuel liquids and chemicals.

The MSW feedstock requires shredding from a 2- to 12-inch maximum size prior to charging the fluid bed gasification reactors. Several suppliers' two-stage (pyrolysis-gasification) fixed bed technologies require minimal preprocessing of the MSW before compaction. One fixed bed technology reportedly needs size reduction of the MSW feedstock to a 3-inch maximum size prior to feeding the fixed bed gasification reactors.

In low temperature gasification, below the melting point of most inorganic constituents, a powdery to clinker-type bottom ash is formed. In high temperature gasification, the inorganic ash materials exit the bottom of the gasifier in a molten state, where the slag falls into a water bath and is cooled and crystallized into a glassy, non-hazardous slag. The slag is crushed to form grit that can be easily handled. Slag can be used in the manufacture of roofing tiles, sandblasting grit, and as asphalt filler. Bottom ash may require landfilling, although some suppliers have been able to manufacture ceramic-like bricks or paving stones.

One system that utilizes oxygen injection creates extremely high temperatures in the bottom of the gasifier, reaching the melting temperature of some metals. In that process, metals can be recovered in "ingot" form. Fly ash from the air emission control system is the primary process residue. Reuse of the slag after metal recovery would result in the high reduction rate. A facility with the gasification conversion technology reportedly can reduce the feedstock by more than 90 percent by weight. If this rate of reduction is correct, it would represent an improvement over traditional thermal conversion technologies that can reduce the volume of MSW by 90 percent, but the weight by only 75 percent.

No MSW processing facilities employing the gasification conversion technology are commercially operating in the United States. However, there is a commercial operation in Sanford, FL that processes sewage sludge through a gasifier, and there are several suppliers of the technology that claim to have commercially operating facilities outside of the U.S. and that have proposed projects in the U.S.

For fluid bed technologies, the net energy generation rate ranges from almost 400 to 450 kWh per ton of waste processed, which is somewhat lower than the conversion rate of traditional thermal conversion technologies. For two-stage (pyrolysis-gasification) fixed bed technologies, the net energy generation rate reportedly ranges from almost 700 to over 900 kWh per ton of waste processed, which is significantly higher than traditional thermal conversion technologies. Global Energy Solutions has the largest operating unit rated at 180 TPD in Tokyo, Japan, with over three years of experience while processing MSW.

C. **Plasma Arc.** 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 19th Century. Plasma arc technology uses very high temperatures to break down the feedstock into elemental by-products.

Plasma is a collection of free-moving electrons and ions that is typically formed by applying a large voltage across a gas volume at reduced or atmospheric pressure. When the voltage is high enough and the gas pressure low enough, electrons in the gas molecules break away and flow toward the positive side of the applied voltage. The gas molecules, losing one or more electrons, become positively charged ions that are capable of transporting an electric current and generating heat when the electrons drop to a stable state and release energy. This same phenomenon creates lightning.

Plasma arc devices or “plasma torches” can be one of two types: (1) the transferred torch; and (2) the non-transferred torch. The transferred torch creates an electric field between an electrode, at the tip of the torch, and the reactor wall or conducting slag bath. When the field strength is sufficiently high, an electric arc is created between the electrode and reactor, much like an automotive spark plug. The non-transferred torch creates the electric arc internal to the torch and sends a process gas, such as air or nitrogen, through the arc where it is heated and then leaves the torch as a hot gas.

Very high temperatures are created in the ionized plasma. The plasma can reach temperatures of 7,000°F and above; the non-ionized gases in the reactor chamber can reach 1,700°F to 2,200°F; and the molten slag is typically around 3,000°F. For applications in processing MSW, the intense heat actually breaks up the molecular structure of the organic material to produce simpler gaseous molecules such as CO, H₂, and carbon dioxide (CO₂). The inorganic material is vitrified to form a glassy residue. A main disadvantage of the plasma arc systems used in power generation is that a large fraction of the generated electricity is required to operate the plasma torches, which reduces net electrical output of the facility.

The MSW feedstock typically requires shredding to a 6-inch maximum size prior to charging the plasma arc reactors.

By-products of plasma gasification are similar to those produced in high temperature gasification, as noted previously. Due to the very high temperatures produced in plasma gasification, carbon conversion nears 100 percent.

The net energy generation rate can reportedly vary significantly depending on the facility throughput. The parasitic load of the torches at plasma arc facilities is significant.

Hitachi Metals, Inc., has developed two commercial plasma arc facilities with the Westinghouse Plasma system in Japan. The facility in Utashinai has the largest operating unit rated at 83 TPD with over three years of experience while processing MSW and auto shredder residue. Existing systems use two operating and one spare torch per reactor. The scale of technology has also been used in a General Motors plant in Defiance, OH since 1989. The plasma arc-based facility melts scrap metal for engine block castings. The plasma heating elements there have logged more than 500,000 hours of operation.

A leading supplier of the plasma arc technology, Westinghouse Plasma system, is Alter NRG. Alter NRG (formerly Geoplasma) was selected to build a 3,000 TPD facility in St. Lucie County, FL nearly five years ago. The project has been revisited and resized to less than 500 TPD and is still in the development stages. Koochiching County, MN is developing a plasma arc facility using MSW, along with other special wastes as feedstock. A independent review is presently being conducted, and funding is being secured from the state and federal governments to support project development. Plasco Energy Group, a plasma arc technology developer, has signed agreements with two provincial governments in Canada to design, build, and operate plasma arc facilities that will use MSW as feedstock. However, no facilities employing the plasma arc conversion technology to manage MSW are presently commercially operating in the United States.

D. Advanced Thermal Recycling. Advanced thermal recycling represents a second generation advancement of technology that utilizes complete combustion of organic carbon-based materials in an oxygen-rich environment, typically at temperatures of 1,300°F to 2,500°F, producing an exhaust gas composed primarily of CO₂ and water (H₂O) with inorganic materials converted to bottom ash and fly ash. The hot exhaust gases flow through a boiler, where steam is produced for driving a steam turbine-generator, thereby generating electricity. The cooled waste gases flow through an advanced emission control system designed to capture and recover components in

the flue gas, converting them to marketable by-products, such as gypsum (e.g., for wallboard manufacture) and hydrochloric acid (used for water treatment). Typical recovery rates of gypsum and hydrochloric acid from MSW on a weight basis are 0.3 and 1.3 percent, respectively. The bottom ash and fly ash are segregated, allowing for recovery/recycling of metals from the bottom ash and use of the bottom ash as a road base and construction material. The advanced recycling and emission control systems with recovery/recycling reportedly go beyond the technology utilized at conventional resource recovery plants.

The feedstock for advanced thermal recycling systems can be unprocessed MSW or refuse-derived fuel (RDF). Using lower moisture content, RDF improves the heating value of the feedstock, resulting in higher efficiency and lower throughput per kWh of electricity generated. To improve economics and efficiency, facilities can incorporate preprocessing to remove marketable recyclables, such as paper, plastics, metals, and glass.

Materials handling involves extensive recycling and reuse of solid and liquid residues which can include various by-products, such as hydrochloric acid, gypsum, metal scrap, and road base. In addition, some facilities will extract recyclables out of the feedstock before processing. These innovations reportedly result in disposal of less than 5 percent of process residues, which will be inert. The weight reduction rate of the advanced thermal recycling technology can reportedly range from almost 80 percent to over 95 percent.

No facilities employing the advanced thermal recycling conversion technology are commercially operating in the United States. However, Waste Recovery Seattle International LLC (WRSI) is a licensee of the Muellverwertung Rugenberger Damm (MVR) advanced thermal recycling conversion technology. The MVR technology is proven in two full-scale commercial facilities in Hamburg, Germany. Müllverwertung Borsigstrasse Damm (MVB), the oldest facility, has been operational since 1994. The MVR facility has reportedly operated at over 90 percent annual availability. The net energy generation rate is 580 kWh per ton of waste processed.

6.2.4 Overview of Enhanced MSW Composting

In accordance with New York State Regulations, leaf and yard waste (green waste) is not allowed to be disposed of in the Broome County landfill. As a service to County residents and businesses, the Division of Solid Waste Management currently operates a leaf and yard waste composting facility on the landfill property to process and recycle green wastes through the windrow method of composting. These services are provided

for a nominal fee to residents and businesses of Broome County (minimum of \$2 per visit to \$20/ton). Other private enterprises within the County also offer facilities for the processing and recycling of green wastes.

In consideration of expanding the County's current composting operations to increase downstream diversion of organic waste, and in light of recent New York State initiatives to promote greater diversion of organics from landfills, there are two potential management strategies that could enhance and expand composting operations. The first is the addition of other types of organic feedstock to the green waste currently being processed; the second is through a large-scale commercial MSW co-composting facility similar to that built for Delaware County, NY.

A. Enhanced Yard Waste Composting. In its simplest form, composting is the biological breakdown and stabilization of organic materials. In nature, this occurs over time through the presence (aerobic) or absence (anaerobic) of air, and the addition of moisture that supports microbial activity and decomposition of organics over a range of temperatures. Formal composting procedures are intended to create a controlled biological process that accelerates the decomposition and stabilization of organics, which can then be reused as a soil amendment.

Enhanced yard waste composting is an organics management strategy that would allow the County to compost other source-separated organics with their current green waste composting operations in a systematic and potentially "phased" approach. A variety of composting methods and engineered systems could be utilized to expand the current green waste composting operations. The following discussion presents an overview of the options that may be available to the County.

1. **Feedstock Availability.** For an enhanced green waste composting program, ideal circumstances for quality feedstock are those materials that can be collected at the source of generation and provide consistent "non-contaminated" (no inorganic materials or paper) feedstock. Although a consistent supply of feedstock can be difficult to achieve, there are also methods and procedures that can be utilized to manage inconsistent feedstock but would require additional capital investment in equipment. The following are typical organic feedstocks that are most suitable for co-composting with leaf and yard waste:

- Biosolids from wastewater treatment facilities.

- Source-separated food waste from residential, commercial, and institutional facilities. Food waste is often categorized as “pre-consumer” food waste (prior to consumption by consumers, e.g., grocery store organics, food preparation businesses, food processing industries, etc.) or “post-consumer” food waste which is discarded organics that are not consumed after serving (vegetable and meat scraps, spoiled foods, etc.). Pre-consumer food waste will generally have less paper and plastics than post-consumer food waste, but it is rare for food waste to be completely free of paper and plastics.

The benefit of each of these types of organic feedstock is that they offer a higher percentage of nitrogen to carbon-rich green waste. Early blending of feedstock to achieve appropriate carbon:nitrogen ratios can accelerate the active composting phase of the material to achieve a stable compost in less time. The advantages and challenges of these feedstocks are summarized as follows:

TYPE OF FEEDSTOCK	ADVANTAGES	CHALLENGES
Wastewater sludges	† Readily available † High nitrogen content † Regular testing at source	† Strong odors † Inconsistent moisture content † Requires more processing controls
Pre-consumer food waste	† Relatively low odor † Excellent source of nitrogen † Many potential sources locally available	† Requires some pre-processing for size reduction † Variable quantity and quality † Requires outreach program
Post-consumer food waste	† Source of nitrogen † Locally available	† Potentially higher odors † Requires pre-processing † Collection challenges

2. **System Components and Alternative Composting Methods.** There are a variety of composting methods that may be utilized to co-compost multiple organic waste streams. However, given the sensitivity for odor generation, outdoor windrow composting is not the most suitable for nitrogen-rich materials since oxygen is rapidly consumed by microorganisms and compost must be mixed regularly to reintroduce oxygen into the compost. This can often result in the release of fugitive odors that are generated if oxygen is depleted, and ammonia and other gases are generated through

anaerobic activity. However, if the compost site is isolated from downwind odor receptors, windrow composting is the least expensive option to the County. Where odors are a concern, the recommended composting methods are as follows:

- a. ***Aerated Static Piles.*** This is a process where source-separated organics are received and mixed with green waste and placed on an aeration pad for processing. The pad includes a system of perforated pipes and aeration blowers that regularly feeds air from the bottom of the piles through the organic materials to control the rate of decomposition and compost production. This method does not require the material to be turned, and generally completes the active phase of composting within 30 days, when the material can then be removed from the pad and cured in windrow piles for final processing. The Onondaga Resource Recovery Agency recently completed a pilot test program utilizing static aerated piles to compost green waste and pre-consumer food waste with excellent results, and therefore plans to pursue full-scale development at their site.
- b. ***Covered Aerated Static Piles.*** Similar to aerated static pile systems, this process utilizes similar forced aeration systems but adds a fabric cover (the Gore Cover System or equivalent) over the piles to control moisture content and to further prevent the escape of fugitive emissions. These cover systems allow air to circulate and escape through the (breathable) fabric while retaining moisture and off-gases that are bound by moisture. These types of systems are popular in Europe and have recently been developed in the western portion of the United States for green waste and biosolids co-composting.
- c. ***In-Vessel Systems.*** In-vessel composting systems are those that process organics in a vessel, container, or building by controlling moisture addition and oxygen as required, and mixing the material as decomposition of the material proceeds. The primary advantage of these systems is that they allow the greatest processing controls to accelerate the overall composting process. In-vessel systems generally control odors by retaining or collecting them and treating them prior to release to the atmosphere. In-vessel systems range from relatively small containers for farms (to compost manure) and universities (food waste) to building systems like the IPS Agitated Bin System for composting biosolids (similar to the Rockland County Solid

Waste Authority Co-compost Facility). The larger systems are generally suited to higher volumes of organic processing due to economy of scale.

3. **Applicability to the Waste Stream.** There has been a variety of experiences in both the United States (recently) and Europe (historically) related to organics composting and the trend to divert greater volumes of organic material from landfills. The Western Region of the United States has shown greater activity with source-separated food waste programs than other portions of the U.S. Biocycle Magazine (December 2008) reports that there are nearly 70 food waste composting facilities in Alaska, Arizona, California, Nevada, Oregon, and Washington. The most challenging and expensive portions of the program relate to collection, public outreach, and management of consistent feedstock. For Broome County, the most readily available source-separated organics are from the wastewater treatment facilities located within the County and at institutional facilities (food waste).
4. **Volume Reduction and Diversion Potential.** Source-separated compost facilities can achieve a very high volume reduction of the organic waste received since it primarily consists of compostable materials. For food waste, however, there will always be a fraction of inorganic waste that will need to be screened from the final product. For pre-consumer food waste, the volume reduction can be over 90 percent. For post-consumer waste, the volume reduction will be somewhat less but should still achieve over 80 percent reduction. The challenge is to manage residuals that are removed from the compost on site without cross contamination of the final compost product. The overall program challenge for food waste composting is to achieve reasonable participation through the implementation of effective collection methods at a reasonable cost. It has also been noted by those communities that have implemented these programs that success often occurs at the “grass roots” level where individuals, businesses, and institutions have a strong desire and commitment to implement organics recycling programs since it generally takes more efforts to succeed.
5. **Environmental Considerations.** For composting operations, the most significant challenges for controlling environmental impacts relate to control of odors, fugitive dust emissions, stormwater management, and prevention of leachate generation. New York State requirements pertaining to composting operations are presented in the 6 NYCRR Part 360-5 Solid Waste Rules and Regulations. For those composting operations greater

than 3,000 cubic yards per year, the NYSDEC requires the facility to be registered. For operations greater than 10,000 cubic yards per year, the facility will require a solid waste permit. In addition, if biosolids are processed in any volume, it will require a solid waste permit.

6. **Residuals.** For source-separated organics, there will be some inorganic materials that will need to be removed from the final compost product. Depending on the materials, this could range from 25 percent by volume to less than 10 percent by volume. Residuals would require disposal in the landfill if it consists of paper, plastics, or large organic material. Wood waste could be reused as a bulking agent for feedstock as part of the composting process.

B. **MSW Co-Composting.** MSW co-composting is a waste diversion and organics recycling technology that processes a single mixed stream of solid waste and captures and composts the organic fraction of the waste. The advantage of this technology is that it does not require special separation or collection programs for the organic fraction of the waste stream (utilizes existing waste collection programs) and integrates well with existing recycling programs.

MSW co-composting technologies are aerobic processes that do not produce synthetic gases for conversion to energy; however, the Nantucket Facility in Massachusetts recently received an approved protocol from the Chicago Climate Exchange for receipt of carbon credits.

1. **Feedstock Availability.** The following types of feedstock can be processed through an MSW co-composting facility:
 - Mixed MSW
 - Green waste
 - Wastewater treatment plant sludges
 - Non-contaminated waste liquids
 - Other organic sludges
 - Food waste
 - Liquid sludges

As previously discussed, all of these organic materials are readily available within the County. The advantage of this process for feedstock is that inorganics are removed as part of the process and it does not rely on separation of organics at the point of generation. In addition, the process

anticipates various levels of moisture content for different feedstocks and can be adjusted throughout the process.

2. **MSW Co-composting Facility Components.** MSW co-composting facilities are fully enclosed facilities that generally consist of a waste receiving area (solid waste, biosolids, liquid waste); an aerobic digester (rotating drum or other mixer); primary refining area where large inorganic material is separated from organic material; an active composting area; a secondary refining area where small inorganics are removed from the compost; operations control center; pre- or post-sorting areas for dry recyclables; automated instrumentation systems; and site utility systems. In some instances, there are enclosed storage areas for compost. The facilities can be developed as modular systems and can be sized for almost any throughput, although economy of scale is a key consideration.
3. **Applicability to the Waste Stream.** *Biocycle Magazine* (November 2008) reports that there are 13 MSW composting facilities operating in the United States ranging in size from 33 to 350 TPD. The largest MSW composting facility in North America is located in Alberta, Canada, and processes over 350 TPD of MSW. The newest facilities to come on line were Delaware County, NY (2006) and Rapid City, SD (2005). Both of these facilities process both MSW and biosolids and are very well run facilities that sell their final compost product.

A significant advantage of MSW co-composting is that it does not require changes to the County's current solid waste collection methods nor does it require residents to modify habits with respect to separation of recyclables and solid waste. It also potentially allows for greater processing of solid waste, which will lower the volume of material into the landfill to extend the overall life of the facility. However, like all alternative technologies, this process can be more expensive than disposal of waste in a landfill. The economic benefits occur with respect to the longevity of the landfill, the ability to process greater volumes of waste, the ability to utilize alternative energy resources to reduce operating costs, and the receipt of economic incentives such as carbon credits – all of which are potentially available to the County.

4. **Volume Reduction and Diversion Potential.** MSW co-composting facilities can achieve volume reductions of between 50 and 75 percent, depending on the equipment and systems utilized. Where the focus is on

maximizing landfill diversion, additional capital expenditures are utilized for greater separation and reuse of materials (similar to the Conporec Facility in Canada). Where facilities are integrated with an active recycling program (Blue Box Program), the focus is on capturing the organic fraction of the waste stream and not spending additional money on recovering recyclables within the facility (similar to the Delaware County model). Delaware County reports that their total solid waste management program is achieving nearly 85 percent recycling with the implementation of the MSW co-composting facility (includes their MRF). From a volume perspective, Delaware County is achieving a 70 percent diversion rate for their landfill air space.

5. **Environmental Considerations.** For MSW co-composting operations, the most significant challenges for controlling environmental impacts relate to control of odors, fugitive dust emissions, and compost quality. New York State requirements pertaining to composting operations are presented in the 6 NYCRR Part 360-5 Solid Waste Rules and Regulations. All MSW co-composting facilities require a New York State solid waste permit to construct and operate the facility. Registration of odor control facilities is also required under the air regulations.

Extensive odor control systems are utilized that maintain negative pressures throughout the processing areas and treat air through scrubbers or biofilters prior to releasing to the atmosphere. Dust collection and removal systems are also used to remove particulates from the air during internal screening and processing of the final compost product.

Worker health and safety is also a significant consideration, and local ventilation systems are utilized extensively in the facilities, as well as sanitary facilities and clean-up areas.

6. **Residuals.** An MSW co-composting facility can process a variety of organic materials in a single stream. Biosolids and liquid waste have very little residuals left after processing, while MSW has a significant component of inorganic materials. Depending on the type of feedstock, the MSW co-composting facility may produce combined residuals of 25 to 40 percent by weight of the material processed. This number may be a bit misleading since moisture is added throughout the process so weight comparisons may not be completely representative of the diversion potential compared to volume reduction. The inorganic material must be disposed of in a landfill or

approved solid waste disposal facility. The final compost product is tested and sold as a soil amendment.

6.2.5 Overview of Waste-to-Energy

The WTE industry emerged in the United States in the 1970s due to several factors. The Arab Oil Embargo resulted in oil and energy prices increasing substantially. Second, there was growing recognition of the potential risks of groundwater contamination at existing unlined landfills. This led to new regulations requiring the construction of lined sanitary landfills, which increased solid waste landfilling cost. Third, WTE facilities were considered viable alternatives for waste disposal and energy production.

In 1980, less than 60 WTE facilities were operating. By 1993, the number of operating facilities reached a peak of approximately 150. From 1993 to present, the number of operating WTE facilities has declined to approximately 89. The decline was caused in part by an abundance of landfill space with lower tipping fees than WTE facilities, loss of ordinance-based flow control, and implementation of more stringent federal air quality standards. Currently, WTE facilities process approximately 12 percent of all MSW generated in the United States, according to the USEPA.

It is important to note that the last “greenfield” WTE facility utilizing mass burn technology was constructed in the United States in the early 1990s. Since that date, several WTE vendors have exited the business (Westinghouse, Foster Wheeler, and General Electric), and multiple acquisitions have taken place. Covanta Energy, Montenay Power/Veolia, and Wheelabrator Technologies represent the three primary remaining WTE vendors. Several existing facilities are proceeding with expansion, including but not limited to, Lee County, FL; Rochester, MN; Honolulu, HI; and Lancaster County Solid Waste Authority. Higher energy prices over the last two to three years have resulted in a renewed interest in WTE technologies.

A. **WTE Facility Components.** Generally, a mass burn WTE facility will consist of a large building, including an enclosed waste receiving and storage area, furnace-boiler room, central operations control center, water treatment area, turbine-generator hall, and residue storage area. An air-cooled condenser, air emissions control systems, a continuous emissions monitoring system enclosure, and stack with multiple flues will be located outdoors.

The WTE facility should be situated on a minimum of an 8- to 10-acre site surrounded by additional buffer area. The selected site should exist near a major road for ease of

access, water supply source, wastewater discharge point to treat wastewater, and electrical interconnection. The design of a new WTE facility can incorporate on-site wastewater reuse.

The anticipated energy content (higher heating value) of the processible solid waste will range from 4,500 to 5,000 Btu per pound. Typically, food waste is the highest moisture-laden component with the lowest energy value of the potential processible waste stream for the WTE facility.

B. Commercially Proven Technologies.

1. **Mass Burn WTE Systems.** Mass burn WTE systems can be basically divided into three separate technologies: (a) modular starved air systems; (b) modular excess air systems; and (3) field-erected excess air systems.

The modular starved air systems were historically used for small applications (under 400 TPD). These facilities would typically combine several refractory lined combustors, each rated for around 90 TPD, in the number necessary to dispose of the quantities of waste available in the area. These refractory lined combustors generally had two chambers in which the MSW was introduced and pushed through several steps during which the fuel was first dried, then combusted, and then completely burned with the ash removed into a submerged conveyor. The combustion was conducted without adequate amounts of oxygen; additional air was introduced in the secondary chamber where the combustion was fully completed. Many of these modular starved air systems were used in small applications for incineration only. If energy recovery was desired, a separate waste heat boiler was included to convert the hot gases from incineration into steam to drive a steam turbine connected to an electric generator.

The modular excess air WTE system can be described as the rotary combustor systems currently in use in several facilities in the United States. These facilities use a rotating cylindrical combustor in combination with a waste heat boiler to create steam for electrical production. The combustors are constructed with tube material that circulates water to absorb the heat of combustion and to heat the water being used in the waste heat boiler to create the steam for use in the steam turbine generator. The MSW tumbles through the inclined combustor and falls out of the combustor onto an after-

burning grate system, which allows for the complete burn-out of the MSW fuel.

The type of WTE facility most prevalent in the United States uses the field-erected excess air technology. With this technology, the incinerator and boiler are one system; the walls of the incinerator are constructed of tubing in which water circulates as part of the steam generation process. The mass burn technology typically utilizes an overhead crane to feed municipal solid waste from a pit into a chute that deposits the municipal solid waste onto an inclined surface upon which the municipal solid waste burns in the presence of more than enough air (oxygen) to achieve complete combustion. The heat generated during combustion is transferred through the water walls to create steam. In addition, the water wall boilers are typically provided with additional tubing in other sections of the boiler to create superheated steam that improves the generation of electricity and other tubes to preheat the water, which improves the efficiency of the boiler process. The super-heated steam is sent to a steam turbine connected to an electrical generator to create electric power. Some facilities use steam turbines that allow for extraction of steam at some specific pressure level to be sold to an adjacent industry that may require process steam.

- 2 **RDF Systems.** RDF systems have been employed as a means to increase the quality of the MSW as a fuel and to provide a means to recover materials prior to combustion. RDF systems in use today are being used in combination with field-erected water wall boilers. RDF systems can be used to prepare fuel to be used with different types of combustors, including fluid bed combustors and other industry boilers (cement kilns, pulverized coal units, etc.). On average, RDF systems have a larger design capacity than mass burn facilities. Most RDF facilities in the U.S. process 1,000 TPD or more.

RDF systems can be arranged in several different forms. There are several systems typically used in an RDF plant, including shredders, magnets, eddy current separators, trommels, and picking stations. The combination of and order in which the systems are arranged are what differentiates one from the other. Two or three types of shredders can be employed, including slow-speed shear-type shredders, bag-breaking “flail mill”-type shredders, and size-reducing hammermill-type shredders. Magnets can be used to remove ferrous metals such as steel cans and other iron. Eddy current separators can be used to remove non-ferrous metals such as aluminum, brass, tin,

etc. Trommel systems can be used to separate materials by size using a rotating cylindrical drum with sides made of screens with holes of certain size. Picking stations provide a means to pick targeted items for recovery.

In the United States, three types of RDF systems are normally employed, including the shred-and-burn system, the trammel-first systems, and the shred-first systems. All three designs use ferrous removal magnets. The shred-and-burn system in use at the SEMASS facility in Rochester, MA basically removes the non-processible waste, shreds everything else, removes ferrous metals, and burns the remainder. The trommel first system at SPSA in Portsmouth, VA and one of the Miami, Dade County, FL systems use trommels to open bags and remove glass and grit; then sends the material into another trommel to separate those items already sized appropriately for the combustor, which also concentrates the aluminum cans; then shreds the oversized material for use in the boiler. Typically magnets are used to remove ferrous metal from each stream, and eddy current separators remove aluminum prior to the size reducing shredder. The shred-first systems typically use a flail mill to open bags of MSW, then magnets and trommels remove small residues and size materials, and hammermills size the remaining materials. H-POWER in Honolulu, HI uses the shred-first system.

All of the RDF systems operating in the United States use grate-type combustion units. Typically, the boilers used in the RDF systems are very similar to those used in mass burn systems: field-erected water wall units with superheaters and economizers. The differences between mass burn and RDF combustion units are associated with the grate systems. The RDF units use a horizontal grate system; the mass burn facilities use inclined grate systems.

C. **Residuals.** Unprocessable (i.e., large, bulky) solid waste is separated in the waste receiving area for recycling or landfill disposal. Unprocessable solid waste components include demolition/renovation/construction debris, durables, household hazardous wastes, and special wastes. The remaining solid waste components are compatible with mass burn technology.

6.2.6 Overview of Bioreactor Landfills

Unlike the other alternative technologies discussed in this section, bioreactor landfill technology does not prevent the disposal of MSW in the landfill. This technology is

focused on the accelerated decomposition of organic matter within the landfill waste mass. Operating a bioreactor landfill requires the managed introduction of liquid, usually leachate, into the waste mass. This is typically accomplished using vertical and/or horizontal piping systems. While the concept is similar to leachate recirculation, a true bioreactor landfill is monitored for various operational parameters (including temperature, moisture content/pore water pressure, leachate generation rate, head on the primary liner system, etc.) to optimize biological degradation of organic matter through controlled liquid addition. A bioreactor landfill is operated within a certain range of these parameters to create the proper environment for biological activity without overapplying the liquid and creating additional leachate generation. Air can also be “injected” into the waste mass to increase oxygen levels and create an aerobic bioreactor, which can further enhance biological activity. The USEPA continues to evaluate the design and operation of bioreactor landfills through both the Project XL program, which began in 1995, and through funding of demonstration projects.

A. **Potential Advantages of Bioreactor Landfills.** According to the USEPA, bioreactor landfill operations can offer several advantages when compared to standard landfill operations, including:

1. **Accelerated Waste Decomposition/Stabilization.** A bioreactor landfill operation increases the volume of waste that can be placed within a given footprint prior to closure and also results in the stabilization of readily and moderately decomposable organic matter in years (typically 5 to 10), as compared to decades for traditionally operated landfills.
2. **Increased Landfill Airspace.** As a result of the increased rate of waste decomposition, organic matter is converted to gas, and the density of the waste is increased. This results in a reported 15 to 30 percent increase in air space.
3. **Reduced Waste Toxicity and Mobility.** As a result of both aerobic and anaerobic conditions within the waste mass, the long-term toxicity and mobility of the waste is reduced.
4. **Increased Landfill Gas (LFG) Generation Rate.** For those facilities that capture and reuse landfill gas, an increased rate of LFG generation allows for more efficient collection of the energy available from the organic waste over a shorter period of time. This can decrease the overall cost to capture and reuse LFG.

5. **Decreased Leachate Disposal Cost.** If leachate is utilized as the liquid in a bioreactor landfill, the cost of leachate treatment/disposal can be reduced.
6. **Reduced Post-Closure Care.** Because more of the decomposition of the waste is completed prior to closure, post-closure settlement is reduced.

In addition to the potential advantages reported by the USEPA, other potential advantages include:

1. **Improved Leachate Quality.** By recirculating leachate through the landfill and increasing the biological activity in the waste mass, the overall quality of the leachate can be improved (i.e., the concentration of biodegradable parameters is reduced) by the time the landfill is capped.
2. **Potential Reduced Landfill Capping Requirements.** Some landfill owners have proposed that by recirculating leachate through the waste mass, the overall environmental liability (toxicity and mobility) remaining at closure is significantly reduced compared to standard operations, and therefore a formal, low permeability landfill cap should not be required. Proponents of this approach have suggested only phyto capping (trees) or no capping of managed and monitored bioreactor landfills.

B. Potential Concerns with Bioreactor Landfills. The USEPA also identifies several special considerations that must be examined and understood prior to implementing a bioreactor landfill operation, including:

1. Increased LFG generation.
2. Increased odors.
3. Decreased waste mass stability due to increased moisture content and waste density.
4. Decreased landfill liner system stability.
5. Increased surface (side slope) seeps.
6. Landfill fires, primarily for aerobically operated bioreactor landfills.

C. State of Bioreactor Landfill Operations in the United States. In conjunction with the Bioreactor Landfill Committee of the Solid Waste Association of North America (SWANA), the USEPA maintains a listing of bioreactor projects in North America. This listing includes approximately 80 projects in the U.S., 7 of which are in New York State. Few of the projects are true bioreactor operations, and many simply utilize surface application (spraying) of leachate. Many of the projects are demonstrations in various

phases. All of the New York State projects ended prior to 2001, including the Broome County leachate recirculation demonstration completed in 1997. In July 2008, the Florida Department of Environmental Protection released a report summarizing bioreactor landfill demonstration projects at five landfills. The report identified findings associated with various aspects of bioreactor landfill operations, both aerobic and anaerobic. Some of the findings included:

1. **Monitoring Equipment.** Several limitations were encountered.
2. **Temperature.** Increased in areas where a significant amount of air was added. However, it was very difficult to control temperature by changing the rate of air addition.
3. **Moisture Content.** Was substantially increased.
4. **Air Addition.** Difficult to get air to deep or wet areas.
5. **Leachate Quality.** Rapid degradation of biodegradable constituents, especially under aerobic conditions. Non-biodegradable and persistent leachate constituents accumulated over time.
6. **Landfill Gas.** Air addition did not significantly impact VOCs or nitrogen oxide, but decreased hydrogen sulfide and increased carbon monoxide concentrations.
7. **Settlement.** An average 10 percent settlement that varied with the depth of waste.

To date, no formal design and operating standards have been developed by the USEPA for operation of a bioreactor landfill, although a significant amount of training and guidance is available.

D. **Applicability of Bioreactor Landfill Operation to Broome County.** Operation of the Section IV landfill as a bioreactor landfill is feasible. Prior to development of the Section IV Cell 1 design, the County evaluated their desire to operate the cell as a bioreactor landfill. While the potential bioreactor operation of Section III presented concerns due to the variety of landfill liner systems within the Section II/III footprint, the Section IV landfill consists of a state-of-the-art double composite landfill liner system. In addition, the performance of the primary liner system to date has been well within regulatory limits. While discussions have been held with Broome County regarding the

potential addition of primary leachate collection piping if the County were to consider a bioreactor landfill operation, a properly operated bioreactor landfill should not produce significantly greater quantities of leachate.

E. Bioreactor Landfill Operation Cost Impacts. A bioreactor landfill operation at the Broome County landfill would require hauling and/or pumping of leachate from existing storage facilities (either from the leachate pretreatment facility or the new Section IV storage tanks) to the Section IV landfill. A distribution system consisting of vertical wells and/or horizontal piping would be required to introduce the leachate in a managed approach. Surface application of leachate could also be utilized depending on its impact on waste placement operations, odor generation, and worker safety. Equipment would also be required to monitor the performance of the bioreactor landfill. Additional vertical and horizontal piping systems, blowers, and monitoring systems would be required to operate the bioreactor landfill aerobically. In addition to capital costs, ongoing operation and maintenance of the system would be required.

F. Potential Revenue Generation from a Bioreactor Landfill. As waste will already be in place, this alternative technology does not present a real opportunity to generate additional revenue except when considering the additional volume of waste that could be placed within the landfill footprint due to accelerated waste decomposition and stabilization. This air space gain could be up to 30 percent, but would more likely be 10 to 15 percent. Waste mass settlement is also a function of the depth of the waste mass, which is a function of the geometry of the landfill footprint. The long, narrow design of the Section IV landfill will limit the overall depth of waste compared to a more square footprint. There may also be some cost avoidance related to reduced leachate hauling and treatment if the cost to pump/apply the leachate is less than the disposal cost.

6.2.7 Screening Criteria to Select Preferred Technologies

Based on the above discussion, we have identified the following as the second level screening criteria:

- Applicability to Broome County solid waste stream.
- Commercial status of technology.
- Technical, environmental, and financial risks.
- Waste diversion potential.

Table 6-1 is a matrix that summarizes the application of these criteria to each of the shortlisted alternative technologies.

TABLE 6-1

ALTERNATIVE SOLID WASTE REDUCTION TECHNOLOGIES MATRIX

TECHNOLOGY	APPLICABILITY TO BROOME COUNTY WASTE STREAM	COMMERCIAL STATUS	RISKS (I.E., TECHNOLOGY, ENVIRONMENTAL, FINANCIAL)	WASTE DIVERSION POTENTIAL
Anaerobic Digestion (AD)	The overall waste stream is composed of nearly 70 percent of organics including, but not limited to, food waste, yard waste, paper, and wood. This estimate excludes the yard waste that is separated from the mixed refuse by homeowners and businesses. AD can be applied to this fraction of the waste stream to convert organics into biogas and digestate (i.e., solid residues).	A few pilot facilities using MSW as feedstock have operated in the U.S. in the past. The wastewater treatment industry has used AD to manage biosolids and generate biogas for decades. There are more than 100 commercially operating facilities using the organic fraction of the MSW stream and/or organic industrial wastes located in Europe, with a few in other locations, including Canada.	Technology risks may include inadequate materials processing because of an underperforming digestion process caused by contaminated feedstock, inadequate moisture content, etc. Environmental risks may include odor from pre-processing and/or digestion activities; exceeding air emissions limits when using the biogas as a fuel; and the inability to site a facility due to perceived threats to water, air, and property values. Financial risks may include lack of markets for biogas and/or residues and failure to receive adequate quantities of materials to ensure needed economies of scale.	Volume reduction is projected up to 75 percent assuming the pre-processing of the feedstock to remove non-organics and the beneficial reuse of digestate. Without beneficial use of the digestate, the potential volume reduction is projected to be approximately 50 to 60 percent.

TABLE 6-1 (continued)

TECHNOLOGY	APPLICABILITY TO BROOME COUNTY WASTE STREAM	COMMERCIAL STATUS	RISKS (I.E., TECHNOLOGY, ENVIRONMENTAL, FINANCIAL)	WASTE DIVERSION POTENTIAL
Pyrolysis/ Gasification	This technology process converts the carbon-based portion of the waste stream into a syngas that can be used to generate electricity or fuels. The organic content, which is carbon- based, composes approximately 70 percent of the waste stream. The carbon content of the overall waste stream would exceed this value.	There are a handful of commercially operating gasification plants operating worldwide using MSW as feedstock. A small number of pilot facilities reportedly are operating or have operated in the U.S. using pre-processed MSW as feedstock to produce syngas. Operating data is very limited for the application of this technology to MSW; therefore, this technology is not considered fully commercialized. The technology has been used for other types of feedstock, such as coal and uniform types of biomass. Plasma arc thermal gasification, a variation of conventional gasification, has reportedly been used in Japan to manage pre-processed MSW and other types of homogeneous solid wastes, such as auto shredder fluff in commercially proven settings.	Technology risks may include inadequate materials processing because of underperforming gasification process due to lack of uniform feedstock and/or issues associated with scaling up demonstration projects. Environmental risks may include odor at the pre-processing stage; air emissions when using the syngas as a fuel in a boiler; disposal of residues (i.e., char, silica, slag, and ash); and inability to site a facility due to perceived threats to water, air, and property values. Financial risks may include lack of markets for sales of syngas and uncertain capital and operating costs due to lack of full-scale projects with MSW as the feedstock.	Volume reduction for pyrolysis/ gasification can reach up to 90 percent with limited pre-processing. However, limited operating data using MSW as feedstock exists to confirm this projection.

TABLE 6-1 (continued)

TECHNOLOGY	APPLICABILITY TO BROOME COUNTY WASTE STREAM	COMMERCIAL STATUS	RISKS (I.E., TECHNOLOGY, ENVIRONMENTAL, FINANCIAL)	WASTE DIVERSION POTENTIAL
Waste-to-Energy (WTE)	The overall waste stream is composed of approximately 85 percent combustible materials by weight.	MSW combustion is a fully commercialized processing technology with nearly 90 WTE projects (mass burn and RDF) operating in the U.S. alone. Many others are operating throughout the world. Most of the facilities in the U.S. are sized to process, on average, approximately 1,000 tons per day. Some smaller WTE facilities of less than 250 TPD (i.e., limited economies of scale) are operating in the U.S, but in many instances struggle to remain economically competitive with landfill disposal options. In the last decade, many of these smaller WTE facilities have had to be retrofitted for additional air pollution control equipment, which has dramatically increased overall costs.	Technology risks may include inefficient energy production due to waste variability, as well as excessive unscheduled maintenance. Environmental risks may include odor at tipping floor/pre-processing stage; exceeding of air emissions limits (including dioxins and furans); metals in ash; and inability to site a facility due to perceived threats to water, air, and property values. Financial risks may include large capital costs, variable operating costs, and variability in energy sales.	Volume reduction for WTE facilities is 75 to 80 percent, depending on the type of technology and system used.

TABLE 6-1 (continued)

TECHNOLOGY	APPLICABILITY TO BROOME COUNTY WASTE STREAM	COMMERCIAL STATUS	RISKS (I.E., TECHNOLOGY, ENVIRONMENTAL, FINANCIAL)	WASTE DIVERSION POTENTIAL
Enhanced Composting	A. Expanded Organics Composting with the Existing Yard Waste Composting Operations			
	† Readily available wastewater sludges † Institutional food waste is available † Potential partnering opportunities with SUNY Binghamton or other schools and institutions	† The Northeast U.S. is primarily focused on yard waste, but communities are recently adding other source-separated organics, such as food waste (e.g., OCRRA). † The western region of the U.S. is very active, with nearly 70 food waste composting facilities spread throughout 6 states.	† Outdoor odor management † Reliability of consistent feed stock † Public perception of dangers of biosolids † Risk of compost sales	† Over 90 percent of the material processed, but at lower volumes
	B. MSW Composting			
	† Single stream process to convert organic content of MSW to compost † Integrates easily with existing recycling and collection programs † Eligible for Carbon Credits <i>Other:</i> New York State is considering incentives for removing organics from landfills (Europe has already implemented organics waste bans to landfills).	† 13 operating facilities in the U.S. † One operating facility in New York State (fully permitted through NYSDEC regulations)	† Odor control management † Worker health and safety † Siting challenges at the landfill site with the FAA † Perceptions of compost quality and available markets † Capital reinvested over the long term	† 60 to 75 percent of the incoming MSW; high volume processing

TABLE 6-1 (continued)

TECHNOLOGY	APPLICABILITY TO BROOME COUNTY WASTE STREAM	COMMERCIAL STATUS	RISKS (I.E., TECHNOLOGY, ENVIRONMENTAL, FINANCIAL)	WASTE DIVERSION POTENTIAL
Bioreactor Landfills	Applies to waste already in place. Applicable to Section IV landfill cells. Previous leachate recirculation demonstration in Section II/III landfill. Increased landfill gas generation rate may not directly benefit the County.	Majority of current projects are in the pilot/ demonstration stage. Long-term cost/benefit still being evaluated.	Risks are primarily operational and include increased cost compared to current operations, increased odors, decreased stability, increased surface seeps, and potential for fires (aerobic operation).	None, but can increase air space by 10 to 30 percent, probably closer to 10 to 15 percent.

6.3 GENERAL COST COMPARISON

Based on the initial evaluation of alternative technologies for downstream diversion, Broome County requested a preliminary overall comparison of costs for each technology which would allow a comparison with current waste management approaches. As each alternative technology requires a minimum waste volume for the technology to be viable, a 500 TPD facility was selected to compare costs. As bioreactor landfills do not present an opportunity for diverting waste from landfill disposal, it was excluded from further consideration. Waste-to-energy facilities typically require a minimum of 1,000 TPD to be economically viable. Since Broome County does not generate that volume of waste and is not interested in importing waste, this technology was also excluded from further consideration. The cost for each remaining alternative technology will be compared with a \$50/ton landfill tipping fee which represents the expected average cost of the current landfill disposal approach over the proposed planning period.

As a majority of the alternative technologies have limited full-size facilities in operation in the United States, the opinion of probable costs (both capital and operations) is based on information available in literature and Stearns & Wheeler GHD/ R.W. Beck files. The following sections present our general opinion of probable costs for each of the three remaining alternative technologies.

6.3.1 Anaerobic Digestion

A. **Technology Options.** Most anaerobic digestion technologies are classified as either wet or dry. This processing technology reduces the volume of solid waste and recovers energy through the process. AD systems may be classified as follows:

- wet single-step
- wet multi-step
- dry continuous
- dry sequencing batch
- dry multi-step
- percolation (dry two-step)

Presently, there are several wet and dry AD systems commercially operating in Europe that use the organic fractions of MSW as feedstock. In addition, digesters have been used in the U.S. to manage biosolids and manures for several decades. However, there are no commercially operating facilities in the U.S. using the organic fraction of the MSW as feedstock.

Wet and dry systems are not typically used for the AD of the full MSW stream, but target the OFMSW. Wet systems are primarily designed to co-digest OFMSW with a liquid substrate, such as manure or sewage sludge. Because the Broome County disposed solid waste stream includes large quantities of both organics and biosolids, we have selected the wet AD system for further review. For purposes of this evaluation, we have identified a facility sized to process 220 TPD based on our characterization of the solid waste stream.

B. Selected Technology for Cost Comparison. For the purposes of a cost comparison, the wet AD system technology was selected based on the following considerations:

1. **Status of Technology.** Wet AD has been used in the U.S. for decades to manage manures and sewage sludge. It is presently used in Europe and Canada to manage OFMSW. For example, since 2002, the City of Toronto has been operating an anaerobic digestion facility at its Dufferin solid waste transfer station using the BTA technology, a wet two-step process. There are several other commercially operating AD facilities in Europe that are co-digesting OFSWM (e.g., yard waste, kitchen waste, and compostable paper) with sewage sludge.
2. **Regulatory Acceptance.** Wet AD has been permitted as a management approach for biosolids in the U.S., including New York. Therefore, the technology is understood by the regulators, but its application to the organic fraction of the MSW would require additional information and analysis. The technology also fits within the State's Solid Waste Management Hierarchy to Reduce, Reuse, and Recycle.
3. **Operating Flexibility.** Wet AD co-digesting systems accept a range of OFMSW and sludges for processing. The proposed technology includes some up-front processing to remove the contaminants and optimize the process. Feedstock may include source separated organics (food waste), biosolids, non-hazardous liquid waste, paper sludge, yard waste, and non-recycled organic material such as soiled paper or cardboard. Thus, some flexibility exists in both the type of materials and the proportional mix of organics that can be processed.
4. **Landfill Preservation/Diversion Goals.** Wet AD systems accepting targeted OFSWM and sludges typically divert up to 80 percent of the materials processed from landfill disposal through volume reduction, composting of the

solids, and reuse and/or land application of the process water. Keys to maximizing landfill diversion include finding markets for the compost by-product and process water. The compost by-product can be used as soil conditioner. The process water and its constituents need to be evaluated prior to identifying reuse opportunities.

C. Cost Considerations. When evaluating the economic viability of alternative waste processing technologies, the basic business model holds true as for many industrial facilities. There is the need for a raw product (feedstock), preparation of the raw product (feedstock mixing and preparation), management of residual products (nonprocessibles), consistent and reliable processing methods and controls (the AD process), the marketing and distribution of the final end products (compost/biogas/process water), and applicable regulatory compliance and reporting (environmental controls).

In addition, it must also be recognized that AD facilities utilize a biological process that must be applied consistently within the system. Unlike landfills, these facilities cannot accept more waste than what they are designed to process. Landfill operators have the ability to accept a wide range of daily volumes of waste. For example, the Broome County landfill can accept 500 or 750 TPD without significant disruption to its operations. However, an anaerobic facility designed to accept 220 TPD of materials cannot accept 500 TPD of materials since the throughput volume is limited and the organics would not be adequately processed.

D. Preliminary Cost Evaluation for Screening Purposes. To determine if this technology is worthy of further economic evaluation, a preliminary cost review was completed based on reported costs for similar AD facilities, published articles, and technical presentations at waste conferences. However, it should be noted there are no commercially operating facilities in the U.S.

The purpose of this screening is to determine if the range of cost for an AD facility compares favorably with Broome County's existing landfill disposal cost, which is estimated at \$50/ton over the planning period. This analysis is not intended to determine if an AD facility is a viable option for Broome County. The intent is to determine if this technology is potentially economically viable as an option to the County for increasing reuse and recycling opportunities and thus should be further evaluated through a more detailed cost analysis.

The following is a summary of the preliminary cost evaluation completed as part of this task based on processing 220 TPD of solid waste composed of OFMSW and wastewater sewage sludges.

1. Facility Processing Input (Feedstock)

- a. OFMSW – 120 TPD (42,000 tons per year [TPY]).³
- b. The OFMSW projected quantity includes the following segments of Broome County's MSW stream:
 - Compostable paper
 - Food waste
 - Yard waste •
 - Diapers
 - Other organics
- c. WWTP Sludges – 100 TPD (35,000 TPY).
- d. Total – 220 TPD (77,000 TPY).

2 Facility Processing Outputs

- a. Fiber (solids from digestate for composting) – 60 TPD (21,000 TPY) .
- b. Filtrate (liquids in digestate) – 140 TPD (49,000 TPY).
- c. Preprocessing residuals for landfill disposal -10 TPD (3,500 TPY).
- d. Biogas – 3,000 cubic feet per ton of waste (70,000,000 cubic feet per year).

3. Site Requirements

- a. Buildings – 2 to 4 acres.
- b. Land Requirements – 7 to 10 acres.
- c. Electricity – Varies.

4. Summary of Facility Components. The following is a summary of the key components required:

³ Quantities of organics composing the OFMSW were estimated using the waste characterization developed as part of the solid waste plan.

- a. Waste pre-processing area, to remove materials that cannot be anaerobically digested (such as metals, glass, and concrete) to pre-process the remaining materials into a uniform feedstock and adding the sludges providing moisture to form a slurry in the digester.
- b. Anaerobic digester, where large organic compounds are broken down into smaller compounds in an airtight vessel called a reactor or digester. The biogas produced by AD can be used with minimal treatment in boilers to generate heat and in reciprocating engines or turbines to generate electricity. If the gas is purified, it can be used in place of natural gas or compressed natural gas as a vehicle fuel.
- c. Gas flaring, steam, and/or power generation using the digester as a fuel.
- d. Emissions control on units combusting the gas produced.
- e. Residue composting and beneficial use.

5. Capital Cost Consideration

- a. Costs adjusted to reflect 2009 Cost Index.
- b. Economies of scale are applicable depending on size and optimization of equipment throughput.
- c. The estimated capital costs for an AD facility of 77,000 TPY are \$250 to \$275 per ton of annual capacity.⁴
- d. Estimate for a 220 TPD MSW AD facility including (42,000 TPY MSW + 35,000 TPY sludge = 77,000 TPY) is \$25,000,000 to \$35,000,000.

6. Operation and Maintenance Cost Considerations

- a. Personnel costs for 5 to 10 staff.
- b. Facility operates seven days per week.

⁴ This is a planning level estimate based on R.W. Beck studies conducted for King County, Washington; Hawaii County, Hawaii; and Linn County, Iowa. There is very limited publicly available data.

- c. Includes utilities, materials, equipment rentals, environmental monitoring, reporting, equipment maintenance.
- d. Include a capital replacement fund of \$500,000 per year.
- e. Electrical costs at \$0.12/kw-hour.
- f. Residual disposal cost of \$50/ton
- g. No host community fee considerations.

7. Gross Cost on Equivalent Per Ton Basis

- a. Operating costs - \$55 to \$65/ton.
- b. Capital cost amortized over 20 years at 4 percent interest (public finance) equals \$24 to \$34/ton.
- c. Gross operating cost, including debt retirement: \$79 to \$99/ton.

8. Potential Annual Revenue Streams

- a. Sale of biogas for direct end use or power purchase agreement using relevant electric utility renewable energy pricing – potential of \$500,000 to \$1,000,000 net revenue depending on selected market (energy credits and other tax credits not considered).
- b. Sale of compost assumed to be offset by cost of building material and mixing/handling.
- c. Total Gross Revenue Potential: \$6.50 to \$13.00/ton

9. Net Cost on Equivalent Per Ton Basis. \$72 to \$86/ton.

E. Results of Preliminary Screening. The preliminary results of the screening process for AD reflect that the gross operating costs are higher than the County's current \$50/ton tip fee cost. Based on the cost analysis, AD is not competitive as an option for increasing diversion and recycling opportunities unless the potential revenue streams can be increased to address the net cost differential.

6.3.2 Gasification

A. **Technology Options.** In addition to the traditional thermal conversion technology of WTE, thermal conversion alternatives include several emerging technologies as outlined in the previous discussion. The emerging thermal conversion technologies discussed in the previous section included pyrolysis, conventional gasification, plasma arc, and advanced thermal recycling.

Pyrolysis and gasification are not new technologies, having been used in the coal industry since the early 20th Century. Plasma arc has been applied in an industrial setting to manage hazardous waste for decades. Advanced thermal recycling represents second generation combustion-to-energy technology that has recently been considered for MSW. All of these technologies have been applied in other parts of the world, such as Japan and Europe, but there are no commercially operating facilities in the U.S. However, there are operating demonstration plants and commercial facilities in the planning stage in the U.S.

Because of the lack of commercially operating facilities in the U.S., cost data is very limited. Through work that Beck has conducted for other clients, we have gathered some preliminary planning level capital and O&M cost information based on previous discussions with suppliers of various gasification technologies. It is worth noting the County would likely need to consider the import of applicable waste streams from outside the County to take advantage of the needed economies of scale for conventional gasification to be considered competitive.

For purposes of this evaluation, we have selected conventional gasification for further review because there are commercially operating facilities in Europe and demonstration facilities in North America.

B. **Selected Technology for Cost Comparison.** For the purposes of a cost comparison, conventional gasification technology was selected based on the following considerations:

1. **Proven Technology.** This emerging technology has a commercially operating status in Europe and Japan. In addition, there are demonstration facilities in the U.S. that reflect that this emerging technology offers potential. Several facilities are planned for development in the U.S. in the future and should offer a frame of reference for additional consideration.

2. **Regulatory Acceptance.** As the technology evolves, the permitting issues will be clarified. Gasification technology has been applied in other energy production settings providing relevant information for the regulators. The key issues are the air emissions and management of the slag/ash.
3. **Operating Flexibility.** Conventional gasification offers operating flexibility because it can process most all of the MSW stream with limited materials considered non-processible. Moreover, some of the other emerging technologies such as plasma arc typically require more materials pre-processing and greater energy input for application of the technology.
4. **Landfill Preservation/Diversion Goals.** For conventional gasification, up to 90 percent of the incoming waste stream may be diverted from landfill disposal. Fly ash from the emissions control system is the primary process residue that may need disposal. The slag resulting from the gasification process has beneficial reuse potential in building and road materials. Thus, Broome County could extend the life of the existing landfill while significantly increasing recycling and reuse as a management strategy.

6.3.3 Cost Considerations

A. **Preliminary Cost Evaluation for Screening Purposes.** To determine if this technology is worthy of further economic evaluation, a preliminary cost review was completed based on reported costs for similar types of conventional gasification facilities, published articles, and technical presentations at waste conferences. The purpose of this screening is to determine if the range of costs for conventional gasification compares favorably with Broome County's existing landfill disposal cost, which is estimated at \$50/ton over the planning period. This analysis is not intended to determine if gasification is a viable option for Broome County. It is intended to determine if this technology is potentially economically viable as an option to the County for increasing reuse and recycling opportunities and thus should be further evaluated through a more detailed cost analysis.

The following is a summary of the preliminary cost evaluation completed as part of this task based on processing 500 TPD of MSW.

1. **Facility Processing Input (Feedstock).** MSW – 500 TPD (175,000 TPY).
2. **Facility Processing Outputs.** Conventional gasification has the potential to reduce the volume of materials received by up to 90 percent. Various

process outputs are provided below. Specific quantity estimates are not provided because of the lack of reliable materials flow data.

- a. Syngas.
- b. Ash/char.
- c. Non-processibles.
- d. Recyclable metals .

However, it is anticipated that non-processibles needing landfilling will compose approximately 5 to 10 percent of the throughputs by weight.

3. Site Requirements

- a. Buildings – 3 to 5 acres.
- b. Land Requirements – 10 to 15 acres.
- c. Electricity – Varies.

4. Summary of Facility Components. The following is a summary of the key components required:

- a. Waste pre-processing area, to remove materials that cannot be thermally degraded (such as metals, glass, and concrete) and some pre-processing of the remaining materials into a uniform feedstock.
- b. Reactor/gas refining, where gasification reactions occur and the resulting product (gases, oils) is refined, as needed, to produce gas of suitable quality. The gas produced is often referred to as “synthesis gas” or “syngas,” because it is predominantly a combination of methane and hydrogen.
- c. Power generation or chemical production using the syngas and/or oils as a fuel or feedstock. Unrefined or minimally refined gas can be burned directly in boilers with heat recovery to produce steam for electricity generation. More refined gas can be used in reciprocating engines, gas turbines, or for chemical production.
- d. Emissions control on units combusting the gas produced.
- e. Ash, char, or slag handling and disposal.

5. Capital Cost Consideration

- a. Costs adjusted to reflect 2009 Cost Index.
- b. Economies of scale are applicable depending on size and optimization of equipment throughput.
- c. For conventional gasification facilities, planning level capital cost ranges from \$150,000 to \$180,000 per ton of daily capacity.
- d. Estimate for a 500 TPD MSW gasification facility is \$75,000,000 to \$92,500,000.

6. Operation and Maintenance Cost Considerations

- a. Personnel costs for 15 to 20 staff.
- b. Facility operates seven days per week.
- c. Includes utilities, materials, equipment rentals, environmental monitoring, reporting, equipment maintenance.
- d. Include a capital replacement fund of \$ 500,000 per year.
- e. Electrical costs at \$0.12/kw-hour.
- f. Residual disposal cost of \$50/ton
- g. No host community fee considerations.

7. Gross Cost on Equivalent Per Ton Basis

- a. Operating and Maintenance Costs - \$60 to \$70/ton (based on data from demonstration facilities without facility scale-up).
- b. Capital cost amortized over 20 years at 4 percent interest (public finance) equals \$32 to \$38/ton.
- c. Gross operating cost, including debt retirement: \$92 to \$108/ton.

8. Potential Annual Revenue Streams

- a. Power purchase agreement with renewable energy pricing – Potential for \$2,000,000 to \$5,000,000 in net revenues depending on end-use markets (energy credits and other tax credits no considered).

b. Gross Total Revenue Potential: \$12 to \$30/ton.

9. Net Cost on Equivalent Per Ton Basis: \$70 to \$85/ton.

B. Results of Preliminary Screening. The preliminary results of the screening process for conventional gasification reflect that the gross operating costs are higher than the County's current \$50/ton tip fee cost. Based on the cost analysis, conventional gasification is not competitive as an option for increasing diversion and recycling opportunities unless the potential revenue streams can be increased to address the net costs differential.

6.3.4 Enhanced MSW Composting

As part of the evaluation of alternative technologies, enhanced MSW composting included two potential management strategies that could expand the County's current yard waste composting operations and increase diversion opportunities. The first was the expansion of yard waste composting with the addition of other organics on a small-scale basis, and the second was through a large-scale commercial MSW composting facility. As a result of the Diversion Strategies Work Session held on July 14, 2009, the Broome County Division of Solid Waste recognized that an enhanced yard waste composting strategy was a potentially viable option, with relatively modest capital investment and risk, and thus should be further considered under the Local Solid Waste Management Plan. It was also agreed that while the economic advantages of MSW composting were not immediately apparent, it does offer a comparative basis to other alternative waste diversion technologies. As a next step in the evaluation process of alternative diversion technologies, a screening of cost considerations was completed to compare the County's current solid waste management operating costs with other alternative technologies, including MSW Composting.

A. Technology Options. There are a variety of composting processes for Municipal Solid Waste (MSW) that has been used throughout the world with varying degrees of success. These include:

- In-vessel aerated systems (containerized processes).
- Aerated static systems on pads (outdoor facilities),
- Aerated static systems with fabric covers (outdoor windrows covered with fabric).
- Rotary drum aerobic systems (fully enclosed within buildings).

All of these options apply the basic principles of composting: feedstock preparation, active maturation of the compost (mixing with the addition of air and water), curing, storage, residuals disposal, and compost marketing and sales. However, large-scale MSW composting results in material handling challenges and associated environmental mitigation challenges that are not as easily managed as some of the less automated compost technologies. Therefore, for the purposes of this evaluation, the rotary drum composting technology (large-scale composting) will be evaluated since there is a similar recently developed project in New York State that is currently operating in Delaware County, NY.

B. Selected Technology for Cost Comparison. For the purposes of a cost comparison, the rotary drum composting technology was selected based upon the following considerations:

1. **Proven Technology.** Although rotary drum composting has been utilized dating back to the early 1960s, its success was often dependent on the cost for alternative local disposal options, such as landfilling. Where facilities needed to compete on a “tip fee basis” against relatively low landfill cost, the success rate was poor since capital investments and operating controls relating to compost quality and odor management were less than adequate. Over the past 20 years, owners and operators of MSW composting facilities have made proper capital investments, and a number of successful projects are currently in operation. The compost process works and is technically and economically manageable. Today there are approximately a dozen MSW Composting projects operating in the United States, with a number of additional facilities in Europe and Australia.
2. **Regulatory Acceptance.** The rotary drum composting process has been successfully permitted in New York State through the NYSDEC. While the details of each project are unique in terms of site access, environmental sensitivities, public considerations, access, etc., the 6 NYCRR Part 360 Solid Waste Regulations are clear with respect to permitting requirements. Thus, the time needed to receive a permit is reasonable and can be significantly less than a new landfill permit. The technology also fits within the State’s Solid Waste Management Hierarchy to Reduce, Reuse, and Recycle.
3. **Operating Flexibility.** MSW composting facilities can accept a wide range of feedstock without disrupting the composting process. Feedstock could include MSW, source separated organics (food waste), biosolids, non-

hazardous liquid waste, paper sludge, yard waste, and non-recycled organic material such as soiled paper or cardboard. The technology does not require pre-sorting and can integrate effectively with existing recycling programs and strategies. It also allows operators to maximize their recycling revenue by focusing on high-value recyclables while capturing a significant volume of organic materials for reuse.

4. **Landfill Preservation/Diversion Goals.** For MSW co-composting facilities (MSW and biosolids), less than 30 percent of the incoming waste stream is sent to the landfill after processing (the inorganic fraction). The material is also inert, resulting from the removal of organics, and thus reduces the amount of contaminants within the landfill leachate. This means that Broome County could extend the life of the existing landfill by a factor of three while significantly increasing recycling and reuse as a management strategy.

C. **Cost Considerations.** When evaluating the economic viability of alternative waste processing technologies, the basic business model holds true as for many industrial facilities. There is the need for a raw product (feedstock), preparation of the raw product (feedstock mixing and preparation), management of residual products (inorganics), consistent and reliable processing methods and controls (the compost process), the marketing and distribution of the final end product (soil amendment/ compost), and applicable regulatory compliance and reporting (environmental controls). The primary difference with MSW composting facilities is that most of the revenue generation occurs through the acceptance of the raw product (feedstock) with limited revenue resulting from the final product. The paradigm shift in this business model leads to an important consideration for these facilities – revenue generation from multiple types of feedstock versus a consistent raw product. This offers both opportunities and challenges for MSW composting facilities. However, operating costs and the establishment of “tip fees” are usually based on a variety of feedstock and estimates of volume processed on an annual basis. Therefore, the greater variety of feedstock that can be processed provides for greater opportunities for revenue.

In addition, it must also be recognized that MSW composting facilities utilize a biological process that must be applied consistently from day to day. Unlike landfills, these facilities cannot accept more waste than what they are designed to process. Landfill operators have the ability to accept a wide range of daily volumes of waste. For example, the Broome County landfill can take 500 or 750 TPD without significant disruption to its operations. However, an MSW composting facility designed to accept

500 TPD of MSW cannot accept 750 TPD of MSW since the throughput volume is limited and the organics would not be adequately processed.

D. Preliminary Cost Evaluation for Screening Purposes. To determine if this technology is worthy of further economic evaluation, a preliminary cost review was completed based on reported costs for similar MSW compost facilities, published articles, and technical presentations at waste conferences. The purpose of this screening is to determine if the range of cost for an MSW composting facility compares favorably with Broome County's existing landfill disposal cost, which is estimated at \$50/ton over the planning period. This analysis is not intended to determine if MSW composting is a viable option for Broome County; it is simply intended to determine if this technology is potentially economically viable as an option to the County for increasing reuse and recycling opportunities and thus should be further evaluated through a more detailed cost analysis.

The following is a summary of the preliminary cost evaluation completed as part of this task based on a "prototype facility" processing 500 TPD of MSW.

1. Facility Processing Input (Feedstock)

- a. MSW – 500 TPD (175,000 TPY).
- b. WWTP Sludges – 100 TPD (35,000 TPY).
- c. Liquid Waste – 100 TPD (35,000 TPY).

2. Facility Processing Outputs

- a. Compost – 125 to 150 TPD (50,000 TPY).
- b. Residuals for Landfill Disposal – 150 TPD (50,000 TPY).
- c. Recyclable Metals – 10 TPD (3500 TPY).
- d. Waste Liquids – 0.

3. Site Requirements

- a. Buildings – 6 to 8 acres.
- b. Land Requirements 13 to 15 acres.
- c. Electricity – 1.0 to 1.3 MW.

4. Summary of Facility Components

- a. Fully enclosed waste receiving area with three days storage for MSW.
- b. Sludge receiving area.
- c. Operator controls and automated instrumentation systems.
- d. Waste feeding systems.
- e. Rotary drum for waste processing.
- f. Conveyance and transfer systems.
- g. Active compost aeration system (windrows, concrete wall, aeration systems, mixing equipment, and support systems),
- h. Compost refining systems and equipment.
- i. Curing and storage area
- j. Air handling and odor control systems, including dust collection and odor treatment.
- k. Post-sorting area for capture of recyclable metals.
- l. Building and support systems.
- m. Site access and site stormwater management features.

5. Capital Cost Consideration

- a. Cost adjusted to reflect 2009 Cost Index.
- b. Economy of scale is noted incrementally depending on size and optimization of equipment throughput.
- c. For larger MSW composting facilities, capital cost ranges from \$280 to \$300/ton of annual capacity (for small facilities it increases to \$450 to \$550/ton).
- d. Estimate for a 500 TPD MSW compost facility including sludge processing (175,000 TPY MSW + 35,000 TPY sludge = 210,000 TPY) is \$58,000,000 to \$63,000,000.

6. Operation and Maintenance Cost Considerations

- a. Personnel costs for 25 to 30 people.
- b. Facility operates seven days per week.
- c. Includes utilities, materials, equipment rentals, environmental monitoring, reporting, and equipment maintenance.
- d. Include a capital replacement fund of \$200,000 per year.

- e. Electrical costs at \$0.12/kw-hour.
- f. Residual disposal cost of \$50/ton.
- g. No host community fee considerations.

7. Gross Cost on Equivalent per Ton Basis

- a. Capital cost amortized over 20 years at 4 percent interest (public finance).
- b. Residual value for facility at the end of the 20-year finance period of 35 percent.
- c. Estimated gross cost on an annual basis: \$10,500,00 to \$11,500,000.
- d. Estimated annual processing fees for privatized operator: \$3,000,000 to \$3,500,000 (before taxes).
- e. Gross operating cost, including debt retirement: \$64 to \$72/ton.

8. Potential Annual Revenue Streams

- a. Compost Sale: Assumes 30 percent of incoming waste stream at \$3 to \$10/ton = \$262,500.
- b. Total Gross Revenue Potential: \$1 to \$3/ton.

9. Net Cost on Equivalent Per Ton Basis: \$63 to \$69/ton

D. Results of Preliminary Screening Process. The preliminary results of the screening process for MSW composting show that gross operating costs are approximately 20 percent higher than the County's projected \$50/ton tip fee cost, but are competitive with tipping fees in other portions of the Northeast United States that range between \$65 and \$80 per ton. As an option for increasing diversion and recycling opportunities, MSW composting appears to offer some potential, but not without significant capital investment. As a future consideration, MSW composting may be a reasonable alternative and worthy of additional evaluation in terms of specific site considerations and site suitability, costs, integration of existing County programs, comparative long-term economic value, landfill life considerations, and risk assessment. However, given the County's past and present capital investments, personnel experience, and operations success related to solid waste landfill disposal, a phased

organics diversion and recycling strategy would integrate more effectively with the County's existing programs.

6.4 CONCLUSION AND RECOMMENDATIONS

Considering a variety of outputs from the alternative technology evaluation process, including:

- required tonnage
- required feedstocks
- applicability to the waste stream
- diversion potential
- environmental considerations
- residuals management
- commercial viability
- anticipated costs

it appears that organics processing through enhanced composting presents the best technological, economical, and environmental option for increasing downstream waste diversion for Broome County. Anaerobic and thermal conversion technologies do not appear as viable or cost effective. However, this evaluation of alternative technologies, including the general cost comparison, was originally developed as a potentially significant downstream diversion approach. As the actual evaluation progressed and further discussions/work sessions were held, it became evident that a major program change from the current landfill approach, which is currently more cost effective, was not likely. As a result, a more modest, sequenced, and scalable approach was considered for Broome County. An approach that focuses on organics would satisfy both the County's interest in increasing recycling and diversion and NYSDEC's interest in organics diversion.

In keeping with enhanced composting as the preferred technology, this approach would most likely begin with expansion of the existing yard waste composting program. The first step in expanding the existing program would be the addition of food waste (pre-consumer) or biosolids. The addition of pre-consumer food waste from institutions (universities, prisons) and commercial enterprises (grocery stores, processors) typically represents the least contaminated (and therefore most cost effective) source of food waste for composting. Collection of pre-consumer food waste would also require the least change to current collection practices. In addition, the County has had some initial discussions related to the economic viability of a County-wide biosolids management facility.

The volume of food waste or biosolids that could be diverted will be a function of the volume of bulking agent (brush/yard/wood waste) that is available. Based on approximately 450 tons of yard waste disposal per year, approximately 300 tons of food waste or biosolids could be processed annually without importing bulking material. This tonnage would be appropriate for an initial demonstration project. In order to expand processing capacity, Broome County could integrate biosolids disposal with wood waste disposal for interested municipalities.

Typically, a biosolids composting facility would be enclosed to minimize management of odor and other environmental impacts (such as leachate). Low volume food waste composting would not typically require completely enclosed facilities. However, the Federal Aviation Administration has expressed their concern with composting facilities and the potential to attract vectors compared to current open landfilling. Considering the processing capacity available with current wood waste tonnage, vector concerns, and other food waste/biosolids composting facilities in the region, an initial, outdoor, demonstration composting facility may be an appropriate first step in pursuing additional downstream organics diversion. A project of this nature would be pursued to demonstrate required mix ratios, processing options, processing times, finished product quality, the potential for vector attraction, and required environmental impact management.

For a demonstration project, a “low tech” approach to material processing could be used that would utilize the County’s existing equipment. Broome County currently owns a tub grinder, windrow turner, and screen. This equipment, along with a front-end loader, could be adequate to operate a static, turned windrow demonstration facility depending on the nature of the food waste. As part of the demonstration, Broome County could also employ a forced aeration static pile processing approach by adding blowers and piping, in lieu of turning windrows, to compare the two processes. Biosolids and food waste could be composted separately and together to evaluate individual and combined processing details. If this first step of enhanced composting shows promise, the next step in expanding organics diversion could be to construct a larger, enclosed composting facility that utilizes more process controls and automation. The nature of that facility (size, feedstock, processing capacity, processing approach, type of enclosure, etc.) would be determined as part of the demonstration project.

Further expansion of enhanced composting as an alternative technology would require the diversion of more organic waste from the MSW stream. Inclusion of source separated organic waste is one option for capturing organic material. However, during evaluation of upstream diversion opportunities (via the issue papers), an organic waste diversion or green bin approach did not receive a high ranking. As a result, processing

the MSW stream may present a more cost-effective approach for significant capturing and diverting organics from the landfill.

Based on the above discussion, we have identified a “Phased Organics Diversion Strategy” that begins with the County’s existing yard waste composting program (the baseline) and builds upon the program as follows:

- A demonstration project that utilizes a forced aeration composting method for processing yard waste and food waste or biosolids.
- A full-scale (outdoor) forced aeration composting operation to process 100 percent of the County’s existing yard waste (as currently delivered to the site) and food waste or biosolids.
- A fully enclosed composting facility to process 100 percent of the County’s existing biosolids that is expandable for processing additional organic feedstock.

Table 6-2 presents a summary of the incremental costs associated with the proposed Phased Organics Diversion Strategy.

TABLE 6-2

INCREMENTAL COST SUMMARY FOR PHASED ORGANICS DIVERSION STRATEGY

PROGRAM ELEMENT DESCRIPTION	ORGANIC FEEDSTOCK TYPE AND VOLUME	INCREMENTAL CAPITAL COST INVESTMENT (L\$)	INCREMENTAL OPERATION & MAINTENANCE COST (L\$)	EQUIVALENT ANNUAL INCREMENTAL COST (L\$/YEAR)	EQUIVALENT ANNUAL INCREMENTAL PROCESSING COST (L\$/TON)
1. Existing Program: Outdoor composting of yard waste	Yard waste 450 tons/year	\$0	Included within existing landfill operations cost.	N/A	N/A
2. Demonstration Project: Yard waste plus food waste or biosolids	Yard waste 300 CY (135 tons) Food waste or biosolids 100 CY (60-80 tons)	Temporary pad with blowers and air distribution system - approximately \$30,000	\$5,000/year	\$35,000 ⁽¹⁾	\$167
3. Forced Aeration Outdoor Composting: 100 percent of existing yard waste plus food waste or biosolids	Yard waste 1,000 CY (450 tons) Food waste or biosolids 330 CY (300 tons)	Site development, pad, equipment, utilities, blowers, and air distribution system - approximately \$250,000	\$20,000/year	\$45,000 ⁽²⁾	\$70
4. Enclosed Composting Facility for 100 percent of County biosolids (with expandability to other feedstock)	Biosolids 20,000 tons Wood chips or sawdust 10,500 tons	Buildings, roadways, utilities, processing equipment, bulking agent, odor controls, etc. - approximately \$8,000,000	\$600,000/year	\$1,200,000 ⁽³⁾	\$60 (biosolids portion only)

(1) Assumes no financing and only a one-year demonstration period.

(2) Assumes 10-year financing at 5 percent interest.

(3) Assumes 20-year financing at 4 percent interest.

7.0 ENHANCEMENTS TO INTEGRATED SYSTEM

7.1 INTRODUCTION

The Broome County Division of Solid Waste Management is responsible for planning, developing, implementing, and sustaining public solid waste management programs and facilities on behalf of the County. These responsibilities also include education and public outreach efforts in order to encourage, support, and foster participation by the public with respect to reducing, reusing, and recycling portions of the existing solid waste stream. Historically, the County's solid waste programs have relied on both public and private participation to manage a variety of waste streams and recyclable products. These efforts have resulted in current recycling rates between 48 and 50 percent.

It is also the Division's mission to "provide our constituency (residents and businesses) with a comprehensive program for managing solid waste, which is consistent with New York State's Hierarchy for solid waste management, in an economically sound and environmentally safe manner." To this end, implementation efforts under the most recent Local Solid Waste Management Plan have focused on the following:

- Safe and reliable disposal of MSW.
- Recyclables acceptance and processing through contracts with private companies.
- Continued efforts with local municipalities and private haulers for residential MSW and recyclables transfer stations.
- Yard waste composting in support of the State's ban on yard waste disposal to the landfill.
- Periodic household hazardous waste collection for residents and small businesses.
- Periodic electronics recycling for residents and small businesses.
- Development of guidelines and educational materials in support of the County's programs, including a web site.
- Public outreach and assistance to businesses and institutions to assist in setting up recycling programs.

- Purchasing and distributing recycling yellow bin containers.
- Assistance with backyard composting, including compost bins for sale and distribution.
- Beneficially reusing “auto fluff” at the landfill as daily cover.

As discussed in Chapter 4, Broome County has a variety of existing solid waste management facilities that are owned and operated by both public and private ventures. In addition, the County has taken steps to support State and Federal efforts to decrease toxins in the landfill and divert beneficially reusable materials or products from the landfill. These actions include the following:

- Per the federal Universal Waste regulations (40 CFR Part 273), wastes with toxic substances as defined in the Resource Conservation and Recovery Act (RCRA), Subtitle C are not permitted at the Broome County landfill.
- Supported New York State legislation to ban the sale of all products containing mercury.
- Support New York State legislation to require extended producer responsibility for various material types.
- Supported past and present Bottle Bill Legislation.
- Adopted local laws to ban yard waste from the landfill.
- Backyard composting is supported by the County by supplying educational materials and working with the Cornell Cooperative Extension (CCE) for outreach activities.
- The County encourages residents to engage in grasscycling and leaving grass clippings on the lawn.
- Promoting food donations to various locations around the County to help feed those in need and to divert organics from the landfill.

These programs are considered “upstream diversion activities” because they focus on preventing material from reaching the landfill. “Downstream diversion activities” are dedicated to processing, recycling, and marketing material brought to the landfill. Broome County is currently participating in the following downstream diversion programs:

- The Broome County landfill has a household hazardous waste (HHW) and an E-waste collection site where residents are able to drop off their materials on specified days each month year-round. These wastes are processed by private companies.
- As mentioned above, banned yard waste is accepted by the county for composting at the Broome County landfill. The compost is available at no charge to Broome County residents while supplies last.

7.2 SELECTION OF PROGRAM EXPANSION OPTIONS FOR THE INTEGRATED SYSTEM

Given the County’s existing programs, past and current investments, and future opportunities, the Division completed a series of team work sessions that evaluated past, present, and future solid waste management program elements and potential areas for improvement. In 2010 when this Plan was submitted to the DEC, New York State was developing draft guidelines for Local Solid Waste Management Plans based on a proposed policy framework that also include increased requirements for organics diversion. As a baseline, the Division selected 2007 as a representative year to examine current operations, waste generation volumes, and recycling rates (2008 was considered to be impacted by economic slowdown and reduced waste volumes). Table 3-1 presents a summary of the estimated waste composition for the MSW that is delivered to the landfill and the reported recycling efforts that resulted in a County-wide recycling rate of 48 percent for 2007.

To increase recycling efforts, the Division was interested in further examination of upstream diversion opportunities (capture, control, and processing of recycling streams prior to disposal) and downstream diversion opportunities (alternative disposal and diversion through waste conversion technologies).

The following topics were selected for further consideration under upstream diversion opportunities:

1. Environmentally Preferable Purchasing (EPP) Practices & Recycled Content - Policy that encourages communities to purchase materials and services that offer specific environmental benefits.

2. Increase CII&M Recycling Participation – A target strategy directed at the largest generators or under-served portion of the County with respect to recycling efforts.
3. C&D Recycling – Source separation of demolition debris to remove reusable and recyclable products.
4. Use of Alternative Daily Cover (ADC) Materials at the Landfill – To beneficially reuse alternative materials in lieu of soils.
5. Franchising Collection Services – An option to further capture recyclables under a consistent collection system with uniform rate structures for customers.
6. Establishment of Collection Districts – An option that would allow the County to contract collection services by district in order to provide “best price” to customers and to specify collection and recycling requirements uniformly across the districts.
7. Expand the Existing Household Hazardous Waste (HHW) and Electronics Recycling – In consideration of growing demands for electronics disposal.
8. Pursue Zero Waste Options – A management philosophy that looks at materials and products from a cradle-to-grave approach to encourage 100 percent reuse.
9. Organics Diversion – Efforts to divert organics from the landfill through the participation of residents, businesses, and institutions.
10. Single Stream Recycling Collection Methods Bins Versus Carts – Consideration of larger recycling containers under a co-mingle collection system that could increase the participation and volume of recyclable products.

Issue Papers were then developed for each of the 10 topics listed above and are presented in Appendix B.

For downstream diversion opportunities, the following technologies were considered during an evaluation of alternative technologies:

1. Anaerobic digestion.
2. Thermal technologies, including gasification, pyrolysis, and plasma technologies.
3. Enhanced composting, including MSW composting.
4. Waste-to-energy.
5. Bioreactor landfill methods.

An evaluation of alternative technologies was then developed for each of the five technologies listed above and is presented in Chapter 6.

7.2.1 Selection Process

After the Issue Papers were developed, reviewed, and finalized, the Division of Solid Waste met to identify applicable ranking criteria and establish priorities within the Local Solid Waste Management Plan for implementation of upstream diversion strategies. It was determined that 11 specific evaluation criteria could be applied to the topics being considered, including:

1. The ability to extend the life of the landfill and optimize investments.
2. Promotion of financial stability over the life of the plan.
3. Life cycle cost considerations.
4. Potential environmental protection and mitigation opportunities.
5. Potential energy efficiency and carbon footprint reduction.
6. Impacts to existing public infrastructure (roads, bridges, etc.).
7. Support to standardized and efficient waste programs.
8. Practicality of implementation and enforcement considerations.
9. Technical and commercial viability.
10. Integration synergies with existing programs. and,
11. Flexibility to respond to markets and opportunities.

Based on the Issue Papers, facility assessments, ranking criteria, legal and institutional considerations, preliminary costs, project goals, and local considerations, the solid waste management team met to apply a weighting factor on a scale of 1 to 5 to each of the evaluation criteria. The results are summarized in Table 7-1. Like many solid waste managers across the country, the Broome County Division of Solid Waste believes that

recycling and diversion activities are extremely important and thus the “spread” of the scores listed on the table is relatively small (a 3.5-point spread).

TABLE 7-1

**SUMMARY OF RANKING AND WEIGHTING CRITERIA FOR
UPSTREAM DIVERSION STRATEGIES**

IP #	ISSUE PAPER TOPIC	SCORE	IMPLEMENTATION PERIOD
1	Environmentally preferable purchasing (EPP) and recycled content procurement policies	31.0	Years 10-20
2	CII&M recycling	31.5	Years 1-20
3	C&D debris recycling	28.0	Years 5-10
4	Alternative daily cover	29.0	Years 1-20
5	Franchising	30.8	Years 10-20
6	Collection (hauling) districts	30.8	Years 10-20
7	HHW and electronics recycling	29.5	Years 1-5
8	Zero waste	25.5	Years 10-20
9	Organics composting	28.5	Years 1-5
10	Residential recycling curbside bins and carts	29.0	Years 10-15

The team also recognized, however, that program changes take time to implement as well as time to grow participation. Therefore, the anticipated timing of implementation for these programs in order to prioritize efforts was further examined; in particular, which programs could more easily be integrated with current programs and which programs would require further evaluation, significant policy changes, or revisions to local laws prior to implementation. It was also determined that alternative daily cover options are evaluated on a continuous basis as part of the landfill options and do not require separate upstream diversion focus. The Division selected the following options for immediate consideration under the Local Solid Waste Management Plan (the next five- year horizon): (1) CII&M recycling; (2) HHW and electronics recycling; (3) C&D debris recycling; and (4) organics diversion.

Based on the results of the evaluation of alternative technologies, including preliminary cost assessments, the Division selected “enhanced composting” for the preferred downstream diversion opportunity as an extension of the existing yard waste composting efforts. This will allow the County to potentially compost wastewater treatment plant sludges currently being disposed of in the County landfill and could

ultimately lead to a County-wide biosolids or food waste composting facility at the landfill.

7.2.2 Upstream Diversion Options

A. **CII&M Recycling.** This program expansion will focus on recycling collection programs at commercial and industrial sites; institutional facilities (i.e., schools, universities, hospitals, prisons, etc.); and multi-family buildings of five or more families. It is estimated that this program could encompass 6,000 to 7,000 building units. The potential to increase recycling participation is significant depending on the amount of staff time and funds that are dedicated to these efforts. Some of the challenges and program implementation needs are summarized in Table 7-2 (more detailed discussions are presented in Issue Paper No. 1 in Appendix B).

TABLE 7-2
SUMMARY OF INITIAL PROGRAM CHALLENGES FOR
INCREASING CII&M RECYCLING RATES

CHALLENGE	PROGRAM IMPLEMENTATION ACTIVITIES	IMPLEMENTATION NEEDS
Lack of space in apartments, offices, and buildings for containers	Establish a CII&M building ordinance requiring recyclables storage in or near the building with individual containers available to transport materials to the central location	Dedicated staff time to work with Building Code Officer
High resident, manager, and building owner turnover rate	Track recycling programs for participation, educational and collaborative opportunities for each building	Dedicated staff time to outreach
Small incentive for building occupants to recycle	Survey building occupants to determine appropriate methods to encourage recycling in that building	Dedicated staff time to outreach
Ineffective recycling and waste education	Improve and advertise the county's solid waste website and information; produce and handout simple and innovative educational materials; provide buildings with appropriate signage	Dedicated staff time to outreach and educational materials
Lack of recycling regulations enforcement	Periodically monitor and analyze recycling data for a statistically significant number of buildings	Dedicated staff time and tracking software

B. **HHW and Electronics Recycling.** This initiative involves expansion of the County's existing HHW and E-waste program. HHWs are household products that contain corrosive, toxic, flammable, or reactive ingredients, warranting their diversion

from the landfill, transfer stations, and other waste disposal sites in order to protect ground and surface waters from accidental release. E-wastes and HHW currently comprise about 1 percent of the MSW stream by volume and have high potential for harmful toxins to enter the surrounding groundwater. Regulations are already in place banning HHW from landfills, but this waste stream is not yet fully captured. Issues and methods to increase diversion are shown in Table 7-3.

TABLE 7-3

**SUMMARY OF INITIAL PROGRAM CHALLENGES FOR
INCREASING HHW AND E-WASTE PARTICIPATION**

CHALLENGE	PROGRAM IMPLEMENTATION ACTIVITIES	IMPLEMENTATION NEEDS
Limited hours of operation of HHW facility because of required staff involvement	Expand the County's HHW facility hours of operation and explore opening satellite collection sites, curbside pick up or a mobile collection unit	Dedicated staff time to increase hours of drop off locations
Low public and Small Business participation rates	Increase educational activities and encourage product stewardship programs	Dedicated staff time for outreach and educational materials
Small quantity and types of materials collected or managed at the facilities	Work with NYSDEC to find businesses that accept or have a demand for various HHW and E-Waste and work to expand facilities to store these products	Dedicated staff time for outreach and storage area
Large amount of usable products going to the landfill	Explore opening a reuse center for certain electronic items	Dedicated staff time to operate re-use center and storage area

C. C&D Debris Recycling. This program would encourage separation of C&D debris for recycling or reuse at the job site of a construction, demolition, or remodeling project. As more buildings are built to achieve LEED¹ accreditation, deconstruction verses demolition will increase since one of the LEED accreditation points involves utilization of recycled or reused construction materials. Table 7-4 highlights the issues and potential activities associated with C&D debris recycling.

¹ LEED (Leadership in Energy and Environmental Design): According to the U.S. Green Building Council website: LEED is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO₂ emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

TABLE 7-4

**SUMMARY OF INITIAL PROGRAM CHALLENGES FOR
IMPLEMENTATION OF C&D DEBRIS RECYCLING (UPSTREAM)**

CHALLENGE	PROGRAM IMPLEMENTATION ACTIVITIES	IMPLEMENTATION NEEDS
Small incentive to spend extra to save material	Increase public and construction workers' education and awareness of LEED certification and the benefits of green building. Promote public recognition programs for those that participate.	Dedicated staff time for outreach
More time and effort needed for deconstruction verses demolition	Increase public and construction workers' education; offer guidance or incentives for C&D recycling such as preferred disposal rates for non-recycled C&D after separation has occurred or for site MSW	Dedicated staff time for outreach and program cost for incentives (lost revenue)

D. Organics Diversion. This program would involve expansion of the current organics (yard waste, food scraps, wood waste) diversion program, including backyard composting, grasscycling, food donations, and small-scale vermicomposting (worm composting in containers). The primary issue associated with upstream diversion of organics is described in Table 7-5.

TABLE 7-5

**SUMMARY OF INITIAL PROGRAM CHALLENGES FOR
ENCOURAGING UPSTREAM DIVERSION OF ORGANICS**

CHALLENGE	PROGRAM IMPLEMENTATION ACTIVITIES	IMPLEMENTATION NEEDS
Educating the public	Have an organics diversion team work with outreach groups to develop a comprehensive program to educate food waste generators and the general public	Dedicated staff time for outreach and educational materials

7.2.3 Downstream Diversion Options

A. C&D Debris Recycling. This program expansion opportunity is targeted for implementation in 5 to 10 years and would involve diverting C&D debris from the landfill by processing material on site. In 2007, the landfill accepted over 22,400 tons of C&D debris, of which 70 percent consisted of highly marketable materials (Tier 1 recyclables). Additional information is presented in Issue Paper No. 3 in Appendix B. Public, private or dual ownership is a possibility with this option. Table 7-6 identifies

challenges that will need to be addressed prior to implementation of a C&D processing facility.

TABLE 7-6

**SUMMARY OF INITIAL PROGRAM CHALLENGES FOR
IMPLEMENTING DOWNSTREAM C&D RECYCLING**

CHALLENGE	PROGRAM IMPLEMENTATION ACTIVITIES	IMPLEMENTATION NEEDS
Determination of waste composition of C&D debris	Identify space at the landfill to complete a C&D composition demonstration study, including rental of appropriate processing equipment. Explore opportunities for beneficial reuse of non-recycled materials as daily cover or bulking agents for compost operations.	Storage and processing equipment, staff time, and maintenance
Daily value variation of recyclable materials	Conduct a market assessment for materials as well as the site's potential recovery of recyclable materials	Dedicated staff time for research

B. Organics Diversion. Choosing the best downstream diversion activity involved considering a variety of outputs from the alternative technology evaluation process, including:

- t required tonnage
- t required feedstocks
- t applicability to the waste stream
- t diversion potential
- t environmental considerations
- t residuals management
- t commercial viability
- t anticipated costs

It appears that organics processing through enhanced composting presents the best technological, economical, and environmental option for increasing downstream waste diversion for Broome County. Anaerobic and thermal conversion technologies do not appear as viable or cost effective. However, this evaluation of alternative technologies, including the general cost comparison, was originally developed as a potentially significant downstream diversion approach. As the actual evaluation progressed and further discussions/work sessions were held, it became evident that a major program change from the current, more cost-effective landfill approach was not likely. As a result,

a more modest, sequenced, and scalable approach was considered for Broome County. An approach that focuses on organics would satisfy both the County's interest in increasing recycling and diversion and NYSDEC's interest in organics diversion.

In keeping with enhanced composting as the preferred technology, this approach would begin with expansion of the existing yard waste composting program. The first step in expanding the existing program would be the addition of food waste (pre-consumer) or biosolids. The addition of pre-consumer food waste from institutions (universities, prisons) and commercial enterprises (grocery stores, processors) typically represents the least contaminated (and therefore most cost-effective) source of food waste for composting. Collection of pre-consumer food waste would also require the least change to current collection practices. In addition, the County has had some initial discussions related to the economic viability of a County-wide biosolids management facility.

The volume of food waste or biosolids that could be diverted will be a function of the available volume of bulking agent (brush/yard/wood waste). Based on approximately 450 tons of yard waste disposed per year, approximately 300 tons of food waste or biosolids could be processed annually without importing bulking material. This tonnage would be appropriate for an initial demonstration project. To expand processing capacity, Broome County could integrate biosolids disposal with wood waste disposal for interested municipalities.

Typically, a biosolids composting facility would be enclosed to minimize management of odor and other environmental impacts (such as leachate). Low volume food waste composting would not typically require completely enclosed facilities. However, the Federal Aviation Administration has expressed their concern with composting facilities and the potential to attract vectors. Considering the processing capacity available with current wood waste tonnage, vector concerns, and other food waste/biosolids composting facilities in the region, an initial outdoor demonstration composting facility may be an appropriate first step in pursuing additional downstream organics diversion. A project of this nature would be pursued to demonstrate required mix ratios, processing options, processing times, finished product quality, the potential for vector attraction, and required environmental impact management.

For a demonstration project, a "low tech" approach to material processing could utilize the County's existing equipment. Broome County currently owns a tub grinder, windrow turner, and screen. This equipment, in addition to a front-end loader, could be adequate to operate a static, turned windrow demonstration facility depending on the nature of the food waste. As part of the demonstration, Broome County could also employ a forced aeration static pile processing approach by adding blowers and piping, in lieu of turning

windrows, to compare the two processes. Biosolids and food waste could be composted separately and together to evaluate individual and combined processing details. The next step in expanding organics diversion would then be to construct a larger, enclosed composting facility that utilizes more process controls and automation. The nature of that facility (size, feedstock, processing capacity, processing approach, type of enclosure, etc.) would be determined as part of the demonstration project.

Further expansion of enhanced composting as an alternative technology would require the diversion of more organic waste from the MSW stream. Inclusion of source-separated organic waste is one option for capturing organic material. However, during evaluation of upstream diversion opportunities (via the issue papers), an organic waste diversion or green bin approach did not receive a high ranking. As a result, processing the MSW stream may ultimately present a more cost-effective approach for significant capture and diversion of organics from the landfill than source separation methods.

Based on the above discussion, a phased organics diversion strategy was recommended that begins with the County's existing yard waste composting program (the baseline) and builds upon the program as follows:

- A demonstration project that utilizes a forced aeration composting method for processing yard waste and food waste or biosolids.
- A full-scale (outdoor) forced aeration composting operation to process 100 percent of the County's existing yard waste (as currently delivered to the site) and food waste or biosolids.
- A fully enclosed composting facility to process 100 percent of the County's existing biosolids that is expandable for processing additional organic feedstock.

7.3 ELEMENTS RELYING ON PRIVATE SECTOR

Broome County currently has four private companies that collect, separate, and market recyclables:

1. Broome Recycling, Inc. in Binghamton, NY. This facility accepts recyclable materials as single stream (fiber and containers) and processes/markets the material at its Binghamton location.
2. A&W Recycling in Chenango Bridge, NY. This facility accepts materials as single stream (fiber and containers) and processes/markets the material at its

Chenango Bridge location.

3. Southern Tier Recyclers in Apalachin, NY (Tioga County). This facility accepts recyclable materials as single streams (fiber and containers) and processes/markets the material at its Apalachin location.
4. Empire Recycling Corporation in Binghamton, NY. This facility is a branch of Empire Recycling's main facility in Utica. They accept scrap paper and shredded paper exclusively from commercial accounts. The materials are baled and marketed to end users from the Binghamton location.

Broome Recycling, Southern Tier Recyclers and A&W Recycling collects and processes the recyclables collected within Broome County. In support of the County's expanded efforts to collect additional recyclables from CII&M units, the private recyclers have confirmed that they have sufficient processing capacity to accept 100 percent of the County's co-mingled recyclables. If 100 percent of the processing capacity of the existing MRFs is met, the County will procure additional processing capacity from other private operators.

7.4 PLAN IF PRIVATE SECTOR IS UNABLE TO FUNCTION

Currently, Broome County has an agreement with Southern Tier Recyclers to manage recyclables from the drop-off located at the landfill. They have the capacity to take all the recyclable materials produced in Broome County if the other private companies are unable to perform. If local MRFs stop collecting and processing recyclables in Broome County, the County's waste haulers will continue to pick up the curbside recyclables and the landfill site will act as a temporary transfer station for recyclables. The County will then transport the materials to the nearest recycling facility that processes single-stream recyclables until another private organization is found to manage the recyclable materials.

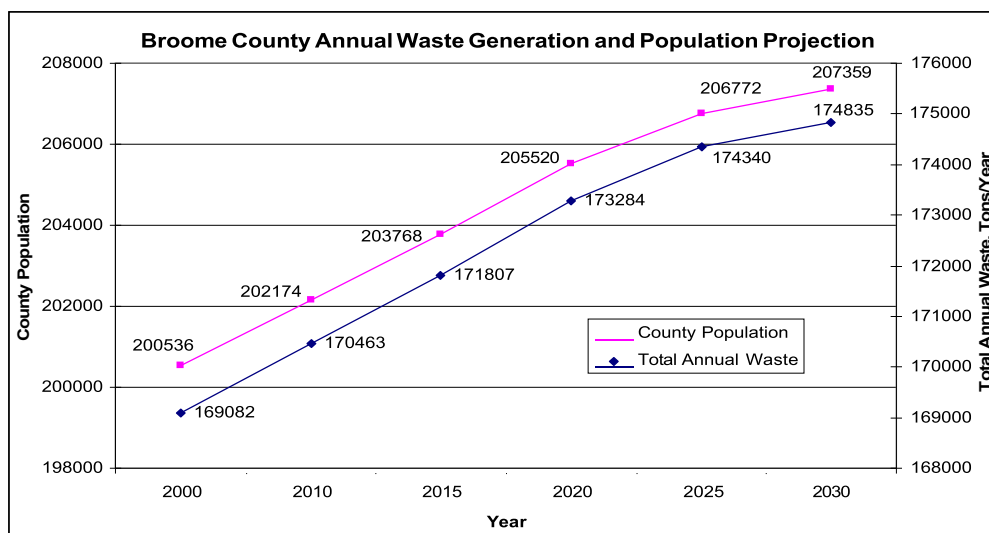
7.5 CERTIFICATION OF DISPOSAL CAPACITY

7.5.1 Solid Waste Generation – 20-Year Projection

Broome County has projected a population increase of 2.56 percent over the next 20 years. The 20-year population projection is more fully described in Chapter 5. For each increase in population, there is an associated increase in waste generated per year. Recently, the USEPA estimated the average waste generation rate in the United States at 4.62 lbs/person-day. Using the USEPA waste generation rate, the projected population and annual waste generation in Broome County is shown in Figure 7-1.

FIGURE 7-1

BROOME COUNTY ANNUAL WASTE GENERATION AND POPULATION PROJECTION



Broome County has completed permitting activities associated with the 100-acre landfill expansion. The first cell in Section IV was opened in 2009. We are currently constructing Cell 4 and there are an additional 9 cells planned for the remainder of Section IV. Given the air space capacity (volume available for solid waste disposal) of the landfill, the anticipated waste generation per year, an average waste density of 1,700 lbs. per cubic yard based on historical data at the landfill, and consideration of daily cover and interim cover material, Section IV is expected to have a lifespan of 40 years.

7.5.2 Locally Available Disposal Options Outside of the Planning Unit

There are currently three landfills outside of Broome County within a 75-mile radius that accept MSW from outside of their individual planning units. The landfills include the Town of Chenango (40 miles, 1.25 hours driving), the County of Chemung (59 miles, 1.2 hours driving), and the City of Auburn (75 miles, 1.75 hours driving).

Although there are landfills available outside of the County, there are no plans or intentions to use them in the next 20 years. In fact, these landfills currently provide market competition for MSW and C&D with the Broome County landfill and potentially have a negative impact to Broome County's revenue generation and subsequent funding of solid waste management programs. Although the County has successfully competed with these facilities on an economic basis in the past, recent economic conditions have resulted in lower than market rates for various waste products, and some waste from private haulers has left the County in light of more favorable tipping fees outside of the County. Control of Broome County-generated waste and related revenue is critically important to the County in terms of expanding and funding additional solid waste management programs (refer to discussion related to flow control in Chapter 9).

7.5.3 Disposal Cost Summary

Broome County currently offers renewable commercial permits on an annual basis that are prorated monthly from the beginning of July through the following June. There is a \$55 application fee and an annual fee for vehicles of \$22 and \$5.50 for trailers or roll-off containers. Tipping fees depend on the type of waste for disposal, ranging from \$20/ton to drop off yard waste to \$100/ton for materials containing asbestos, with MSW rates currently set at \$45/ton. Appendix C includes the Broome County Landfill Information Guide, including the tipping fees for various materials accepted at the landfill.

The competing landfills around Broome County have similar tipping fees and are summarized in the table below.

LANDFILL	DISTANCE	TRAVEL TIME	TIPPING FEE
Chenango	40 miles	1.25 hours	\$60/ton
Chemung	59 miles	1.20 hours	\$40/ton
Auburn	75 miles	1.75 hours	\$72/ton
Broome	-	-	\$45/ton

7.6 SPECIFIC, MEASURABLE, ATTAINABLE, REALISTIC, TIME-BOUND (S.M.A.R.T.) GOALS

As summarized in and discussed in Chapter 3, Table 3-4 presents the estimated “baseline composition” of waste generated and managed within the County and compares it to recycling and diversion capture rates for the year 2007. The following observations were noted:

1. There is a very high capture rate of metals within the waste stream (approximately 90 percent). This is likely due to the market value of metals during 2007. However; like other commodities, the value of metals is prone to significant price fluctuations.
2. The remaining “yellow bin” type recyclable materials, including paper, plastic, glass, and co-mingled materials, are being captured at about a 40 percent rate. These numbers support the County’s desire to pursue targeted commercial, institutional, industrial, and multi-family recycling (CII&M) recycling efforts to increase the capture of these materials.
3. Food waste and yard waste currently account for 9 percent of the total waste stream (although other organics such as paper could also be considered as organic waste) and offer opportunity for diversion through private and public composting efforts.
4. Sludges from wastewater treatment facilities are organics that can also be composted for reuse as a solid amendment. Although composting of sludges (biosolids) by local municipalities has occurred in the past, it has grown burdensome in some cases and the County is evaluating potential coordination efforts for a central composting facility. The volume of sludges produced in the County on an annual basis is over 15,000 wet tons with a potential for higher production in the future.
5. C&D debris volumes fluctuate from year to year but contribute to approximately 15 percent of the total waste stream on an average annual basis. This is clearly a source that can be targeted for diversion potential and beneficial reuse of products, but also comes with program management challenges.
6. HHW and E-waste does not comprise a large portion of the waste, but it is a waste stream that should be kept out of the landfill. Current public

participation with the HHW and E-waste is relatively low and the County has targeted this waste for increased participation and diversion opportunities.

7. The County currently takes significant advantage of alternative daily cover materials for the landfill in lieu of purchasing soil materials. Although these efforts fall under the State's Beneficial Reuse Program, it is not considered a recycling or diversion program since these materials are ultimately placed in the landfill.

The NYSDEC has offered guidance to solid waste planning units to set diversion rates on a per capita basis. Based on 2007 numbers, the County currently captures and diverts approximately 220,000 tons of materials per year as shown on Table 3-4. Based on an estimated 2007 population of 200,000, Broome County has a per capita diversion rate of 5.9 lbs. diverted/capita-day. A reasonable goal over the next 20-year planning period is to increase the diversion rate per capita by 25 percent, to 7.4 lbs/capita-day. When compared to the 2007 diversion rates, it is approximately equivalent to an additional 55,000 tons of waste diverted on an annual basis.

To determine whether this goal is reasonably attainable, the 2007 waste characteristics were examined and the following targets were set for the primary diversion actions selected for upstream and downstream activities:

1. Increase recycling participation by 10 percent by targeting CII&M building units. This would result in the additional capture of 19,000 tons of recyclables per year by the end of the planning period.
2. Develop capture and processing strategies for approximately one third of the current C&D debris waste stream. This would result in the diversion and reuse of 20,000 tons of C&D per year by the end of the planning period.
3. Increase HHW and E-waste diversion to 35 percent (on a tonnage basis) in order to capture approximately 1,000 tons of these waste products per year by the end of the planning period.
4. Implement a phased program to expand the existing composting operations to include biosolids and food waste. Approximately 15,000 tons of organics could be composted and diverted on an annual basis by the end of the planning period.

Increasing the per capita diversion goal to 1.6 lbs. would result in additional diversion of 55,000 tons when using the baseline waste generation for 2007, or a 60 percent overall diversion rate compared to the current 48 percent.

7.7 CARBON REDUCTION CONSIDERATIONS

To quantify the carbon effects of the diversion programs identified above, the USEPA Waste Reduction Model (WARM) was used. WARM was created by the USEPA to help estimate greenhouse gas (GHG) emission reductions resulting from various waste management practices by calculating GHG emissions in metric tons of carbon or carbon dioxide equivalents for baseline and alternative waste management practices.

The USEPA WARM was used because it provides GHG emission calculations based on the County's specific waste characterization and operations. The baseline carbon emissions were calculated using tonnages of materials in the solid waste characterization described in Table 3-1 and 3-2, including landfilled waste and designated recycled or composted material. Broome County-defined waste categories were allocated to the most appropriate categories within the model. Broome County landfill operations are represented by designating landfill gas recovery for energy production and an estimated landfill gas collection system efficiency of 75 percent.

The upstream diversion activities and the resulting estimated diversion over the planning period are shown below:

UPSTREAM DIVERSION ACTIVITY	ADDITIONAL DIVERSION
CII&M recycling	10 percent of available recyclables to 1,000 tons
HHW and E-waste recycling	35 percent increase for an increase of 19,000 tons
Organics diversion	15,000 tons of biosolids and food wastes
C&D debris recycling	30 percent of wood and C&D debris in MSW for an increase of 20,000 tons

Carbon emissions based on the waste stream at the end of the planning period were calculated using the material tonnages after the diverted material was subtracted from the baseline landfilled tonnage and added to the recycled or composted material tonnage. A summary of the results of the WARM model are included in Appendix D.

The results of the model show a carbon equivalent emissions savings of approximately 10,300 metric tons. This is equivalent to removing almost 1,900 passenger cars from the roadway a year. The model also calculates an energy savings of approximately

104,000 million BTU, or almost 18,000 barrels of oil a year. Output from the model is provided in Appendix D.

8.0 IMPLEMENTATION SCHEDULE

8.1 PROGRAM PROCEDURES

8.1.1 Plan and Scope of Operation

A primary objective of the enhancements to the current Solid Waste Management Program is to increase diversion from the landfill by increasing recycling efforts for commercial, industrial, institutional, and multi-family units; increase HHW and E-waste collection; decrease C&D debris and organic material from the MSW stream; as well as process C&D debris and compost some organics at the landfill.

8.1.2 Collection, Processing and Storage Procedures

At this time, the County intends to continue with the existing collection, processing, and storage procedures described in Chapter 4. There are recyclables drop-off bins and storage areas for HHW and E-wastes located at the landfill, but private companies transport, process, and dispose of the recyclable material entering the landfill. All non-hazardous commercial, industrial, institutional, and residential recyclables are collected and processed by the private sector.

8.1.3 Market Agreements

There are no existing market agreements at this time and no agreements are anticipated during this planning period. All recycled material is processed and sold through the private sector.

8.1.4 Funding Sources

The County's existing and future solid waste management programs will continue to be self funded from revenue generated through permits, licenses, and tipping fees at the landfill for various waste products. Capital investments are funded through capital reserves (through a dedicated enterprise fund) and revenue bonds.

A. **Waste Revenue.** The tipping fees from commercial and residential haulers support most of the educational activities, equipment, and O&M costs. As of December 2018, the majority of landfill fees were collected from commercial permits from eight

private waste haulers and four municipalities. Some revenue was collected for household hazardous waste and the sale of scrap and excess material.

B. Other Revenue. New York State grants have been used to fund a portion of the recycling efforts under the Solid Waste Management Program. The specific grant programs that have been used include:

- The New York State Shared Municipal Services Incentive (SMSI) Grant Program
- The NYSDEC Municipal Waste Reduction and Recycling Program (MWR&R) for Capital Projects and Recycling Coordinators
- The NYSDEC Household Hazardous Waste State Assistance Program

8.1.5 Entity Responsible for Program Operation and Management

Broome County is responsible for program management regarding both solid waste and recyclable materials. Their primary operations program relates to past, present, and future landfilling actions (waste disposal). The operation of the recyclable program is divided between the private sector and the County, with private companies collecting, processing, marketing, and disposing of products; while the County is responsible for recycling outreach and education activities.

8.1.6 Implementation of Potential Staff

Potential staff increases to implement program modifications are summarized as follows.

A. CII&M Recycling Initiative.

- One full-time Recycling Assistant - Immediate.
- Part-time Summer Intern to assist Recycling Coordinator – As program expands.

B. C&D Debris Recycling Initiative

- Utilize existing landfill operators for C&D characterization – Years 2-4.

- Complete market assessment with existing staff - Years 1-2.
- Investigate private operator interest with existing staff - Years 3-5.
- Procure private operators if applicable – Years 5-10.
- Hire County operators if C&D processing is implemented with County staff – Years 5-10.

C. HHW and Electronics Recycling Initiative (E-Waste)

- Extend current hours of operations at the existing drop-off centers using existing staff – Immediate.
- Add one laborer at the landfill to manage the collection program as it expands – Years 1-2.
- Investigate the benefits of private management of these facilities using existing staff – Years 1-3.

D. Enhanced Composting Initiative

- Utilize existing operators to complete a demonstration project as previously described – Years 1-2.
- Increase landfill operations staff by one operator and one laborer – Years 2-4.
- Staff full-scale facility for target capture of organics (three to five people) – Years 5-10.

8.2 IMPLEMENTATION SCHEDULE

8.2.1 Program Schedule and Milestones

The NYSDEC has offered guidance to solid waste planning units to set diversion rates on a per capita basis. Based on 2007 numbers, the County currently captures and diverts approximately 220,000 tons of materials per year as shown on Table 3-4. Based on an estimated 2007 population of 200,000, Broome County has a per capita diversion rate of 5.9 lbs. diverted/capita-day. A reasonable goal over the next 20-year planning period is to increase the diversion rate per capita by 25 percent, to 7.4 lbs/capita-day.

When compared to the 2007 diversion rates, it is approximately equivalent to an additional 55,000 tons of waste diverted on an annual basis.

To determine whether this goal is reasonably attainable, the 2007 waste characteristics were examined and the following targets were set for the primary diversion actions selected for upstream and downstream activities:

- Increase recycling participation by 10 percent by targeting CII&M building units. This would result in the additional capture of 19,000 tons of recyclables per year by the end of the planning period.
- Develop capture and processing strategies for approximately one third of the current C&D debris waste stream. This would result in the diversion and reuse of 20,000 tons of C&D per year by the end of the planning period.
- Increase HHW and E-waste diversion to 35 percent (on a tonnage basis) in order to capture approximately 1,000 tons of these waste products per year by the end of the planning period.
- Implement a phased program to expand the existing composting operations to include biosolids and food waste. Approximately 15,000 tons of organics could be composted and diverted on an annual basis by the end of the planning period.

Increasing the per capita diversion goal to 1.6 lbs. would result in additional diversion of 55,000 tons when using the baseline waste generation for 2007, or a 60 percent overall diversion rate compared to the current 48 percent. A summary of the specific measures and milestones to achieve these goals is summarized in Table 8-1.

8.2.2 Existing Facility Closure Schedule

There are no facilities scheduled for closure or replacement. All operating facilities are currently permitted and are not forced by a government agency to close.

8.2.3 Economic Development Schedule

No economic development schedule is required because all recycled material is handled by private companies. Recyclable material stored at the County is brought to Southern Tier Recyclers.

8.2.4 Educational Schedule

The County's existing education schedule is presented in Table 8-2. Outreach activities will be expanded to include proposed program enhancements as they are implemented.

8.3 INTERIM MANAGEMENT PLAN

An interim management plan is required by the NYSDEC when a large solid waste program change is offered and significant transitional steps are necessary as part of the implementation process. The recommended program enhancements under this Local Solid Waste Management Plan do not require major changes under the existing program, so an interim management plan is not necessary.

TABLE 8-1

**SUMMARY OF BROOME COUNTY SOLID WASTE PROGRAM ENHANCEMENTS
KEY MEASURABLES AND MILESTONES**

UPSTREAM DIVERSION GOALS	MEASURABLES	MILESTONES	TIMEFRAME
CII&M recycling	Quantify number of CII&M building	Establish a communication system with the Municipal Building Code Officers	By Year 2020
		Work with tax information to building a database of existing CII&M buildings in the County	Completed in 2011
	Establish a baseline participation rate	Develop and distribute survey to all building units	By year 2020
		Determine estimates of participation rates based on survey results	By Year 2021
	Education and outreach to the public	Develop and distribute educational material to participants	Began in 2011
		Revise County website and offer more information and outside links	Completed in 2011; Update as needed
	Track participation rates and trends	Conduct a survey of occupants in a statistically representative sample of buildings regarding recycling participation	By Year 2023
	Track tonnages of recyclables collected in Broome County with private haulers		By Year 2023 and annually thereafter
HHW and electronics (E-waste) recycling	Quantify number of HHW and E-waste collectors	Work with tax information to building a data base of existing electronic stores who could accept E-waste	Began 2011 and annually thereafter
		Conduct research to find businesses who accept HHW or E-waste	Began 2012 and annually thereafter
	Count existing County participants who self deliver	Develop and distribute educational material to public forums, collection centers, and residents.	Began 2013 and annually thereafter

TABLE 8-1 (continued)

UPSTREAM DIVERSION GOALS	MEASURABLES	MILESTONES	TIMEFRAME
HHW and electronics (E-waste) recycling (continued)	Measure increases in tonnage received and number of participants	Increase collection center hours for HHW and E-waste	Began 2014. Evaluate annually thereafter
		Increase storage at collection centers to double current capacity.	By Year 2022
	Determine results of program expansion efforts	Track tonnages of HHW and E-waste collected in Broome County using County collection centers and private collectors	Began 2014 and annually thereafter
		Determine estimates of participation rates based on tracking results	By Year 2021 and annually thereafter
C&D debris recycling	Quantify C&D composition through a waste characterization process	Establish a communication system with the County Building Code Officer and Green Building Council member	By Year 2021
		Conduct research to create database of local businesses who reuse building material	Began 2014; Update as needed
		Update educational materials with reuse list, LEED and construction regulations	Began 2014; Revise by Year 2021
	Implement tip fee incentives and record participation	Develop and distribute educational material to public forums, collection centers, and all County residents.	By year 2023 period; annually
Organics diversion	Identify number of compost bins sold to date	Determine local organizations who promote and work with residents on composting.	Began 2011; Update as needed
		Establish a communication system with the identified organizations.	Began Year 2012
	Track purchase of County compost bins	Update educational materials with available compost assistance and resources	Began 2014
	Track businesses and institutions who develop organic diversion programs	Develop and distribute educational material to public forums, collection centers, and all County residents.	By Year 2021 and annually thereafter

TABLE 8-1 (continued)

DOWNSTREAM DIVERSION GOALS	MEASURABLES	MILESTONES	TIMEFRAME
C&D debris recycling	Track tonnage of C&D debris passing scalehouse and entering landfill	Designate an area at landfill for temporary storage and processing of C&D material	By Year 2025
	Based on the database of C&D debris recyclers, track tonnage of C&D diverted from landfill	Work with haulers to separate C&D debris from MSW upon delivery	By Year 2026
	Determine estimates of diversion rates based on tracking results	Conduct pilot C&D debris processing program at landfill	By Year 2027
		Conduct market research to determine potential value of reusable materials	By Year 2028
		Determine appropriate management strategy - publicly or privately owned	By Year 2029
Organics diversion	Estimate feedstock and tonnages of organics available in County	Track tonnage of yard waste entering landfill at scalehouse	Began 2011 and annually thereafter
		Conduct survey of commercial, industrial, and institutional centers who process food for types and amounts	Began 2012 and updated annually
		Determine amount of biosolids produced in County by contacting WWTPs	Began 2011 and annually thereafter
	Determine amount of organics that could be composted at existing facilities	Conduct survey to WWTPs and food processing facilities in County to determine interest in composting at landfill	By Year 2022
		Calculate feasibility of composting organics identified in survey at landfill in regard to land and bulking agents available	By Year 2023
		Research permitting requirements for a biosolids and food composting facility at the landfill	Began 2012; Evaluate periodically
	Measure volume of organics composting	Construct a demonstration biosolids and food composting facility	By Year 2025
		Determine feasibility of full-scale operation	By Year 2026

TABLE 8-2
BROOME COUNTY EDUCATION SCHEDULE

MONTH	PROGRAM	OUTREACH
January- February	HHW and electronics recycling	Advertisement in newspaper. Outlines accepted materials and collection days for the year, press release, posting on County website, Facebook, printed schedules and submitted to free news outlet (community calendar).
March-April	Recycling, waste reduction	Television ads to promote recycling/provide tips, posted on County website, Facebook, press release, and printed guide.
March-April	Backyard composting	Sell bins at discounted rate, press release, posted on County website, posters hung, promoted at farmers markets and special events.
April	Earth Fest	Community event - display table and disbursement of informational guides.
April-May	Farmer markets	Participate in a few and promote composting, recycling, HHW & electronics recycling.
May-July	Grass recycling	Radio advertisements (one week in May, one week in July), press release, posted on the County website (composting page), printed brochure, Facebook.
November-December	Waste reduction/holiday tips, buy recycled, recycling	Advertisement in newspaper, press release, posted on County website.
November-December	Christmas tree recycling	Press release, posted on County website, Facebook, submitted to free press outlets.
Year-round	Recycling programs, landfill tours	Conduct year round specific school and community group programs regarding recycling, HHW, electronics, composting. Promoted through direct contact with teachers and the County website.
Year-round	Recycling programs, waste reduction, composting	Informational posts on the Division of Solid Waste Management's Facebook page.

9.0 LEGAL AND INSTITUTIONAL CONSIDERATIONS

9.1 REVENUE GENERATION AND PROGRAM FUNDING

Control of Broome County-generated waste and revenue from waste disposal tipping fees is critically important to the County in terms of expanding and funding additional solid waste management programs. There are a variety of costs to the Division of Solid Waste for managing recyclables. These include costs for contract services with a private MRF for processing recyclables; cost for purchasing and distribution of recycling containers; cost for contracting for disposal of HHW; staff cost associated with coordination and permitting local haulers; staff time for public outreach and education activities; and administrative costs for managing and reporting on the overall solid waste management program. All of these activities rely on revenue from tipping fees at the landfill or through annual subsidies from the New York State Recycling Grants Program. To sustain existing and expanded programs, the County must rely on consistent levels of revenue generation from tipping fees. Therefore, the Division made a critical examination of recent flow control legislation in New York State and its applicability to Broome County, particularly in light of the potential expansion of the proposed recycling and diversion programs.

The County's existing and future solid waste management programs will continue to be self funded from revenue generated through permits, licenses, and tipping fees at the landfill. Capital investments are funded through capital reserves (through a dedicated enterprise fund) and revenue bonds. As previously described, there are no tipping fees or user fees charged for residential or commercial recyclables.

9.1.1 Waste Revenue

The tipping fees from commercial or residential haulers help pay for most of the educational activities, equipment and O&M costs. As of December 2018, the majority of landfill fees were collected from commercial permits from eight private waste haulers and four municipalities. Some revenue was collected for HHW and the sale of scrap and excess material.

9.1.2 Other Revenue

New York State grants have been used to fund a portion of the recycling efforts under the Solid Waste Management Program. The specific grant programs that have been used include:

- The New York State Shared Municipal Services Incentive (SMSI) Grant Program.
- The NYSDEC Municipal Waste Reduction and Recycling Program (MWR&R) for Capital Projects and Recycling Coordinators.
- The NYSDEC Household Hazardous Waste State Assistance Program.

Approximately 4 percent of the program cost is funded through State grants.

9.2 LEGAL/INSTITUTIONAL ANALYSIS

Broome County is considering implementing flow control regulations to address its solid waste management needs. The County requested that Pannone, Lopes, Devereaux, West, LLC (New York, NY) complete an analysis of the various issues, benefits, and drawbacks of flow control in the event it decides to implement such regulations. Accordingly, the following is a discussion of flow control, considerations associated with implementation of flow control regulations, and issues to consider going forward. Also included in Appendix E is information regarding the legal history of flow control, economic flow control, and a summary of the flow control law of Madison County, NY (a community with similar solid waste programs).

9.2.1 Flow Control - Overview

Flow control refers to the ability of local governments and agencies to mandate -- through laws or other regulations -- that all locally-generated solid waste be delivered to designated solid waste management facilities. Until the United States Supreme Court's recent decision in *United Haulers Association, Inc. et al v. Oneida-Herkimer Solid Waste Management Authority, et al.*, 127 S.Ct. 1786 (2007), the prevailing view was that most flow control laws were unconstitutional because such laws imposed an impermissible burden on interstate commerce. That view had been endorsed by the Supreme Court's opinion in *C&A Carbone, Inc. v. Town of Clarkstown*, 511 U.S. 383 (1994). In *United Haulers*, the Supreme Court held that it is legally permissible for a local government to require that MSW be processed at a designated publicly-owned and operated solid waste management facility. Accordingly, municipalities throughout the country have started enacting their own flow control regulations.

9.2.2 Flow Control – Benefits

Flow control is an essential tool, without which municipalities may find it more difficult to fulfill their responsibilities to plan for the management of MSW. Flow control is necessary to ensure the financing of existing facilities within the municipalities and to meet the responsibilities of municipalities to sustain old disposal sites. Municipalities are also obligated to provide and/or fund all supplementary waste management services, such as HHW collection, curbside recycling programs, and community education programs. Flow control is essential to keep municipalities from going bankrupt trying to fulfill these obligations; in addition to covering the costs of meeting regulatory requirements, planning, and public participation in decision-making activities. Flow control provides for various economic benefits such as economies of scale in operation of solid waste management facilities. Greater throughput allows for a decrease in per ton costs for disposal at facilities, and recyclables revenue can increase.

Aside from ensuring the financial viability of MSW management systems, flow control measures provide municipalities with greater control and oversight of the solid waste generated within their jurisdictions. Flow control measures therefore allow municipalities to better protect the health, safety, and welfare of their citizens. By thoroughly regulating disposal of solid waste through flow control measures, municipalities can ensure that solid waste is disposed of in a safe and environmentally sound manner. Flow control measures also serve to protect natural resources by allowing municipalities to designate disposal sites in specific areas that must meet certain environmental standards. Such measures additionally provide municipalities with sufficient revenue to pursue alternative technological solid waste disposal methods that would otherwise be unattractive to private entities due to their prohibitive costs.

Of the many laudable goals that may be achieved through the adoption and enforcement of flow control measures, an increased rate of recycling is perhaps the most significant, given current environmental concerns. By allowing municipalities to control and inspect all the solid waste generated within their jurisdictions, flow control measures permit municipalities to implement recycling programs that would otherwise be unmanageable. For example, flow control measures increase the rate of recycling by: (1) creating incentives for citizens to recycle (flow control measures are often drafted to exempt from tipping fee requirements disposal of recyclable materials, thus encouraging citizens to separate their recyclables from their solid waste); and (2) allowing municipalities to better enforce their recycling laws by requiring all solid waste to be delivered to designated publicly-owned solid waste management facilities. Flow control measures and their resulting increased rate of recycling allow municipalities to better conserve their resources and protect the local environment.

9.2.3 Flow Control – Issues

One important issue to consider is how to monitor waste collectors and haulers to ensure they take solid waste and recyclables to designated publicly-owned solid waste management facilities. Like other municipalities, Broome County must also consider whether and to what extent a flow control law could conflict with an existing law, such as a provision of health code.

Consideration must also be given to a flow control law's impact on existing solid waste collection contracts. If a collection contract specifies that solid waste collected in a municipality must be taken to a transfer station or other privately-owned solid waste facility, the likely impact by a flow control law is that the waste may be redirected to a publicly-owned solid waste facility. The impact to the hauler, if any, would likely result from a higher tip fee at the publicly-owned solid waste facility, and an increase in transportation costs if the publicly-owned facility is farther than the facility designated in the contract. While the hauler is unlikely to prevail on a constitutional challenge to the flow control law, presumably it would seek to pass these increased costs on to the municipality.

9.2.4 Flow Control – Implementation

As explained by the Supreme Court in the United Haulers decision, local governments' authority to enact flow control is derived from their police power. It is therefore essential for municipal governments interested in enacting legally sustainable flow control laws to demonstrate the relationship between the proposed flow control regime and the health, safety and welfare of their citizenry. Accordingly, it is recommended that a findings statement should be prepared that establishes the public policy basis for restructuring the municipality's solid waste management system. The findings statement should discuss the legitimate governmental objectives that will be achieved through the implementation of flow control. Furthermore, the findings statement should, to the extent possible, provide persuasive evidence of community support for the creation and development of an integrated public solid waste management system. Additional items that may be appropriate for inclusion in the findings statement are:

- A technical description of the proposed integrated system and an examination of how such a system would operate to the benefit of the public.
- A technical assessment of existing publicly-owned solid waste management facilities and a discussion of their proposed role in an integrated waste management system.

- Evaluation of the perceived benefits of a public system as compared to waste management services provided by the private sector.
- Discussion of public health and environmental benefits of an integrated public system.
- Perceived economic benefits of an integrated system to the public.
- A clear presentation of the reasons why flow control would be good for the current and future needs of the County.
- A draft of amended flow control legislation.

This Local Solid Waste Management Plan Update identifies the County's current and future solid waste management needs. The County must also consider its policy with respect to recyclable materials and whether such materials would continue to be disposed of at private facilities. The County should also consider potential political issues involved with the implementation of flow control regulations and the impact of such regulations on the private solid waste industry.

It appears that the authority to implement flow control measures is contained in the Broome County Solid Waste Code. Section 179-14 (B)(1) provides:

"The County Executive (Executive) or his designee, which designee must be an officer or agent of the county, is hereby authorized and directed to designate, by written statement, from time to time, one or more solid waste management - resource recovery facilities to be used for the disposal of solid waste generated, originated or brought within the County of Broome, which designation may include a determination that a particular solid waste management - resource recovery facility shall be the only facility used for the disposal of solid waste generated, originated or brought within all of, or a described area within, the County of Broome or by a particular person or persons. Such written designation of a facility shall be filed with the Clerk of the Broome County Legislature and shall become effective within 60 days of filing, unless rescinded or modified by appropriate resolution of the Broome County Legislature."

9.3 SUMMARY OF PROPOSED ACTIONS TO MODIFY LOCAL LAWS

The following is a summary of the proposed 2010 revisions to the Broome County Local Solid Waste Management Laws, Chapter 317. Changes or additions are shown as bold and deletions are shown in italics.

§317-7 Responsibility for control and operation. (*Delete: Deputy Commissioner*) Director for the Divisions of Solid Waste Management will be responsible for the proper operation, control and maintenance of any landfill owned and/or operated by the County of Broome.

§317-27 D(3) The (*Delete: Deputy Commissioner*) **Director** for Solid Waste Management is hereby authorized and directed to designate, by written statement, from time to time, the practices and standards for preparation of recyclables for collection.

§317-27 D(4) The (*Delete: Deputy Commissioner*) **Director** shall solicit information from solid waste collectors, solid waste management facility operators and other concerned parties prior to designating revised rules for preparation of materials.

§317-28 (B) The owner and/or manager of every multifamily apartment building or condominium within the county shall provide and maintain, in a neat and sanitary condition, recycling dropoffs to receive all recyclable materials, generated by residents of the building or complex. **Recycling drop-offs must be placed adjacent to each solid waste collection point.** In cases where a condominium association exists, the condominium association shall be responsible for provision and maintenance of the recycling dropoff(s). It shall be the tenant's responsibility to separate designated recyclable materials from the solid waste and deposit the recyclables in the dropoff(s), in the manner prescribed by facility management.

§317-32. Solid waste disposal on public property.

C.(1) **All municipal** parks (*Delete: may, in lieu of*) **must** provide separate public receptacles for recyclables collection and arrange transportation of all recyclable materials to a material recovery facility (*delete: require that park patrons take their recyclable materials with them upon leaving the park. The municipalities shall post signs at all park entrances advising the public of the rule. Park patrons shall be responsible for removing recyclables from the park and disposing of them*) in accordance with this article.

§317-32 C(2) (*Delete: Notwithstanding the provisions of the paragraph*), concession stands within the park providing food or other items packaged in recyclable containers shall provide both refuse and recyclable containers to conform to this section.

§317-34. Reporting to (*Delete: Deputy Commissioner*) **Director**.

§317-34 B. Reports containing the information required in this section shall be compiled and delivered to the (*Delete: Deputy Commissioner*) **Director** for the Division of Solid Waste Management on an annual basis. Reports shall be filed with the (*Delete: Deputy Commissioner*) **Director** no later than January 31 of the subsequent year of filing.

§317-34 C. Each waste hauler shall retain for no less than five years the records and documents required pursuant to this article and shall make such documents available upon the request of the (*Delete: Deputy Commissioner*) **Director** or law enforcement officers.

***Any section of the local law that referred to fines will be updated to reflect any fines collected shall be split 50/50 with the municipality in which the violation occurred and with Broome County.**

9.4 COORDINATION WITH OUTSIDE JURISDICTIONS

9.4.1 Participation with Outside Jurisdictions

Currently, Broome County works cooperatively with Tioga County to collect and store HHW and electronics for processing at a private facility. The drop-off facility is located at the Broome County landfill. Residents from both Broome and Tioga Counties may drop off HHW materials at no charge without an appointment on the days that the HHW collection drop-off facility is open. Commercial hazardous waste is accepted for a fee and by appointment only. Small businesses in Broome and Tioga Counties may participate after they have completed a permit process and have registered with the County. In accordance with Broome County Local Law, no outside waste is accepted at the landfill.

9.4.2 Intermunicipal Agreements

As mentioned above, Broome County and Tioga County have an intermunicipal agreement for the collection and storage of HHW and E-waste. This agreement is renewed each year and includes Broome County charging Tioga County \$400 per month to manage and operate the program, plus \$0.75 per pound for all HHW and E-waste collected from Tioga residents.

The County contracts with a private hazardous waste management and disposal/recycling company for the packaging, transport, and disposal of the HHW and E-waste. The Broome County staff does some processing of waste such as bulking latex and oil-based paints into 55-gallon drums. The latex paint is exposed to air and solidified and then disposed of in the landfill in accordance with New York State regulations. The County has several hazardous materials storage lockers to contain the materials until there is enough for a full truckload, at which time the contracted vendor is called to service the facility.

10.0 INTERIM SOLID WASTE MANAGEMENT MEASURES

An interim management plan is required by the NYSDEC when a large solid waste program change is offered and significant transitional steps are necessary as part of the implementation process. The recommended program enhancements under this local Solid Waste Management Plan do not require major changes under the existing program, so an interim management plan is not necessary. Goals will be tracked as summarized on Table 8-1.

10.1 SOLID WASTE PROGRAM FUNDING

Until flow control legislation is fully assessed and acted upon, tipping fees and other fees will be set to be competitive with other New York State landfills. Program enhancements during the first five years of the Plan will be funded through modest rate increases. In order to fund additional program enhancements for the remainder of the planning period, modifications to local law to enact flow control may be necessary or adjustments to future enhancements may be needed. Thus, the dynamics of this Plan will continuously be evolving over the planning period.

11.0 EXPORT CERTIFICATION OF CAPACITY

An export certification of capacity is not required since the County does not export any MSW for disposal. However, if there is an emergency, there are currently three landfills outside of Broome County within a 75-mile radius that accept MSW from outside of their individual planning units. The landfills include the Town of Chenango (40 miles, 1.25 hours driving), the County of Chemung (59 miles, 1.2 hours driving), and the City of Auburn (75 miles, 1.75 hours driving).

Although there are landfills available outside of the County, there are no plans or intentions to use them in the next 20 years. In fact, these landfills currently provide market competition for MSW and C&D with the Broome County landfill and potentially have a negative impact to Broome County's revenue generation and subsequent funding of solid waste management programs. Although the County has successfully competed with these facilities on an economic basis in the past, recent economic conditions have resulted in lower than market rates for various waste products, and some waste from private haulers has left the County in light of more favorable tipping fees outside of the County. Control of Broome County generated waste and related revenue is critically important to the County in terms of expanding and funding additional solid waste management programs.

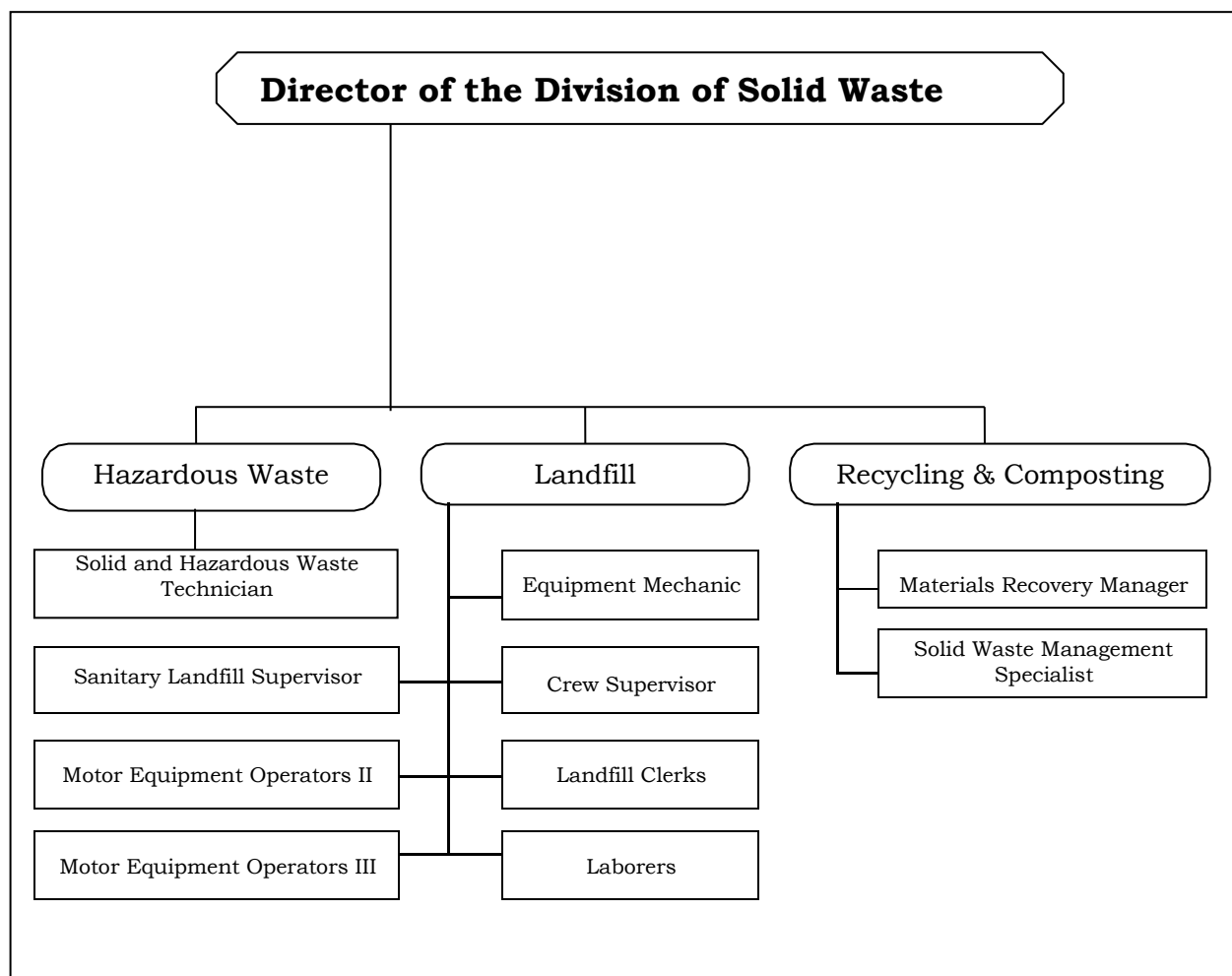
12.0 ADMINISTRATIVE STRUCTURE AND FINANCIAL MECHANISMS

12.1 CURRENT STRUCTURE

Figure 12-1 presents a graphical representation of Broome County's current administrative and management structure. No organizational changes are anticipated under this plan; however, additional staff is likely over the planning period.

FIGURE 12-1

BROOME COUNTY SOLID WASTE MANAGEMENT



12.2 COST ANALYSIS

The following discussion is offered to demonstrate the County's commitment to implementing and financially supporting existing solid waste management programs, ongoing landfilling operations, and proposed program enhancements to increase overall recycling and landfill diversion rates within the County, including public outreach and education participation. As summarized in Chapter 7, the County has identified specific program goals to increase recycling and diversion rates from 48 percent in 2007 to 60 percent in 2020 (based on increasing per capita participation rates by 25 percent).

12.2.1 Current Operating Costs

The Division of Solid Waste is responsible for managing operating costs as well as for collecting revenue through various fees. The solid waste management program is self funded and has relied on revenue bonds to finance significant capital investments. Debt service is retired through revenue generated from tipping fees, and no general funds are used to financially support this debt (no ad valorem taxes). In addition, New York State grants have provided some financial support to recycling programs in recent years (about 4 percent of the total revenue in 2008). Additional revenue collected beyond operating expenses is held in a reserve fund dedicated to future solid waste program investments. In 2008, the Division operating expenses totaled approximately \$9 million and costs were generally allocated as follows:

Debt service payments	\$3.2 million
Landfill operations	\$4.8 million
Recycling program.....	<u>\$1.0 million</u>
Total	\$9.0 million

In 2008, revenue collected was approximately \$9.8 million and was generally allocated as follows:

Revenue from fees	\$8.6 million
Interest, earnings, and miscellaneous	\$0.8 million
State Grants	<u>\$0.4 million</u>
Total	\$9.8 million

Please note that these summaries only reflect operating expenses and revenue and do not include financial assurance requirements, Enterprise Fund balance, asset value, or other financial numbers the County is obligated to manage in accordance with generally accepted public accounting standards.

12.2.2 Cost Projections for Planning Purposes

The primary purpose of the Local Solid Waste Management Plan Update is to set the stage for the next 20-year planning horizon for solid waste programs within Broome County. Although the Plan has targeted continued landfilling operations and program enhancements to increase recycling and diversion rates, it must also provide flexibility in anticipation of changing regulations, new technologies, public interest, changing environmental attitudes, and economic influences. In other words, it is likely that this Plan will continue to undergo revisions during the 20-year planning period. However, in support of future decision-making efforts, cost projections were developed over the next 20 years to estimate the level of financial support that will be required to continue landfilling operations and to implement program enhancements related to upstream diversion efforts. These are not intended to be future budget projections; rather, they are planning estimates for future program costs given specific volumes of wastes and anticipated events and milestones over the next 20 years.

Current operating expenses are supported through current revenue (fees), and the following projections focus on potential incremental cost increases.

12.2.3 Landfill Disposal Cost Section

Landfill disposal represents the current primary downstream waste management approach. Broome County has invested significant capital in developing the Section IV landfill and infrastructure during the past 10 years. Section IV Cell 1 was opened in August 2009. In light of this past investment and in review of future options, landfill disposal will continue as a significant waste management approach during the planning period as other solid waste program enhancements are developed.

To evaluate the capital investment for design, construction, and closure of future cells in Section IV, the overall capacity analysis performed for Section IV was updated based on recent operational data. The new analysis also detailed the development schedule and cost by individual cell for the duration of the planning period. From the *Engineering Report and Leachate Management Plan (Volume II)* of the 2001 Section IV Permit Application Package, the total airspace available below the proposed cap for all of Section IV was 12.4 million cubic yards (CY). For the original capacity analysis in 2001, the following parameters were used:

Annual disposal	114,000 tons (includes waste, daily cover material, roadways)
Average waste density.....	1,100 lb/CY
Annual airspace consumption.....	207,000 CY

Intermediate cover	1 foot
Life of Section IV	60 years

For the current SWMP process, the parameters were modified as follows:

Annual disposal	240,000 tons (waste and daily cover as ADC)
Average waste density.....	1,700 lb/CY
Annual airspace consumption.....	282,000 CY
Additional daily cover/roadways	5 percent
Intermediate cover	1 foot
Life of Section IV	41 years (from August 2009)

While the annual disposal more than doubled, the increased density and overall reduction in daily cover volume only resulted in a 30 percent decrease in landfill capacity. The parameters used to estimate the remaining life of Section IV should be revised as better data specific to operations in Section IV become available and to reflect actual annual disposal rates. While the overall capacity of each of the 13 cells conceptually designed for Section IV can be estimated from the permit drawings, the actual capacity in each cell based on operations will be less, as an individual cell may not be completely filled until the next cell is constructed.

A more detailed evaluation of Cells 1 to 3 was completed to better determine the useful life of each of these cells. Based on discussions with site personnel, the evaluation limited waste placement in each cell to provide a minimum 200-foot wide level working surface (thereby limiting the waste height). For the remaining cells (4 to 13), the specific capacity and life of each was based on its relative capacity. A more detailed analysis of Cells 4 to 13 was not warranted, as more accurate operational data will become available, future cell development may not follow the original pattern due to the construction of the new Section IV landfill entrance, and the bedrock profile in future cells may change the cell design and capacity.

The following assumptions were made in creating a development schedule:

1. Construction of a new landfill cell is required the year before existing capacity is exhausted unless a given cell provides capacity through October of a given year.
2. Design of a new cell is undertaken the year prior to construction.
3. Construction of partial closures is performed in the year following the use of existing capacity, except for Cell 5 where partial closure is delayed until the capacity in Cell 6 is exhausted.

4. Design of partial closures is undertaken the year prior to construction.

A summary of capital costs for design, new cell construction, and partial closure of cells for Section IV is provided in Table 12-1. From the detailed capacity analysis, Cells 1 to 8 will be needed during the 20-year planning period. The design of Cell 9 will be completed in year 2030 in order for construction to be completed in 2031 and have additional airspace available by late 2031. Capital expenditures were based on the following costs (2010 dollars):

New cell construction.....	\$500,000/acre
Partial cell closure	\$100,000/acre
Design	10 percent of construction cost

The area of each partial closure was estimated and may vary. We also note that based on the limited capacity of Cell 5 (the first cell on the western portion of Section IV), Broome County may wish to consider building Cells 5 and 6 (under the original development plan) or Cells 5 and 11 (under an optional development plan) at the same time to preclude new cell construction in consecutive years.

The capital costs presented in Table 12-1 are intended for planning purposes. Some capital projects are relatively minor and may not be financed, while other capital projects are more significant and will likely be financed. As such, the debt service on capital costs for landfill disposal have not been projected. As presented in Section 12.2.1, debt service payments in 2008 were \$3.2 million. Annual debt service payments typically vary between \$3.0 and \$3.5 million.

Ongoing O&M costs for the entire landfill site are also presented in Table 12-1. For those landfill cells south of Dunham Hill Road (old landfill/Section I and Sections II/III), active waste placement will be completed and post-closure O&M will be implemented. The annual O&M cost for these cells is based on the financial assurance calculations presented in the O&M Manual for the 2010 final closure plan for Sections II/III. Variations in annual cost are related to projected reductions in leachate generation rates and environmental monitoring during the planning period. After Year 15 (2025), the 30- year post-closure period under 6 NYCRR Part 360 regulations for the old landfill/Section I footprint expires.

Normally, the post-closure costs for a given footprint would be eliminated after 30 years. However, based on the nature of the environmental monitoring network and the leachate collection and removal system, it is likely that a portion of the current O&M program will be continued after the initial post-closure period. Therefore, 60 percent of the costs associated with post-closure monitoring for that footprint is continued through the end of the planning period.

TABLE 12-1

CAPITAL AND O&M COSTS FOR LANDFILL DISPOSAL OVER THE PLANNING PERIOD

Planning Year	Calendar Year	Description	Landfill Footprint (Acres)	Capital Cost				O&M Cost		Total Annual Cost
				Design	New Cell	Partial Closure	Total	Old Landfill/ Sections I, II, and III	Section IV	
1	2011	Final Closure Section II / III	16.0			\$1,854,000				
		Construct Cell 2	7.6		\$3,914,000		\$5,768,000	\$1,171,110	\$3,708,000	\$10,647,110
2	2012	Design partial closure of Cell 1	5.0	\$53,045			\$53,045	\$1,206,243	\$3,819,240	\$5,078,528
3	2013	Partial closure of Cell 1	5.0			\$546,364				
		Design Cell 3	7.1	\$387,918			\$934,282	\$1,242,431	\$3,933,817	\$6,110,529
4	2014	Construct Cell 3	7.1		\$3,939,281		\$3,939,281	\$1,279,704	\$4,051,832	\$9,270,816
5	2015	Design partial closure of Cell 1, 2	8.0	\$92,742			\$92,742	\$1,318,095	\$4,173,387	\$5,584,223
6	2016	Partial closure of Cells 1, 2	8.0			\$955,242				
		Design Cell 4	8.4	\$501,502			\$1,456,744	\$1,140,320	\$4,298,588	\$6,895,652
7	2017	Design partial closure of Cells 1, 2, 3	8.0	\$98,390						
		Construct Cell 4	8.4		\$5,165,470		\$5,263,860	\$1,174,530	\$4,427,546	\$10,865,936
8	2018	Partial closure of Cells 1, 2, 3	8.0			\$1,013,416	\$1,013,416	\$1,209,765	\$4,560,372	\$6,783,554
9	2019	Design Cell 5	6.5	\$424,051			\$424,051	\$1,246,058	\$4,697,183	\$6,367,293
10	2020	Design partial closure of Cells 2, 3, 4	14.0	\$188,148						
		Construct Cell 5	6.5		\$4,367,728		\$4,965,771	\$1,283,440	\$4,838,099	\$11,087,310
		Design Cell 6	6.1	\$409,894						
11	2021	Partial closure of Cells 2, 3, 4	14.0			\$1,937,927				
		Construct Cell 6	6.1		\$4,221,913		\$6,159,841	\$1,259,653	\$4,983,242	\$12,402,735
12	2022	Design Cell 7	7.1	\$506,145			\$506,145	\$1,297,442	\$5,132,739	\$6,936,327
13	2023	Construct Cell 7	7.1		\$5,213,295		\$5,213,295	\$1,336,366	\$5,286,721	\$11,836,382
14	2024	Design partial closure of Cells 5, 6	5.0	\$75,629			\$75,629	\$1,376,457	\$5,445,323	\$6,897,409
15	2025	Partial closure of Cells 5, 6	5.0			\$778,984	\$778,984	\$1,417,750	\$5,608,683	\$7,805,417
16	2026	Design Cell 8	7.1	\$569,671			\$569,671	\$899,259	\$5,776,943	\$7,245,873
17	2027	Design partial closure of Cells 5, 6, 7	8.0	\$132,228						
		Construct Cell 8	7.1		\$5,867,609		\$5,999,837	\$954,024	\$5,950,251	\$12,904,112
18	2028	Partial closure of Cells 5, 6, 7	8.0			\$1,361,946	\$1,361,946	\$982,644	\$6,128,759	\$8,473,350
19	2029						\$-	\$982,644	\$6,312,622	\$7,295,266
20	2030	Design Cell 9	6.9	\$623,108						
		Design partial closure of Cells 6, 7, 8	6.0	\$108,367			\$ 731,475	\$1,042,487	\$6,502,000	\$8,275,963

Notes:

Based on an annual rate increase of 3%.
New Cell: Based on \$500,000/acre.
Partial Closure: Based on \$100,000/acre.

Design: Based on 10% of construction cost.
O&M: Based on Section II/III Final Closure Plan financial assurance calculations.
O&M Section IV: Based on County's long-term maintenance calculations.

12.2.4 Program Enhancement Cost Projections

To estimate future program costs associated with each recommended program enhancement, the individual program elements were evaluated separately using today's costs and then projecting the cost over the 20-year planning period (at an increase of 3 percent per year). For capital cost investments, estimates were projected to the year when the capital investment is anticipated. Table 12-2 summarizes potential operating costs for these programs. The first page of the table represents operating costs and the second page represents capital investments.

The following presents a summary of the parameters used for the cost projections.

A. Increase Commercial, Institutional, Industrial, and Multi-Family Recycling Efforts.

Annual Cost Considerations:

- Staff time.....One person
- Outreach efforts Mailables and information
- Recycling bin replacement.....25 percent of total
- Recyclables processing cost.....Δ increase of 1,000 TPY

Capital Cost (2011):

- New recycling bins 10,000

B. **Alternative Daily Cover.** Additional costs were not considered under this program enhancement since the County implemented this management option within their 2009 operating budget.

C. Increase Household Hazardous Waste and Electronic Waste Recycling Efforts.

Annual Cost Considerations:

- Staff time.....Two People
- Processing cost\$0.06/pd for E-waste
\$0.60/pd for HHW
- Education and outreach Flyers, presentations, meetings

Capital Cost (2011):.....New storage center

TABLE 12-2

**POTENTIAL OPERATING COSTS FOR BROOME COUNTY'S SOLID WASTE MANAGEMENT PLAN
UPSTREAM DIVERSION PROGRAM ELEMENTS**

Planning Year	Calendar Year	Selected Upstream Diversion Program Elements				Total Annual Operating Cost
		CII&M ⁽¹⁾	HHW/Electronics ⁽²⁾	Organics Diversion	C&D ⁽³⁾	
	Estimated Cost in 2010 \$	\$79,200	\$160,000	Varies	\$395,000	
1	2011	\$62,200	\$164,000	\$ -		\$ 227,000
2	2012	\$97,700	\$169,000	\$ 5,300		\$ 272,000
3	2013	\$115,000	\$174,000	\$ 5,500		\$ 295,000
4	2014	\$133,000	\$180,000	\$22,500		\$ 335,000
5	2015	\$152,000	\$185,000	\$23,200	\$458,000	\$ 818,000
6	2016	\$172,000	\$191,000	\$788,000	\$472,000	\$ 1,622,000
7	2017	\$193,000	\$196,000	\$812,000	\$486,000	\$ 1,687,000
8	2018	\$215,000	\$202,000	\$836,000	\$500,000	\$ 1,754,000
9	2019	\$239,000	\$208,000	\$861,000	\$515,000	\$ 1,824,000
10	2020	\$263,000	\$215,000	\$887,000	\$531,000	\$ 1,896,000
11	2021	\$289,000	\$221,000	\$914,000	\$547,000	\$ 1,971,000
12	2022	\$316,000	\$228,000	\$941,000	\$563,000	\$ 2,048,000
13	2023	\$345,000	\$234,000	\$969,000	\$580,000	\$ 2,129,000
14	2024	\$375,000	\$241,000	\$998,000	\$598,000	\$ 2,212,000
15	2025	\$406,000	\$249,000	\$1,028,000	\$615,000	\$ 2,299,000
16	2026	\$439,000	\$256,000	\$1,059,000	\$634,000	\$ 2,389,000
17	2027	\$474,000	\$264,000	\$1,091,000	\$653,000	\$ 2,482,000
18	2028	\$510,000	\$272,000	\$1,124,000	\$673,000	\$ 2,578,000
19	2029	\$548,000	\$280,000	\$1,157,000	\$693,000	\$ 2,678,000
20	2030	\$588,000	\$288,000	\$1,192,000	\$713,000	\$ 2,782,000

(1) CII&M = Commercial, institutional, and multi-family recycling.

(2) HHW/Electronics = Household hazardous waste and electronics recycling.

(3) C&D = Construction and demolition debris recycling.

TABLE 12-2 (continued)

Planning Year	Calendar Year	Selected Upstream Diversion Program Elements				Estimated Capital Outlay	Equivalent Annual Debt Retirement
		CII&M	HHW/Electronics	Organics Diversion	C&D		
Estimated Cost in 2010 \$		\$75,000	\$100,000	Varies	\$2,294,000		
1	2011	\$77,300	\$103,000	\$ -	\$ -	\$180,000	\$21,800
2	2012	\$ -	\$ -	\$ -	\$ -	\$ -	\$22,400
3	2013	\$ -	\$ -	\$31,800	\$ -	\$31,800	\$23,100
4	2014	\$ -	\$ -	\$ -	\$ -	\$ -	\$23,800
5	2015	\$ -	\$ -	\$281,000	\$2,659,000	\$2,941,000	\$390,000
6	2016	\$ -	\$ -	\$ -	\$ -	\$ -	\$402,000
7	2017	\$ -	\$ -	\$ -	\$ -	\$ -	\$414,000
8	2018	\$ -	\$ -	\$ -	\$ -	\$ -	\$426,000
9	2019	\$ -	\$ -	\$ -	\$ -	\$ -	\$439,000
10	2020	\$ -	\$ -	\$9,552,000	\$ -	\$9,552,000	\$1,640,000
11	2021	\$ -	\$ -	\$ -	\$ -	\$ -	\$1,660,000
12	2022	\$ -	\$ -	\$ -	\$ -	\$ -	\$1,710,000
13	2023	\$ -	\$ -	\$ -	\$ -	\$ -	\$1,762,000
14	2024	\$ -	\$ -	\$ -	\$ -	\$ -	\$1,814,000
15	2025	\$ -	\$ -	\$ -	\$ -	\$ -	\$1,377,000
16	2026	\$ -	\$ -	\$ -	\$ -	\$ -	\$1,419,000
17	2027	\$ -	\$ -	\$ -	\$ -	\$ -	\$1,461,000
18	2028	\$ -	\$ -	\$ -	\$ -	\$ -	\$1,505,000
19	2029	\$ -	\$ -	\$ -	\$ -	\$ -	\$1,550,000
20	2030	\$ -	\$ -	\$ -	\$ -	\$ -	\$1,597,000

- (1) CII&M = Commercial, institutional, and multi-family recycling.
(2) HHW/Electronics = Household hazardous waste and electronics recycling.
(3) C&D = Construction and demolition debris recycling.

Based on an annual interest rate of 3%.

All future costs based on $(F/P, i\%, n)$, or $(1+i\%)^n$

Equivalent annual debt requirements based on $(A/P, i\%, n)$, or $[i(1+i)^n]/[(1+i)^n - 1]$ with interest at 5% for 10 years of financing.

D. Increase Organics Diversion.

Annual Cost Considerations:

- Demonstration project.....2014
- Forced aeration pad O&M.....Beginning in 2016
- Compost facility O&M Beginning in 2025

Capital Cost Considerations:

- Demonstration project.....2013
- Forced aeration pad O&M.....2015
- Compost facility O&M 2020

E. Implement Construction and Demolition Debris Recycling.

Annual Cost Considerations: O&M Cost for processing equipment and personnel (2015)

Capital Cost Considerations: Equipment (2015)
t Grinder; front-end loader, excavator with grapple, skid steer loader, roll-off containers, tractor trailer (transfer)

As summarized on Table 12-2, the projected additional operating cost and annual debt retirement costs for capital investments will grow from approximately \$250,000 in 2011 to over \$4,000,000 in 2030. To support these program enhancements, the County may need to increase revenue generation by nearly 50 percent by the end of the 20-year planning period, depending upon mechanisms for financing capital expenditures.

12.2.5 Summary of Cost Implications

Broome County has made a significant investment in long-term landfill disposal of solid waste. The solid waste program is a well-managed combination of public and private parties and is self sustaining using a competitive tipping fee that secures a majority of the local waste stream. Moving forward during the planning period, the County proposes program enhancements to increase diversion from the landfill. The nature, timing, cost, and rate of cost increase of these enhancements have been projected for planning purposes and should be reviewed and updated. For the solid waste management program to remain self sustaining, the County may need to consider appropriate mechanisms (such as tipping fee increases, flow control, etc.) if needed to generate sufficient revenue for continued operational and debt service (capital) costs.

13.0 FUTURE ACTIONS TO FURTHER THE SWM HIERARCHY

13.1 SCOPE OF EXISTING RECYCLABLES RECOVERY PROGRAMS

The existing recyclables recovery programs are described in Chapters 3 and 4 of this document as well as R.W. Beck's Recyclable Materials Characterization Study (Appendix A). All residential and commercial recycling is coordinated and processed by private companies, but the County records and reports recycled material tonnages to the State. The County will store HHW and E-waste at the landfill for private businesses, but does not process any material. As shown in Table 3-1, the County achieved a diversion rate of 48 percent in 2007 by recycling tires, HHW and E-wastes, and residential and commercial recyclables; and by composting yard wastes and biosolids.

13.2 FACILITY SIZING

The implementation of the priority programs presented under this Local Solid Waste Management Plan Update requires minimum capital investment for new facilities. The upstream and downstream diversion programs will be implemented using existing infrastructure; expansion of program features; and continued investment in landfill disposal. However; the HHW and E-waste drop-off and storage center at the County landfill will be expanded to accommodate increases in material resulting from extended hours of operation and potential increased public participation rate. The current composting facility will initially be expanded as part of a demonstration project using the existing area and equipment. Development of a full scale composting facility is not anticipated during the first ten years of the plan and actual sizing of this facility is dependent upon the results of the demonstration project, available feedstock, and discussions with the FAA (with respect to proximity of the airport). C&D debris will continue to be disposed in the landfill until a final decision is reached regarding processing and recovery of recyclables based on demonstration projects or private participation. The CII&M program will require additional processing of recyclables under the County's existing contract or through multiple processing contracts. No new facilities are anticipated.

13.3 RECYCLING PROGRAM ENHANCEMENT

As described in Chapter 7, the County will pursue four upstream diversion activities (i.e., activities that promote reducing, recycling, and reusing products before reaching the County's landfill). The following describes the four upstream diversion activities.

A. **Commercial, Industrial, Institutional and Multi-family Recycling.** This program expansion will focus on recycling collection programs at commercial and industrial sites; institutional facilities (i.e., schools, universities, hospitals, prisons, etc.); and multi-family residential units of five or more families. It is estimated that this program could encompass 6,000 to 7,000 building units. The potential to increase recycling participation is significant depending on the amount of staff time and funds that are dedicated to these efforts.

B. **HHW and Electronics Recycling.** This initiative involves expansion of the County's existing HHW and E-waste Program. HHWs are household products that contain corrosive, toxic, flammable, or reactive ingredients, warranting their diversion from the landfill, transfer stations, and other waste disposal sites in order to protect ground and surface waters from accidental release. E-wastes and HHW currently comprise about 1 percent of the MSW stream by volume and have high potential for harmful toxins to enter the surrounding groundwater. Regulations are already in place banning HHW from landfills, but this waste stream is not yet fully captured.

C. **Construction and Demolition (C&D) Debris Recycling.** This program would encourage separation of C&D debris for recycling or reuse at the job site of a construction, demolition, or remodeling project. As more buildings are built to achieve LEED¹ accreditation, deconstruction verses demolition will increase since one of the LEED accreditation points involves utilization of recycled or reused construction materials. In addition, the County will consider reduced landfill tip fee rates for those businesses or construction contractors that can document and certify that C&D recycling was completed on site as part of the construction process. This incentive will provide an offset to the additional costs to residents or businesses for deconstruction and on-site recycling efforts.

D. **Organics Diversion.** This program will encourage private participation to increase diversion of organics (yard waste, food scraps, wood waste) from the landfill, including backyard composting, grasscycling, food donations, and small-scale vermicomposting (worm composting in containers). These activities include continuation of the sale of backyard composting containers as well as public outreach, educational materials, and guidance to commercial and institutional establishments regarding organics diversion and on-site composting practices.

¹ LEED (Leadership in Energy and Environmental Design): According to the U.S. Green Building Council website: LEED is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO₂ emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

13.4 PROCUREMENT PRACTICES FOR PRODUCTS WITH RECYCLED CONTENT

Although the Broome County Division of Solid Waste utilizes products with recycled content and encourages the use of recycled products for all county departments, there currently are no local procurement laws that specifically mandate the use of products with recycled content. The County supports extended producer responsibility, an environmental policy approach requiring producers to accept responsibility for recycling, reusing, or disposing of their own products. This policy approach encourages products to be made with materials that are easily recycled, potentially increasing the County's landfill diversion rate and reducing the amount of hazardous substances entering the landfill.

FINAL REPORT

Broome County, New York Recyclable Materials Characterization Study



Prepared by R. W. Beck, Inc. for Stearns & Wheler, LLC

DECEMBER 2008



Prepared in support of the Broome County, NY Local Solid Waste Management Plan Update

Stearns & Wheler Broome County Recyclable Materials Characterization Study

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Appendix A Material Definitions and Category List

This report has been prepared for the use of the client for the specific purposes identified in the report. The conclusions, observations and recommendations contained herein attributed to R. W. Beck, Inc. (R. W. Beck) constitute the opinions of R. W. Beck. To the extent that statements, information and opinions provided by the client or others have been used in the preparation of this report, R. W. Beck has relied upon the same to be accurate, and for which no assurances are intended and no representations or warranties are made. R. W. Beck makes no certification and gives no assurances except as explicitly set forth in this report.

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1.1 Introduction

Section 1 of this report outlines the study design used by R. W. Beck for the Broome County (County) Recyclable Materials Characterization Study (Study). The Study design included the following steps:

- Determine material categories;
- Conduct pre-sort site assessment;
- Formulate materials sorting protocol;
- Conduct sampling and sorting event;
- Compile and review collected data; and
- Complete statistical modeling.

1.2 Determine Material Categories

The material categories selected for the Study were based on discussions with County staff and R. W. Beck's waste and recycling characterization experience.

Twenty-two (22) categories were selected for this study and are listed below. The definitions of each of these categories are included in Appendix A for reference.

Table 1-1
Recyclable Materials Category List
Broome County, NY

PAPER
1. Newspaper
2. Household Office Paper & Mail
3. Magazines/Catalogs
4. Phone Books
5. Uncoated Cardboard & Brown Paper Bags
6. Boxboard
7. Beer, Pop & Water Boxes
8. Other (Milk/Juice Cartons, Frozen Pizza Boxes)
PLASTIC
9. #1 PET Containers & Bottles
10. #1 PET Deposit Bottles
11. #2 HDPE Containers & Bottles
12. #3-#7 Plastic Containers
METALS
13. Aluminum Beverage Containers
14. Aluminum Deposit Beverage Containers
15. Ferrous Food & Beverage Containers
16. Other Aluminum (alum. pans, tin foil)
GLASS
17. Glass Bottles & Jars
18. Glass Deposit Bottles & Jars
NON-TARGETED MATERIALS
19. Other Paper Trash
20. Plastic Bags & Other Film Plastic
21. Other Trash
FINES
22. Fines

The materials numbered 1 through 18 in Table 1-1 are currently accepted for recycling in the County's recycling program. Items numbered 19 through 21 represent the material that is not accepted or targeted in the County's program.

Recyclable materials are collected from residents and businesses in Broome County using two collection methods: single-stream in which all materials are commingled together, and dual-stream in which fiber and containers are separated into two streams.

The collection method is determined by the hauler and/or processor. There are five recyclable materials processors in the region:

1. WM Recycle America in Binghamton, NY. This facility accepts recyclable materials commingled (single-stream) and transfers the materials to their materials recovery facility (MRF) in Syracuse where the loads are sorted, processed and marketed. The County has a contract with WM Recycle America for recyclable materials processing, however haulers and municipalities are not mandated to use this MRF.
2. Broome Recycling, Inc. in Binghamton, NY. This facility accepts recyclable materials in two streams (fiber and containers) and processes/markets the material at its Binghamton location.
3. A&W Recycling in Chenango Bridge, NY. This facility accepts materials in two streams (fiber and containers) and processes/markets the material at its Chenango Bridge location.
4. Taylor Garbage & Recycling in Owego, NY (Tioga County). This facility accepts recyclable materials in two streams (fiber and containers) and processes/markets the material at its Owego location.
5. Empire Recycling Corporation in Johnson City. This facility is a branch of Empire Recycling's main facility in Utica. They accept scrap paper and shredded paper, exclusively from commercial accounts. The materials are baled and marketed to end users from the Johnson City location.

The residential recyclable materials collected in Broome County are delivered to WM Recycle America, Broome Recycling, Inc. and A&W Recycling. Commercial recyclables are taken to any of the five facilities.

From the tonnage data reported to the County, it was determined that approximately 65 percent of the total amount of recyclable materials collected in Broome County is delivered to WM Recycle America's MRF in Binghamton, and an estimated 35 percent is delivered to Broome Recycling and A&W Recycling facilities combined. (Taylor and Empire did not report any recycling tonnages to the County in 2007.)

For this Study, the recyclable materials sorting event took place at WM Recycle America's MRF in Binghamton. Because nearly two-thirds of the County's recyclables are received at WM's facility and based on the geographic areas represented by the haulers listed in Table 1-2, it is R. W. Beck's opinion that the Study results are representative of the composition of the County's recyclable materials stream.

All of the materials that were sorted for this Study were collected via the single-stream collection method and were delivered by the municipalities and hauling companies listed below in Table 1-2.

Table 1-2
List of Haulers and Municipalities Whose Loads Were Randomly
Selected for the Study
Broome County, NY

Hauling Company/Municipality	Method of Collection
Town of Union	Single-stream
Village of Endicott	Single-stream
Binghamton University	Single-stream
Village of Johnson City	Single-stream
Waste Management	Single-stream
Broome County Landfill	Single-stream via Drop-Off
City of Binghamton	Single-stream
Joe's Disposal	Single-stream

Table 1-2 is not a full list of WM Recycle America's customers; it is a list of haulers that collect recyclable materials in Broome County in a single-stream which, according to WM, make up approximately 65 to 70 percent of the tonnage received at the MRF. The MRF also receives loads containing materials collected from outside of Broome County, as well as loads of dedicated material such as old corrugated cardboard (OCC) and shredded paper from private companies, that were not considered for this Study.

The loads for sampling were randomly chosen, as explained in detail in Section 1.5 of this report.

1.3 Complete Pre-Sort Site Assessment

Prior to initiating the sorting event, a site assessment was conducted at the WM Recycle America MRF¹ in Binghamton. The purpose of the site assessment was two-fold: 1) to introduce R. W. Beck staff to WM staff and garner cooperation for the sorting events; and 2) gather MRF transaction data and site information needed to develop a sampling and sorting plan.

The transaction data was reviewed to identify the average daily and weekly quantities of materials received at the MRF, the customers (private haulers and municipalities) using the facility, and an overview of the scope of the activity at the Binghamton site.

¹ The facility is referred to as a MRF, however it is more of a transfer facility. Recyclable materials delivered to WM Recycle America's facility in Binghamton are not sorted at the facility, rather they are loaded into transfer trailers and transported to WM's MRF in Syracuse, NY where the materials are then sorted, processed and marketed.

1.4 Formulate Materials Sorting Protocol

Upon completing the pre-sort site assessment, development of a materials sorting protocol was essential to obtain consistent and representative recyclable material characterization data. The critical aspects of the sampling and sorting plan relating to the materials sort protocol are discussed below. These include the following:

- Seasonality;
- Generator types; and
- Frequency of sampling.

1.4.1 Seasonality

Based on data provided by WM Recycle America, seasonal differences in the recyclable material accepted at the MRF are not statistically substantial. As a result, all of the field data was collected the last week in September of 2008 as part of one sorting and sampling event.

1.4.2 Generator Types

The recyclable materials delivered to the MRF are generated by the residential sector (including both single-family and multi-family residences) and by the industrial/commercial/institutional (ICI) sector. Through our data assessment, we determined that only limited data was available on the proportion of residential versus ICI materials received at the MRF because many haulers collect both residential and ICI accounts in the same truck. Loads containing both residential and ICI materials were documented as “mixed” generator types during the sorting event.

To gather data, R. W. Beck relied on the sampling randomization inherent in the Nth truck approach. The Nth truck approach is based on the number of vehicles expected each day and the number of samples required for the Study to yield statistically sound results. Due to limited data regarding the breakdown of residential versus ICI material in incoming loads, R. W. Beck selected for sampling approximately every other truck entering the MRF each day. Based on an interview with the driver, the contents of the truck were assigned to the residential, ICI or mixed sector. The random selection of the vehicle loads dictated the ultimate mix of generator type samples actually sorted. Provided below is a discussion of the issues associated with each of the generator types that was considered when establishing the protocol for identifying the generator types.

Residential Recyclable Materials. Public and private haulers typically serve residential accounts using compactor trucks that collect recyclable materials from multiple households. The recyclable materials from these households are thoroughly mixed during the collection and tipping process. R. W. Beck’s opinion is that, as long as samples are captured from vehicles serving a variety of geographical and demographic areas, it is feasible to obtain representative samples of residential materials. This conclusion is based on our overall opinion that:

- Residential recyclables composition does not differ materially based on the time of day it is collected; and
- Residential recyclables composition does not differ materially based on the day of the week it is collected.

ICI Recyclable Materials. The ICI sector typically has the greatest variation in recyclable materials composition from sample to sample. Recyclable materials collected from restaurants, retail establishments, office buildings, institutions, manufacturing establishments, and other businesses all vary considerably. For example, a restaurant/bar may have a high percentage of glass in its recyclables compared to an office building, whose recyclables may contain a high percentage of paper.

Of the 34 randomly selected vehicles chosen for the sampling, only one contained 100 percent ICI materials. A sample from this load was sorted, however the results are not included in the Study because that one load was considered an outlier when included with the residential and mixed generator type loads.

In addition, because the primary focus of the Study was to quantify the County's recyclables by material type, the sampling protocol excluded loads that could be clearly identified as homogeneous, such as shredded paper and OCC. Vehicles hauling exclusively shredded paper or OCC were excluded from the vehicle count and sampling scheme.

Mixed Recyclable Materials. The mixed recyclables sector was composed of loads delivered to the MRF originating from both the residential and ICI sectors. R. W. Beck utilized the information gathered from the sampled vehicles' drivers to classify loads as mixed recyclables.

It should be noted that a majority of the mixed loads contained a larger percentage of residential material than ICI material.

1.4.3 Frequency of Sampling

The sampling approach taken resulted in an adequate number of representative samples being sorted that provided statistically meaningful results. The approach selected included a four-day sorting event during a "typical" week at the MRF. In total, thirty-four (34) samples were selected and sorted at the MRF.

1.5 Conduct Sampling and Sorting Event

The sorting event was conducted at the MRF the last week in September of 2008. A total of 34 samples representing 5,426 pounds of recyclable material were sorted.

The selection of vehicles to secure recyclable materials for sampling was based upon the MRF transaction data provided by WM and the Nth truck approach with driver interviews to determine generator types - residential, ICI, and mixed.

From the randomly selected loads, a minimum of 100 pound samples were taken for sorting. The average sample weighed approximately 160 pounds. One hundred to one

hundred fifty pound samples are considered the appropriate size to provide representative results per accepted industry standards. The various samples were randomly selected from within each selected load.

Table 1-3 below depicts the sampling mix resulting from using the Nth truck approach to randomly select loads for sampling.

Table 1-3
Sample Types and Quantities Sorted
Broome County, NY

Total	Number of Samples			Quantities Sorted
	Residential	ICI	Mixed	
34	16	1	17	5,426 lbs

Once each sample was selected, the materials were pre-sorted for any hazardous or infectious wastes. (A Health and Safety Plan was developed by R. W. Beck prior to initiating the field work and was reviewed with the sorting crew before the actual sorting began.) The materials were then sorted by the R. W. Beck sorting crew and the items were placed into individual containers representing the various 22 material categories (Figure 1-1).



Figure 1-1. Sorting Recyclable Materials Into Various Categories.

Then, each container was weighed to determine the quantity of materials by material type for each sample (Figure 1-2).



Figure 1-2. Weighing Each Material Category.

These weights were recorded on individual data sheets to document the sorting process. The data were then forwarded to R. W. Beck's analytical staff for review and analysis.

1.6 Review Collected Data

Upon completing the sampling and sorting event, the data sheets for each sample were reviewed to ensure the following:

- Individual entries were legible;
- Generator types were clearly identified and consistent with the types of materials recorded on the data form;
- A description of the likely origin of the recyclable materials was included;
- Specific comments on the unusual aspects of the sample were legible and understandable;
- A minimum of 100 pounds was sorted for each sample; and
- Homogeneous loads were excluded from the analysis.

The tare weight of the individual material's container and the weight of the individual materials were recorded on the actual data sheets for all materials weighed. These two sets of quantitative data for each material and each sample are critical to conducting the statistical analysis.

1.7 Complete Statistical Modeling

All of the data were entered into R. W. Beck's specially-designed solid waste/recyclable materials composition statistical model (Model). This Model has been developed in Microsoft Excel for easy accessibility and use. The Model statistically manipulates the data to calculate the mean, 90% confidence intervals, and standard deviation for individual material categories and generator type. In addition, the Model is structured to identify where specific samples could be considered statistical outliers.

The mean represents the mathematical average or average percent of material composing the recyclable materials stream by weight. The confidence interval is an expression of accuracy. It provides the upper and lower limits of the "actual" mean for all the recyclable materials received at the MRF based upon the sorting and sampling observations of the sampled materials. For example, the 90% confidence interval represents that there is a 90% level of confidence that the true population mean falls within the upper and lower bounds of the confidence interval. The 90% confidence interval is the generally accepted industry standard for solid waste and recycling composition studies. In general, the more samples that are sorted, the narrower the confidence interval becomes for a given level of confidence. The narrower the intervals, the less variability in the data.

The standard deviation represents how widely spread the values are in a data set. For example, if the majority of the data points are close to the mean, then the standard deviation is small; if the majority of data points are far from the mean, then the standard deviation is large.

Overall, the outputs of the Model provide multiple measures for evaluating the results. It is critical when comparing the recyclable materials composition results that the confidence intervals are considered along with the mean percentages. The results are provided by generator type for each material type on a weight basis.

2.1 Overview

This section presents the results of the statistical modeling of the quantitative data gathered during the recyclable materials sampling and sorting event held the last week in September of 2008 at WM Recycle America's MRF in Binghamton. The specific steps of the analysis are summarized below:

- **Step 1 – Generator Type:** R. W. Beck calculated the composition of the Residential and Mixed recyclable streams based on the samples obtained. No ICI results are provided because of the lack of samples containing only ICI recyclable materials.
- **Step 2 – Aggregate Results:** The aggregate results are the results of all the loads sampled during the recyclable materials sorting event, with the exception of the one pure ICI load.

The following assumptions and limitations should be considered upon reviewing the Study results:

- The sorting event was performed the last week in September of 2008. Although the results are considered representative, it is possible that some bias may exist because the study involved only one field event, rather than several sorting events throughout the year.
- There were no holidays or special events taking place in the County during the week of the sorting event influencing the results.
- The statistical results represent projections for the individual generators and the entire County. The generator results have reasonable confidence intervals. As the number of samples decreases, the confidence intervals tend to widen.

Based on data reported to the County, the quantity of materials collected in Broome County and recycled in calendar year 2007 was approximately 20,976 tons¹. Of the total amount recycled, approximately 65 percent was delivered to WM Recycle America's MRF and 35 percent was delivered to A&W Recycling and Broome Recycling facilities combined.

¹ Recycling tons were reported by WM Recycle America, Broome Recycling, Inc. and A&W Recycling. Taylor Garbage & Recycling and Empire Recycling did not report 2007 tons. This does not include tonnage from items such as scrap metal, appliances, electronics, tires, yard waste, etc. It does include the typical residential and commercial recyclable materials such as paper, plastic, metal containers and glass.

R. W. Beck believes that the data depicted here provides a reasonable snapshot of the composition of recyclable materials collected in Broome County.

2.2 Recyclable Materials Composition

Tables 2-1 and 2-2 provide the County's recyclable materials composition by generator types – residential and mixed. Table 2-3 provides the aggregated data for the residential and mixed samples. These results were calculated by using the samples for the applicable generator to identify the mean and confidence intervals for the various material categories.

The measures provided include the mean, standard deviation, and lower and upper bounds of the composition for each of the material categories. The lower and upper bounds represent a 90% confidence interval for the various material means.

In all the tables included in this section, the totals may not sum due to rounding.

Table 2-1
Residential Recyclable Materials Composition (by weight)
Broome County, NY

Material	Average Percent Comp.	Standard Deviation	90% Confidence Interval	
			Lower Bound	Upper Bound
Total Paper	76.87%	10.30%	72.24%	81.20%
Newspaper	34.50%	14.09%	27.86%	41.45%
Household Office Paper & Mail	9.28%	12.29%	5.67%	13.66%
Magazines/Catalogs	9.13%	6.31%	6.23%	12.52%
Phone Books	0.82%	1.28%	0.33%	1.54%
Uncoated OCC & Brown Paper Bags	15.02%	6.22%	12.42%	17.82%
Boxboard	4.76%	1.99%	3.79%	5.84%
Beer, Pop & Water Boxes	2.09%	3.44%	1.11%	3.38%
Other (Milk/Juice Cartons, Froz. Pizza Boxes)	1.27%	0.94%	0.94%	1.66%
Total Plastics	7.55%	3.40%	6.15%	9.09%
#1 PET Bottles	2.78%	1.12%	2.31%	3.29%
#1 PET Deposit Bottles	0.12%	0.14%	0.07%	0.20%
#2 HDPE Bottles	3.90%	2.19%	3.03%	4.86%
#3-#7 Plastic Containers	0.76%	0.50%	0.52%	1.03%
Total Metals	3.48%	2.05%	2.74%	4.30%
Aluminum Beverage Containers	0.07%	0.08%	0.03%	0.12%
Aluminum Deposit Beverage Containers	0.06%	0.08%	0.02%	0.10%
Ferrous Food and Beverage Containers	3.26%	2.00%	2.54%	4.07%
Other Aluminum (Alum. pans, tin foil)	0.09%	0.11%	0.04%	0.16%
Total Glass	5.50%	3.77%	3.72%	7.59%
Glass Bottles & Jars	5.35%	3.74%	3.60%	7.42%
Glass Deposit Bottles & Jars	0.15%	0.38%	0.04%	0.33%
Total Non-Targeted Materials	4.85%	4.98%	3.16%	6.87%
Other Paper Trash	0.64%	0.38%	0.46%	0.84%
Plastic Bags & Other Film Plastic	1.05%	2.04%	0.51%	1.76%
Other Trash	3.16%	3.78%	1.97%	4.63%
Total Fines	1.76%	1.89%	1.07%	2.62%
Fines	1.76%	1.89%	1.07%	2.62%
GRAND TOTAL	100.00%			

Residential recyclables are relatively homogenous. Although there are some differences in generation depending on local demographics (i.e., income, education level, etc.), most households recycle similar types of materials. The composition of Broome County's residential recyclable materials, as shown above, is similar to other communities, as discussed further in Section 2.3.

Section 2

Table 2-2
Mixed (Residential & Commercial) Recyclable Materials Composition (by weight)
Broome County, NY

Material	Average Percent Comp.	Standard Deviation	90% Confidence Interval	
			Lower Bound	Upper Bound
Total Paper	66.87%	13.40%	61.08%	72.42%
Newspaper	21.30%	11.12%	16.07%	27.05%
Household Office Paper & Mail	14.86%	9.59%	11.15%	19.00%
Magazines/Catalogs	10.62%	8.34%	7.18%	14.65%
Phone Books	0.92%	1.66%	0.30%	1.87%
Uncoated OCC & Brown Paper Bags	12.51%	9.87%	8.45%	17.25%
Boxboard	3.87%	1.63%	3.18%	4.63%
Beer, Pop & Water Boxes	1.55%	1.56%	0.90%	2.37%
Other (Milk/Juice Cartons, Froz. Pizza Boxes)	1.23%	0.84%	0.85%	1.68%
Total Plastics	10.64%	11.22%	7.05%	14.86%
#1 PET Bottles	6.14%	10.42%	3.34%	9.72%
#1 PET Deposit Bottles	0.18%	0.23%	0.08%	0.31%
#2 HDPE Bottles	3.35%	1.67%	2.70%	4.06%
#3-#7 Plastic Containers	0.98%	0.81%	0.68%	1.32%
Total Metals	4.71%	3.95%	3.38%	6.26%
Aluminum Beverage Containers	0.19%	0.22%	0.09%	0.32%
Aluminum Deposit Beverage Containers	0.16%	0.19%	0.08%	0.25%
Ferrous Food and Beverage Containers	4.23%	3.95%	2.92%	5.77%
Other Aluminum (Alum. pans, tin foil)	0.14%	0.14%	0.07%	0.23%
Total Glass	9.71%	7.10%	6.37%	13.67%
Glass Bottles & Jars	9.16%	6.87%	5.99%	12.91%
Glass Deposit Bottles & Jars	0.56%	0.83%	0.23%	1.02%
Total Non-Targeted Materials	6.35%	4.19%	4.63%	8.31%
Other Paper Trash	0.85%	0.76%	0.59%	1.16%
Plastic Bags & Other Film Plastic	0.70%	0.77%	0.46%	1.00%
Other Trash	4.79%	4.04%	3.14%	6.77%
Total Fines	1.71%	1.82%	1.11%	2.45%
Fines	1.71%	1.82%	1.11%	2.45%
GRAND TOTAL	100.00%			

Table 2-3
Aggregated Recyclable Materials Composition (by weight)
Broome County, NY

Material	Average Percent Comp.	Standard Deviation	90% Confidence Interval	
			Lower Bound	Upper Bound
Total Paper	71.72%	12.86%	67.85%	75.44%
Newspaper	27.70%	14.13%	23.14%	32.50%
Household Office Paper & Mail	12.15%	11.17%	9.41%	15.20%
Magazines/Catalogs	9.90%	7.35%	7.68%	12.36%
Phone Books	0.88%	1.46%	0.47%	1.41%
Uncoated OCC & Brown Paper Bags	13.73%	8.27%	11.22%	16.45%
Boxboard	4.30%	1.84%	3.72%	4.92%
Beer, Pop & Water Boxes	1.81%	2.61%	1.24%	2.49%
Other (Milk/Juice Cartons, Froz. Pizza Boxes)	1.25%	0.87%	1.00%	1.53%
Total Plastics	9.14%	8.41%	7.27%	11.21%
#1 PET Bottles	4.51%	7.60%	3.20%	6.03%
#1 PET Deposit Bottles	0.15%	0.19%	0.10%	0.22%
#2 HDPE Bottles	3.61%	1.93%	3.09%	4.17%
#3-#7 Plastic Containers	0.87%	0.67%	0.68%	1.08%
Total Metals	4.11%	3.19%	3.37%	4.93%
Aluminum Beverage Containers	0.13%	0.18%	0.08%	0.19%
Aluminum Deposit Beverage Containers	0.11%	0.16%	0.07%	0.16%
Ferrous Food and Beverage Containers	3.76%	3.15%	3.03%	4.56%
Other Aluminum (Alum. pans, tin foil)	0.12%	0.12%	0.07%	0.17%
Total Glass	7.67%	6.04%	5.78%	9.80%
Glass Bottles & Jars	7.31%	5.82%	5.51%	9.34%
Glass Deposit Bottles & Jars	0.36%	0.67%	0.18%	0.59%
Total Non-Targeted Materials	5.62%	4.58%	4.41%	6.97%
Other Paper Trash	0.75%	0.61%	0.59%	0.92%
Plastic Bags & Other Film Plastic	0.87%	1.51%	0.60%	1.19%
Other Trash	4.00%	3.94%	2.98%	5.17%
Total Fines	1.74%	1.82%	1.28%	2.26%
Fines	1.74%	1.82%	1.28%	2.26%
GRAND TOTAL	100.00%			

It is critical when evaluating the results to consider not only the mean composition but also the applicable confidence intervals. For example, Table 2-3 depicts the total paper material category with a mean of 71.72% and corresponding confidence intervals of 67.85% and 75.44%. The confidence intervals characterize the level of variability associated with the mean estimate of 71.72%. In other words, R. W. Beck is 90% confident that total paper comprises between 68% and 75% of the County's recyclable materials stream. Generally, the more samples taken, the narrower the confidence interval because the accuracy of the estimate is increasing. However,

some material types offer inherent variability and their confidence intervals may be wide regardless of the extent of the data used in the calculations.

Overall, the width of the confidence intervals for the many material categories in the Study is reasonable and consistent with other similar types of recyclable materials composition studies.

2.3 Composition Results Applied to 2007 Estimated Tons of Recyclable Materials Collected in Broome County

The New York State Solid Waste Regulations (Section 360.15.9 related to Comprehensive Solid Waste Management Planning) require that recyclable materials be quantified by material type. By applying the 2008 aggregated recyclable materials composition percentages to the County's 2007 estimated tons of recyclable material collected, the quantity by material type can be estimated, as shown below in Table 2-4. For purposes of this estimate, it is assumed the 2008 composition is similar to the 2007 composition.

Table 2-4
2008 Aggregated Recyclable Materials Composition Applied to
2007 Estimated Total Tons Collected
Broome County, NY

Material	Average Percent Comp.	2007 Tons
Total Paper	71.72%	15,044
Newspaper	27.70%	5,810
Household Office Paper & Mail	12.15%	2,549
Magazines/Catalogs	9.90%	2,076
Phone Books	0.88%	184
Uncoated OCC & Brown Paper Bags	13.73%	2,880
Boxboard	4.30%	902
Beer, Pop & Water Boxes	1.81%	380
Other (Milk/Juice Cartons, Froz. Pizza Boxes)	1.25%	262
Total Plastics	9.14%	1,918
#1 PET Bottles	4.51%	946
#1 PET Deposit Bottles	0.15%	32
#2 HDPE Bottles	3.61%	758
#3-#7 Plastic Containers	0.87%	182
Total Metals	4.11%	863
Aluminum Beverage Containers	0.13%	28
Aluminum Deposit Beverage Containers	0.11%	23
Ferrous Food and Beverage Containers	3.76%	789
Other Aluminum (Alum. pans, tin foil)	0.12%	24
Total Glass	7.67%	1,608
Glass Bottles & Jars	7.31%	1,533
Glass Deposit Bottles & Jars	0.36%	75
Total Non-Targeted Materials	5.62%	1,179
Other Paper Trash	0.75%	157
Plastic Bags & Other Film Plastic	0.87%	183
Other Trash	4.00%	840
Total Fines	1.74%	364
Fines	1.74%	364
GRAND TOTAL	100.00%	20,976

2.4 Recyclable Materials Composition Comparison

Because this is the County's first recyclable materials characterization study, it will serve as a baseline from which future recyclable materials sorting events can be benchmarked. As part of this Study, R. W. Beck has provided a comparison of Broome County's *residential* recyclable materials composition results to two other composition studies - Onondaga County Resource Recovery Agency's (OCRRA)

“2005 Onondaga County Waste Quantification and Characterization Study”, and the City of Roseville, Minnesota’s 2004 “Recycling Pilot Program Summary.” This comparison will provide the County with an overview of how its residential recyclable materials composition compares to that of other counties/municipalities.

It should be noted that every solid waste and recyclable materials characterization study is specifically designed for a municipality/organization/jurisdiction and their particular goals and objectives, so comparing them can be challenging. Some things to keep in mind when comparing the data:

- The Broome County Study had 22 material categories, compared to 50 categories for OCRRA and only 14 categories for the City of Roseville. (OCRRA’s study also included an MSW component, so the same 50 material categories were used for categorizing both the MSW and recyclable materials.) The fewer the number of sort categories, the more likely materials will end up in the “other waste” category.
- The number of loads sampled varied between studies. For the Broome County study, 34 loads were sampled, compared to 42 in the OCRRA study, and 8 in the Roseville study. Generally, the more samples taken, the higher the accuracy of the estimates.
- The material categories that made up the “Total Plastics” for each study had the following differences:
 - In the Broome County Study, Total Plastics included four categories: #1 PET (non-deposit), #1 PET Deposit Bottles, #2 HDPE Containers, and #3-7 Containers. In the OCRRA study, Total Plastics included twelve categories and in the City of Roseville study, Total Plastics included only one category - #1 and #2 plastic bottles. As a result, in the Roseville study, more plastics were categorized as “Non-Targeted Materials” compared to Broome and OCRRA.
 - In the Broome County and City of Roseville studies, “Plastic Bags & Other Film Plastic” was included with the Non-Targeted Materials, whereas in OCRRA’s study, those materials are included in the overall Plastics results.
- The OCRRA study included flat glass and other glass, including ceramics, in the Glass total. In the County and the Roseville studies, any glass other than bottles and containers were considered Non-Targeted Materials.
- At the time of the Roseville study, beer, pop and water boxes (“wet-strength” carriers) were not recyclable in that market, so those items were included with Non-Targeted Materials. The “wet-strength” boxes *are* included in the County’s recycling program, so those items were sorted during this Study and were included in the Total Paper results.
- Regarding the Roseville results, Minnesota is not a “Bottle Bill” state so there is no cash redemption opportunity for certain plastic, aluminum or glass beverage containers.

- The recyclable materials that were sorted for the Broome County and City of Roseville studies were collected via single-stream collection methods. The materials that were sorted for the OCRRA study were collected via both single-stream and dual-stream methods. In R. W. Beck's experience, there are typically more Non-Targeted Materials found in loads collected using the single-stream method compared to loads collected using the dual-stream collection method.

A comparison of the three studies' average percent composition for the major recyclable material groups is provided below in Table 2-5.

Table 2-5
Recyclable Materials Composition – Comparison to Other Studies
Broome County, NY

Material Group	Mean (by weight)		
	Broome County 2008 Residential	OCRRA 2005 ¹	City of Roseville, MN 2004 ²
Total Paper	76.9%	73.8%	77.9
<i>Old Newspaper (ONP)</i>	34.5	41.9	40.9
<i>Old Corrugated Cardboard (OCC)</i>	15.0	11.1	16.4
Total Plastics	7.6	10.1	5.4
Total Metals	3.5	5.0	2.6
Total Glass	5.5	9.7	5.5
Total Non-Targeted Materials	4.9	0.6	7.9
Total Fines	1.8	0.8	0.6
GRAND TOTAL ³	100%	100%	100%

¹ OCRRA's 2005 recyclables characterization study was based on residential materials only, collected via both single-stream and dual-stream collection methods.

² The City of Roseville conducted a pilot study in 2004 in which two residential routes were converted from dual-stream curbside collection to single-stream collection. The results are based on two months' of pilot study data.

³ Totals may not sum due to rounding.

It should be noted that Table 2-5 provides a comparison of *means* and not *confidence intervals*. (The OCRRA study did not list confidence intervals for the major material groups, but did list them for individual material types.) Confidence intervals were compared for certain material types, as shown below. If the ranges of the lower and upper confidence intervals among the studies overlapped, the results were considered statistically similar, as shown below in the Newspaper, Total Metals and Total Glass categories.

Newspaper		Confidence Interval	
Study	Mean	Lower	Upper
Broome County	34.5%	27.9%	41.5%
OCRRA	41.9	26.9	56.8
City of Roseville	40.9	36.9	45.0

Section 2

Total Metals		Confidence Interval	
Study	Mean	Lower	Upper
Broome County	3.5%	2.7%	4.3%
City of Roseville	2.6	2.2	3.1

Total Glass		Confidence Interval	
Study	Mean	Lower	Upper
Broome County	5.5%	3.7%	7.6%
City of Roseville	5.5	4.9	6.3

If the ranges of the lower and upper confidence intervals among the studies did not overlap, the results were considered statistically different. Broome County's confidence intervals for Non-Targeted Materials are slightly lower than the City of Roseville's, as shown below. (The County's upper confidence interval is equal to the City of Roseville's lower confidence interval.)

Non-Targeted Materials/Other Waste		Confidence Interval	
Study	Mean	Lower	Upper
Broome County	4.9%	3.2%	6.9%
OCRRA	0.6	n/a	n/a
City of Roseville	7.9	6.9	9.0

As mentioned previously, Roseville may have a higher mean for Non-Targeted Materials because more plastics were categorized as Non-Targeted Materials compared to the other two studies, and "wet-strength" boxes were also categorized as Non-Targeted Materials. OCRRA's study did not have an "other waste" category, however the mean percentages were summed for the following categories: food waste, textiles/leather, rubber, diapers, electronics, wood, rubble, yard waste, hazardous/paint, and miscellaneous. Confidence intervals were not available for these materials in the OCRRA study.

R. W. Beck provided the comparison data in Table 2-5 for the County to use as a general benchmark. Based on R. W. Beck's experience in working with municipal recyclable materials collection programs, the composition of Broome County's residential recyclable materials appears to be consistent with national averages of 70-75% paper and 25-30% containers.

Appendix A

Material Definitions and Category List

Appendix A

MATERIAL DEFINITIONS AND CATEGORY LIST

Paper Products	
Newspaper (ONP)	Printed “ground wood” newsprint, including glossy and semi glossy advertisements and inserts typically found in newspapers.
Household Office Paper and Mail (HOPM) - recyclable	Also referred to as “mixed paper” or “junk mail,” paper that would be included in residential “mixed mail” or commercial “office” recycling programs, not including the grades identified above. Examples include “junk” mail, printer paper, envelopes of all types, file folders and notebooks, card stock, key punch cards and computer printouts, financial statements, annual reports, other report-like documents, books (other than phone books), brightly colored paper, calendars, tablets with colored glue bindings, shredded paper, fax paper, onion skin paper, and Post-It Notes.
Magazines/Catalogs (OMG)	Magazines, catalogs including any “seasonal circular” catalog clearly recognized as such from direct mail (e.g., LL Bean, Nordstrom’s, etc.).
Phone Books	Clean telephone directories printed for or by telephone directory publishers.
Uncoated Old Corrugated Cardboard (OCC) and Brown Paper Grocery Bags	Uncoated cardboard with a wavy core and not contaminated with other materials such as wax, plastic coating, Styrofoam, or food, and all paper bags. Examples include large packing boxes, clean pizza delivery boxes, and paper bags (including brown Kraft bags).
Old Boxboard (OBB)	Chipboard boxes not coated with wax, plastic or metal. Examples include cereal boxes, other clean chipboard food containers, shirt boxes, and shoeboxes, egg cartons, and tissue roll cores.
Beer, Pop & Water Boxes	Also referred to as “carrier stock.” Used as “wet-strength”, coated boxboard. Includes 12-pack and 24-pack cartons used for cans of beer, pop, water, etc.
Other Paper Items	Includes those items currently collected by Broome County, such as milk and juice cartons, frozen pizza boxes and frozen food packaging.

Plastic	
#1 Polyethylene Terephthalate (PET) Containers	Plastic containers and bottles coded #1 without a New York deposit label.
#1 PET Deposit Bottles	Plastic bottles coded #1 with a New York deposit label.
#2 High Density Polyethylene (HDPE) Containers	Plastic containers and bottles such as milk jugs, shampoo bottles, and laundry detergent bottles coded #2.
#3-7 Plastic Containers	Plastic containers coded #3, #4, #5, #6, #7.

Appendix A

Metals	
Aluminum Beverage Containers	All beverage containers made from aluminum without a New York deposit label.
Aluminum Deposit Beverage Containers	All beverage containers made from aluminum with a New York deposit label.
Ferrous Food and Beverage Containers	Food and beverage containers composed primarily of iron/steel.
Other Aluminum	Other aluminum items such as aluminum pans and clean foil.

Glass	
Glass Bottles and Jars	All glass food, beverage, wine, liquor and beer containers without a New York deposit label.
Glass Deposit Containers	All glass food, beverage, wine, liquor and beer containers with a New York deposit label.

Non-Targeted Materials (i.e., “trash” or “rejects” as collected)	
Other Paper Trash	All other non-recyclable paper; contaminated paper (i.e., paper used to dispose of chewing gum, soaked with food spills, sprayed with paint, covered in tape, OCC with Styrofoam attached); paper or boxboard coated with wax; tissue papers, napkins, cups, coffee filters, tea bags, wax paper, and cellophane, carbon paper, wallpaper, bathroom waste paper, photos, slides, and transparencies.
Plastic Bags and Other Film Plastic	Includes trash bags, grocery bags, storage bags, plastic wrap, film, etc.
Other Trash	All other non-recyclable items including other scrap metal (ferrous and non-ferrous), rope, string, twine, cotton balls, tape, cups, silverware, trays, and foam packaging. Includes “Non-Recyclable Glass/Ceramics” such as windowpanes, mirrors, bulbs of any type, dishes, glasses, pottery, and ceramics. Also includes “Non-Recyclable Plastics” such as plastic toys, clothes hangers, extruded pipes, etc., including anything not coded with a #1 - #7. Also includes “Non-Recyclable Cans” such as aerosol cans, paint cans, motor oil containers, and gasoline containers. Also includes “Medical Waste” such as sharps (e.g., needles/syringes, razors), medicine containers, etc.
Fines	Residuals on the sort table after the sample has been sorted. Includes dirt, broken glass, etc.

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Appendix A Additional EPP Case Studies

Appendix B Model Green Purchasing Ordinance - StopWaste.Org

This report has been prepared for the use of the client for the specific purposes identified in the report. The conclusions, observations and recommendations contained herein attributed to R. W. Beck, Inc. (R. W. Beck) constitute the opinions of R. W. Beck. To the extent that statements, information and opinions provided by the client or others have been used in the preparation of this report, R. W. Beck has relied upon the same to be accurate, and for which no assurances are intended and no representations or warranties are made. R. W. Beck makes no certification and gives no assurances except as explicitly set forth in this report.

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Issue Paper #1

Environmentally Preferable Purchasing and Recycled-Content Procurement Policies

1.1 Definition and Purpose of EPP

Environmentally preferable purchasing (EPP) is a practice that encourages communities to purchase materials and services that, in some way, are preferable to the environment and/or to human health, relative to “traditional” materials and services that serve the same purpose. EPP policies are implemented at the state, local, and federal level, as well as by individual businesses. Policies often focus on encouraging the purchase of recycled-content materials, but can also encourage the purchase of products that:

- Result in lower toxicity;
- Reduce greenhouse gas emissions;
- Are made with renewable energy;
- Contain the highest possible percentage of post-consumer recycled-content;
- Reduce air and water pollution;
- Reduce waste (e.g., by being reusable, lasting longer, or serving several functions);
- Are manufactured by suppliers who have adopted EPP and can document their supply chain and impacts of their efforts; and
- Are recyclable or compostable.

EPP policies can be implemented in part or in whole through state or local ordinances, executive orders, resolutions or policies (such as company or institutional policies). Ordinances have more “teeth” than resolutions. Policies are also often seen as less mandatory than ordinances. In some cases environmentally preferable purchasing is just one activity that supports a more broad sustainability policy. National, state and local governments as well as businesses and institutions can facilitate EPP through the use of various tools that assist local governments, residents, and businesses in identifying opportunities to “buy green.”

Per Executive Order 13101¹, “environmentally preferable” means products or services that have a lesser or reduced effect on human health and the environment when

¹ Source: Office of the Federal Environmental Executive, Executive Order 13101, September 1998.
<http://www.ofee.gov/eo/13101.asp>

compared with competing products or services that serve the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal of the product or service.

Many states and local governments have based their definition of EPP on the federal definition. The federal government sees the benefits of an EPP program to include:

- Improved ability to meet entity's environmental goals and/or ethics;
- Improved worker safety and health;
- Reduced liabilities;
- Reduced health and disposal costs; and
- Increased availability of environmentally preferable products in the marketplace.

Other potential benefits of an EPP program are:

- Reduced energy use;
- Strengthened markets for recycled materials;
- Reduced costs due to decreased use of water, energy, or due to the use of more durable items and reduced disposal costs;
- The potential to increase local reuse/recycling markets and the use of locally manufactured or remanufactured products, thus improving the local economy; and
- The opportunity to enhance an entity's image through the implementation of environmentally beneficial activities and programs.

1.2 Implementation Requirements

Implementation of EPP would require the adoption of an EPP policy – either through resolution, ordinance, executive order or a combination thereof. When considering stakeholders to include in the policy development and implementation process, it is important to remember that not all purchasing entities have knowledge about the environment, health, and the potential impacts certain materials can have on human health and the environment. Similarly, the stakeholders that have knowledge about potential environmental and health impacts of products may not know of the availability of products and performance requirements. Therefore, it would be beneficial to form a “team” of stakeholders to consider the policy language and implications. Many state and local governments form “green teams” when developing their EPP policies, to ensure that environmental, purchasing, and product expertise are all incorporated in the process. The steps typically required to implement an EPP program include:

- Inform stakeholders of intent to develop the policy;
- Solicit stakeholder input;
- Identify goals of the policy;
- Develop the policy;

- Inform stakeholders of the policy;
- Present/adopt the policy;
- Develop policy tools;
- Educate stakeholders about policy tools; and
- Evaluate the effectiveness of the policy and supporting programs (ongoing basis).

Stakeholders that the County might consider involving in the process include:

- Individuals responsible for making purchasing decisions;
- End users of products that would be considered for inclusion in the EPP program;
- Manufacturers of qualifying products;
- Individuals that are knowledgeable about the environmental and health benefits of environmentally preferable products and services;
- Local economic development specialists; and
- Individuals who are knowledgeable about the existence and suitability of environmentally preferable products and services.

1.3 Policy Considerations

There are several options the County should consider when deciding on the details of an EPP policy. They include:

1.3.1 Include Source Reduction Strategies

Many EPP policies stipulate that agencies should include waste minimization efforts when possible. Generally these policies are geared toward avoiding the consumption of natural resources, as well as cost savings. Examples include:

- Using email instead of printed correspondence when possible;
- Printing on both sides of paper;
- Streamlining forms;
- Purchasing rechargeable batteries;
- Printing reports as requested instead of anticipating demand;
- Choosing durable, long-life products (in lieu of disposable – including dishes, utensils, glasses, etc.);
- Leasing or sharing equipment that is not used frequently;
- Buying in bulk, when storage is available;
- Reducing the weight of products (e.g., using lighter weight paper when appropriate or buying cleaning products as concentrates and diluting on-site, etc.); and

- Reusing items as much as possible (such as file folders, office furniture, etc.).

There are many opportunities for agencies, offices and departments to purchase refurbished items or have items they currently own refurbished instead of purchasing new items. It is often suggested that departments consider refurbished items as long as the practice is compatible with safety, quality, and cost goals. Examples include:

- Carpet tiles – replace the soiled or worn tiles only, instead of the entire area;
- Remanufactured toner cartridges – many communities not only decrease the amount of plastic disposed, but also save money by refurbishing toner cartridges;
- Re-treaded tires instead of new tires;
- Refurbished furniture;
- Re-refined antifreeze and oil; and
- Refurbished office equipment.

It is important that equipment purchased by departments and agencies is compatible with waste minimization efforts – for example, that copy machines and printers are capable of easily printing on both sides of paper.

1.3.2 Consider Ownership Costs Instead of Initial Purchase Costs

In some cases, products and services that offer environmental benefits may appear to be more costly, however the initially higher purchase cost is offset by lower maintenance and upkeep costs and/or a longer product lifespan. One example is artificial turf, which is costly to install but can be more cost-effective when lower maintenance costs are considered. Similarly, hand dryers may be more costly to purchase than paper towel dispensers, however they eliminate the need to purchase and dispose of paper towels, as well as eliminate the labor required to re-stock the dispensers and clean-up and dispose of used paper towels. When considering ownership costs, one should consider all costs incurred during the useful life of the item, including:

- Initial acquisition costs;
- Warranty costs;
- Operation costs;
- Maintenance costs; and
- Disposal costs.

Costs for options should be compared for the same time period.

The term “lifecycle costs” refers to a more complex calculation, including costs from resource extraction, production, material use, and disposal. It is not common practice to consider lifecycle costs in EPP programs.

1.3.3 Recycled-Content Products

Most EPP policies include some type of recycled-content procurement policy. The U.S. EPA guidelines provide suggested recycled-content levels for various types of products. For example, the EPA suggests that many types of printing and writing papers (reprographic paper, offset paper, tablet paper, forms bond, envelope paper, cotton fiber paper, text and cover papers) contain 30 percent post-consumer fiber. Some types of paper (white and colored, supercalendered, machine finish groundwood, and check safety paper) should contain 10 to 20 percent post-consumer fiber. The guidelines can be found at the following website:

<http://www.epa.gov/epawaste/consERVE/tools/cpg/products/index.htm>.

The U.S. EPA indicates that the following items are commonly purchased products that contain recycled-content:

- Carpet
- Concrete
- Engine coolants
- Office products
- Paper
- Parking stops
- Plastic lumber
- Re-refined motor oil
- Retread tires
- Toner cartridges
- Traffic cones
- Trash bags

1.3.4 Consider Attributes Beyond Recycled-Content

Several state and local governments have EPP policy directives that specifically focus on material attributes other than recycled-content (although also include recycled-content directives). Examples (some of which may overlap with each other) include:

- Pollutant releases;
- Waste generation;
- Energy consumption/efficiency;
- Depletion of natural resources;
- Potential impact on human health and environment;
- Greenhouse gas emissions;
- Recyclability;
- Durability;
- Toxic material content (for example, low-VOC, dioxin-free, chlorine-free, etc.);

- Reduced packaging;
- Reduced transportation (e.g., sourced locally);
- Made of renewable resources (including energy);
- Bio-based;
- Biodegradable;
- Carcinogen-free;
- Persistent Bioaccumulative and Toxic (PBT)-free;
- Heavy metal-free (i.e., no lead, mercury, cadmium); and
- Reduced pollutant releases.

Many state and local governments direct purchasing entities to consider some of these product characteristics when making purchasing decisions and developing request for bids (RFBs) for products and services.

1.3.5 Consider Other Departments' Specification Requirements

Specific departments often have very specific product needs. For example, in most counties and states the Department of Transportation (DOT) is required to specify products, such as aggregate, etc., to be used for a project. DOTs have expertise in the area of road and highway construction, and contractors must use what the DOT specifies in order to fulfill the requirements of the project. If a city or county wanted to incorporate the use of more recycled materials (such as recovered aggregate, asphalt containing recycled glass cullet, rubber-derived asphalt, recycled-content parking stops, etc.) they should work with the specifying agency in order to identify opportunities for rewriting specifications. Local DOTs sometimes adopt specifications from other local entities if projects have a positive history and assuming weather and soil conditions in the neighboring jurisdiction are similar. Similarly, some local jurisdictions may adopt specifications developed by the state DOT. Often state DOTs have more resources available for alternative material testing. When developing EPP specifications it is important that the needs of specific purchasing entities are incorporated into the specifications.

1.3.6 Price Preference

Many communities include a price preference into their EPP policies – e.g., such that environmentally preferable products can still be considered to be cost-effective if their price is within a certain range (usually 5 to 15 percent) of the “traditional” goods or service. According to a U.S. EPA document², some officials believe that price preferences can actually limit the market penetration of green products by encouraging prices for green products to remain higher than those of traditional products. The intent, however, is to provide leeway (or directive) for an agency or department to

² U.S. EPA, “State and Local Government Pioneers: How State and Local Governments are Implementing Environmentally Preferable Purchasing Practices,” November 2000.

select a “green” product over a traditional product, even if the pricing is somewhat higher than a traditional product, due to the fact that some environmental and/or health benefit is derived from the product’s use. Others cited in the EPA document indicated that they were not mandated to purchase the environmentally preferred product, so they simply made decisions based on price. In other words, only those making purchasing decisions that are committed to promoting EPP took advantage of the price preferential. Other communities indicate that they simply specify the type of product the department seeks to purchase (e.g., describing its environmentally preferable characteristics, such as low-toxicity cleaning products) and the price factor becomes irrelevant, as the lower-cost products that do not meet the other specifications can simply be disregarded.

1.3.7 Provide Clarity Regarding Potential Concerns about EPP Policy

There are concerns and fears about EPP policies from the perspective of purchasing agencies, which are discussed in more detail below. The County should consider including limitations to the EPP policy, or verbiage to counteract such concerns, in the EPP Policy. For example, California’s definition of EPP is very similar to the federal government’s definition, however California’s statute provides clarity on potential concerns about EPP. It states explicitly that EPP cannot supersede recycled-content laws, require purchase of poorly performing goods, exclude adequate competition, or require unreasonable prices or lead times. Similarly, in order to alleviate fears of “greenwashing” (the dissemination of false information pertaining to EPP issues), some states use environmental specifications developed by a third-party certifier. Pennsylvania, for example, reportedly uses Green Seal’s standards when purchasing paint, degreasers, and cleaning products.³

1.3.8 Incentive Programs

Some local and state governments participate in or establish their own incentive or award programs to encourage the environmentally preferable purchasing decisions. Such reward programs are critical to promoting the program, stressing the benefits of the EPP policy, recognizing the hard work and successes that have stemmed from the program, and generating enthusiasm and encouragement for others to consider and implement EPP options. One existing program that the County might consider participating in is the National Association of Counties (NACo) Environmental Achievement Awards Program.

Examples of incentive programs that other communities have implemented include:

- Providing staff bonuses and an “employee of the month” program for EPP involvement (Lee County, Florida’s vehicle fleet management);
- Including environmental performance as part of the annual review process for city department directors and management staff (Phoenix, AZ, pilot program);

³ Ibid.

- “On-the-Spot” award program, for employees that recommend ways to improve environmental performance (Phoenix, AZ);
- “Lead by Example” program that provides grant funding for agencies to try new, environmentally preferable products (MA DEP and Hennepin County, MN); and
- Requiring communities to establish EPP program in order to be eligible for recycling implementation grant funds (MA DEP).

1.4 Capital and Operating Expenses

Implementing an EPP policy is not expected to require capital expenditures, however will likely require some staff time. Simply developing and implementing a policy are activities that may be part of existing staff time, requiring no additional expenditures. However, it is possible that involving stakeholders, developing tools, and possibly evaluating the policy on an ongoing basis may require additional resources, such as additional staff time, possible use of consultants, and costs associated with holding stakeholder meetings, if desired.

1.5 Education Tactics

Educating stakeholders (primarily purchasing entities) about a County-wide EPP program before the policy is implemented is critical, in order to obtain key stakeholder feedback and support. Once the policy has been adopted, multiple education tactics should be implemented in order to educate County agencies, departments, and offices regarding:

- a. Requirements of the policy;
- b. Expected benefits of the policy;
- c. Resources available (including state purchasing contracts that local governments may be able to participate in);
- d. State and County purchasing contracts;
- e. Product specifications;
- f. Technical assistance; and
- g. Model EPP policies for companies to adopt.

Education and outreach tools can be developed to focus on particular types of products (such as cleaning products) or particular types of settings (such as an office, where multiple types of products might be discussed, such as copy and print paper, ink and toner cartridges, computers and janitorial paper, and cleaning products). Disseminating education might be done through:

- Website/Intranet/Internet (which can be used to convey various types of information as well as provide access to some of the other tools listed below);
- List serve;

- Email bulletin;
- Conferences/seminars/workshops (e.g., to inform purchasers of the policy, provide a forum for manufacturers and distributors of environmentally preferable products to interface with purchasers and perhaps demonstrate their products);
- Fact sheets (e.g., detailing requirements of the policy, alternatives to specific toxic or wasteful commodities, or industry-specific fact sheets);
- EPP product and services directory (to let purchasers of particular items know what vendors are available);
- Technical assistance (e.g., potential users/purchasers of a product may need assistance in identifying environmentally preferable options, and determining whether the product(s) will be suitable for their needs. Often state or county agencies assist in providing technical assistance to demonstrate the suitability of a product through demonstration sites, case studies or product testing, for example.); and
- Information about County or state contracts (so that individual agencies can “join in” on the state or County contracts to obtain favorable pricing).

It is suggested that, to the extent possible, all education and outreach materials be offered electronically in order to minimize waste and expenses. The primary audiences for the education and outreach would be those who make purchasing and specification decisions in County departments, offices and agencies. A secondary audience would be private businesses that wish to obtain EPP products and services. Some education tactics might be relevant to the general public – citizens who desire to minimize their environmental impact through their individual purchasing decisions. Also, it is beneficial for the County to educate businesses, institutions and individuals about the County’s EPP policy and progress made with regard to the policy, so that the County’s dedication to minimizing health and environmental impacts is conveyed.

1.6 Diversion Potential

There are many potential benefits to an EPP policy, as described above. While the potential to divert waste is not expected to be the primary benefit of an EPP policy, it can indeed be one of the benefits of such a policy. Waste can be diverted, for example, through the purchase of more durable or upgradeable products, purchasing goods with reduced packaging or in bulk, using locally generated materials (such as yard waste for mulch rather than disposing of it and purchasing mulch elsewhere). It can also result in the disposal of less toxic waste, which can reduce disposal costs and reduce environmental and health risks at the landfill. Some EPP policies also include waste reduction measures. For example, one of the goals of Rutgers University’s “Green Purchasing Policy and Guidelines” is to “reuse packing materials and plastic bags.” Another goal is to “turn used paper into scratch pads for distribution to departments on campus.” Their Green purchasing policy also includes several goals to recycle specific types of items (ink and toner cartridges, fluorescent bulbs, mercury-

type bulbs, wood pallets, lead acid batteries) which increases the amount of waste the University diverts from disposal.

1.7 Case Studies

Provided below are two county EPP case studies (King County, WA and Alameda County, CA) and one state (New York) case study. Additional case studies for the states of Minnesota and Massachusetts are included in Appendix A of this paper.

1.7.1 King County, Washington

1.7.1.1 Introduction

King County, Washington, first implemented its EPP policy in 1989, in hopes of strengthening markets for newly collected recycled materials. In 1995 the program was expanded, in order to target other environmentally preferable products. The county expanded the policy to consider multiple product attributes, including:

- Toxicity;
- Durability;
- Emissions;
- Energy efficiency;
- Recycled-content; and
- Conservations of natural resources.

In addition, the policy considers:

- Price;
- Performance; and
- Availability of the product.

King County's EPP Program is mandatory for all county agencies, offices and departments, as well as contractors. Through the program, county personnel are provided with information and technical assistance to help them identify, evaluate, and purchase economical and effective environmentally preferable products and services. In 2007, the county estimates that their agencies purchased \$41 million worth of environmentally preferable products and services. The largest purchases of EPP products (in terms of total expenditures) included:

- Ultra-low sulfur diesel (\$22.8 million);
- Biodiesel (\$8.2 million);
- Recycled-content paper and paper products (\$3.7 million); and
- Computers (\$3.4 million).

It is estimated that EPP purchases resulted in cost savings of \$875,000 over the purchase of conventional products. Estimated cost savings include:

- Aggregates (avoided purchase costs for reuse of asphalt and concrete that are stockpiled, then used as fill material in road projects) – \$300,000;
- Toner cartridges – \$275,000;
- Tire re-treading – \$275,000;
- Antifreeze – \$17,000; and
- Plastic lumber – \$10,000.

1.7.1.2 Policy Highlights

The King County’s EPP Policy highlights include requirements that all departments, offices, and agencies:

- Use, and require their contractors and consultants to use, products manufactured with the maximum practicable amount of recovered material, especially post-consumer material.
- Use, and require their contractors and consultants to use, environmentally preferable products whenever cost effective and to the extent practicable.
- Establish a price-preference of up to fifteen percent (15%) for recycled paper products and up to ten percent (10%) for re-refined lubricating oil.
- Ensure that they and their contractors use recycled paper in printed material, and that it bears an imprint identifying the recycled-content of the paper, whenever practicable.
- Ensure that they and their contractors use both sides of paper sheets whenever practicable.
- May specify recycled-content at levels higher than the minimum content standards.

Under the Policy, the Purchasing Agency and Solid Waste Division are responsible for providing departments with information to facilitate their evaluation and purchase of designated products, and to inform them of their responsibilities under the policy. They are also responsible for revising minimum standards as necessary, to ensure consistency with the other government entities, ensure that EPP are designated whenever practicable, transmit minimum content standards to departments, and provide an annual report to the county council. The county departments, offices and agencies must assign staff to:

- Ensure that contracting procedures do not discriminate against recycled products without justification;
- Evaluate each designated product to determine the extent to which it may practicably be used by the agency and its contractors;

- Revise contracting procedures to maximize the specification of designated products whenever practicable;
- Compile data on the purchase of designated products by the agency and its contractors; and
- Provide evaluation results and procurement data to the Purchasing Agency by July 30 each year for inclusion in the annual report to the county council on the status of policy implementation.

1.7.1.3 Tools Utilized

In order to inform county agencies, suburban cities, and the community-at-large about opportunities to purchase environmentally preferable products, the county focuses on the dissemination of information and technical assistance. Specific tools include:

- **Educational Seminars** – The Agency provides seminars on specific opportunities for EPP.
- **Environmental Purchasing Bulletin** – The Agency produces electronic “Environmental Purchasing Bulletins” to share information about EPP products, events, contracts, etc. There are over 1,000 direct email recipients of the Bulletin. Past Bulletin topics included:
 - Greenwashing;
 - Porous Concrete;
 - Green Procurement Case Studies;
 - Natural Vegetation Management (use of goats); and
 - Hybrid Bus Purchase.

An index of past bulletins is available at the following Website:

<http://your.kingcounty.gov/procure/green/bulindex.htm>.

- **Waste Prevention Forum** – An online discussion group managed by the King County Solid Waste Division, and part of the National Waste Prevention Coalition.
- **Website** – Through the county’s website, the Purchasing Agency shares information with county departments, offices and agencies. The Agency keeps in contact with many communities throughout the nation, and stays abreast of EPP issues through several Internet discussion groups. The website includes information about green building, EPP products, contact information for local vendors, some case study information regarding EPP products, and links to other resources for additional information. King County EPP staff also serve on the steering committee for the Responsible Purchasing Network, which has a mission to promote environmentally preferable purchasing policies.
- **Annual Report** – Agencies, Offices and Departments are required to report EPP activities, (environmentally preferable materials purchased, quantities purchased, dollar amount spent, and any cost savings realized over traditional materials) to

the Purchasing Agency by July 30. The Purchasing Agency compiles a report for the county council on the status of policy implementation. The 2007 Report is available online at <http://your.kingcounty.gov/procure/green/2007annrep.pdf>.

- **Technical Assistance** – The EPP Program staff provides policy development and implementation strategies to other jurisdictions, businesses, and non-profit agencies. The program staff also assists buyers and user agencies in the development of specifications and contracts, and provide technical assistance to facilitate evaluation and adoption of environmentally preferable products and applications by county agencies. In addition, the staff researches and communicates information about price, performance, availability and potential benefits of environmentally preferable products.
- **Supply Contracts** – The county negotiates contracts for EPP products and services. Local governments within the county and non-profit entities are eligible to use the contracts.

1.7.1.4 Materials Targeted

Materials that are highlighted as EPP materials include:

- Recycled-content paper;
- Remanufactured toner cartridges;
- Refined antifreeze and motor oil;
- Ultra-low sulfur diesel;
- Biodiesel fuel;
- Hybrid Vehicles;
- Bio-based oils;
- Plastic lumber;
- Compost;
- Shredded wood waste; and
- Tire re-treading services.

1.7.2 Alameda County, California (Partnering with StopWaste.Org)

1.7.2.1 Introduction

The Alameda County Waste Management Authority and Recycling Board (also known as StopWaste.Org) is a joint powers authority that is controlled by two boards. The county itself has not passed an EPP policy specifically, but has passed several ordinances and policies which relate to and encourage EPP activities. StopWaste.Org has passed their own EPP policy which governs them as a public agency, and has developed a model policy which seven of their 14 member agencies have adopted.

StopWaste.Org had been focusing on buying recycled-content products, but in 2003 made a push to further their involvement in EPP. The Agency works with their members, including the county and municipalities within the county, to help implement EPP programs, as described below.

1.7.2.2 Policy Highlights

Alameda County has adopted a vision which has five areas (one being environment and sustainability) and goals and strategies pertinent to each area. For example, one goal for county operations and services is to “Ensure that the county’s operations and services are consistent and comprehensive in prioritizing environmental protection.” Another goal is to “Demonstrate a commitment to environmental stewardship in county policies.” The county’s General Services Agency (GSA)’s comprehensive sustainability efforts include actions to:

- Fight global climate change;
- Produce clean energy and conserve energy;
- Reduce waste, reuse, recycle and compost;
- Build and operate green buildings;
- Reduce toxics; and
- Purchase alternative-fuel vehicles and environmentally preferable products.

The County’s GSA has undertaken several efforts regarding EPP which have resulted in the annual purchases of over \$20 million in goods annually with environmental specifications. The county sees incorporating EPP criteria in purchasing decisions (at both the county and private-sector levels) as vital to helping the county achieve their goal of 75 percent waste diversion. (The current rate of waste diversion is 50 percent.) The county indicates that they have included environmental specifications when purchasing paper, furniture, computers, janitorial supplies, and vending machines. The county has passed several policies/legislation regarding EPP including:

- **Resolution No. 2008-213** – Resolution Establishing a Goal of 75 percent Reduction in Waste Going to Landfills by 2010 for Unincorporated Areas and Civic Operations of the County of Alameda. This is the mission of StopWaste.Org, which has been successful in getting all member agencies to pass resolutions establishing a goal of 75 percent waste reduction.
- **Green Building Ordinance** – Adopted in 2003, this ordinance states that all county projects must be built to a minimum U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) Silver standard and divert construction debris from the landfill. StopWaste.Org has been successful in encouraging many member agencies to pass similar ordinances for civic projects. Some grant funding is dependent upon their passing this ordinance.
- **Persistent Bioaccumulative Toxins Resolution** – Adopted in 2002, this resolution requires elimination or reduction of PBTs, such as mercury, lead, and dioxins, through purchasing and disposal standards.

- **Bay-Friendly Landscaping Resolution and Integrated Pest Management Resolution** – Adopted in 2008 and 2001 respectively, these resolutions require a whole systems approach to pest management, where chemicals are a last resort for pest prevention, both indoors and out.

These policies are in compliance with and support the county’s Climate Change Leadership Strategy and the county’s Strategic Vision.

Highlights of the Waste Reduction Resolution include:

- The Community Development Agency is to provide practicable assistance to local waste and recycling service providers to help them reach the 75 percent goal in unincorporated areas;
- The Board of Supervisors directs the General Services Agency to develop strategies to achieve the 75 percent goal for county operations in cooperation with all employees and agencies, which will be measured through internal inventories;
- All agencies will report annually on their efforts to minimize waste generation and promote recycling within their agencies and for services provided to them by outside contractors;
- County employees are expected to recycle and reuse all materials for which recycling programs are available, and consider the full lifecycle of products when using materials; and
- The county will partner with StopWaste.Org, recycling companies, local businesses, and sustainability advocates to strengthen the county’s economy by stimulating sustainable local enterprises that use discarded products and to develop strategies to advance “upstream” waste prevention strategies such as product redesign, process re-engineering, and low-impact lifestyles.

The ultimate goal of the resolution is for the county to review adopting a Zero Waste goal once the 75 percent goal is achieved.

1.7.2.3 Tools Implemented

StopWaste.Org’s website, www.stopwaste.org, provides many resources that are well-suited for member agencies as well as private businesses. They may also benefit other local governments that are not agency members and provide additional assistance. The resources provided by StopWaste.Org include:

- **Product Guides** – The county has developed specific product guides and vendor contact information for specific types of EPP products, including:
 - Compostable food service and kitchen products; and
 - Recycled paper.
- **Fact Sheets** – The county has published fact sheets regarding different types of materials that can be considered in an EPP Program, and provides information regarding what to look for in the product (e.g., toxicity level, percent post-consumer content, etc.) and specifications. Several fact sheets appear to be county-specific (e.g., “How to Purchase Recycled Paper in Alameda County”),

however even those fact sheets contain information of value to those located outside the county.

- **Model Policy** – The county has developed a model policy that is available online. The policy is intended to be used by local governments and businesses. This Model Policy is provided as Appendix B to this report.
- **Guide to Green Maintenance and Operation** – This publication describes how and why to implement green maintenance and operation practices. Specific topics discussed include lighting, paint, flooring, furniture, appliances, water-efficient products, mechanicals (HVAC maintenance), janitorial cleaning and supply products, and landscaping.
- **Technical Assistance** – StopWaste.org provides technical assistance to businesses and agencies as well as municipal governments to help them identify and implement strategies to implement EPP policies and minimize waste.
- **Information about State and Other Programs** – StopWaste.Org provides information about upcoming state and regional conferences and events relating to EPP and often pays registration fees for member agencies. One example is a green building conference, West Coast Green. Another example is partnering with the Association of Bay Area Governments, a nine-county organization that will host an EPP workshop in the spring. StopWaste.Org will help sponsor the event and will pay the registration fee for member city purchasers.
- **Workshops** – From time to time, StopWaste.Org will host workshops for member agencies and private businesses where EPP vendors can discuss the benefits of their products to potential products. Past products highlighted have been rubber sidewalks and green building products.

In addition to the StopWaste.Org activities, the county develops county contracts that support EPP. In many cases member cities can be included in the contract.

1.7.3 The State of New York

1.7.3.1 Introduction

New York's governor signed Executive Order No. 4, "Establishing a State Green Procurement and Agency Sustainability Program," in April 2008. The Order directs state agencies, public authorities and public benefit corporations to "green" their procurements and to implement sustainability initiatives. The Order established an Interagency Committee on Sustainability and Green Procurement that is co-chaired by the Commissioner of General Services and the Commissioner of the Department of Environmental Conservation. The Interagency Committee is charged with identifying an annual list of product categories and specific products and services for which specifications will be developed and issued for greener procurements. The Committee is also charged with establishing goals for reductions in the amount of paper used and solid waste generated, and with the development of coordination, reporting and training programs to support agency sustainability efforts. The final list of product and service categories, issued in September 2008, includes:

Electronics/Appliances:

- Desktop computers
- Laptop computers
- Copiers
- Room air conditioning
- Refrigerators
- Washers (domestic and commercial)
- Vacuum cleaners
- Dishwashers (domestic and commercial)
- Printers (network and multifunction)

Transportation:

- Traffic safety equipment
- Traffic Paint
- Glass Beads
- Treated road salt
- Passenger vehicles
- Aggregate for road construction
- Asphalt mixes
- Concrete
- Engine block heaters
- Re-refined motor oil
- Re-refined hydraulic oil
- Traffic message boards

Office and Building Operations:

- Toner cartridges
- Printing services
- Carpet
- Fluorescent lamps (compact and traditional)
- Interior paint
- Drinking water fountains
- Pest management
- Cleaning products
- Recyclables collection and disposal service
- Turf management

In addition, there have been additional policies passed that relate to EPP. They include:

- Executive Order Number 142, “Establishing New Waste Reduction and Recycling Initiatives for State Agencies,” which was passed in 1991; and
- Executive Order Number 134, “Directing State Agencies to Reduce the Impact of Cleaning of State Facilities,” which was passed in 2005.

The New York State Department of Transportation (NYSDOT) also has a Solid and Hazardous Waste Reduction Policy in place, which was implemented in 1999. The policy expresses DOT’s commitment to reducing waste and pollution by:

- Source reduction (eliminating or reducing the volume and toxicity of waste through good operating practices, product substitution, and procedure substitution);
- Reuse and Recycling (reusing material for its original purpose, or recycling when reuse is not possible);

- Using recycled-content products in all DOT projects “where reasonable and feasible;” and
- Implementing a preferred management hierarchy for waste management. The hierarchy is:
 - Source reduction;
 - Recycling;
 - Energy recovery;
 - Treatment; and
 - Disposal.

The types of programs implemented by NYSDOT that support the DOT’s EPP Policy include the use of:

- Environmentally friendly solvents for cleaning pavement-marking painting equipment;
- Eliminating the use of chlorinated solvents (e.g., for degreasing);
- Using reduced VOC traffic marking and bridge paints;
- Reducing the use of herbicides;
- Reducing the use of salt;
- Purchasing recycled products such as:
 - Paper;
 - Lead-acid batteries;
 - Re-tread tires;
 - Antifreeze;
 - Lubricating oil; and
 - Plastic cones.

1.7.3.2 Policy Highlights

Highlights of Executive Order Number 4 include:

- Establishes an interagency committee on sustainability and green procurement.
- Charges the Committee with selecting a minimum of three “priority categories” and products and services within those priority categories for which the Committee will develop “green procurement lists.” The Committee is directed to focus on goods and services that will:
 - Reduce or eliminate the health and environmental risks from the use or release of toxic substances;
 - Minimize risks of discharge of pollutants into the environment;
 - Minimize the volume and toxicity of packing;

- Maximize the use of recycled-content and sustainably-managed renewable resources; and
- Prove other environmental and health benefits.
- Charges the Committee with developing procurement specifications and new solicitations for priority commodities, services and technology. The Committee is to consider the specific product attributes, including reduction of greenhouse gases, waste reduction, recyclability, durability, and others.
- Charges the Committee with establishing specific waste reduction goals and strategies.
- Stipulates that each state agency and authority shall develop and implement a sustainability and environmental stewardship plan.
- Stipulates that all copy paper, janitorial paper and other paper supplies purchased by each State agency or authority shall be composed of 100 percent post-consumer recycled-content to the maximum extent practicable, and shall be chlorine-free to the extent practicable.
- Stipulates that all public agencies and authorities shall use 100% post-consumer recycled paper for publications, to the extent practicable, or non-recycled-content should be from sustainably-grown trees.
- Directs state agencies and authorities to rely on and use the procurement lists and specifications issued by the Committee when developing new solicitations and contracts for the procurement of commodities, services and technology, unless there are cost or function issues or a compelling emergency.
- Directs state agencies and authorities to implement effective programs to source separate recyclable materials, to the extent practicable, as well as waste reduction programs, and to use locally available compost, mulch and soil amendments from recovered materials and recovered materials in construction.
- Stipulates that State agencies and authorities must assign an employee to serve as a sustainability and green procurement coordinator.
- Directs that the Committee shall design and implement training and outreach programs for coordinators.
- States that the Committee must develop a format for a progress report to be used by State agencies and authorities.
- States that each state agency and authority shall annually submit a progress report to the Committee describing the agency/authority's efforts and progress regarding green procurement, waste reduction, etc.
- Stipulates that the Committee must submit a report to the Governor each year compiling the information submitted by state agencies pursuant to Executive Order 4.
- Calls for the formation of a Sustainability and Green Procurement Advisory Council, consisting of 11 members appointed by the Governor who have

experience in the fields of green procurement, public health, waste prevention and recycling, energy efficiency, workplace safety, labor relations, environmental protection, environmental justice, or chemical manufacturing.

1.7.3.3 Tools Utilized

New York State has utilized the following tools in order to implement their Green Procurement Policy:

- **Development of Product Specifications** – The Committee has developed specifications for purchasing many priority materials. Three specifications have been finalized (computers, engine block heaters, and passenger vehicles). Several others are in draft form.
- **DEC Green Schools Program** – Provides resources (including grants) and information that allows schools to implement actions to be more “green.” Assistance is available for pest management, toxics reduction, solid waste reduction and recycling, and stormwater management.
- **Recognition and Awards Programs** – NY DEC has a Green Schools Awards Program which rewards schools for implementing exceptional environmental programs. In addition, the DEC sponsors a NYS Environmental Excellence Awards Program which recognizes businesses, schools, organizations, individuals and others for “improving and protecting New York State’s environment.
- **Roundtable Discussions** – NY DEC hosted a series of roundtable discussions in 2008 about chemicals. Key topics included but were not limited to: moving away from chemical-by-chemical approaches, prioritizing chemicals for evaluation, maximizing information sharing, promoting green chemistry and considering substitutions and restrictions for hazardous chemicals.
- **NYSDOT GreenLITES Program** – This NYSDOT program recognizes transportation project designs that incorporate a high level of environmental sustainability. GreenLITES (Leadership in Transportation and Environmental Sustainability) is a project rating system, similar to the USGBC’s LEED system. Projects are rated based on the extent to which they incorporate sustainable design choices. This is primarily an internal management program for NYSDOT to measure performance, recognize good practices, and identify and improve where needed. The program also serves to provide the department with a way to demonstrate to the public how NYSDOT is advancing sustainable practices.

There have been no annual reports submitted to the governor to date regarding Executive Order Number 4.

1.8 Addressing Stakeholder Concerns

Stakeholder concerns regarding EPP policies may include:

- Lack of familiarity with the use of many environmentally preferable products, and how to specify them effectively, or apply them as substitutes for more traditional materials;

- Fear that the costs associated with EPP purchases will be higher than the costs associated with traditional materials;
- Fear that quality of recycled-content products may be inferior or lack standards and specifications;
- Greenwashing – the dissemination of false information pertaining to EPP issues; and
- The fear of overly onerous data collection.

Means of addressing these issues are discussed below.

1.8.1 Lack of Familiarity

The marketplace is continuously changing. There are new products and new versions of products constantly being developed. The Broome County Division of Purchasing or other County staff can facilitate the conveyance of knowledge about such products via the Internet, list serves, email lists, etc. There are many organizations and list serves in existence that share information on such topics, and could serve as a valuable resource to Broome County. Several are listed in Section 3.10 - “Resources” of this paper. In addition, many government entities, as described in the case studies, have implemented programs that encourage and assist agencies with learning about and purchasing EPP products. They include:

- Workshops/vendor conferences;
- Roundtable discussions;
- Technical assistance to demonstrate or test the suitability of a product or product type;
- Development of case studies; and
- “Before You Buy” programs and other grant programs to pay for or partially pay for the product.

1.8.2 Costs

Some environmentally preferred products and services may be more costly than “traditional” products and services, however some actually result in a cost savings. For example, King County, Washington, actually saved money over purchasing “traditional” materials through its use of:

- Reused aggregates;
- Refurbished toner cartridges;
- Tire re-treading (versus purchasing new tires);
- Antifreeze (re-refined versus new); and
- Plastic lumber.

In some cases, lifetime cost analyses are more accurate means of assessing costs than simply considering purchasing costs. For example, synthetic turf fields may cost more to install, initially, however they are less costly to maintain over time, so the lifecycle cost analysis may be favorable. Similarly, plastic lumber may be more costly initially, but due to its durability and lack of maintenance, can be more cost-effective in the long run.

It is also important that EPP policies be implemented with cost-effectiveness in mind. While some communities' EPP policies provide a cost preferential for specific material types (for example, King County provides a cost preferential of 15 percent for recycled-content paper, and 10 percent for re-refined motor oil), other communities provide a cost preferential for all types of commodities. In some emerging markets product manufacturers are not always adept at identifying the needs of potential customers, marketing, and distributing products. The Purchasing Agency or Department, in some cases, can help facilitate these activities through conferences and workshops that bring product manufacturers and purchasers (as well as potential purchasers) together to share information and experiences.

In California, the California Integrated Waste Management Board (CIWMB) states that $EPP = Environment + Price + Performance$. As the "Price" component of this equation, the CIWMB acknowledges that "EPP is best value. When a product creates too much pollution this impact is a cost to those who have to clean it up or get sick from it. The lowest price isn't necessarily the lowest cost. That is what EPP tries to sort out." In other words, the economic externalities associated with "traditional materials" are not always considered in the purchase price.

1.8.3 Product Quality

Broome County once again can look to other communities for information regarding types of products and their quality. Some purchasers may be familiar with a prior "generation" of a product, and may be unaware of changes in manufacturing environmentally preferable products that have taken place. Further, Broome County may be able to borrow language regarding product specifications from other communities to help ensure that the products meet their needs.

Some manufacturers of environmentally preferable products have begun to see the value of third-party standards and testing, and are engaging in developing standards and having independent laboratories conduct testing on their products. The County could also help educate departments about the successful use of certain products by researching what has been used with success in other counties and states, and by developing those into case studies. Similarly, as described above, the County might also develop a pilot test for a product or product type.

1.8.4 Greenwashing

Greenwashing is a deceptive use of green public relations or green marketing. As the demand for "environmentally preferable" products has grown, so has the need to use caution when evaluating manufacturers' claims regarding the environmental benefits

of their products or services. Some specific types of greenwashing to be aware of include:

- Fluffy yet meaningless language – language that sounds “green” but has no real meaning (for example, “eco-friendly,” “green” and “environmentally sound”);
- Overly scientific language, that is not understandable;
- Pictures that provide a “environmentally friendly” feeling with no real connection to the product or service;
- Statements that give the appearance of a third-party endorsement when one does not actually exist;
- Focusing on a small benefit when larger, more significant negative environmental impacts exist; and
- Making claims without providing evidence.

Products, companies and claims should be researched using resources and organizations that aim to safeguard against false claims regarding environmental benefits. Some resources include:

- The Green Washing Index (EnviroMedia and the University of Oregon)
<http://www.greenwashingindex.com/index.php>
- StopGreenwashing.org
<http://www.stopgreenwashing.org/>
- Greenpeace
<http://stopgreenwash.org/>
- The U.S. Green Building Council (USGBC)
<http://www.usgbc.org/>

Also, sharing information on list serves and through email and reading industry trade journals are other means of becoming aware of false “green” claims. Also, before entering into a contract with a manufacturer, it is important to conduct research. Read the company’s annual report, interview other purchasers, and tour a manufacturing facility, if possible.

1.8.5 Overly Onerous Reporting Requirements

While it can seem time consuming and costly to track data on EPP programs, it is important to track certain information to garner support and understand the progress that is being made. Also, analyzing information can point out specific strengths and weaknesses within the EPP program. To the extent possible, it is best to incorporate tracking within the existing system – for example, in some communities a certain two-digit number preceding the entry indicates that the item is an EPP purchase. In Minnesota, for example, the Department of Administration provides specific codes where EPP purchases can be tracked on an ongoing basis. This made it unnecessary for Authority of Local Purchase (ALP) buyers to submit quarterly reports. At the end of the year, it is relatively simple to track EPP purchases and tally corresponding cost

savings and expenditures. Up-front planning with the entity's accounting system will help ensure that reporting is as automatic as possible.

1.9 Benefits and Drawbacks

The implementation of an EPP policy has benefits as well as drawbacks (real or perceived), as outlined below.

1.9.1 Benefits

- Adopting a procurement policy that gives preference to recycled-content products, reducing toxicity, and reducing consumption represents an opportunity for the County to lead by example in their recycling effort, thus conveying to the community and agencies the County's dedication to recycling and reducing environmental and health impacts.
- Purchasing post-consumer recycled-content materials encourages markets for recycled products.
- Adopting a procurement policy that gives preference to products with other environmental attributes (such as lower toxicity) can:
 - Reduce liabilities;
 - Increase employee health; and
 - Increase environmental health.
- Including provisions for more durable goods, reduced packaging (or buying in bulk) can lead to increased waste diversion, thus reducing disposal costs.
- Including provisions for recycling or reducing the use of certain goods can lead to increased waste diversion, thus reducing disposal costs.
- Including provisions for products and services that use fewer resources (such as water and energy) saves natural resources and expenditures on those resources.
- It is expected that no capital expenditures would be required to develop such a policy.

1.9.2 Drawbacks

- In meeting the goals and requirements of an EPP, the County may be required to change vendors and products in some cases.
- The County will likely spend resources initially, in the form of staff time, developing an EPP policy.
- The County may spend resources on an ongoing basis, in the form of staff time, conferences, etc., in developing tools to facilitate the implementation of an EPP policy.

- The County may spend resources on an ongoing basis, in the form of staff time and potentially software upgrades, to develop tools to track progress in EPP programs.
- Some departments may see tracking and reporting the amount and type of EPP products purchased as burdensome.

1.10 Resources

There are many resources available on EPP and recycled-content products. Provided below are links to websites for accessing some of these resources.

Alameda County, California, Waste Diversion Resolution.

http://www.acgov.org/gsa/75_Waste_Diversion_Resolution_06-2008.pdf.

Alameda County, California, Strategic Vision.

<http://www.acgov.org/pdf/strategicvision.pdf>.

The California Integrated Waste Management Board, EPP Best Practices.

<http://www.green.ca.gov/EPP/Introduction/default.htm>.

The Center for a New American Dream (website/organization that “helps Americans consume responsibly to protect the environment, enhance quality of life, and promote social justice.” – includes the “Responsible Purchasing Network” listed below, and other campaigns and programs).

<http://www.newdream.org/>

Electronic Product Environmental Assessment Tool (EPEAT) (a tool for evaluating the environmental performance of electronics throughout their life cycles).

<http://epeat.net/>.

The Green Meetings Industry Council (GMIC) (a non-profit organization that aims to transform the meeting industry through sustainability).

<http://www.greenmeetings.info/>.

Inform, (a non-profit agency that disseminates information about environmental issues, including EPP-related topics).

<http://www.informinc.org/>.

King County, WA, Environmental Purchasing Program.

<http://your.kingcounty.gov/procure/green/index.htm>.

King County, WA, EPP Annual Report, 2007.

<http://your.kingcounty.gov/procure/green/2007annrep.pdf>.

King County, WA, EPP Bulletins.

<http://your.kingcounty.gov/procure/green/bulindex.htm>.

Massachusetts DEP, Environmentally Preferable Purchasing Guide.

http://www.mass.gov/Aosd/docs/EPP/VOL_26_SEC_2_OCT_2007.doc.

Massachusetts DEP, EPP Product Fact Sheets (in development, please check back) and Buyer Update Newsletters.

[http://www.mass.gov/?pageID=osdsubtopic&L=4&L0=Home&L1=Buy+from+a+Contract&L2=Environmentally+Preferable+Products+\(EPP\)+Procurement+Program&L3=Download+Publications%2c+Reports+and+Tools&sid=Aosd](http://www.mass.gov/?pageID=osdsubtopic&L=4&L0=Home&L1=Buy+from+a+Contract&L2=Environmentally+Preferable+Products+(EPP)+Procurement+Program&L3=Download+Publications%2c+Reports+and+Tools&sid=Aosd).

Minnesota Pollution Control Agency, 2006 Biennial Report to the Legislature.

<http://www.pca.state.mn.us/publications/reports/lrp-gen-3sy-07.pdf>.

Minnesota Pollution Control Agency, “Buying Green,” (quarterly newsletter about EPP).

<http://www.pca.state.mn.us/oea/epp/newsletter.cfm>.

Minnesota Pollution Control Agency, EPP Guide.

<http://www.rethinkrecycling.com/government/eppg/tools>.

Minnesota Pollution Control Agency, Recycled Products Directory (provides information about products made from recycled materials).

<http://www.pca.state.mn.us/oea/rpdir/index.cfm>.

National Association of Counties (NACo) (award programs, case studies and peer advice).

<http://www.naco.org/>

National Institute of Government Procurement (has a “Green Knowledge Community” available to members, which can provide additional resources regarding EPP policies).

<http://www.nigp.org/communities/about.htm>.

Natural Resources Defense Council, (information regarding company-wide EPP policies).

http://www.nrdc.org/enterprise/greeningadvisor/gpp-purch_policy.asp

New York State Department of Transportation, GreenLITES Program.

<https://www.nysdot.gov/programs/greenlites>.

New York State Department of Transportation, Solid and Hazardous Waste Reduction Policy.

<https://www.nysdot.gov/divisions/engineering/environmental-analysis/repository/wastered.pdf>.

New York State Department of Transportation, Specifications.

<https://www.nysdot.gov/main/business-center/engineering/specifications/2008-standard-specs-us>.

New York State Office of General Services, Green Procurement Information.

<http://www.ogs.state.ny.us/ExecutiveOrder4.html>.

New York State, Executive Order Number 4, “Establishing a State Green Procurement and Agency Sustainability Program.”

<http://www.ogs.state.ny.us/EO4/pdf/FinalGreenProcurementEO.pdf>.

Responsible Purchasing Network (an international network of buyers dedicated to socially responsible and environmentally sustainable purchasing).

<http://www.responsiblepurchasing.org/>.

Rutgers University, Green Purchasing Policy and Guidelines.

<http://purchasing.rutgers.edu/green/images/Rutgers%20Green%20Purchasing%20Policy.pdf>.

Solid Waste Management Coordinating Board's (SWMCB) Environmentally Preferable Purchasing Guide (developed by the SWMCB which serves six metropolitan counties in the Minneapolis-St. Paul, Minnesota region).

<http://www.rethinkrecycling.com/government/eppg>.

Solid Waste Management Coordinating Board's Sample EPP Resolution.

<http://www.rethinkrecycling.com/government/eppg/tools/sample-epp-resolution>.

StopWaste.Org, Compostable Food Service Product List.

http://www.stopwaste.org/docs/bioplastics_products-distrib.pdf.

StopWaste.Org, EPP fact sheets (topics include: Environmentally Preferable Cleaning Products, Recycled Paper, Toner Cartridges, Janitorial Paper Supplies, Park and Recreation Products, Environmentally Preferable Traffic Control Products, Using Rechargeable Batteries, and Biodiesel Fuel Use in Heavy Duty Vehicles).

<http://www.stopwaste.org/home/index.asp?page=372>.

StopWaste.Org, Environmental Purchasing Links (provides links to information regarding specific products and product types geared for purchasers as well as consumers from the general public).

<http://www.stopwaste.org/home/index.asp?page=532>.

StopWaste.Org, EPP Implementation Guide.

<http://www.stopwaste.org/home/index.asp?page=468>.

StopWaste.Org, Guide to Green Maintenance and Operations.

<http://www.stopwaste.org/docs/gbmng-dec-20-07ltr.pdf>.

U.S. EPA, Comprehensive Procurement Guidelines.

<http://www.epa.gov/epawaste/conserve/tools/cpg/index.htm>

U.S. EPA, Environmentally Preferable Purchasing.

<http://www.epa.gov/epp/index.htm>

U.S. EPA, "State and Local Government Pioneers: How State and Local Governments are Implementing Environmentally Preferable Purchasing Practices," November 2000.

<http://www.epa.gov/epp/pubs/case/statenlocal.pdf>

U.S. EPA, "Federal Pioneers: Environmentally Preferable Purchasing Success Stories From the Federal Government," September 2000.

<http://www.epa.gov/epp/pubs/case/FedPioneers.pdf>

U.S. EPA, Green Meetings Information.

<http://www.epa.gov/oppt/greenmeetings/>.

Appendix A

Additional EPP Case Studies

A.1 State of Minnesota

A.1.1 Introduction

The Materials Management Division and Minnesota Pollution Control Agency (MPCA) are committed to helping state agencies purchase environmentally preferable products that:

- Contain fewer toxic materials;
- Minimize waste;
- Contain recycled content;
- Conserve energy and water; and
- Contain plant-based materials.

The MPCA is the lead agency in promoting EPP.

A.1.2 Policy Highlights

Through statute and executive order, the state of Minnesota has mandated that state agencies must purchase certain materials that contain recycled content, as well as reduce toxicity by purchasing specific “less toxic” products. For example:

- **Recycled Copier Paper** – All copier paper purchased by state agencies must contain at least 10 percent post-consumer recycled material (per Chapter 16B.122, “Purchase and Use of Paper Stock; Printing”).
- **All Other Recycled Products** – State agencies must buy products made with recycled material when the price does not exceed comparable non-recycled products by more than 10 percent (per Chapter 16B.121, “Purchase of Recycled, Repairable, and Durable Materials”).
- **Less Toxic and Reusable Products** – State agencies shall put special emphasis on using products that are less toxic and generate less waste. State agencies are to promote the waste hierarchy by selecting products that reduce the quantity and toxicity of materials in waste. The commissioner, and state agencies when purchasing under delegated authority, in developing bid specifications, must also consider the extent to which a commodity or product is durable, reusable, or recyclable and marketable through the state resource recovery program and the extent to which the commodity or product contains post-consumer material (per Chapter 16B.121, “Purchase of Recycled, Repairable, and Durable Materials”).

- **Mercury Thermometers Prohibited** – Effective January 1, 2002, thermometers that contain mercury can no longer be sold or distributed in the state. The law covers mercury-based fever thermometers, as well as those used for outdoor temperature readings and cooking (per Chapter 116.92, “Mercury Emissions Reduction”).
- **Mercury Emissions Reduction, Product Bans, and Disposal Bans** – Minnesota has taken a number of steps to keep mercury out of the environment, such as banning the sales of games, toys, and clothing containing mercury; and prohibiting the disposal of mercury-containing fluorescent lamps, thermostats, thermometers, switches, appliances, and medical or scientific instruments (per Chapter 116.92, “Mercury Emissions Reduction”).
- **Printing Guidelines** – Whenever practicable, public entities shall comply with the printing guidelines by choosing recyclable paper, reducing paper waste and selecting less toxic inks (per Chapter 16B.122, “Purchase and Use of Paper Stock; Printing”).
- **Implementation of Pollution Prevention and Resource Conservation by State Governments** – This Executive Order called for the formation of an Interagency Pollution Prevention Advisory Team. One of their tasks – state agencies shall encourage pollution prevention through their purchasing policies and specifications. (Per Executive Order – 99-4).

A.1.3 Tools Utilized

The MPCA has developed several tools to assist local governments, state agencies and businesses to implement the state’s EPP policy. Some tools serve multiple purposes, taking a somewhat holistic approach and educate about and promote a wide audience about multiple environmental issues. The tools include:

- **EPP Guide** – This guide provides information about environmentally preferable products, vendors of products, and product specifications.
- **Recycled Products Directory** – An online recycling markets directory is available to inform purchasers of recycled-content products made in Minnesota.
- **Recycling Markets Directory** – An online directory that helps Minnesota businesses and recyclers find companies that collect or accept recyclable materials. This directory also helps brokers, processors and manufacturers identify sources of recycled feedstocks that can be used to make new products containing recycled materials.
- **Living Green Expo** – The Living Green Expo is a two-day event that showcases products, services, and activities that help people “live green.” During the event in 2006, there were over 19 major sponsors, 14,000 visitors, and 2,200 visitors made a commitment to take environmental action. The Expo is geared more toward individuals and families than governmental entities.
- **Healthy Sustainable Schools** – The MN Pollution Control Agency helps schools incorporate sustainable practices through grant assistance. In 2006, three schools

received this assistance enabling them to implement programs and practices that resulted in reducing waste, toxicity, pollution, and increasing energy efficiency.

- **Governor’s Awards for Pollution Prevention** – Each year outstanding environmental projects and programs throughout the state are recognized through the Governor’s Awards for Excellence in Waste and Pollution Prevention. Awards are presented to businesses and non-profit organizations. Another award program, the MnGREAT Awards program, recognizes public organizations and agencies.
- **Buy Green Power Campaign** – The MPCA works with the Department of Commerce and others to encourage consumers to support clean energy by purchasing renewable energy from their electrical utility provider. The MPCA is modeling environmental stewardship by making a three-year commitment to purchase 450,000 kilowatt hours per year of green power at the St. Paul office, matching the new green power purchases of its employees.
- **The Eco Experience** – A 12-day exhibit at the Minnesota State Fair (co-sponsored by the Fair and the MPCA) partners with more than 140 businesses to present environmental messages to the public at the 12-day Minnesota State Fair. Highlights include a wind turbine, an “eco-home,” a working hydrogen fuel cell, a waste reduction exhibit, wind and solar demonstrations, as well as water monitoring demonstrations.
- **MN Technical Assistance Program (MnTAP)** – The Minnesota Technical Assistance Program, which has been in existence for more than 20 years, has focused on pollution prevention assistance to manufacturing and service industries. Industry specialists help identify efficiency gains and material/chemical substitutions that result in less risk. Outcomes include reduced spending, waste, water consumption, waste disposed, and energy consumption.

MnTAP also operates the Minnesota Materials Exchange program which is a free service that links organizations that have reusable goods they no longer need to those who can use them. By providing a business reuse network, the Materials Exchange program helps prevent usable materials from becoming waste. In the last five years, the Materials Exchange program has helped businesses save over \$7 million and exchange over 30 million pounds of material.
- **Involvement in EPEAT** – The MPCA staff has been instrumental in the development and implementation of the national Electronic Product Evaluation and Assessment Tool (EPEAT). This tool enables purchasers to evaluate and select information technology products that meet their green standards – using less energy, incorporating recycled content, and incorporating other environmental attributes. Agency staff worked with the state Office of Enterprise Technology to incorporate EPEAT into procurement standards that are now available for public entity purchasing in Minnesota, including college and university system purchasing.
- **“Buying Green” Newsletter** – The MPCA develops a quarterly newsletter that is distributed via email and through the MPCA website to interested parties. The

newsletter aims to inform governmental and institutional purchasers about EPP opportunities, and provides a forum for communities, agencies and institutions to share their successes with regards to EPP activities. The newsletter also provides an opportunity for MPCA to share additional EPP resources.

- **Develop Specifications** – The MPCA works with the MN Materials Management Department to develop specifications for environmentally preferable products.
- **Workshops** – When the state budget allows, the MPCA coordinates workshops which are held in different counties to provide an opportunity for vendors and purchasers to come together and share information.
- **Cooperative Purchasing** – The Department of Materials Management allows counties, cities, schools and certain non-profits to participate in state purchasing contracts.

A.2 The Commonwealth of Massachusetts

A.2.1 Introduction

The primary goal of Massachusetts' Recycled Materials Procurement Plan is to use the Commonwealth's purchasing power to reduce the environmental and public health impact of state government and foster markets for EPPs. The Program is a collaborative effort among the Executive Office of Environmental Affairs, the Department of Environmental Protection (DEP) and the Operational Services Division. The Program was launched in May 1988 with the issuance of Executive Order #279, which directed the state's Purchasing Agent to develop a Recycled Materials Procurement Plan, implement a statewide buy recycled program, and establish regulations to guide the program. This effort to establish detailed direction for recycled product procurement was one of the first in the nation. Since that time, additional executive orders have been passed, and procurement reform took place in 1997, promulgating new purchasing regulations which included environmental guidelines. Executive Order 438 established a state sustainability program in 2002. The most recent EPP-related policy passed is Executive Order Number 484, which is described below.

A.2.2 Policy Highlights

Executive Order Number 484 – Established in April 2007. “Leading by Example – Clean Energy and Efficient Buildings.” The program encompasses all of Massachusetts' executive agencies and public institutions. The Order establishes higher energy efficiency standards in the operation of state buildings, setting short and long-term targets and goals to advance clean energy and efficiency, and reduce greenhouse gas emissions that contribute to global warming. It promotes sustainability activities within state government including waste reduction, water conservation, green buildings, alternatives fuels, efficient transportation, and recycling.

A.2.3 Tools Utilized

- **EPP Products Guide and State Contracts** – Massachusetts has developed a guide to provide information about environmentally preferable products purchased by the state, and for which state contracts exist.
- **EPP Buyer Update** – The Buyer Update is an electronic newsletter that informs citizen consumers and purchasing agents about news in the EPP arena.
- **Fact Sheets** – The MA DEP is in the process of developing two-page fact sheets on specific products and product types.
- **MA Lead By Example Program Award Program** – Recognizes outstanding efforts among Commonwealth agencies, public higher education institutions, and municipalities.
- **MA Environmental Purchasing and Sustainability Awards Program** – Recognizes outstanding efforts in purchasing EPPs and implementing other sustainable practices among Commonwealth public sector entities and businesses (stems from Buy Recycled Awards program).
- **Annual EPP Vendor Fair and Conference** – The annual Vendor Fair (typically held in October) brings together vendors of EPP products and potential purchasers.
- **“Try Before You Buy” Program** – In previous years (FY 1997 through FY 2006) funding was made available to assist purchasing agencies and departments in “trying out” a new recycled product or innovative technology. The objective was to gather information concerning product performance and acceptability, and to promote the acceptance of environmentally preferable products that have widespread applications throughout the state.

Appendix B

Model Green Purchasing Ordinance

StopWaste.Org

ENVIRONMENTALLY PREFERABLE PURCHASING
MODEL POLICY - REVISED—9/26/06

PREPARED BY STOPWASTE.ORG
(ALAMEDA COUNTY WASTE MANAGEMENT AUTHORITY
AND SOURCE REDUCTION & RECYCLING BOARD)

1.0 STATEMENT OF POLICY

It is the policy of [organization] to:

- institute practices that reduce waste by increasing product efficiency and effectiveness,
- purchase products that minimize environmental impacts, toxics, pollution, and hazards to worker and community safety to the greatest extent practicable, and
- purchase products that include recycled content, are durable and long-lasting, conserve energy and water, use agricultural fibers and residues, reduce greenhouse gas emissions, use unbleached or chlorine free manufacturing processes, are lead-free and mercury-free, and use wood from sustainably harvested forests.

2.0 PURPOSE

This Policy is adopted in order to:

- conserve natural resources,
- minimize environmental impacts such as pollution and use of water and energy,
- eliminate or reduce toxics that create hazards to workers and our community,
- support strong recycling markets,
- reduce materials that are landfilled,
- increase the use and availability of environmentally preferable products that protect the environment,
- identify environmentally preferable products and distribution systems,

- reward manufacturers and vendors that reduce environmental impacts in their production and distribution systems or services,
- create a model for successfully purchasing environmentally preferable products that encourages other purchasers in our community to adopt similar goals.

3.0 SPECIFICATIONS

3.1 Source Reduction

3.1.1 [Organization] shall institute practices that reduce waste and result in the purchase of fewer products whenever practicable and cost-effective, but without reducing safety or workplace quality.

3.1.2 [Organization] shall purchase remanufactured products such as toner cartridges, tires, furniture, equipment and automotive parts whenever practicable, but without reducing safety, quality or effectiveness.

3.1.3 [Organization] shall require all equipment bought after the adoption of this policy to be compatible with source reduction goals as referred to in this section (3.1), when practicable.

3.1.4 All buyers shall consider short-term and long-term costs in comparing product alternatives, when feasible. This includes evaluation of total costs expected during the time a product is owned, including, but not limited to, acquisition, extended warranties, operation, supplies, maintenance, disposal costs and expected lifetime compared to other alternatives.

3.1.5 Products that are durable, long lasting, reusable or refillable are preferred whenever feasible.

3.1.6 [Organization] requests vendors to eliminate packaging or use the minimum amount necessary for product protection, to the greatest extent practicable.

3.1.7 Packaging that is reusable, recyclable or compostable is preferred, when suitable uses and programs exist.

3.1.8 Vendors shall be encouraged to take back and reuse pallets and other shipping and packaging materials.

3.1.9 Suppliers of electronic equipment, including but not limited to computers, monitors, printers, and copiers, shall be required to take back equipment for reuse or environmentally safe recycling when [organization] discards or replaces such equipment, whenever possible.

3.1.10 [Organization] shall consider provisions in contracts with suppliers of non-electronic equipment that require suppliers to take back equipment for reuse or environmentally safe recycling when [organization] discards or replaces such equipment, whenever practicable.

3.1.11 All documents shall be printed and copied on both sides to reduce the use and purchase of paper, whenever practical.

3.2 Recycled Content Products

3.2.1 All products for which the United States Environmental Protection Agency (U.S. EPA) has established minimum recycled content standard guidelines in the Agency's Comprehensive Procurement Guidelines, such as those for printing paper, office paper, janitorial paper, construction, landscaping, parks and recreation, transportation, vehicles, miscellaneous, and non-paper office products, shall contain the highest postconsumer content practicable, but no less than the minimum recycled content standards established by the U.S. EPA Guidelines.

3.2.2 Copiers and printers purchased shall be compatible with the use of recycled content and remanufactured products.

3.2.3 In accordance with California Public Contract Code, Sec. 10409, [organization] shall purchase re-refined lubricating and industrial oil for use in its vehicles and other equipment, as long as it is certified by the American Petroleum Institute (API) as appropriate for use in such equipment.

3.2.4 When specifying asphalt concrete, aggregate base or portland cement concrete for road construction projects, [organization] shall use recycled, reusable or reground materials when practicable.

3.2.5 [Organization] shall specify and purchase recycled content transportation products, including signs, cones, parking stops, delineators, channelizers and barricades, which shall contain the highest postconsumer content practicable, but no less than the minimum recycled content standards established by the U.S. EPA Comprehensive Procurement Guidelines.

3.2.6 All pre-printed recycled content papers intended for distribution that are purchased or produced shall contain a statement that the paper is recycled content. Whenever feasible, the statement should indicate the percentage of postconsumer recycled content it contains.

3.3 Energy and Water Savings

3.3.1 Where applicable, energy-efficient equipment shall be purchased with the most up-to date energy efficiency functions. This includes, but is not limited to, high efficiency space heating systems and high efficiency space cooling equipment.

3.3.2 When practicable, [organization] shall replace inefficient interior lighting with energy efficient equipment.

3.3.3 When practicable, [organization] shall replace inefficient exterior lighting, street lighting and traffic signal lights with energy-efficient equipment. Exterior lighting shall be minimized where possible to avoid unnecessary lighting of architectural and landscape features while providing adequate illumination for safety and accessibility.

3.3.4 All products purchased by [organization] and for which the U. S. EPA Energy Star certification is available shall meet Energy Star certification, when practicable. When Energy Star labels are not available, [organization] shall choose energy-efficient products that are in the upper 25% of energy efficiency as designated by the Federal Energy Management Program.

3.3.5 [Organization] shall purchase water-saving products whenever practicable. This includes, but is not limited to, high-performance fixtures like toilets, low-flow faucets and aerators, and upgraded irrigation systems.

3.4 Green Building

3.4.1 All building and renovations undertaken by [organization] shall follow Green Building Practices for design, construction, and operation, where appropriate, as described in the LEED™ Rating System.

3.5 Landscaping

3.5.1 All landscape renovations, construction and maintenance performed by [organization], including workers and contractors providing landscaping services for [organization], shall employ Bay-Friendly Landscaping or sustainable landscape management techniques for design, construction and maintenance whenever possible, including, but not limited to, integrated pest management, grasscycling, drip irrigation, composting, and procurement and use of mulch and compost that give preference to those produced from regionally generated plant debris and/or food waste programs.

3.5.2 Plants should be selected to minimize waste by choosing species for purchase that are appropriate to the microclimate, species that can grow to their natural size in the space allotted them, and perennials rather than annuals for color. Native and drought-tolerant plants that require no or minimal watering once established are preferred.

3.5.3 Hardscapes and landscape structures constructed of recycled content materials are encouraged. [Organization] shall limit the amount of impervious surfaces in the landscape, wherever practicable. Permeable substitutes, such as permeable asphalt or pavers, are encouraged for walkways, patios and driveways.

3.6 Toxics and Pollution

3.6.1 To the extent practicable, [organization] shall purchase, or require janitorial contractors to supply, industrial and institutional cleaning products that meet Green Seal certification standards for environmental preferability and performance.

3.6.2 To the extent practicable, [organization] shall purchase, or require janitorial contractors to supply, vacuum cleaners that meet the requirements of the Carpet and Rug Institute “Green Label” Testing Program – Vacuum Cleaner Criteria, are capable of capturing 96% of particulates 0.3 microns in size, and operate with a sound level less than 70dBA. Where possible and as applicable, other janitorial cleaning equipment shall be capable of capturing fine particulates, removing sufficient moisture so as to dry within 24 hours, operate with a sound level less than 70dBA, and use high-efficiency, low-emissions engines.

3.6.3 The use of chlorofluorocarbon and halon-containing refrigerants, solvents and other products shall be phased out and new purchases of heating/ventilating/air conditioning, refrigeration, insulation and fire suppression systems shall not contain them.

3.6.4 All surfactants and detergents shall be readily biodegradable and, where practicable, shall not contain phosphates.

3.6.5 When maintaining buildings and landscapes, [organization] shall manage pest problems through prevention and physical, mechanical and biological controls. [Organization] may either adopt and implement an organic pest management policy and practices or adopt and implement an Integrated Pest Management (IPM) policy and practices using the least toxic pest control as a last resort.

3.6.6 When maintaining buildings, the [organization] shall use products with the lowest amount of volatile organic compounds (VOCs), highest recycled content, and low or no formaldehyde when practicable when purchasing materials such as paint, carpeting, adhesives, furniture and casework.

3.6.7 [Organization] shall reduce or eliminate its use of products that contribute to the formation of dioxins and furans. This includes, but is not limited to:

- Purchasing paper, paper products, and janitorial paper products that are unbleached or that are processed without chlorine or chlorine derivatives, whenever possible.
- Prohibiting purchase of products that use polyvinyl chloride (PVC) such as, but not limited to, office binders, furniture, flooring, and medical supplies whenever practicable.

3.6.8 [Organization] shall purchase products and equipment with no lead or mercury whenever possible. For products that contain lead or mercury, [organization] shall give preference to those products with lower quantities of these metals and to vendors with established lead and mercury recovery programs.

3.6.9 [Organization] shall specify that desktop computers, notebooks and monitors purchased meet, at a minimum, all Electronic Product Environmental Assessment Tool (EPEAT) environmental criteria designated as “required” as contained in the IEEE 1680 Standard for the Environmental Assessment of Personal Computer Products, whenever practicable.

3.6.10 When replacing vehicles, [organization] shall consider less-polluting alternatives to diesel such as compressed natural gas, bio-based fuels, hybrids, electric batteries, and fuel cells, as available.

3.7 Forest Conservation

3.7.1 To the greatest extent practicable, [organization] shall not procure wood products such as lumber and paper that originate from forests harvested in an environmentally unsustainable manner. When possible, [organization] shall give preference to wood products that are certified to be sustainably harvested by a comprehensive, performance-based certification system. The certification system shall include independent third-party audits, with standards equivalent to, or stricter than, those of the Forest Stewardship Council certification.

3.7.2 [Organization] encourages the purchase or use of previously used or salvaged wood and wood products whenever practicable.

3.8 Bio-Based Products

3.8.1 Vehicle fuels made from non-wood, plant-based contents such as vegetable oils are encouraged whenever practicable.

3.8.2 Paper, paper products and construction products made from non-wood, plant-based contents such as agricultural crops and residues are encouraged whenever practicable.

3.8.3 Bio-based plastic products that are biodegradable and compostable, such as bags, film, food and beverage containers, and cutlery, are encouraged whenever practicable.

3.8.4 Compostable plastic products purchased shall meet American Society for Testing and Materials (ASTM) standards as found in ASTM D6400-04. Biodegradable plastics used as coatings on paper and other compostable substrates shall meet ASTM D6868-03 standards.

3.8.5 Proof of compliance with ASTM standards for compostable, biodegradable and degradable plastic products shall be provided by vendors of such products, upon request. One acceptable proof of compliance for compostable plastic products will be certification by the Biodegradable Products Institute (BPI).

4.0 PRIORITIES

4.1 The health and safety of workers and citizens is of utmost importance and takes precedence over all other policies.

4.2 [Organization] has made significant investments in developing a successful recycling system and recognizes that recycled content products are essential to the continuing viability of that recycling system and for the foundation of an environmentally sound production system. Therefore, to the greatest extent practicable, recycled content shall be included in products that also meet other specifications, such as chlorine free or bio-based.

4.3 Nothing contained in this policy shall be construed as requiring a department, purchaser or contractor to procure products that do not perform adequately for their intended use, exclude adequate competition, or are not available at a reasonable price in a reasonable period of time.

4.4 Nothing contained in this policy shall be construed as requiring the [organization], department, purchaser or contractor to take any action that conflicts with local, state or federal requirements.

5.0 IMPLEMENTATION

5.1 The [Director of Purchasing, Director of Finance, other responsible director] shall implement this policy in coordination with other appropriate [organization] personnel.

5.2 As applicable, successful bidders shall certify in writing that the environmental attributes claimed in competitive bids are accurate. In compliance with State law, vendors shall be required to specify the minimum or actual percentage of recovered and postconsumer material in their products, even when such percentages are zero.

5.3 Upon request, buyers making the selection from competitive bids shall be able to provide justification for product choices that do not meet the environmentally preferable purchasing criteria in this policy.

5.4 Purchasers shall include businesses certified by the Bay Area Green Business Program in requests for products and services.

5.5 Vendors, contractors and grantees shall be encouraged to comply with applicable sections of this policy for products and services provided to the [organization], where practicable.

6.0 PROGRAM EVALUATION

6.1 The [Director of Finance, Director of Purchasing, other position responsible for implementing this policy] shall periodically evaluate the success of this policy's implementation.

7.0 DEFINITIONS

7.1 "American Society for Testing and Materials" means ASTM International, an open forum for the development of high quality, market relevant international standards use around the globe.

7.2 "Bay Area Green Business Program" is a partnership of governments and businesses that certifies the environmental performance of government agencies and businesses.

7.3 "Bay-Friendly Landscaping" means working with the natural ecosystems of the San Francisco Bay Area to foster soil health, to reduce runoff and pollution, prevent and reuse plant waste, conserve water and other natural resources. Bay-Friendly Landscaping practices are described in the Bay-Friendly Landscape Guidelines, by StopWaste.Org.

7.4 "Bio-Based Products" means commercial or industrial products (other than food or feed) that utilize agricultural crops or residues but does not include products made from forestry materials.

7.5 "Biodegradable plastic" means the degradation of the plastic must occur as a result of the action of naturally occurring microorganisms.

7.6 "Biodegradable Products Institute" (BPI) is a multi-stakeholder association of key individuals and groups from government, industry and academia, which promotes the use, and recycling of biodegradable polymeric materials (via composting). BPI does not create standards but certifies products that demonstrate they meet the requirements in ASTM D6400 or D6868, based on testing in an approved laboratory.

7.7 "Buyer" means anyone authorized to purchase or contract for purchases on behalf of [organization] or its subdivisions.

7.8 "The Carpet and Rug Institute" (CRI) is the national trade association representing the carpet and rug industry. CRI has developed and administered the "Green Label" indoor air quality testing and labeling program for carpet, adhesives, cushion materials and vacuum cleaners. The "Green Label Plus" testing program incorporates additional requirements to meet California's Collaborative for High Performance Schools low emitting materials criteria.

7.9 "Chlorine free" means products processed without chlorine or chlorine derivatives.

7.10 “Compostable plastic” means plastic that is biodegradable during composting to yield carbon dioxide, water and inorganic compounds and biomass, at a rate consistent with other known compostable materials and leaves no visually distinguishable or toxic residues.

7.11 “Contractor” means any person, group of persons, business, consultant, designing architect, association, partnership, corporation, supplier, vendor or other entity that has a contract with [organization] or serves in a subcontracting capacity with an entity having a contract with [organization] for the provision of goods or services.

7.12 “Degradable plastic” means plastic that undergoes significant changes in its chemical structure under specific environmental conditions.

7.13 “Dioxins and furans” are a group of chemical compounds that are classified as persistent, bio-accumulative, and toxic by the U.S. Environmental Protection Agency (EPA).

7.14 “Energy Star” means the U.S. EPA’s energy efficiency product labeling program.

7.15 “Energy Efficient Product” means a product that is in the upper 25% of energy efficiency for all similar products, or that is at least 10% more efficient than the minimum level that meets Federal standards.

7.16 “Electronic Product Environmental Assessment Tool” (EPEAT) is a procurement tool to help institutional purchasers in the public and private sectors evaluate, compare and select desktop computers, notebooks and monitors based on their environmental attributes.

7.17 “Federal Energy Management Program” is a program of the Department of Energy that issues a series of Product Energy Efficiency Recommendations that identify recommended efficiency levels for energy-using products.

7.18 The “Forest Stewardship Council” is a global organization that certifies responsible, on-the-ground forest management according to rigorous standards developed by a broad variety of stakeholder groups.

7.19 “Green Building Practices” means a whole-systems approach to the design, construction, and operation of buildings and structures that helps mitigate the environmental, economic, and social impacts of construction, demolition, and renovation. Green Building Practices such as those described in the LEED™ Rating System, recognize the relationship between natural and built environments and seeks to minimize the use of energy, water, and other natural resources and provide a healthy productive environment.

7.20 “Green Seal” is an independent, non-profit environmental labeling organization. Green Seal standards for products and services meet the U.S. EPA’s criteria for third-party certifiers. The Green Seal is a registered certification mark that may appear only on certified products.

7.21 “Integrated Pest Management (IPM)” is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are

needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

7.22 “LEED™ Rating System” means the most recent version of the Leadership in Energy and Environmental Design (LEED™) Commercial Green Building Rating System, or other related LEED™ Rating System, approved by the U.S. Green Building Council and designed for rating new and existing commercial, institutional, and high-rise residential buildings.

7.23 “Organic Pest Management” prohibits the use and application of toxic chemical pesticides and strives to prevent pest problems through the application of natural, organic horticultural and maintenance practices. All pest control products shall be in keeping with, but not limited to, those products on the approved list of California Certified Organic Foods (CCOF).

7.24 “Postconsumer Material” means a finished material which would normally be disposed of as a solid waste, having reached its intended end-use and completed its life cycle as a consumer item, and does not include manufacturing or converting wastes.

7.25 “Practical” and “Practicable” mean whenever possible and compatible with local, state and federal law, without reducing safety, quality, or effectiveness and where the product or service is available at a reasonable cost in a reasonable period of time.

7.26 “Preconsumer Material” means material or by-products generated after manufacture of a product is completed but before the product reaches the end-use consumer. Preconsumer material does not include mill and manufacturing trim, scrap, or broke which is generated at a manufacturing site and commonly reused on-site in the same or another manufacturing process.

7.27 “Recovered Material” means fragments of products or finished products of a manufacturing process, which has converted a resource into a commodity of real economic value, and includes preconsumer and postconsumer material but does not include excess resources of the manufacturing process.

7.28 “Recycled Content” means the percentage of recovered material, including preconsumer and postconsumer materials, in a product.

7.29 “Recycled Content Standard” means the minimum level of recovered material and/or postconsumer material necessary for products to qualify as “recycled products.”

7.30 “Recycled Product” means a product that meets [organization’s] recycled content policy objectives for postconsumer and recovered material.

7.31 “Remanufactured Product” means any product diverted from the supply of discarded materials by refurbishing and marketing said product without substantial change to its original form.

7.32 “Reused Product” means any product designed to be used many times for the same or other purposes without additional processing except for specific requirements such as cleaning, painting or minor repairs.

7.33 “Source Reduction” refers to products that result in a net reduction in the generation of waste compared to their previous or alternate version and includes durable, reusable and remanufactured products; products with no, or reduced, toxic constituents; and products marketed with no, or reduced, packaging.

7.34 “U.S. EPA Guidelines” means the Comprehensive Procurement Guidelines established by the U.S. Environmental Protection Agency for federal agency purchases as of May 2002 and any subsequent versions adopted.

7.35 “Water-Saving Products” are those that are in the upper 25% of water conservation for all similar products, or at least 10% more water-conserving than the minimum level that meets the Federal standards.

8.0 EFFECTIVE DATES

8.1 This policy shall take effect on [date].

Issue Paper #2

Commercial, Industrial, Institutional and Multifamily Recycling

2.1 Overview

As part of the planning effort to update the Broome County Local Solid Waste Management Plan, a Continuous Improvement Workshop was held in July of 2008. An outcome of the workshop included identifying upstream diversion strategies including fostering additional commercial and multifamily recycling through more comprehensive programs. This issue paper aims to address commercial and multifamily recycling challenges and offer recommendations for the County to consider as a means to improve waste diversion from this sector.

Recycling collection programs at commercial and industrial sites, institutional facilities (i.e., schools, universities, hospitals, prisons, etc.) and multifamily buildings¹ present issues that are unique compared to residential recycling collection from single-family homes. This issue paper will discuss:

- Common recycling challenges for the multifamily and commercial/industrial/institutional (CII) sectors and provide recommendations to overcome these challenges;
- Implementation requirements to improve CII and multifamily recycling programs;
- Capital and operating expenses related to improving CII and multifamily recycling programs;
- Diversion potential;
- Stakeholder concerns; and
- Benefits and drawbacks of implementing an advanced CII and multifamily recycling program.

2.2 Common Recycling Challenges

Some recycling challenges are universal while others differ between the multifamily and CII sectors. For that reason, some of the discussions are listed separately below.

¹ In most municipalities, larger multifamily buildings (usually 5 units or more) are considered commercial accounts and their garbage and recyclable materials are collected separately from residential routes consisting of single-family homes. For this paper, large multifamily dwelling units are the focus.

2.2.1 Site Issues

Oftentimes businesses and multifamily buildings have limited storage space for recycling containers. Any extra outdoor space is usually reserved for employee, customer, or tenant parking.

Some cities and counties have passed ordinances that require adequate outside space be designated for the placement of recycling collection containers when a new CII establishment or multifamily housing developer applies for a building permit. (This is often required in building plans for garbage dumpsters, however space for recycling containers is frequently overlooked.). The benefit to these types of ordinances isn't immediate, but in the long-run the local government would eliminate or at least reduce this barrier to recycling. Many municipalities adopt minimum requirements for space for recycling containers at all new developments. Examples of guidelines are provided in Appendix A.

2.2.1.1 Commercial/Industrial/Institutional Locations

In addition to dumpsters, which are usually used for the collection of old corrugated cardboard (OCC) at CII sites, most haulers offer wheeled carts to be used for the collection of other recyclable materials such as paper, plastic, cans and glass. The carts take up less space and can be placed outside next to the garbage dumpsters.

Depending on the size and layout of the business, it may be possible to store the recycling carts inside the facility and then wheel them outside on collection day. For large office buildings, recycling collection bins should be located on each floor or in a common area inside the building and then brought down to a centralized area for consolidation. In some situations it might make sense for businesses to share recycling containers/service.

2.2.1.2 Multifamily Buildings

For multifamily buildings with several outdoor garbage collection points, recycling containers should be located next to every garbage dumpster so residents have the option to recycle when disposing of their trash. Some larger apartment buildings have recycling collection bins inside the building and then maintenance staff transport the materials outside for collection.

Also, many residents lack adequate space inside their apartment to store recyclable materials. The County may want to consider providing small recycling containers to each dwelling unit to transport recyclable materials to a central collection location. Examples include small 5- to 10-gallon bins or reusable cloth tote bags. A list of companies that provide recycling bins and tote bags well-suited for apartment recycling is provided in Appendix B. Another option to address storage issues would be for apartment buildings to have recycling collection bins on each floor or in a common area inside the building. However that would require the building staff (or a dedicated resident) be responsible for transferring the materials from the inside bins to the larger collection containers located outside. It is also important to ensure that, if possible, central recycling containers are located in high-traffic areas or areas that are

frequented by residents – near the trash bin is ideal. The recycling/trash area should also be clean and well-lit.

2.2.2 High Turnover Rates

2.2.2.1 Commercial Property Owner/Lease Company Turnover

Commercial property is bought and sold periodically resulting in changes to a building's owner or leasing company. As a result of these changes, the recycling program can sometimes suffer. Some owners and leasing companies may view recycling as a high priority, while others may not. If a property owner or leasing company does not consider recycling a high priority, collection programs put in place by the previous owner may fall by the wayside, resulting in an increase in the quantity of garbage collected. This is especially true if recycling laws are not enforced and/or education is weak.

Considerations for improvement include creating recycling information packets specifically designed for commercial property owners and leasing companies. The information could include detailed waste reduction, reuse, and recycling tips to be forwarded to building tenants, as well as a copy of the County's recycling ordinances. The packets could even be tailored for specific business types such as offices, retail businesses, restaurants, etc. The local Chamber of Commerce could be enlisted to distribute the information packets to new businesses as they open in the County, as well as distribute information to current businesses.

Another approach is to ask building managers to provide the County with names and addresses of new commercial tenants on a monthly or quarterly basis so that the County can send out information packets as needed.

2.2.2.2 Business Manager Turnover

Just as commercial property is bought and sold periodically, managers of commercial property, retail businesses, and multifamily properties turn over periodically. Knowledge and enthusiasm about recycling programs and responsibilities can wane when such turnover occurs.

If not already created, a database of businesses in the County could be generated and letters sent annually asking for updated contact information. The County could inquire about any recycling issues, or the need for more information packets, signage, etc. The County might consider hosting an event periodically where a working session could be conducted in order to gain an understanding of specific barriers business managers face, and allow the sharing of information and suggestions among managers. Functions like these often motivate managers to reinvigorate their recycling program, and also show that the County is interested in helping, not just enforcing. Providing this information by email to businesses could save the County money on publishing and mailing information, as well as reduce the consumption of paper.

2.2.2.3 Resident Turnover

Because the nature of apartment building living isn't always a long-term living arrangement for a majority of tenants, there tends to be a constant flow of incoming and outgoing residents.

To combat this, a "new resident" information packet could be created that is specifically designed for multifamily residents and provides recycling and waste reduction information. Packets could be provided to apartment managers and ask that they be delivered to each new resident. County staff should work with building owners, managers, and condo associations to ensure this is carried out in order to be successful. Or apartment managers could be asked to provide the County with names and addresses of new residents on a monthly or quarterly basis so that the County can send out information packets. For examples of multifamily recycling information created by other municipalities, as well as a list of multifamily recycling resources, see Appendix C.

2.2.3 Minimal Incentive to Recycle at Multifamily Buildings

In most cases, residents in multifamily dwelling units do not receive a separate bill for garbage and recycling services, as fees for these services are usually prorated and each unit's portion is included in their monthly rent. Consequently, there is not a financial incentive for the tenants to recycle or reduce the amount of garbage they generate. Furthermore, there is little accountability for residents, as it is not known who is recycling and who is not.

The County could consider conducting a survey of residents from multifamily buildings with low participation rates in an attempt to understand residents' particular needs and obstacles to recycling. A sample survey is provided in Appendix D.

Another angle is to promote environmental stewardship by asking residents to recycle, conserve natural resources and to take responsibility for protecting the County's environment. The building manager, County staff, and/or volunteers (for example, environmental club high school students) could set up a recycling education "booth" on-site (perhaps as people are returning from work) to distribute information about the environmental benefits of recycling. This, in conjunction with the distribution of apartment-sized recycling bins or tote bags, would demonstrate to the residents the commitment to recycling by the County and the building manager/owner. It would also provide effective one-on-one recycling education and provide residents with the opportunity to have their recycling questions answered.

2.2.4 Recycling and Waste Reduction Education

Providing recycling information to commercial establishments and residences in large multifamily buildings can be difficult due to the potentially high turnover rate of multifamily residents and property owners and/or managers. Suggested improvements to increase recycling are outlined in the sections below.

2.2.4.1 Recycling Education

General recycling reminders should be provided at least once per year to all residents and businesses. As mentioned earlier, information packets for commercial businesses, or at least new establishments, is one way to get the message out. Listed below are other recommendations for improving recycling public education to the CII sector and multifamily residents.

- **Website** – Many people look for recycling information on their municipalities' website. The Internet is a relatively low-cost means of providing information. In addition to the current recycling guide, it is recommended that the County add more detailed commercial and multifamily recycling information and tips/suggestions to its website, so businesses and residents have a source to turn to for easily accessible information. See Appendix C for examples of other municipalities' websites specifically designed to provide information regarding commercial and multifamily recycling.
- **Clear Signage** – Recycling areas should have clear signage, both on the containers and above containers (e.g., posters), if possible, explaining which recyclable items should be placed in each container. Text should be large and bold and signage with pictures is generally preferable.
- **Promotional Items** – Promotional items such as pens, magnets, calendars, etc. (specifically made with recycled-content materials) are an inexpensive way to convey the County's recycling message to businesses and multifamily residents in a way that has the potential to be seen over and over again.
- **Brochure or Flyer Developed Exclusively for Multifamily Residents** – A recycling brochure or a flyer should explain the basics of the County's recycling program, including what materials are accepted in the program and how to prepare the items for collection. Ideally, additional information addressing apartment building recycling issues would be most beneficial. In addition, residents should be reminded that garbage and recycling collection services are not free, but are included in their rent and if the amount of garbage increases, it may result in the need for increased collection service (i.e., larger garbage containers or more frequent collections per week), which could result in an increase in rental fees.

Public education pieces that are sent through the mail and addressed to the resident by name are more likely to be read than items addressed to "Resident." However, if the cost of postage is prohibitive, the County could hand-deliver brochures to each multifamily building or property manager and ask that they distribute the information to their tenants. In general, brochures are most effective when they are printed in more than one color and have pictures or drawings to emphasize the message. Also, in communities with large populations of non-English speaking residents, brochures printed in additional languages and/or brochures that feature pictures, not words, help to educate more of the population.

- **Door Hangers for Multifamily Buildings** – Because multifamily residents are often “on the go,” delivering door hangers to their apartments may be a convenient and effective means of providing a friendly reminder about the recycling program.
- **Letter to Multifamily Building Managers and Landlords** – By sending a separate letter directed toward multifamily building managers and landlords (especially if addressed to the individual by name), the County may achieve better recycling participation from multifamily dwelling units. The letter should not only reference the County’s Mandatory Source Separation Law, but also offer assistance in the form of a site visit or site audit, especially for buildings that are struggling with participation or contamination issues. If at all possible, County staff should periodically deliver printed materials to building managers and landlords, and while on-site, visit the recycling area(s). If warranted, suggestions for improving the site should be provided to the manager or landlord.
- **Workshops for CII Property Owners/Managers, Multifamily Building Managers and Landlords** - The County currently contracts with Cornell Cooperative Extension (CCE) for direct educational outreach. CCE could be tasked with hosting recycling workshops specifically designed for CII and/or multifamily building managers and landlords as a way to improve recycling and overcome recycling barriers at these specific types of buildings.

Provided below are broader recommendations for developing effective public education materials. Some of these options may not be financially feasible for the County, but they are included here for future consideration.

- When designing public education brochures and information pieces, consider using a consistent “look” in all pieces (i.e., use the same font, colors, logo, mascot, etc.). Residents will eventually recognize these as recycling information pieces and will hopefully save them and reference them when needed.
- Increase the public education budget to expand the visibility of the County’s recycling program. It is recommended that at least \$1.50 per household, per year, be budgeted for public education.
- Consider partnering with the County’s Environmental Management Council (EMC) for dissemination of public education and outreach information. The EMC is the County’s citizen advisory board for local environmental matters. Each year the EMC budgets for staff support, technical assistance, planning, and research and development assistance to the County’s Solid Waste Management Division.²
- Consider hiring a college intern or part-time staff person to help with CII and multifamily recycling-related tasks.

² For 2009, the EMC’s proposed budget to assist the Solid Waste Management Division was slightly less than \$10,000, a portion of which is allocated for planning and technical assistance.

2.2.4.2 Waste Reduction Education for Businesses

The advantages of waste reduction are numerous. Waste reduction impacts the economic health of all types of businesses, from corner stores to international corporations. For industrial entities (e.g., those manufacturing goods), there is a built-in economic incentive to minimize waste, as inputs are generally purchased, and no business wishes to waste a commodity.

The County could consider providing businesses with waste reduction education and tools to assist with:

- **Estimating Disposal Costs** – Many businesses are unaware of the cost savings that can be attributed to waste reduction and recycling. Worksheet A in Appendix E provides the steps and equations to estimate disposal costs.
- **Conducting a Waste Analysis** – Businesses can gain valuable knowledge by conducting a waste analysis or composition study of their waste stream. Worksheet B in Appendix E provides options for estimating the types and quantities of materials in a company's waste stream. With this information, a business can increase its recycling efforts to capture recyclable materials that are currently being thrown in the garbage. A waste analysis also provides insight to where waste reduction efforts could be focused. For example, large quantities of paper towels from restrooms could be reduced by installing hand dryers or cloth towels; and large quantities of paper cups in the waste stream could be eliminated by using ceramic mugs or glassware. There is potential to realize cost savings due to decreased number of pulls for disposal or decreased size of disposal containers. If the County were able to hire a college intern or part-time staff person, they could provide waste analysis assistance to businesses.
- **Tracking Progress** – As with the United Way Campaign and other similar charities, a “thermometer-like” poster that shows progress to date can help motivate employees to recycle.
- **Marketing** – Many cities and counties provide free marketing to businesses that implement and maintain successful recycling programs. Examples include mention in the municipal newsletter, on a web page, or a sticker placed on the front door of the business, which will appeal to environmentally-conscious customers. This method of “social marketing” is increasing in popularity as individuals are more frequently weighing how “green” a business is when deciding which businesses to support.
- **Incentives and Award Programs** – Businesses should recognize individual employees and departments that are particularly successful in reducing waste.

To encourage businesses to institute waste reduction strategies, the following messages should be conveyed:

Economic gain – Controlling raw material waste and reducing waste disposed are increasingly important business goals, which can often result in reduced costs. Worksheets C and D in Appendix E can assist with evaluating the costs of a waste

reduction or recycling program as well as calculating avoided collection and disposal costs.

Enhanced product and business image – The benefits of waste reduction extend beyond the short-term economic advantages. U.S. consumers are increasingly changing purchasing habits based on the environmental records of products and companies with sustainable goals.

Improved employee morale – Waste reduction programs have also served as an effective tool for improving employee morale. Many programs provide ideal opportunities to involve employees in organizational decision making and team work.

The County and its cities, towns, and villages have the opportunity to set an example for reducing waste by implementing source reduction policies and directives in-house. Similar to waste assessments for businesses, County and municipal staff should conduct site visits at all government offices and buildings to not only improve recycling efforts, but also look for opportunities to increase source reduction.

2.2.5 Enforcement of Recycling Regulations

Broome County mandates that all businesses and residents separate their recyclable materials from the waste stream for collection under the County's Mandatory Source Separation Law (Chapter 179, Article IV of the Broome County Charter and Administrative Code). Materials that must be source-separated include paper, glass, metals, plastics, leaves, yard wastes, tires, batteries and household hazardous waste (HHW), per Section 179-26.B of the Code.

While this law is difficult to enforce, the County should consider tracking CII and multifamily recycling program data by conducting an inventory of each business and multifamily building to determine what recycling services are currently being offered. This could be a daunting task if done manually, however the County could survey the sites via a form letter or provide the option of submitting data electronically by implementing a web-based data collection program, so that businesses and multifamily buildings can conveniently report what type of recycling program they have in place. Eventually the program could be expanded to track tonnage data and become a tool for the County to monitor its waste diversion programs and concentrate its efforts on areas identified as needing improvement.

For example, a company called Emerge³ offers a web-based program called Re-TRAC™. Their program is designed to assist communities in managing their data and reporting activities by allowing users to:

- Collect MSW and recycling data over the Internet;
- Keep data organized in a searchable, secure database;
- Conduct program performance analyses; and
- Automatically generate annual reports.

³ Website: <http://www.emergeknowledge.com/>

Some municipalities use Re-TRAC to efficiently obtain and track MSW and recycling tonnage data. Lancaster County (PA) Solid Waste Management Authority implemented Re-TRAC as a way to reduce its staff's time that had been spent collecting, organizing and reporting MSW and recycling data and is so far pleased with the results⁴.

Once the County has established an inventory of CII and multifamily recycling programs and service levels, it can work to achieve the following:

- Determine sites with low recycling participation rates;
- Target individual multifamily buildings or businesses;
- Determine why residents or employees within those buildings do not recycle; and
- Develop specific strategies for increasing recycling within these businesses or buildings.

2.3 Implementation Requirements

Implementing an advanced CII and multifamily recycling program would likely require additional staff time (plus assistance from CCE, the EMC or a college intern) because one of the main components to a successful program is increased education.

In addition, coordination with the recycling haulers is key to making the program a success. In Broome County, the majority of CII sites and multifamily buildings are serviced by private haulers. In certain cities or towns, municipal crews may service businesses and apartment buildings. Depending on the hauler, the recyclable materials are collected either commingled in one container (single-stream) or the fiber is kept separate from the glass, metal and plastic containers (dual-stream). The collection method is determined by the hauler and/or processor. This could require that some of the education materials be tailored to a particular collection method.

2.4 Capital and Operating Expenses

The capital and operating expenses to implement an advanced CII and multifamily recycling program would be dependent on what ideas or recommendations the County chooses to implement. As stated in Section 2.3, Implementation Requirements, an advanced recycling program would likely require additional staff time for increased education efforts (including designing and distributing education pieces, website development, etc.), possible site visits and audits, additional data tracking, etc. Capital expenditures could include, but not be limited to, the purchase of promotional and education pieces, the purchase of software for a data collection program, and the purchase of bins or tote bags for multifamily units.

⁴ Source: Re-TRAC Client Profile, "Re-TRAC Performance Exceeds Expectations in Lancaster County." http://www.emergeknowledge.com/pdfs/Lancaster_Profile.pdf

2.5 Diversion Potential

By implementing an advanced CII and multifamily recycling program, the County could see significant increases in waste diversion. The extent of the diversion is difficult to measure, as it would be dependent on how much staff time and financial resources the County plans to dedicate to these programs.

It is likely that with each additional recycling program improvement, expansion, policy, or service level, the County would most likely see an increase in diversion. This issue paper provides numerous suggestions for improving or enhancing CII and multifamily recycling programs, including:

- Passing an ordinance that requires adequate outside space be designated for the placement of recycling collection containers at new CII or multifamily sites;
- Providing small recycling containers or bags to each multifamily dwelling unit to transport recyclable materials to a central collection location;
- Creating recycling information packets specifically designed for commercial property owners and leasing companies;
- Hosting a working session with business managers to discuss barriers to recycling and offer information and suggestions for improving recycling in the workplace;
- Creating a “new resident” recycling and waste reduction information packet specifically designed for multifamily residents;
- Designing and distributing multifamily recycling educational tools such as flyers, brochures, door hangers, promotional items (calendars, pens, magnets), etc.;
- Conducting a survey of residents from multifamily buildings with low participation rates;
- Expanding the commercial and multifamily recycling information on the County’s website;
- Providing CII sites and multifamily buildings with standard, consistent signage for recycling areas including posters and labels for collection containers;
- Hiring a college intern or part-time staff person to help with CII and multifamily recycling-related tasks;
- Conducting waste analyses or composition studies for businesses;
- Enforcing mandatory recycling regulations; and
- Tracking CII and multifamily recycling program data either manually or via a web-based data collection system.

Obviously, the more time and effort the County can put towards CII and multifamily recycling issues, the greater the potential of increasing recycling participation and waste diversion.

2.6 Addressing Stakeholder Concerns

The stakeholders most impacted by changes to the County's CII and multifamily recycling programs include business and multifamily building owners/managers and recycling haulers.

To address stakeholder concerns, it is recommended the County work with the EMC's Recycling and Waste Management Committee or form an advisory or ad-hoc committee to promote dialogue between the major players. The committee could consist of County staff, recycling collection haulers, landlords/building owners/managers, business owners and managers, and condominium or homeowner association representatives. Discussions should include what is working, what obstacles to collecting recyclable materials are the haulers encountering, what do business owners perceive to be barriers to recycling, what are the obstacles to increasing participation, etc. The group should be encouraged to share ideas and examples of successful programs, and work together to solve CII and multifamily recycling issues. A pilot study could be coordinated among willing haulers and businesses or multifamily buildings as a way to test a new collection approach, or education tactic. The committee approach allows haulers and business and multifamily managers to see each others' perspectives, which can be invaluable.

2.7 Benefits and Drawbacks

Implementing an advanced CII and multifamily recycling program has benefits as well as drawbacks, as outlined below.

2.7.1 Benefits

The benefits to the County may include, but not be limited to the following:

- A potential increase in recycling participation from businesses and multifamily buildings;
- A potential increase in the quantities of recyclable materials collected in the County;
- A potential decrease in the amount of waste disposed at the Broome County Landfill, thus increasing the life of the Landfill;
- A potential increase in cost-savings for business and multifamily building owners as a result of downsizing solid waste collection container sizes and/or service frequency levels; and
- An overall increase in awareness of recycling and environmental-related issues.

2.7.2 Drawbacks

The drawbacks to implementing an advanced CII and multifamily recycling program are strictly financial. Most program additions or enhancements would require the County to increase funding for additional staff and expenses.

It should also be noted that by increasing the quantities of recyclable materials collected, the County could see an increase in processing fees charged by Waste Management (WM) Recycle America in Binghamton, if the materials were brought to that particular materials recovery facility (MRF). The County has a contract with WM Recycle America for recyclable materials processing, however haulers and municipalities may choose to deliver their materials to any of the four MRFs in the region. Any fees paid for the processing of recyclable materials are collectively less expensive when compared to the cost of landfill disposal on a per ton basis or per cubic yard of air space.

However, when considering the “cost” of recycling programs there are both “economic” considerations and “non-economic” considerations. Under economic considerations, the County must compare the cost of recycling programs with the cost of landfill disposal, including transportation costs and long term disposal obligations after the landfill is closed (post-closure obligations). For “non-economic” considerations there are factors such as environmental sustainability, carbon footprint, public desire for and participation in recycling, and New York State Rules and Regulations. These factors should all be considered as the County formulates its integrated solid waste management planning efforts.

Appendix A

Examples of Space Requirements For Recycling Containers at Commercial and Multifamily Buildings

“Trash and Recycling Enclosures - Design Considerations,”
City of Fort Collins Guidance Document, August 2004

<http://www.ci.fort-collins.co.us/recycling/pdf/enclosure-guidelines0804.pdf>

Space Allocation

How much space is adequate for the collection and loading of recyclable materials? This is a hard question to answer due to the variability in development types and collection methods.

The amount of space provided for the collection and storage of recyclable materials shall be designed to accommodate collection and storage containers consistent with the recyclable materials generated. It is recommended the area be at least as large as the amount of space provided for the collection and storage of refuse materials.

Estimating area needed: (please note this is in addition to space needed for trash service)

Type of Occupancy	Amount of Space Required Over and Above Standard Refuse Bin Requirements
Multi-Family	100 square ft. for the first 10 units and 5 square ft. for each additional unit
Commercial	10,000 sq. ft. and above 100 sq. ft. for the first 10,000 sq. ft. (gross) and 5 sq. ft. for each additional 1,000 sq. ft. (gross)

Container Type	Dimensions	Square Feet (container only)
40 yard bin	8' x 20–24' / 8' deep	160–192
20 yard bin	8' x 20–24' / 4' deep	160–192
3 yard bin	4' x 3' / 3'–4' deep	12
2 yard bin	4' x 2' / 3'–3½' deep	8

Vehicle Type	Access Requirements/Concern
Front loader	25 ft. vertical clearance.
Rolloff	25–30 ft. vertical clearance, 60–70 ft. horizontal distance. The greater vertical clearance, the smaller horizontal distance required.
Stake bed	Access to containers only. Forklift access may be required.
Recycling vehicle/ Compartmentalized truck	Access to containers only.

“Recycling Guidelines for Multifamily Housing Design,” StopWaste.org, Alameda County, California

<http://www.stopwaste.org/docs/1720381662005mfu-designguidelines.pdf>

How much space is needed for the collection company’s containers?

Container Volume

The companies that collect garbage and recyclables will provide carts and/or bins to hold those materials prior to collection. The size and number of these containers will depend on the number of people or units in the project and possibly on the frequency of collection. For once-a-week collection (the norm), a reasonable rule of thumb is to provide $\frac{1}{4}$ cubic yard (cy) of container capacity for every three residents. This can be a mix of garbage bins and recycling carts (or bins), with about half of the volume for garbage and half for recycling. For example, a 60-unit complex with average occupancy of three people per unit would require 15 cubic yards of capacity ($0.25 \text{ cy} \times 60$). If the collection company uses 4-cubic-yard bins for garbage and 64-gallon carts for recyclables, this could be served by two bins and 22 carts. It is good practice to provide 20% to 35% excess capacity for seasonal variation, so in this example the design objective should be to accommodate three bins and 28 carts. Local demographics may change these assumptions; large or extended families will require more space; and senior citizens living alone may require less.

Storage Space Floor Area

Bin sizes can vary in all dimensions; check with the local collection companies for exact dimensions. The typical footprint of a bin is about 7 feet wide and 4 feet deep. A 4-cy bin with these dimensions would be between four and five feet tall. Most 64-gallon carts fit snugly in a footprint that is 32x30 in.; they are about 42-in. tall. Bins and carts typically have hinged lids that must be lifted; these can damage low ceilings. In addition to space for the containers themselves, space is needed to walk among them and shift them around. An area that is 150% of the sum of bin and cart footprints should suffice, unless the available area is unusually thin or oddly shaped; then more space may be needed.

Continuing with the example above, if the 60 units are in three buildings, each with an outdoor enclosure for discards, then each enclosure should accommodate one bin plus nine carts, having a total footprint of:

$$(7 \times 4) + 9 \times (32 \times 30) / 144 = 88 \text{ square feet}$$

Each enclosure should provide 150% of 88 square feet, or 132 square feet (inside dimensions). A pair of 9-foot-wide parking spaces can provide this capacity.

Appendix B

Resource List of Recycling Bin and Tote Bag Vendors and Manufacturers

Provided below is a list of recycling bin and tote bag vendors and manufacturers that offer appropriate-sized containers for apartment recycling. R. W. Beck does not endorse any particular vendor or manufacturer, nor does it claim that this list is complete.

Adco Marketing

300 Tamal Plaza, Suite 220
Corte Madera, CA 94925
Phone: 415-927-2881
Toll Free: 888-332-ADCO (2326)
<http://www.adcomarketing.com/totebags.htm>

Awareness Ideas

Flexi Display Marketing, Inc.
801 Stephenson Hwy.
Troy, MI 48083
Phone: 800-875-1725
<http://www.awarenessideas.com/SearchResults.asp?Search=tote+bags>

The Bag Connection, Inc.

459 SW 9th Street
Dundee, OR 97115
Phone: 800-622-2448
<http://www.bagitsystem.com/MultiFamily.htm>

Busch Systems International, Inc.

343 Saunders Road
Barrie, Ontario Canada L4N 9A8
Phone: 705-722-0806
Toll Free: 800-565-9931
<http://www.buschsystems.com/home-apartment-kitchen-recycling-bins.html>

Enviro-Tote

4 Cote Lane
Bedford, NH 03110-5805
Phone: 603-647-7171
Toll Free: 800-TOTE BAG (868-3224)
<http://www.enviro-tote.com/index.html>

Recycled.CA

46 LePage Court
Toronto, Ontario Canada M3J 1Z9
Phone: 416-638-9895

http://www.recycled.ca/Products/product_list.htm

Weisenbach Recycled Products

437 Holtzman Avenue
Columbus, OH 43205
Phone: 800-778-5420

[http://www.recycledproducts.com/?search_type=products&search_field=tote+bags&cid=12
&s_type=ALL](http://www.recycledproducts.com/?search_type=products&search_field=tote+bags&cid=12&s_type=ALL)

Appendix C

Commercial and Multifamily Recycling Public Education Programs, Examples, and Resources

Provided below is a list of various resources and public education examples related to commercial and multifamily recycling.

Stopwaste.org (Alameda County, California)

This organization's website contains comprehensive information for business & industry and a Best Practices page for apartment building managers.

- <http://www.stopwaste.org/home/index.asp?page=4>
- <http://www.stopwaste.org/home/index.asp?page=507>

City of Beaverton, Oregon

The City's "2008 Beaverton Recycling Guide" includes information for apartment building residents and recycling at work.

- <http://www.beavertonoregon.gov/departments/recycling/apartments/docs/BOOKLET.pdf>

Eureka Recycling (St. Paul, Minnesota)

This private recycling hauler and processor created a multifamily recycling toolkit titled "Exploring Multifamily Recycling: Tools for the Voyage." In addition to the comprehensive information provided in this toolkit, it also contains templates for posters, door hangers, labels, signage, etc.

- <http://www.eurekarecycling.org/Tools.cfm>

City of Philadelphia, PA

Commercial Solid Waste and Recycling Plan form, for multifamily, commercial, and institutional establishments:

- <http://www.phila.gov/STREETS/RecComWaste.pdf>

Recycling Alliance of Philadelphia - Information on commercial recycling:

- http://www.cleanair.org/recyclingalliance/rec_phila.html#12

Greater Philadelphia Commercial Recycling Council website - contains success stories, tips and tools:

- <http://www.gpcrc.com/index.asp>

Pennsylvania Department of Environmental Protection (PA DEP)

Developing a Recycling Program for Commercial, Institutional & Municipal Establishments:

- <http://www.dep.state.pa.us/dep/deputate/airwaste/wm/recycle/FACTS/Comrec2.htm>

City of Austin, Texas

The City of Austin mandates that certain businesses, depending on size, must provide on-site recycling service. The following must provide recycling service: 1) multi-family properties with 100 or more units; and 2) commercial businesses and building owners with 100 or more employees. Businesses and office buildings must provide recycling of at least two of the following materials: aluminum cans, tin/steel cans, glass containers, plastic bottles, newspaper, mixed office paper, and cardboard. Multi-family complexes must provide recycling of at least four of the following materials: aluminum cans, tin/steel cans, glass containers, plastic bottles, newspaper, cardboard, kraft paper bags, and home office paper. New employees and tenants must be informed about the recycling program and all employees and tenants must be re-educated about the program at least annually.

A recycling plan must be filed with the City's Solid Waste Services Department and a quarterly volume report must be submitted to the Department. (Recycling haulers may file volume reports for their clients.)

- <http://www.ci.austin.tx.us/sws/recyclerules.htm>

RethinkWaste.org (San Mateo County, California)

The South Bayside Waste Management Authority provides specific recycling information on its website for businesses and multifamily dwellings.

- <http://www.rethinkwaste.org/businesses>
- <http://www.rethinkwaste.org/residents/multi-family-dwellings/recycling-services>

City of Portland, Oregon

The City's Bureau of Planning and Sustainability has comprehensive web pages dedicated to recycling at work and multifamily recycling, including a page for multifamily property owners and managers.

- <http://www.portlandonline.com/osd/index.cfm?c=45520&>
- <http://www.portlandonline.com/osd/index.cfm?c=41466>

Portland Metro

Portland Metro offers tools and resources for recycling at work in the Portland, OR metropolitan region and a property managers guide for multifamily recycling.

- <http://www.metro-region.org/index.cfm/go/by.web/id/537>

- <http://www.oregonmetro.gov/index.cfm/go/by.web/id=28771>

Seattle Public Utilities (SPU)

This comprehensive website provides outreach, education, and technical assistance to businesses in the Seattle area.

- <http://www.resourceventure.org/>

SPU also provides detailed information for apartment recycling.

- http://www.ci.seattle.wa.us/util/Services/Recycling/Recycle_at_Your_Apartment/index.asp

Minnesota Pollution Control Agency (MPCA)

The MPCA has website pages dedicated to recycling in the workplace:

- <http://www.pca.state.mn.us/oea/p2/waste.cfm>
- <http://www.reduce.org/workplace/>

LessisMore.org (Santa Barbara County, CA)

Santa Barbara County has webpages dedicated to business recycling and multifamily recycling:

- http://www.lessismore.org/Programs/bsnss_recycling_complete.html
- <http://www.lessismore.org/Programs/multifamilyrecy.html>

Appendix D
Multifamily Dwelling Recycling
Sample Residential Survey

We need your input!

Hinton Heights Management is looking for ways to improve its recycling program for its residents. Currently, 2 outside recycling bins, near the main complex entrance, are provided for residents to drop off their recycling. The following questions will help management better meet resident's recycling needs. **Please return your completed survey to the Rental Office by Friday, September 14.**

Please check the box most appropriate.

Do you use Hinton Heights's current recycling containers?

- ☐ Yes
- ☐ No

If "yes", what do you recycle?

- ☐ Food and beverage cans
- ☐ Glass bottles and jars
- ☐ Plastic bottles
- ☐ Newspaper
- ☐ Mixed paper and junk mail

If "no", which of the following come close to your reasons? (check all that apply)

- ☐ I didn't know that there was a recycling program at Hinton Heights.
- ☐ There is not an outside recycling bin close to my apartment.
- ☐ It's too much trouble to carry out the recyclables.
- ☐ I don't have enough space in my apartment to store recyclables.
- ☐ I don't have enough recyclables to make it worthwhile.
- ☐ I'm not sure how to recycle.
- ☐ It's something I just forget to do.
- ☐ I don't know what things I can recycle.
- ☐ I don't know where the outside recycling bins are.
- ☐ Other_____

Who primarily takes out your garbage or your recycling?

- ☐ Yourself
- ☐ Your child(ren)
- ☐ Your spouse/partner
- ☐ Other_____

(OVER)

How often is your garbage taken out to the dumpsters?

- ☐ Daily
- ☐ Once a Week
- ☐ Twice a Week
- ☐ Every Other Week

How often is your recycling taken out to the recycling bins?

- ☐ Daily
- ☐ Once a Week
- ☐ Twice a Week
- ☐ Every other Week
- ☐ Never

How could we improve our recycling program for you? (You may check more than one).

- ☐ Have outside recycling bins near every garbage dumpster.
- ☐ Provide a recycling container to store and carry out recycling to the outside recycling bins.
- ☐ Provide pamphlets describing what can be recycled.
- ☐ Give out recycling reminders.
- ☐ Post better signs at the recycling area.
- ☐ Other _____

If additional recycling containers were provided near every dumpster, would you start recycling or would you recycle more?

- ☐ Yes
- ☐ No
- ☐

Comments: _____

Please return your completed survey to the Rental Office by Friday, September 14.

Thank you for your time. We appreciate your comments!

Appendix E

Commercial Recycling Worksheets

Worksheet A: Estimating Disposal Costs

Off-Site Waste Removal

A. Name of waste removal company _____

Telephone number _____ Date contract expires _____

B. Removal Schedule

Number of times _____ Per (day/week/month/other) _____

Days of week _____ Time(s) of day _____

Choose one of the following equations (C1, C2 or C3):

C1. Waste removal charge (If charged as flat fee or part of rent)

$$\frac{\text{Waste removal fee}}{\text{Number of Times per Year}} \times \text{Number of Times per Year} = \text{TOTAL WASTE DISPOSAL}$$

C2. Waste removal charge (If charged by weight or volume)

$$\frac{\text{Waste removal charge per unit of weight or volume}}{\text{Number of units of waste removed of waste (from receipts or call haulers)}} \times \text{Number of units of waste removed of waste (from receipts or call haulers)} = \text{Annual waste removal charge}$$

If applicable, add:

$$\frac{\text{Hauling container(s) rental fee per time periods}}{\text{Number of time periods per year}} \times \text{Number of time periods per year} = \text{Annual container cost}$$

$$\text{Annual Waste Removal Cost} + \text{Annual Container Cost} = \text{Total Waste Disposal Cost}$$

C3. Waste removal charge (If charged per pull)

$$\frac{\text{Charge per pull}}{\text{Pulls per year}} \times \text{Pulls per year} = \text{Annual waste pulling charge}$$

If applicable, add:

$$\frac{\text{Hauling container(s) rental fee per time period}}{\text{Number of time periods per year}} \times \text{Number of time periods per year} = \text{Annual Waste container rental cost}$$

$$\text{Annual waste pulling charge} + \text{Annual waste container rental cost} = \text{Total Waste Disposal Cost}$$

Worksheet B: Conducting a Waste Analysis

The following are two options for estimating the types and quantities of materials in a company's waste stream. This knowledge will aid you in targeting materials for recycling and reduction and in contacting recyclers.

Method I

This Method involves visually monitoring the dumpster each day and keeping track of the following:

- What materials are visible in the dumpster?
- What materials take up the largest volume in the dumpster?
- How full is the dumpster?

If the majority of a company's waste is placed in garbage bags before disposal, have cleaning staff use different colored bags for each area. For example, put the waste from the offices in clear bags, the cafeteria waste in white bags, the restrooms' in blue bags, the production waste in black bags, etc. This will help to identify the areas which are generating the most material. Then, walk through those areas to see what is being thrown away. In the above example, we could assume that the clear bags contained primarily office paper.

Waste Analysis Estimation – Method 1

Day observed _____

How full _____

Materials Visible

Estimated Percentage of Waste Stream

Color of bag

in dumpster

Type of waste generated in the designated area

Method 2

This method provides a more accurate estimation of the quantity of material in the waste stream. Place a container near the dumpster or in a central location and designate it for your targeted material. Notify all employees that, for a specified period of time, all of the targeted material will be placed in this container rather than the dumpster. With certain materials, such as OCC, it may be possible to have one employee or the cleaning staff segregate the material. For other materials, such as office paper, all employees will need to be involved. Note that the container must be under shelter.

Continue the sort for at least two weeks. At the end of the specified time period, record the quantity of material accumulated. Contact the local recyclers listed in the back of this guide to find one that will pick up or allow you to drop-off the sorted material for recycling.

Waste Analysis Estimation – Method 2

Material sorted _____ Time period sorted _____

$$\frac{\text{_____ cubic yards}}{\text{Size of containers}} \times \frac{\text{_____}}{\text{Number of containers}} = \frac{\text{_____ cubic yards}}{\text{Amount sorted}}$$

$$\left(\frac{\text{_____ pounds}}{\text{Weight of full Container}} - \frac{\text{_____ pounds}}{\text{Weight of empty container}} \right) \times \frac{\text{_____}}{\text{Number of containers}} = \frac{\text{_____ pounds}}{\text{Amount sorted}}$$

Extrapolate this amount to a month or year. This information will be extremely useful when contacting recyclers and determining the cost-effectiveness of your recycling program.

$$\left(\frac{\text{_____ pounds}}{\text{Amount sorted}} \right) \div \frac{\text{_____}}{\text{Number of weeks Of sort}} \times 52 \text{ weeks/year} = \frac{\text{_____ pounds}}{\text{Targeted material discarded per year}}$$

Worksheet C: Evaluating the Costs of a Waste Reduction or Recycling Program

Monthly Program Costs

Additional labor (cleaning/maintenance staff)	\$ _____
Additional energy requirements	\$ _____
Transportation	\$ _____
Additional space requirements	\$ _____
Education/promotion	\$ _____
Record keeping	\$ _____

START-UP COSTS (AMORTIZED MONTHLY)

Containers	\$ _____
Equipment (if any)	\$ _____
Other:	\$ _____
Total Program Costs	\$ _____

Monthly Program Savings and Revenues

Avoided collection/disposal costs (See Worksheet D)	\$ _____
Decrease in new material costs	\$ _____
Revenues from sale of recyclables	\$ _____
Avoided purchases	\$ _____
Avoided labor (cleaning/maintenance staff)	\$ _____
Total Program Savings/Revenues	\$ _____
 Total Program Savings/Revenues – Total Program Costs	 \$ _____

Worksheet D: Calculating Avoided Collection/Disposal Costs

Material targeted for recycling or waste reduction _____

Approximate percentage of waste stream _____

By Volume

Use this formula if you used a visual estimate of the waste stream or if you calculated volumes in the waste sort.

$$\begin{array}{ccccc} \text{_____} & \times & \text{_____} & = & \text{_____} \\ \text{\% of material} & & \text{Total cubic yards disposed} & & \text{Targeted for} \\ \text{(by visual estimation} & & \text{(ex.: 4 cubic yard dumpster emptied} & & \text{diversion} \\ \text{or sort)} & & \text{3 times per week = 12 cubic yards} & & \\ & & \text{or 48 cubic yards per month.)} & & \end{array}$$

$$\begin{array}{ccccc} \text{_____} & \times & 70\%^{**} & = & \text{_____} \\ \text{cubic yards} & & & & \text{cubic} \\ \text{yards} & & & & \\ \text{Targeted for diversion} & & & & \text{Expected diversion} \end{array}$$

$$\begin{array}{ccccc} \text{_____} & \div & \text{_____} & = & \text{_____} \\ \text{cubic yards} & & \text{Total volume of all waste disposed} & & \text{cubic} \\ \text{yards} & & & & \\ \text{Expected diversion} & & & & \text{Percent of Waste} \\ & & & & \text{Stream Diverted} \end{array}$$

By Weight

Use this formula if you calculated weight in the waste sort and if your hauler will provide weight slips for your dumpster.

$$\begin{array}{ccccc} \text{_____} & \times & 70\%^{**} & = & \text{_____} \\ \text{pounds} & & & & \text{pounds} \\ \text{Pounds of material} & & & & \text{Expected diversion} \\ \text{Discarded per year} & & & & \\ \text{(Worksheet B)} & & & & \end{array}$$

$$\begin{array}{ccccc} \text{_____} & \div & \text{_____} & = & \text{_____} \\ \text{pounds} & & \text{Total volume of waste disposed} & & \text{Percent of Waste Stream} \\ \text{Expected diversion} & & \text{(provided by hauler)} & & \text{to be Diverted} \end{array}$$

******To be conservative, assume that you will divert 70% of the target material.

Depending upon the amount of material diverted from the waste stream, a business may be able to save money by reducing the number of times per week the dumpster is hauled or by reducing the size of the dumpster. Businesses should be encouraged to ask their waste hauler how much disposal costs can be reduced if the waste stream is reduced by the percent estimated above.

Issue Paper #3

Construction & Demolition Debris Recycling

3.1 Overview

Construction and demolition (C&D) debris represent a waste stream that poses materials handling challenges, yet also offers many diversion opportunities. The New York State Department of Environmental Conservation (DEC) defines C&D debris as:

“uncontaminated solid waste resulting from the construction, remodeling, repair and demolition of utilities, structures and roads; and uncontaminated solid waste resulting from land clearing. Such waste includes, but is not limited to bricks, concrete and other masonry materials, soil, rock, wood (including painted, treated and coated wood and wood products), land clearing debris, wall coverings, plaster, drywall, plumbing fixtures, non-asbestos insulation, roofing shingles and other roof coverings, asphaltic pavement, glass, plastics that are not sealed in a manner that conceals other wastes, empty buckets ten gallons or less in size and having no more than one inch of residue remaining on the bottom, electrical wiring and components containing no hazardous liquids, and pipe and metals that are incidental to any of the above.”

The composition of the C&D waste stream may vary over time and from region to region because quantities disposed are directly influenced by the national and local economy and, as a result, by the scope of residential and commercial building activities that are occurring in any given region. In a C&D visual waste characterization study conducted by R. W. Beck, Inc. for Bartow County, Georgia in 2008, the top five materials by weight in the C&D waste stream were:

1. Non-treated wood (29.6%)
2. Treated wood (16.1%)
3. Asphalt shingles (13.6%)
4. Pressboard and other sheet lumber (6.7%)
5. Gypsum Board (5.6%)

Wood waste comprised nearly 46 percent, with asphalt shingles at nearly 14 percent. Similarly, a study in 2002 for the State of Vermont¹ resulted in wood (treated and non-treated) comprising 43 percent of the C&D stream, asphalt shingles comprising 21 percent, and drywall comprising 5 percent. Based on these two studies, as well as

¹ Source: Vermont Waste Composition Study, Final Report, June 2002.
<http://www.anr.state.vt.us/dec/wastediv/solid/pubs/VTWasteCompReport.pdf>

other sources, it is R. W. Beck's opinion that these percentages are representative of typical C&D waste stream composition.

Other recoverable materials include old corrugated cardboard (OCC) and metals, however they typically make up a small percent of the C&D waste stream. The quantities of OCC and metals that have been estimated in several C&D waste composition studies are shown in Table 3-1.

Table 3-1
C&D Waste Composition Data for OCC & Metals¹

	Bartow County, GA (2008)	State of Minnesota (2000)	State of California (2005)	Des Moines, Iowa (2002)
OCC	2.0%	5.0%	3.0%	6.0%
Metals	3.4	7.0	4.0	5.0

¹ Sources of data include R. W. Beck and "Minnesota Construction, Demolition, and Industrial Waste Study," Minnesota Solid Waste Management Coordinating Board, 2007.

Presently, C&D material is accepted at the Broome County Landfill (Landfill) and is not required to be separated, except for asbestos. Friable asbestos must be wetted down and double-bagged in accordance with New York State regulations, and each load must be accompanied with a manifest. The current tipping fee for friable asbestos is \$100 per ton. Non-friable asbestos must also be separated from other waste, but does not require a manifest. The tipping fee for non-friable asbestos is \$45 per ton. All other C&D material is currently disposed in the active cell at the Landfill along with the municipal solid waste (MSW). An estimate of the County's C&D waste composition is not known since C&D is not required to be separated from MSW. The Landfill tipping fee is currently the same for C&D and MSW, at \$40 per ton.

Many U.S. communities are actively focusing on recovery of select materials within the C&D waste stream. Approaches include upstream diversion through enactment of ordinances mandating source separation of recoverable materials (i.e., wood, OCC, metals, etc.) at the job site. These materials are then processed and transported to an end market. An additional approach is processing the materials downstream (at a landfill or transfer station) to identify and separate (mechanically and manually) recoverable materials.

This issue paper will discuss the various diversion opportunities for C&D waste available to Broome County (County).

3.2 Opportunities to Increase Upstream Diversion of C&D Debris

Separating C&D debris for recycling or reuse at the job site of a construction, demolition, or remodeling project may be the most direct way to divert C&D debris from being disposed in a landfill. In recent years, there has been more deconstruction taking place as an alternative to demolition. Deconstruction is when a building is dismantled in order to salvage the materials for reuse. Many developers are deconstructing buildings to earn Leadership in Energy and Environmental Design (LEED) credits as part of the U.S. Green Building Council's Green Building Rating System.

While separating C&D provides an opportunity for the contractor or builder to save money on disposal costs, the decision to separate C&D is most likely going to be determined by the following considerations:

- Are there space constraints? Space is often limited, so it is not always feasible to have separate dumpsters or roll-off containers for several different types of material on-site. The rental cost of having the collection containers on site for several days or weeks is also a financial consideration for the contractor.
- Will separating the waste require additional labor or take longer? Often a contractor is under a deadline to complete a project, and a time delay could result in lost rent on a piece of property. The extra time to separate waste may become an issue. Deconstruction, in most cases, takes longer than demolition.
- Does the material have value? A developer may choose to separate the C&D waste if there are large quantities of a material that has value. Deconstruction can be profitable, especially if the value of the salvaged material covers the cost of the labor to dismantle it.

The materials that are most often recycled from new construction projects include wood, metal, drywall, and cardboard while renovation projects tend to generate more concrete and rubble in addition to the other materials.

Often during renovation projects, there are items which can be reused. Habitat for Humanity operates building supply outlets called ReStores which accept donated materials including fixtures, cabinets, countertops, plumbing, drywall, doors, windows, etc. and re-sells them with the proceeds benefiting Habitat for Humanity. The nearest ReStore to Broome County is in Syracuse². Other reuse options in the County include:

- Binghamton Freecycle – Internet site that allows people to post items to be given away or find items they need. All items must be free.
<http://groups.yahoo.com/group/binghamtonfreecycle/>
- Preservation Association of the Southern Tier (PAST) – Non-profit organization serving Broome and Tioga Counties working to preserve historic architecture.

² Source: <http://www.habitat.org/cd/frame/frameset.aspx?url=www.syracuserestore.org>

The group will salvage/reclaim certain materials from buildings before they are torn down.

www.pastny.org

- Western/Central New York Materials Exchange – Internet site for businesses to exchange unwanted or unusable products that would otherwise be discarded, and/or locate free or inexpensive materials that can be used in daily business operations.
<http://www.mat-ex.org/>

Some cities and counties have passed ordinances mandating source separation of recoverable C&D materials at the job site. While this can be a significant step to increasing diversion, it is imperative that there are adequate end markets or C&D recycling facilities in the area to process the types and quantities of C&D material collected. An in-depth market assessment should be conducted prior to adopting an ordinance because management alternatives need to be available if diversion mandates are implemented. Section 3.3 of this paper explores local end-markets for the C&D materials that typically comprise the largest part of the C&D waste stream.

Section 3.11 (Resources) provides examples of C&D separation ordinances and tools used by other jurisdictions for increasing upstream C&D diversion.

3.3 Opportunities to Increase Downstream Diversion of C&D Debris

When considering implementing a C&D diversion program for materials that are not separated before disposal, the County should not only determine what comprises the largest portion of the C&D waste brought to the Landfill, but also what markets are available in the region for recycling or reusing the material and the costs of processing the materials.

Per the NYS DEC website, there are nine registered C&D processing facilities located in DEC Region 7 (Broome County is in Region 7). The majority of the companies listed below process either aggregate or wood waste.

1. Earth Blends, Inc. in Jordan (biosolids and yard waste)
2. Alpha Portland Cement in Jamesville (concrete, asphalt, clean soil, rock)
3. Clifton Recycling, Inc. in Syracuse (wood pallets and crates)
4. Crushed Products, Inc. in Syracuse (concrete, brick, rock)
5. Kinsella Barrett Plant in Jamesville (no waste type listed)
6. Kinsella Quarry in Fayetteville (asphalt, concrete, rock clean soil)
7. RE-UZ-IT Recycling, Inc. in Syracuse (asphalt, concrete, brick)
8. McIntosh Box & Pallet Co. in Bernhards Bay (wood pallets and crates)
9. Superior Disposal C&D Processing in Newfield (no waste type listed)

R. W. Beck created two categories for analyzing the marketability of materials. The two categories are designed to focus on the materials with the greatest potential impact to the diversion of C&D debris. The material categories, Tier 1 and Tier 2, are based

on prevalence in the waste stream as identified in field observations from other studies. Tier 1 materials as those that typically represent five percent or greater of the waste stream, by weight and Tier 2 materials as those that represent less than five percent of the waste stream, by weight.

3.3.1 Tier 1 C&D Materials

The list of Tier 1 materials is presented in Table 3-2. From the results of C&D studies conducted by R. W. Beck and others, there are typically five material categories that comprise more than five percent of the C&D waste stream, as shown below.

Table 3-2
Tier 1 C&D Materials

Material
1. Non-Treated Wood
2. Treated Wood
3. Asphalt Shingles
4. Pressboard and other sheet lumber
5. Gypsum Board

Possible markets for each of these materials are described below.

3.3.1.1 Non-Treated Wood

The end-markets identified for recovered non-treated wood include:

- Mulching and Composting – where the wood material is ground into mulch and used for horticultural or agricultural purposes.
- Pallet Recycling – where intact pallets are refurbished and reused as pallets.
- Energy Generation – where wood material is accepted at facilities that burn the wood for its fuel value (e.g., industrial boilers, power plants, or biomass³ facilities).

For mulching and composting, the County could elect to mulch wood as part of the C&D diversion process or deliver it unprocessed to a mulcher/composter. If the County elected to mulch wood prior to shipping it off-site, the County would incur operations and maintenance costs and possibly capital costs associated with such an operation. The Landfill does own a grinder, compost turner and screen. Further research would be required to determine the typical size of the incoming wood waste and the processing capacity of the County's grinder.

³ Biomass is organic matter produced by plants and animals and includes wood, crops, manure and some types of MSW.

If the County elected to deliver the non-treated wood to a mulcher or composter, it is most likely the mulchers and composters would charge a fee for accepting unprocessed non-treated wood. In most instances, the County would be responsible for the delivery of the materials. Local mulchers and composters that may provide options for diversion include:

- Pro-Mulch, Inc.
<http://www.pro-mulch.com/>
- R&R Mulch Sand and Gravel
<http://www.rrlawnsvc.com/>
- Robinson Hill Nursery located in Johnson City, NY. (no website)

In contrast to mulching and composting end markets, some pallet recyclers pay for reusable pallets. Options for the County to consider include:

- Malchak Salvage Company in Binghamton.
- Wholesale Mulch & Sawdust in Owego.
- The Western/Central New York Materials Exchange. This on-line service is free and lists materials “wanted” and “available.” Often times there are listings under “Pallets Wanted.” The County may be able to find an outlet for reusable pallets through this resource.
<http://www.mat-ex.org/>
- U.S. Pallet Recycling Directory.
<http://www.palletbuyersguide.com/usa/index-newyork.html>
- Clifton Recycling, Inc. in Syracuse.
<http://cliftonrecycling.com/Index.html>
- McIntosh Box & Pallet Co. in Bernhards Bay.
<http://www.mcintoshbox.com/>

The processors in Syracuse and Bernhards Bay were listed for reference, however long-hauling pallets for reuse may not be cost effective.

Depending on the location of appropriate facilities, the most viable market for untreated wood may be energy generation. Some coal plants co-fire with biomass, so that could be an option for the County to consider. Most end-users of untreated wood require that the material have no nails, plaster or other building materials attached. For energy generation, the wood would most likely be required to be less than two feet in length. If used as an energy source, the wood should be a revenue generator, excluding transportation and processing costs. Local energy producers include:

- New York State Electric and Gas (NYSEG)
<http://www.nyseg.com/>
- National Grid
<https://www.nationalgridus.com>

3.3.1.2 Treated Wood

Because of the chemicals used to treat wood, it is typically not accepted for energy generation or mulching. The State DEC defines treated wood as “wood combined with chemical compounds (e.g., copper chromium arsenate (CCA) or pentachlorophenol (PCP) treated woods)” and unadulterated wood as “wood that is not painted or treated with chemicals such as glues, preservatives or adhesives. Any painted wood or chemically treated wood (e.g., pressure treated wood, treated railroad ties) or wood containing glues or adhesives (e.g., plywood, particle board) is considered adulterated wood.”⁴

Per the DEC, “In New York State, CCA-treated wood may be disposed of in construction & demolition (C&D) debris landfills and municipal solid waste landfills which are authorized to accept construction and demolition debris.”⁵

Thus, to market the non-treated wood to one of the markets described above, the County would need to take care to separate the treated wood from the untreated or unadulterated wood at the Landfill.

3.3.1.3 Asphalt Shingles

Because of their asphalt content (19 to 36%)⁶, shingles are often used in hot mix asphalt for paving or in pothole patch materials. Most state department of transportation specifications allow no more than 5% recycled asphalt shingles to be used in paving projects.⁷ The NYS DEC has granted four beneficial use determinations (BUDs) for using asphalt shingles in New York as shown in Table 3-3:

Table 3-3
Beneficial Use Determinations for Asphalt Shingles Granted by New York DEC¹

DEC Region	Facility Name	City	Beneficial Use
9	Natural Environmental, Inc.	Buffalo	Base (Road)
9	Modern Landfill, Inc.	Model City	Landfill Base (Road-Parking)
4	King Road Materials, Inc.	Albany	Asphalt (Hot-Mix) Concrete
9	Parker Bay Consultants, Inc.	Buffalo	Base (Road; Sub)

¹ Source: DEC BUD website: <http://www.dec.ny.gov/chemical/8821.html>

The New York State Recycling Markets Database⁸ provides listings of companies that collect, process, remanufacture, reuse or export asphalt shingles. The companies listed that are nearest to Broome County include:

⁴ Source: NY State DEC website: <http://www.dec.ny.gov/chemical/31238.html>

⁵ Source: NY State DEC website: <http://www.dec.ny.gov/chemical/8790.html>

⁶ Source: Northeast Recycling Council: <http://www.nerc.org/documents/asphalt.pdf>

⁷ Source: NAHB Research Center: http://www.epa.gov/osw/conserve/rrr/imr/cdm/pubs/roof_br.pdf

⁸ Source: NYS Recycling Markets Database website: <http://appcenter.nylovesbiz.com/esdrecycling/>

- Contento's in Cortland (collector and/or intermediate processor);
- Feher Rubbish Removal in Syracuse (collector and/or intermediate processor); and
- United Industrial Services in Syracuse (collector, intermediate processor, remanufacturer, reuse, and/or exporter).

Although it may not be economically feasible to divert asphalt shingles at this time, the opportunities to recycle shingles continue to grow and the County should monitor these markets in the future.

3.3.1.4 Pressboard and Other Sheet Lumber

Similar to non-treated wood, the primary end markets for pressboard and other sheet lumber is energy generation. This material can be sorted with clean lumber.

3.3.1.5 Gypsum Board

Some states have considered banning gypsum board (also called drywall, wallboard, or plasterboard) from landfills because of the development of hydrogen sulfide gas when gypsum is mixed with moisture. While the gas is not lethal at low levels, the strong sulfur odor can be a nuisance and generate complaints from residents living or working nearby.

Currently, wallboard is viewed as one of the more difficult materials to recycle in the C&D waste stream because some wallboard has more contaminants than others. For example, construction wallboard is typically free of contaminants, while some demolition wallboard may be contaminated with lead-based paint, asbestos, or other toxins.

R. W. Beck researched gypsum recycling in New York and found two gypsum wallboard recyclers in New York and one in Pennsylvania:

1. Gyp-Pak Container in Tonawanda, NY;
2. Taylor Recycling Company in Montgomery, NY; and
3. Agri-Marketing in Reinholds, PA.

Andela Products located in Richfield Springs, New York manufactures gypsum board recycling equipment and may be a resource for the County in finding local end-users of drywall.

The County's local market area for recovered gypsum board appears to be undeveloped, therefore landfilling this material appears to be the most cost effective disposal option at the current time. The County should continue to monitor the market for drywall recycling and if it becomes economically feasible, the Landfill could consider recovering this material (most likely uncontaminated wallboard) in the future.

3.3.2 Tier 2 C&D Materials

Table 3-4 lists the Tier 2 materials that R. W. Beck has defined as those that represent less than five percent of the C&D waste stream, by weight, based on field sampling. Most of these materials typically comprise less than one percent of the total C&D debris disposed.

Many of the materials listed in Table 3-4 are recyclable, however small amounts have been found in C&D field observations, so are listed here. It should be noted that the Broome County Landfill does not permit the landfilling of office paper, newspaper, OCC, phone books, yard waste, tires, etc.

Table 3-4
Tier 2 C&D Materials

Material
Yard Waste
Ferrous Metal
Carpet
Non-Reinforced Concrete
MSW
OCC
Rubber
Other Masonry
Soil
Glass
Plastic - Other Plastic Products
Brick
Reinforced Concrete
Expanded Polystyrene
Textile
Durables - Electrical Appliances, Computer, TV's
Office Paper
Tile
PVC
Other Paper
Crushable Inerts
Asphaltic Concrete
Linoleum
Plastic Film/Wrap/Bags
Other Inerts
Insulation
Tires
Non-Ferrous Metal
Newspaper
Aluminum
Wood Packaging
Phonebooks
Food Waste
Brush

Table 3-4
Tier 2 C&D Materials

Material
Dirt/Fines
Drywall/Sheetrock
Household Hazardous Waste (HHW)
Magazines
Other Non-C&D
Other C&D
Rock

3.3.2.1 Materials with Existing Markets

R. W. Beck identified the C&D materials in which markets typically exist. However, because individually these materials comprise such a small amount of the C&D waste stream, it may be difficult to stockpile any one material at the Landfill until marketable quantities are collected. For some materials, such as metal or paper, it may be more feasible for different grades of a material to be combined and marketed as a mixed-grade material (e.g., newspaper, magazines, office paper). Additionally, there are certain fixed and variable costs (e.g., sorting personnel) associated with recovering material. Thus, although recoverable, the cost of recovery for many of the Tier 2 materials may exceed the revenue and/or cost avoidance associated with the material. Table 3-5 lists local market locations or uses for certain Tier 2 materials.

Table 3-5
Materials with Existing Local Markets or Uses

Material	Market Location
Yard waste	Onsite (at Landfill)
Ferrous and Non-Ferrous Metal, Aluminum	Haul to Local Processor
OCC	Haul to Local Processor
Office Paper, Other Paper, Newspaper, Phone Books, Magazines	Haul to Local Processor
Tires	Onsite (at Landfill)
Glass bottles	Haul to Local Processor
HHW	Onsite (at Landfill)
MSW	Onsite (at Landfill)
Soil	Onsite (at Landfill)

3.3.2.2 Materials That Can Be Used At the Landfill

Aggregate materials from the incoming C&D (including reinforced and non-reinforced concrete, bricks, and asphalt concrete), could be sorted at the Landfill. Collected aggregate of a suitable size could be used to off-set some of the Landfill's purchase of gravel or stone, or possibly reduce the amount of shale currently being mined for use on Landfill access roads. Recycled concrete is sometimes marketed as an alternative to mined gravel. Because the quality of the aggregate material is not fully known, it will not be assumed to generate revenue but could prove useful for landfill operations.

3.3.2.3 Materials with Underdeveloped Markets

Currently, many Tier 2 materials have underdeveloped markets. Some examples are carpet, plastic film, and expanded polystyrene (Styrofoam). Even though the Tier 2 materials with underdeveloped markets may not be recovered initially, the County may recover them in the future if the tonnages and available markets make it feasible to recover the material.

Potential processors include:

- North Brook Farms in Auburn, NY (carpet)
<http://www.northbrookfarms.com/>
- CNY Resource Recovery Inc. in Syracuse, NY (plastic film)
<http://www.cnyresourcerecovery.com/index.php>
- Plasticycle in Auburn, NY (polystyrene)
<http://www.plasticycle.com/>
- Thermal Foams, Inc. in Cicero, NY (polystyrene)
<http://www.thermalfoams.com/>

3.4 Implementation Requirements

The County should consider a dual approach, focusing on both potential upstream and downstream C&D debris diversion program options. Upstream diversion would most likely require increased public education, possible ordinance changes, and political will. Downstream diversion would require increased equipment and processing costs.

It is recommended the County establish a task force composed of stakeholders including C&D generators (developers and contractors), haulers, C&D recyclers and processors, etc. The task force should be charged with identifying barriers to recovery of C&D materials and recommended approaches to foster recovery. The task force could also be asked to make specific recommendations related to the County's ordinances for fostering upstream source separation and recovery.

Implementing an upstream C&D diversion program would require additional staff time to research the issues, find markets, possibly develop ordinance language, etc.

Implementing a C&D debris diversion program at the Landfill would require additional staff time to research equipment options and determine capital expenditures and operating costs. Section 3.6 of this paper discusses public/private ownership and operation options. If the County considered this option, staff time would be needed to develop and distribute a Request for Information (RFI) to firms with capabilities and interest in providing the services of processing mixed C&D for recovery.

3.5 Capital and Operating Expenses

The capital and operating expenses to implement a C&D diversion program would be dependent on the extent of the program. Estimates are provided below for both upstream and downstream diversion programs.

3.5.1 Upstream Diversion of C&D Debris

As mentioned in Section 3.4, Implementation Requirements, an upstream diversion program would require additional staff time for program and policy development, public education, possible C&D waste audits, possible ordinance creation and enforcement, etc. It is not anticipated that there would be a need for many capital expenditures, however the additional staff time would result in higher program operations costs.

3.5.2 Downstream Diversion of C&D Debris

3.5.2.1 Capital Expenses

A large capital expense for diverting C&D materials at the Landfill would be the purchase of a wood or tub grinder. Based on information provided by C&D processing equipment manufacturers, and information from other sources, it is estimated that a grinder may cost between \$250,000 and \$750,000, depending on the size and horsepower. A portion of the capital cost for equipment may be eligible for

funding under the NYS DEC's Municipal Waste Reduction and Recycling (MWR&R) grant program.

An array of rolling stock and heavy equipment may be required to separate C&D debris at the Landfill. Some items may not be necessary if the Landfill already owns certain pieces of equipment, but Table 3-6 lists the basic rolling stock required.

Table 3-6
C&D Diversion
Heavy Equipment and Rolling Stock Cost Estimates¹

Description	High Acquisition, Each	Low Acquisition, Each
Front-end loader	\$350,000	\$250,000
Excavator with grapple	\$305,000	\$175,000
Skid-steer with bucket	\$45,000	\$35,000
Roll-off truck	\$138,000	\$90,000
Roll-off containers	\$6,000	\$4,500
Road tractor	\$120,000	\$90,000
Transfer trailer	\$80,000	\$65,000

¹ Source: R. W. Beck research.

The road tractor and transfer trailer would be necessary if the County were to transport processed materials to a local end market. Other expenses that were not estimated but should be considered include equipment acquisition costs and annual debt service.

3.5.2.2 Operating Expenses

The operating expenses to implement a C&D diversion program at the Landfill would be dependent on the extent of the program.

Personnel

Operating expenses may include the following staff positions:

- Heavy equipment operator – loader
- Heavy equipment operator – excavator
- Roll-off driver
- Spotter/general site laborer

The use of labor from community service workers, sentence-to-serve, or prison inmate labor could significantly reduce the operating expenses.

Processing Equipment Operating Cost Estimate

Grinders and shredders typically have relatively high operating costs because they use high horsepower motors and have cutting teeth or other wear parts that need to be regularly replaced.

Based on information supplied by equipment manufacturers and information obtained from operators of similar facilities, it is estimated that the operating costs could range from \$2 per ton processed to \$4.50 per ton processed.

Rolling Stock and Heavy Equipment Operating Cost Estimates

Based on information obtained from several sources, including equipment manufacturers and other public entities conducting similar operations, the operating costs in Table 3-7 were developed. For purposes of estimating rolling stock operating cost, it is assumed that rolling stock will be used to transport materials around the site and for hauling commodities to local markets (average about 20,000 miles per year initially). The County rolling stock is not expected to be used for long-haul trucking.

Table 3-7
C&D Diversion
Heavy Equipment and Rolling Stock Operating Costs¹

Description	High Operating, Each	Low Operating, Each
Front-end loader	\$77,000	\$63,000
Excavator with grapple	\$30,800	\$25,200
Skid-steer including bucket attachment	\$9,020	\$7,380
Roll-off truck	\$26,400	\$21,600
Roll-off containers	\$ 220	\$180
Road tractor	\$26,400	\$21,600
Transfer trailer	\$2,200	\$1,800

¹ Source: R. W. Beck research.

3.6 Evaluation of Public/Private Ownership and Operation Options

Public-private partnerships may be an option for the development of a downstream C&D diversion program. Typically, such partnerships would utilize the financing advantages of the public sector entity (i.e., lower cost of capital) and the operational expertise of the private sector.

One approach for the County to consider is to distribute a Request for Interest (RFI) to firms with capabilities and interest in providing the services of processing mixed C&D for recovery. The approach could include an incentive in which the County provides the land for use at a minimal cost and then contracts with a private firm to operate the processing facility. One example of this type of public/private partnership can be found in LaCrosse County, Wisconsin (website address is provided in Section 3.11, Resources).

3.7 Marketable Materials from Downstream Diversion

Based on the market assessment in Section 3.3 of this paper, a list of target materials was developed and consolidated into practical sorting categories. R. W. Beck assumed that only materials with a positive value or that have an immediate use (e.g., aggregate) would be separated at the Landfill. Material not sorted would be managed as residue and transported to the working face for disposal.

The values listed below for sorted materials are estimates based on national prices and published indices⁹ for certain materials.

- Clean Wood, to be marketed as boiler fuel: \$5 per ton.
- Aggregate: \$0 per ton marketed, however the County would benefit from avoided cost of purchasing gravel or stone to be used on-site.
- Ferrous/Non-Ferrous Metal to be marketed locally: \$80 - \$90 per ton.
- Cardboard, to be marketed through existing materials recovery facility (MRF): \$30 - \$35 per ton.
- Mixed Paper, to be marketed through existing MRF: \$5 - \$10 per ton.
- Plastic, to be marketed through existing MRF: \$0 - \$200 per ton.

At the time of this writing, the market prices for most recyclable materials are depressed and some commodities are at historically low prices, nationwide. A year ago, ferrous scrap metal would have garnered close to \$120 per ton and cardboard was also near \$120 per ton.

The price per ton received for cardboard, mixed paper and plastic will vary depending on the cleanliness of the materials and where the materials are delivered. The Waste Management (WM) Recycle America MRF in Binghamton accepts paper and plastic materials commingled (materials do not need to be separated by material type) and transports the materials to its sorting facility in Syracuse. Currently, the County has a contract with WM Recycle America and the County pays a processing fee but does not receive any revenue from the sale of the recyclable materials. There are three other MRFs in the region that process recyclable materials in two streams (fiber and containers), plus one company that exclusively handles scrap paper. It is possible the County could receive little, if any, revenue for the mixed paper and plastic from any of the local MRFs because of the market prices (especially at current market prices, first quarter of 2009) and the cleanliness of the materials, however the County should certainly receive revenue from the sale of corrugated cardboard diverted from the C&D waste stream.

⁹ Cardboard and mixed paper pricing source: Official Board Markets, New York Region, March 2009. Metal and plastic pricing source: Waste & Recycling News' Secondary Materials Online, March 2009.

3.8 Diversion Potential

Although the County does not require C&D debris to be separated from MSW, the Landfill does track the tonnage of mixed C&D debris that comes in as dedicated loads from area contractors. In 2007, the Landfill accepted approximately 22,400 tons of dedicated C&D debris. (The Landfill also received C&D mixed with MSW, however the quantities are unknown because the loads were recorded as MSW tons.) For planning purposes, R. W. Beck applied the C&D percentages from the 2008 Bartow County, Georgia visual C&D waste characterization study to Broome County's 2007 C&D debris tonnage, as shown in Table 3-8.

Table 3-8
Estimate of C&D Tonnage, by Material Type
Accepted at the Broome County Landfill

Tier 1 Materials	Projected Tonnage	Percent of Total
Non-Treated Wood	6,642	29.60%
Treated Wood	3,613	16.10%
Asphalt Shingles	3,052	13.60%
Pressboard and other sheet lumber	1,503	6.70%
Gypsum Board	1,257	5.60%
<i>Tier 1 Materials Sub-total</i>	<i>16,066</i>	<i>71.60%</i>
Tier 2 Materials	Projected Tonnage	Percent of Total
Yard Waste	808	3.60%
Ferrous Metal	740	3.30%
Carpet	516	2.30%
Non-Reinforced Concrete	494	2.20%
MSW	471	2.10%
OCC	449	2.00%
Rubber	314	1.40%
Other Masonry	292	1.30%
Soil	247	1.10%
Glass	247	1.10%
Plastic - Other Plastic Products	224	1.00%
Brick	224	1.00%
Reinforced Concrete	157	0.70%
Expanded Polystyrene	157	0.70%
Textile	135	0.60%
Durables - Electrical Appliances, Computer, TV's	112	0.50%

Table 3-8
Estimate of C&D Tonnage, by Material Type
Accepted at the Broome County Landfill

Tier 1 Materials	Projected Tonnage	Percent of Total
Office Paper	112	0.50%
Tile	112	0.50%
PVC	112	0.50%
Other Paper	90	0.40%
Crushable Inerts	67	0.30%
Asphaltic Concrete	67	0.30%
Linoleum	45	0.20%
Plastic Film/Wrap/Bags	45	0.20%
Other Inerts	22	0.10%
Insulation	22	0.10%
Tires	22	0.10%
Non-Ferrous Metal	22	0.10%
Newspaper	0	0.00%
Aluminum	0	0.00%
Wood Packaging	0	0.00%
Phonebooks	0	0.00%
Food Waste	0	0.00%
Brush	0	0.00%
Dirt/Fines	0	0.00%
Drywall/Sheetrock	0	0.00%
HHW	0	0.00%
Magazines	0	0.00%
Other Non - C&D (please Specify)	0	0.00%
Other C&D	0	0.00%
Rock	0	0.00%
<i>Tier 2 Materials Sub-total</i>	6,328	28.20%
Total	22,394	99.80%

Note: Totals may not sum due to rounding.

As stated previously, the composition of C&D debris in the waste stream varies over time and from region to region. The tons and percentages shown in Table 3-8 may provide the County with an approximation of what the Landfill's mixed C&D waste stream might consist of. R. W. Beck recommends the County conduct its own visual characterization of the mixed C&D loads disposed at the Landfill in order to provide a more accurate depiction. A C&D waste characterization would offer the County

insight to the types of materials that could potentially be diverted from the Landfill if local markets and end-users exist.

The diversion potential of a C&D debris program will be determined by how much staff time and financial resources the County plans to dedicate to the program. The County would certainly see an increase in diversion if either an upstream or a downstream diversion program were implemented.

Diversion potential will depend on the following implementation options:

- Increased public education;
- Mandatory C&D materials separation;
- Existence and throughput capabilities of local C&D processors;
- Existence of markets/end-users; and
- Public/private partnerships.

One of the reasons for implementing a C&D debris diversion program is to conserve remaining space in the Landfill. Because C&D is assumed to consume more air space per ton than MSW, the effective air-space savings of diverting C&D will be more pronounced.

Also, if the County can use shredded C&D as daily cover (discussed in Issue Paper #4), the life of the Landfill can be further increased.

3.9 Addressing Stakeholder Concerns

The stakeholders most impacted by a C&D diversion program include C&D generators (developers and contractors), haulers, C&D recyclers and processors, and the Landfill Citizen Advisory Committee. As mentioned in Section 3.4, Implementation Requirements, it is recommended that the County establish a task force to discuss the issues associated with establishing C&D diversion programs. The purpose of the task force meetings is to address concerns which may include, but not be limited to:

- Resistance from developers to a mandatory C&D debris separation requirement (if an ordinance were developed);
- Concerns from cities, towns and villages regarding potential increase in duties to monitor mandatory C&D debris separation (if an ordinance were developed);
- Concerns from developers regarding anticipated cost increases to provide roll-off containers or dumpsters for multiple C&D materials at job sites;
- Concerns from haulers required to collect and haul source-separated materials (if an ordinance were developed); and
- Concerns from processors regarding the cleanliness of recyclable materials recovered from C&D separation at the Landfill.

3.10 Benefits and Drawbacks

Diverting C&D debris from the waste stream has benefits as well as drawbacks to the County, as outlined below.

3.10.1 Benefits

- Conservation of natural resources by recycling C&D debris and making it available for reuse or making it into a new product, rather than using virgin materials;
- Avoided cost of purchasing materials for Landfill operations, such as gravel or stone (e.g., incoming C&D aggregate of a suitable size could be used by the Landfill for access roads rather than purchasing gravel or stone);
- Potential cost savings to developers and contractors by decreasing the amount of waste they generate, resulting in avoided landfill tipping fees;
- Potential cost savings to developers and contractors by off-setting landfill tipping fees with lower per ton processing fees at recoverable materials processing facilities;
- Potential revenue to developers and contractors from the sale of the recoverable/recyclable material diverted from construction projects;
- Potential revenue to processors from the sale of processed C&D or recyclable materials sold to end markets;
- Decrease in hydrogen sulfide gas generated at the Landfill from decaying gypsum board (if a local end market for gypsum was identified and materials were diverted); and
- A decrease in the amount of waste disposed at the Landfill, thus preserving the airspace for MSW and extending the life of the Landfill.

3.10.2 Drawbacks

In addition to the potential stakeholder concerns discussed in Section 3.9, other drawbacks to a C&D diversion program include:

- An increase in County staff time to develop diversion programs and policies;
- An increase in multiple departmental staff time to monitor and enforce a mandatory C&D debris separation requirement (if an ordinance were developed); and
- An increase in capital and operating expenses if the County were to implement a C&D debris diversion program at the Landfill.

When considering the “cost” of diversion programs there are both “economic” considerations and “non-economic” considerations. Under economic considerations, the County must compare the cost of a diversion program with the cost of landfill disposal, including transportation costs and long term disposal obligations after the

landfill is closed (post-closure obligations). For “non-economic” considerations there are factors such as environmental sustainability, carbon footprint, public desire for and participation in diversion, and New York State Rules and Regulations. These factors should all be considered as the County formulates its integrated solid waste management planning efforts.

3.11 Resources

There are many resources available on C&D debris diversion, recycling and reuse. Some of the references used in this paper are listed below.

- California Integrated Waste Management Board (CIWMB). In 2002, the State of California passed a law that required the CIWMB to offer assistance to jurisdictions for diverting C&D waste. One of the results was the development of a model C&D ordinance which can be found, along with other sample ordinances, on the CIWMB’s C&D Recycling website. Jurisdictions must also report their progress in implementing C&D waste-related diversion programs in an annual report to the CIWMB.
 - <http://www.ciwmb.ca.gov/LGLibrary/CandDModel/Default.htm#Introduction>
- King County, Washington. King County developed a Recycling Economics Worksheet that allows the user to calculate their savings from recycling and diverting materials instead of using traditional disposal methods.
 - http://your.kingcounty.gov/solidwaste/greenbuilding/documents/economics_worksheet.xls
- Santa Cruz County, California. An example of a simple, yet effective public education piece is the “Re-Thinking C&D” brochure created by the Santa Cruz County Department of Public Works.
 - http://www.dpw.co.santa-cruz.ca.us/www.santacruzcountyrecycles/PDF/CD_Brochure_8-06.pdf
- Andela Products, Ltd. (gypsum board recycling equipment)
<http://www.andelaproducts.com/products/drywall.html>
- CIWMB, Wallboard (Drywall) Recycling website
<http://www.ciwmb.ca.gov/conDemo/Wallboard/>
- Construction Site Recycling Guide, Recycleworks.org – San Mateo County, CA
http://www.recycleworks.org/pdf/CD_office_guide.pdf
- King County, Washington, Construction Recycling website
<http://your.kingcounty.gov/solidwaste/greenbuilding/construction-recycling/index.asp>
- LaCrosse County, Wisconsin Landfill website
<http://www.co.la-crosse.wi.us/solidwaste/landfill/services.asp>

- Minnesota Pollution Control Agency, C&D Waste website
<http://www.pca.state.mn.us/oea/greenbuilding/waste.cfm>
- NERC Fact Sheet, “Asphalt Shingles Waste Management in the Northeast,” February 2007
<http://www.nerc.org/documents/asphalt.pdf>
- NERC Fact Sheet, “Carpet Recycling Infrastructure in the Northeast,” July 2008
http://www.nerc.org/documents/carpet_recycling_infrastructure_in_northeast.pdf
- NERC Fact Sheet, “Gypsum Wallboard Waste Management in the Northeast,” July 2006
http://www.nerc.org/documents/gypsum_wallboard_waste_management_fact_sheet_2006.html
- New York State Recycling Markets Database
<http://appcenter.nylovesbiz.com/esdrecycling/>
- ShingleRecycling.org website
<http://www.shinglerecycling.org/content/asphalt-shingle-recycling-resources>
- Taylor Recycling Company in Montgomery, NY (wallboard recycling)
<http://www.taylorrecycling.com/company/newyork.php?id=2&sid=3>
- USA Gypsum (Agri-Marketing in Reinholds, PA)
<http://www.usagypsum.com/recyclingimportance.aspx>
- U.S. EPA, C&D Materials website
<http://www.epa.gov/epawaste/conserve/rrr/imr/cdm/index.htm>
- U.S. EPA, C&D Materials Factsheets and Case Studies
<http://www.epa.gov/epawaste/conserve/rrr/imr/cdm/factsheet.htm>
- U.S. EPA Region 2, C&D Debris, Regional Initiatives
<http://www.epa.gov/region02/demolition/initiatives.htm>
- Vermont Department of Environmental Conservation, Construction Waste Reduction website
<http://www.anr.state.vt.us/dec/wastediv/recycling/CandD.htm>
- Waste Age, “When Recycling C&D: Makes Sense,” by Sharon Colley, May 1, 1998.
http://wasteage.com/mag/waste_recycling_cd_makes/

Issue Paper #4

Availability of Permeable Daily Cover Material for Landfill Operations

4.1 Definition and Purpose of Permeable Daily Cover

Landfill daily cover is required by both federal and state regulations to be placed on any area with exposed municipal solid waste (MSW) at the end of each operating day. The purposes of daily cover include:

- Litter control;
- Fire prevention;
- Odor reduction;
- Vehicle access to active face;
- Rodent and bird contact reduction; and
- Erosion control.

Permeable cover options allow for leachate to pass through the daily cover medium. This helps prevent liquid from ponding within the landfill, horizontal leachate movement and side seeps while still providing the benefits listed above.

Alternative daily cover (ADC) is material other than 6 inches of soil that still performs to the same standard in controlling all of the above. ADC is generally used to save air space, money and/or virgin materials. ADC may also be easier to work with than the standard soil cover option. Some ADC is specifically chosen for its ability to limit leachate generation or improve landfill gas collection efficiency. This is not typically the case with permeable ADC.

Examples of permeable alternative daily cover include:

- Shredded tires;
- Processed construction and demolition (C&D) debris;
- Glass Aggregate;
- Spray-on Slurries, such as ConCover[®];
- Foundry sand;
- Coal ash or incinerator ash;
- Contaminated soil;
- Auto Fluff;

- Green Waste and/or Composted Material;
- Paper mill sludge; and
- Water treatment plant sludge.

4.2 Rules and Regulations

4.2.1 Federal Requirements

Federal requirements for alternative daily cover at MSW landfills are described in Subtitle D of the Resource Conservation and Recovery Act (RCRA), Title 40, Section 258.21 which states:

“Alternative materials of an alternative thickness (other than at least six inches of earthen material) may be approved by the Director of an approved State if the owner or operator demonstrates that the alternative material and thickness control disease vectors, fires, odors, blowing litter, and scavenging without presenting a treat to human health and the environment.”¹

4.2.2 State Requirements

The New York State Department of Environmental Conservation (NYSDEC) has regulations regarding landfill cover. Chapter IV-Quality Services, Subchapter B: Solid Wastes, Part 360: Solid Waste Management Facilities, Subpart 360-2: Landfills, Section 360-2.17, Landfill Operation Requirements (c) Daily Cover states:

“A minimum of six inches of compacted cover material must be applied on all exposed surfaces of solid waste at the close of each operating day to control vectors, fires, odors, blowing litter and scavenging. The department may approve the use of alternative daily cover materials of an alternative thickness, upon a demonstration that the alternative daily cover material will adequately control vectors, fires, odors, blowing litter and scavenging without presenting a threat to human health and the environment. Such demonstrations are not subject to variance procedures of this Part.”

Subpart 360-1: General Provisions, Section 360-1.15, Beneficial Use (b) Solid Waste Cessation states: “The following items are no longer considered solid waste for the purposes of the Part when used as described in this subdivision: (10) solid wastes which are approved in advance, in writing, by the department for use as daily cover material or other landfill liner or final cover system components pursuant to the provisions of subdivision 360-2.13(w) of this part when these materials are received at the landfill.”²

¹ Source: Electronic Code of Federal Regulations <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=40:24.0.1.4.38&idno=40#40:24.0.1.4.38.3.23.2>

² Source: NYSDEC regulations. <http://www.dec.ny.gov/regs/2491.html>

4.3 Current Daily Cover at Broome County Landfill

Currently the Broome County Landfill (Landfill) uses six inches of soil as daily cover. The Landfill utilizes on-site soil for a majority of the daily cover material. The soil material is currently being excavated from the Section IV Cell 2 footprint in preparation for future expansion. The soil in this area consists of a glacial till which is comprised of a mixture of clay, silt, sand, gravel, and cobbles. Larger material (cobbles) is removed from the soil by the excavator during removal. Additional unsuitable material is also removed during placement as daily cover. The resulting soil material can become relatively impermeable when compacted as daily cover. This characteristic can impact landfill operations from both a landfill gas collection and stormwater management perspective by preventing the upward movement of landfill gas (LFG) and downward percolation of stormwater.

The Landfill also uses a tarp as ADC to cover the waste when weather permits. This option is used when there is no wind and the working face is on a flat surface. The tarp is not a permeable ADC, but it is a favorable system because it does not consume any airspace.

4.4 Examples of Permeable ADC

Provided below are detailed evaluations of each alternative daily cover option:

4.4.1 Tire Shreds as Alternative Daily Cover

4.4.1.1 Introduction

The California Integrated Waste Management Board (CIWMB) prepared a guidance manual entitled “Shredded Tires as Alternative Daily Cover at Municipal Solid Waste Landfills,”³ in which experience from a demonstration project at the Chicago Grade Landfill located in Templeton, California was evaluated. The performance evaluation consisted of the following:

- Protection of Public Health;
- Protection of the Environment;
- Durability;
- Operational Impact;
- Product Characteristics;
- Cost Impact; and
- Engineering Performance.

³ Source: CIWMB. <http://www.ciwmb.ca.gov/publications/tires/21297024.doc>

General characteristics and engineering properties of tires and tire shreds were evaluated. In addition, recommended procedures for landfill owners/operators who consider using tire shreds as ADC were provided including:

- Permitting;
- Acquisition of Tires or Shreds;
- Storage;
- Shred Sizing;
- Mixing with soil (optional);
- Placement;
- Monitoring;
- Documentation; and
- Health and Safety.

4.4.1.2 Performance Evaluation

The findings of the evaluation criteria are summarized below:

- **Public Health:** When used in accordance with the guidance manual, tire shreds as ADC meets public health requirements, though may not control landfill gas.
- **Environment:** When used in accordance with the guidance manual, tire shreds as ADC meets environmental protection requirements in regards to dust, litter, odor, and erosion. It does not contribute to leachate generation or add organics/inorganics to leachate or run-off. Mixing tires with soil (at least 50% soil in the mixture) will mitigate odors if they do exist with tire shreds alone. The soil mixture will also mitigate fire potential. The shreds are permeable and thus allow for leachate infiltration.
- **Durability:** Tire shreds are very durable and, when mixed with soil, provide resistance to burrowing of animals. However, tire shreds will not biodegrade.
- **Operational Impact:** Storage is similar to that of soil requirements, but the production of the shreds requires specialized equipment and additional personnel. Mixing with soil can also add a preparation step. Placement of the tires is relatively easy on a 3:1 slope or less. However, during placement, the tires can be difficult to compact. Additional layers of waste will typically help compact the tires shreds up to 50%,⁴ which can result in less air space consumption than soil. During placement, and prior to additional lifts of waste, metal wires can cause flat tires on vehicles and be a danger to foot traffic.
- **Product Characteristics:** Desirable ADC qualities of tire shreds include: material flexibility, no nutrient source for animals, high permeability, and resistance to adverse weather. An undesirable quality of tire shreds is combustibility. However, when mixed with soil, the combustibility is low.

⁴ Source: Stearns & Wheler, Broome County Section 4 Expansion Literature.

- **Cost Impact:** Use of tire shreds as ADC is generally deemed to be cost effective compared to soil. Tipping fees may be received for accepting tires; volume reductions are achieved by shredding the tires; and there is a decrease in the quantities of soil required for daily cover. However, there may be significant costs associated with shredding tires onsite due to equipment and processing costs. A detailed cost analysis should be conducted to evaluate the costs and availability of scrap tires/shreds compared to soil.
- **Engineering Performance:** Tire shreds as ADC should not have a significant impact on the performance or stability of the landfill.

4.4.1.3 Guidance for Tire Shred Use as ADC

The guidance given by CIWMB is based on this one study; site specific criteria should be evaluated. The guidance includes the following:

- **Permitting:** The landfill owner/operator should issue a letter of intent regarding the use of tire shreds as ADC and submit for approval to the NYSDEC and the local fire department. Tire shreds as ADC is not currently on the NYSDEC Beneficial Use Designation (BUD) list.
- **Acquisition of Tires or Shreds:** Tires should be free of surface contaminants and can either be purchased as whole scrap tires or already shredded tires. If shredded onsite, it is best to have at least two personnel with protective equipment performing the shredding.
- **Storage:** Whole tires should be stored in a manner that does not provide a refuge or breeding ground for mosquitoes, rodents and other vectors. Stored tires or shreds should not be located near flammable materials. The NYSDEC's guidance on stockpiling tire shreds includes periodic temperature monitoring and limits the size of the piles and spacing between the piles to limit potential spontaneous combustion.⁵ It is advised that only shreds to be used that day should be stockpiled near the working face. Shreds should be handled appropriately as to avoid injury from metal wires (which should be no more than one inch from the edge of the tire shred).
- **Shred Sizing:** When measured in any direction, shreds should have a maximum dimension of 12 inches and 50% by weight should be smaller than 6 inches. The use of U-shaped pieces should not be allowed. Tire shreds mixed with soil should meet the same requirements. The thickness on the working face is recommended to be 12 inches.
- **Mixing with Soil (Optional):** Mixing tire shreds with soil can be performed with a dozer either at the stockpile location or on the working face.
- **Placement:** Rubber-tired trucks are generally used to transport tires to the working face despite the risk of the metal wires. The shreds are generally placed in a single lift between 6 and 12 inches thick. Two to six passes of a compactor is recommended to ensure there are no large voids. If shreds are used that are not

⁵ Source: Stearns & Wheler, Broome County Section 4 Expansion Literature.

mixed with soil, then soil (instead of shreds) should be placed and compacted on the working face approximately once a week to reduce the fire hazard.

- **Monitoring:** A program should be developed to ensure that the tire shreds, when used as ADC, meet the performance standards for landfill daily cover. This could be accomplished by maintaining a logbook of visual observations.
- **Documentation:** Both the monitoring program log and the trip tickets of shreds received should be retained in the landfill files for regulatory review.
- **Health and Safety:** Tires and tire shreds are non-hazardous inert materials, however during placement and prior to additional lifts of waste, metal wires can cause flat tires on vehicles and be a danger to foot traffic. Personal protective equipment should be worn when working around/with tires. Also, employees should practice good hygiene and wash hands before eating, smoking or using the restroom.

4.4.1.4 Availability

In the past, the Landfill could request tire chips from the recycler contracted to collect and process the County's whole tires, as a provision of the contract. This practice was discontinued, but may be added back into the contract when it comes up for bid in December 2009.

4.4.2 Construction and Demolition (C&D) Waste as an Alternative Daily Cover

4.4.2.1 Introduction

A number of studies and landfills have used C&D debris as an Alternative Daily Cover. This evaluation includes the results of Allied Waste's Middle Point Landfill near Murfreesboro, Tennessee⁶ and other findings from a number of sources, and is based on the following criteria:

- Protection of Public Health;
- Protection of the Environment;
- Durability;
- Operational Impact;
- Product Characteristics; and
- Cost Impact.

General characteristics and engineering properties of C&D were evaluated and guidance for their use as ADC includes the following:

⁶ Source: <http://www.thefreelibrary.com/Tennessee+approves+use+of+ADC+made+from+C&D+finer.-a0157034850>

- Permitting;
- C&D Sizing;
- Storage;
- Mixing with soil (optional);
- Placement;
- Monitoring;
- Documentation; and
- Health and Safety.

4.4.2.2 Performance Evaluation

The findings of the evaluation criteria are summarized below:

- **Public Health:** When used in accordance with NYSDEC Part 360 regulations, C&D as ADC meets public health requirements.
- **Environment:** When used in accordance with NYSDEC Part 360 regulations, C&D as ADC meets environmental protection requirements in regards to dust, litter, and erosion. C&D that has been reduced in size via a grinder is permeable and thus allows for leachate infiltration. However, if not screened properly some materials can cause problems. For example, drywall (also called Sheetrock[®], gypsum and wallboard) is often the most prevalent material found in C&D loads and can emit a strong sulfur odor when it becomes wet and begins to decay. Some states have considered banning gypsum drywall from landfills because of the development of hydrogen sulfide gas when gypsum is mixed with moisture. Allied Waste's Middle Point Landfill in Tennessee has not found any generation of hydrogen sulfide when using C&D as ADC. (The state does not require the removal of gypsum prior to processing C&D.) The content of C&D varies with different generators, so the loads should be carefully monitored.

Also, green-treated or pressure-treated lumber may also cause problems due to potential contaminants used as preservatives (e.g., chromated copper arsenate or creosote) within the wood.

- **Durability:** C&D debris is very durable and compacts well, when reduced in size. However, not all of it will biodegrade.
- **Operational Impact:** Storage is similar to that of soil requirements. Mixing C&D with soil can also add a preparation step. Placement of the C&D ADC is relatively easy. Because C&D is currently being landfilled in Broome County, its use as an ADC would increase the volume of airspace for waste disposal.
- **Product Characteristics:** Desirable qualities of C&D ADC include: no nutrient source for animals, high permeability, and resistance to adverse weather. Undesirable qualities include: possibility of dust and high levels of gypsum. The CIWMB allows the following C&D materials and fines to be used as ADC: rock, concrete, brick, sand, soil, ceramics, cured asphalt, lumber and wood, wood

products, roofing material, plastic pipe, and plant material when commingled from construction work. As mentioned previously, if gypsum wallboard is not removed, then odors and hydrogen sulfide can form which are both objectionable for ADC.

- **Cost Impact:** Tipping fees are currently received for accepting C&D waste at the Landfill. If C&D were used as ADC, there would be a decrease in the quantity of soil required resulting in cost savings. However, costs would be incurred by purchasing shredding equipment and adding operational costs of processing the C&D. A full cost analysis should be conducted to determine potential revenues and expenses.

4.4.2.3 Guidance for C&D use as ADC

Guidance given by the CIWMB and the State of New York⁷ includes the following:

- **Permitting:** The landfill owner/operator should issue a letter of intent regarding the use of C&D waste as ADC and submit for approval to the NYSDEC and the local fire department. C&D screenings as ADC are currently on the NYSDEC Beneficial Use Designation (BUD) list. New York State operations requirements for C&D as ADC according to Subpart 360-16.4(d) states that applications for approval shall describe sampling and analytical procedures, including testing frequency, to ensure compliance.
- **C&D Sizing:** The CIWMB⁸ recommends 95% of the C&D material have a maximum dimension less than 12 inches and 50% of the C&D material, by volume, have a maximum dimension less than 6 inches, because field studies have shown that any other size of C&D is undesirable as cover. New York regulations state that the amount of fines (materials that passes through a number 200 sieve) be less than 25% by weight.
- **Mixing with Soil (Optional):** The process of mixing soil and C&D should be completed prior to application on the working face.
- **Placement:** Thickness of placement would be similar to that of the virgin soil requirement. C&D should be “ground, pulverized, shredded, screened, source separated, or otherwise processed, alone or mixed with soil in a manner to provide a compacted material free of open voids when applied to meet the performance requirements as alternative daily cover.”⁹
- **Monitoring:** A program should be developed to ensure that the C&D, when used as ADC, meet the performance standards for landfill daily cover. This could be accomplished by maintaining a log book of visual observations.

⁷ Source: New York State Department of Environmental Conservation
<http://www.dec.ny.gov/regs/4400.html>

⁸ Source: CIWMB. <http://www.ciwmb.ca.gov/rulearchive/2004/ADC/WSPresJun03.doc>

⁹ Source: CIWMB. www.ciwmb.ca.gov/rulearchive/2004/ADC/WSPresJun03.doc

- **Documentation:** Tests and monitoring of the C&D content should be documented, and the trip tickets of C&D fines received should be retained in the landfill files for regulatory review.
- **Health and Safety:** C&D is a non-hazardous material. However, employees should practice good hygiene and wash hands before eating, smoking or using the restroom. Personal protective equipment may be necessary.

4.4.2.4 Availability

The Broome County Landfill currently accepts C&D debris, however it is not required to be separated from the MSW. The Landfill does track the tons of dedicated C&D loads (loads not mixed with MSW) brought in by local contractors, so it is possible for the County to evaluate how much would be available for use as ADC. The County accepted approximately 21,350 tons of mixed C&D debris in 2006 and 22,400 tons in 2007.

4.4.3 Glass Aggregate as an Alternative Daily Cover

4.4.3.1 Introduction

Glass aggregate, when mixed with soil or tire chips, can be used as an Alternative Daily Cover. This evaluation is based on the following criteria:

- Protection of Public Health;
- Protection of the Environment;
- Durability;
- Operational Impact;
- Product Characteristics; and
- Cost Impact.

General characteristics and engineering properties of glass aggregate were evaluated and guidance for their use as ADC includes the following:

- Permitting;
- Glass Sizing;
- Storage;
- Mixing with soil (optional);
- Placement;
- Monitoring;
- Documentation; and
- Health and Safety.

4.4.3.2 Performance Evaluation

The findings of the evaluation criteria are summarized below:

- **Public Health:** When used in accordance with NYSDEC Part 360 regulations, glass aggregate as ADC meets public health requirements.
- **Environment:** When used in accordance with NYSDEC Part 360 regulations, glass aggregate as ADC meets environmental protection requirements in regards to dust, litter, and erosion.
- **Durability:** Glass aggregate is very durable and compacts well, when reduced in size. However, it will not biodegrade.
- **Operational Impact:** Storage could be done in a stockpile on-site. Mixing glass aggregate with soil or tire chips can also add a preparation step. Placement of the glass aggregate ADC is relatively easy.
- **Product Characteristics:** Desirable qualities of glass aggregate ADC include: no nutrient source for animals, high permeability, and resistance to adverse weather.
- **Cost Impact:** Tipping fees are currently received for accepting glass aggregate waste at the Landfill.

4.4.3.3 Guidance for glass aggregate use as ADC

Guidance includes the following:

- **Permitting:** The landfill currently has approval to use glass aggregate for ADC, when mixed with soil or tire chips.
- **Glass Sizing:** The glass aggregate the Landfill receives is generally crushed to 3/8th or minus in size.
- **Mixing with Soil or Tire Chips:** The process of mixing soil or tire chips and glass aggregate should be completed prior to application on the working face.
- **Placement:** Thickness of placement would be similar to that of the virgin soil requirement.
- **Monitoring:** A program should be developed to ensure that the glass aggregate, when used as ADC, meets the performance standards for landfill daily cover. This could be accomplished by maintaining a log book of visual observations.
- **Documentation:** Trip tickets of glass aggregate received should be retained in the landfill files for regulatory review.
- **Health and Safety:** Glass aggregate is a non-hazardous material. However, employees should practice good hygiene and wash hands before eating, smoking or using the restroom. Personal protective equipment may be necessary.

4.4.3.4 Availability

The Broome County Landfill currently accepts glass aggregate. The Landfill receives approximately 11,000 tons of glass aggregate per year from Waste Management's

Syracuse recycling facility. Currently, most of the glass aggregate is used for traction on the roads leading up to the working face.

4.4.4 Spray-On Slurries as Alternative Daily Cover

4.4.4.1 Introduction

A number of spray-on slurries are available for ADC. They harden after being applied but can be broken apart to remain pervious during waste filling activities. Examples of products include Pro-Guard,¹⁰ ConCover,¹¹ and Posi-Shell®.¹² (It should be noted that R. W. Beck does not endorse any particular vendor or manufacturer, nor do we claim this list to be complete.)

This summary of findings from a number of sources is based on the following criteria:

- Protection of Public Health;
- Protection of the Environment;
- Durability;
- Operational Impact;
- Product Characteristics; and
- Cost Impact.

General characteristics and engineering properties of spray on slurries were evaluated and guidance for their use as ADC includes the following:

- Permitting;
- Acquisition of Product;
- Storage;
- Placement;
- Monitoring;
- Documentation; and
- Health and Safety.

4.4.4.2 Performance Evaluation

The findings of the evaluation criteria are summarized below:

- **Public Health:** When used in accordance with NYSDEC Part 360 regulations, spray-on ADC meets public health requirements. ConCover, Pro-Guard and Posi-Shell are rated non-hazardous for health, fire and reactivity.

¹⁰ Source: New Waste Concepts. <http://www.nwci.com/proguardSB.html>

¹¹ Source: New Waste Concepts. <http://www.nwci.com/concover180.html>

¹² Source: Landfill Service Corporation. <http://www.landfill.com/posidescription.htm>

- **Environment:** When used in accordance with NYSDEC Part 360 regulations, spray-on ADC meets environmental protection requirements in regards to dust, litter, odor and erosion.
- **Durability:** Spray-on ADC is durable once it is applied and can be used as a temporary cover for a period longer than required for ADC, if necessary.
- **Operational Impact:** When high winds or low temperatures exist, these products can be difficult to apply.¹³ However, labor intensity is reduced because the application is a spray, not a manual spread, and leachate can be used as the liquid base for the mixture in some cases rather than water. Because it is a spray, steep slopes are less of a problem; the spray can be applied with equipment specifically designed for application of this type of ADC or standard hydroseeding equipment can be used. Cement mortar types of products are impermeable until broken up but the polymer products will absorb some water like a sponge and then be more permeable once broken up.
- **Product Characteristics:** Desirable ADC qualities of spray-on ADC include: no nutrient source for animals, good erosion control, and gained air space for waste. Orange County, North Carolina reported that over the life of their landfill, they will have saved an estimated two years of space.¹⁴ Undesirable qualities of spray-on ADC include: adverse weather can make application difficult and the product is not permeable until broken up for more waste placement. Examples of products include Pro-Guard and ConCover which are mixes of polymers, and Posi-Shell which is a cement mortar coating similar to stucco. These products are non-flammable and non-toxic.
- **Cost Impact:** Spray-on systems are designed to be no more than ¼ inch thick, unlike typical soil ADC and therefore they save air space for waste. The cost of application equipment, the material, and labor must be evaluated. Specialized equipment may be required; however, some slurries can be sprayed using standard hydroseeding equipment. Collier County, Florida's landfill reported a savings of \$600,000 to \$800,000 in 10 months compared to the use of soil at their 280 acre landfill that receives between 1,300 and 1,500 tons of MSW per day, according to the WasteAge article "Covering Their Tracks."¹⁵

4.4.4.3 Guidance for Spray-on Slurries as ADC

Guidance for using spray-on slurries includes the following:

- **Permitting:** Spray-on slurries are an approved ADC in New York State.
- **Acquisition of Product:** The dry product is purchased from a local supplier and mixed with water or leachate onsite prior to application.
- **Storage:** The materials come in bags that can easily be stored.

¹³ Source: MSW Management. <http://www.mswmanagement.com/march-april-2009/landfill-airspace-value-3.aspx>

¹⁴ Source: Orange County, NC. <http://www.p2pays.org/localgov/BMPs/PDFs/OrangeCountyCover.pdf>

¹⁵ Source: <http://wasteage.com/>, March 2008.

- **Placement:** The placement of spray-on slurries should be done in accordance with the manufacturer’s guidelines. The material can sometimes be placed using standard hydroseeding equipment. Specialized equipment, like truck mounted units or different tank sizes, are available for application depending on the landfill’s needs and can be purchased or leased. Product thickness when applied is about ¼ inch. Low temperatures and high winds may make application difficult or impossible, so another type of ADC should be used during winter months or during times of inclement weather.
- **Monitoring:** A program should be developed to ensure that the spray-on slurry, when used as ADC, meet the performance standards for landfill daily cover. This could be accomplished by maintaining a log book of visual observations.
- **Documentation:** The monitoring program log should be retained in the landfill files for regulatory review.
- **Health and Safety:** Spray-on slurries are non-hazardous inert materials. However, employees should practice good hygiene and wash hands before eating, smoking or using the restroom.

4.4.4.4 Availability

These products would be ordered from a sales representative for the respective company. Two companies that were discussed above are listed below. (R. W. Beck does not endorse any particular vendor or manufacturer, nor do we claim this list to be complete.)

Posi-Shell sales in New York are handled through the Northeast Regional Sales Manager at 1-800-800-7671, ext. 246.

Pro-Guard and Concover sales in New York are handled through the Vice President of Sales and Marketing for New Waste Concepts, Margie Campbell. Her phone number is 419-872-2190, and her email address is margie.campbell@nwcs.com. Ms. Campbell recalls doing a demonstration for Broome County about a year ago with one of their products called Pro-Guard SB.

4.4.5 Foundry Sand as Alternative Daily Cover

4.4.5.1 Introduction

Foundry sand is described as “primarily clean, uniformly sized, high-quality silica sand or lake sand bonded to metal castings,” according to the American Foundrymen’s Society, Inc.¹⁶ This summary of findings from a number of sources is based on the following criteria:

- Protection of Public Health;
- Protection of the Environment;
- Durability;

¹⁶ Source: American Foundrymen’s Society, Inc. <http://www.tfhrcc.gov/hnr20/recycle/waste/fs1.htm>

- Operational Impact;
- Product Characteristics; and
- Cost Impact.

General characteristics and engineering properties of foundry sand were evaluated and guidance for its use as ADC includes the following:

- Permitting;
- Storage;
- Mixing with soil (optional);
- Placement;
- Monitoring;
- Documentation; and
- Health and Safety.

4.4.5.2 Performance Evaluation

The findings of the evaluation criteria are summarized below:

- **Public Health:** When non-toxic foundry sand is used in accordance with NYSDEC Part 360 regulations, it meets public health requirements.
- **Environment:** When used in accordance with NYSDEC Part 360 regulations, foundry sand meets environmental protection requirements in regards to litter, odor and erosion. In general, metal concentrations are below regulatory standards and similar to virgin sands and sandy soils according to the EPA's review of beneficial reuse of foundry sand.¹⁷ However there are some occasions where metal leachate concentrations are above RCRA thresholds. Fine sands also have the potential to cause dust.
- **Durability:** Foundry sand is a durable material that should perform comparable to virgin raw material according to the Federal Highway Administration (FHA).¹⁸
- **Operational Impact:** Foundry sand as an ADC is similar to placement of soil daily cover and can be mixed with soil as necessary.
- **Product Characteristics:** Foundry sand is high quality silica sand that is a byproduct of metal castings from a foundry. Desirable ADC qualities of foundry sand include: no nutrient source for animals, good erosion control, and it is permeable. It is also considered a beneficial use in many states, including New York.¹⁹ Undesirable qualities include: potential for metal or organic contaminants due to binders, curing, and metals used on the sand. There is also a potential for

¹⁷ Source: U.S. Environmental Protection Agency. <http://www.epa.gov/ispd/metalcasting/reuse.pdf>

¹⁸ Source: U.S. Department of Transportation, Federal highway Administration. <http://isddc.dot.gov/OLPFiles/FHWA/011435.pdf>

¹⁹ Source: New York State Department of Environmental Conservation Granted Beneficial use Determinations. http://www.dec.ny.gov/docs/materials_minerals_pdf/budwst.pdf

very fine sands to cause dust, as was found at Crisp County’s Landfill in Georgia.²⁰ The landfill operators found difficulty with the powder consistency of the foundry sand as it clogged radiators and permeated into their equipment. Foundry sand from specific locations/generators should be evaluated before use as an ADC is allowed.

- **Cost Impact:** There is the potential to collect a tipping fee for foundry sand at the Landfill, and since the placement of sand is similar to that of soil, there would be no additional cost incurred for application.

4.4.5.3 Guidance for Foundry Sand use as ADC

Guidance for using foundry sand includes the following:

- **Permitting:** The landfill owner/operator should issue a letter of intent regarding the use of foundry sand as ADC and submit for approval to the NYSDEC. According to the FHA, agencies in the state of New York have previously approved the use of foundry sand as ADC. Broome County has been granted a BUD (#439-7-04) for the use of foundry sand as ADC. An example of a permit from Ohio requires a “report comparing the effectiveness of the foundry sand to conventional soil cover and other alternative daily covers.”²¹
- **Storage:** The sand can be stored in stockpiles, exposed to the elements.
- **Mixing with Soil (Optional):** Mixing the sand with soil may help control the potential for dust as well as reduce the percentage of any contaminants in a given volume of cover.
- **Placement:** The placement is similar to soil as the foundry sand is basically a fine aggregate. Because dust can occur in dry and windy conditions, it may be necessary to add moisture to the material.
- **Monitoring:** A program should be developed to ensure that foundry sand, when used as ADC, meets the performance standards for landfill daily cover. This could be accomplished by maintaining a log book of visual observations.
- **Documentation:** Both the monitoring program log and the trip tickets of foundry sand received should be retained in the landfill files for regulatory review.
- **Health and Safety:** Foundry sand is a non-toxic material, but when handled, there is potential to create a large amount of dust. Employees should use personal protective equipment when handling foundry sand. Also, employees should practice good hygiene and wash hands before eating, smoking or using the restroom.

4.4.5.4 Availability

Currently there are no foundries located in the Broome County region.

²⁰ Source: Crisp County. <http://www.crispcounty.com/meetings/080627m.html>

²¹ Source: State of Ohio Environmental Protection Agency.
http://www.epa.ohio.gov/dsiwm/document/issued_actions/aa-06-097.pdf

4.4.6 Coal Ash as Alternative Daily Cover

4.4.6.1 Introduction

Coal ash is a non-combustible by-product of furnaces that burn coal. It can range from very fine fly ash particles to more coarse dry bottom ash and wet boiler slag.²² This summary of findings from a number of sources is based on the following criteria:

- Protection of Public Health;
- Protection of the Environment;
- Durability;
- Operational Impact;
- Product Characteristics; and
- Cost Impact.

General characteristics and engineering properties of coal ash were evaluated and guidance for its use as ADC includes the following:

- Permitting;
- Storage;
- Mixing with soil (optional);
- Placement;
- Monitoring;
- Documentation; and
- Health and Safety.

4.4.6.2 Performance Evaluation

The findings of the evaluation criteria are summarized below:

- **Public Health:** Coal ash may include toxic elements such as arsenic, lead, mercury and other heavy metals that could be harmful to humans through ingestion, inhalation or skin contact.
- **Environment:** When used in accordance with NYSDEC Part 360 regulations, coal ash meets environmental protection requirements in regards to litter, odor and erosion. However, heavy metals should not be allowed to percolate into ground water, so a landfill liner is necessary to protect the surrounding environment.²³

²² Source: National Synthesis Report on Regulations, Standards, and Practices Related to the use of Coal Combustion Products, prepared by the University of North Dakota.

<http://www.epa.gov/epawaste/partnerships/c2p2/pubs/natpraccc08.pdf>

²³ Source: CSMonitor.com. <http://features.csmonitor.com/environment/2009/01/09/coal-ash-waste-poses-risk-across-the-nation/>

- **Durability:** Coal ash is a durable material that should perform comparable to virgin raw material according to the EPA.²⁴
- **Operational Impact:** Coal ash as an ADC is similar to placement of soil daily cover and can be mixed with soil as necessary.
- **Product Characteristics:** Desirable ADC qualities of coal ash include: no nutrient source for animals, good erosion control (depending on gradation), and it can be placed easily. Undesirable qualities include: potential for metal contaminants, potential for very fine ash to cause dust, and a potential for fly ash to harden when mixed with water. Coal ash from specific generators should be evaluated before use as an ADC is allowed
- **Cost Impact:** There is a potential for collecting a fee for accepting the coal ash, and since the placement of coal ash is similar to that of soil, there is no additional cost incurred for application. However, storage separation from surrounding soil and water may add cost.

4.4.6.3 Guidance for Coal Ash use as ADC

The guidance includes the following:

- **Permitting:** If the County were to consider using coal ash, the Landfill would need to issue a letter of intent regarding the use of coal ash as ADC and submit for approval to the NYSDEC. Coal ash is currently considered non-hazardous and is unregulated by the EPA, but legislation is currently (February 2009) being considered that would place federal regulations on disposal of coal combustion waste.²⁵ If this bill is passed, a review should be done to ensure proper use of coal ash as an ADC.
- **Storage:** The coal ash should be stored where airborne dust can be limited and water is not allowed to percolate a stockpile that could leach into the groundwater, vegetation or soil.
- **Mixing with Soil (Optional):** Mixing the coal ash with soil may help control the potential for dust as well as reduce the percentage of any contaminants in a given volume of cover.
- **Placement:** The placement is similar to soil as the coal ash is basically a fine aggregate. Because dust can occur in dry and windy conditions, it may be necessary to add moisture to the material or limit the conditions under which it is used.
- **Monitoring:** A program should be developed to ensure that the coal ash, when used as ADC, meets the performance standards for landfill daily cover. This could include visual observations and a log book. Monitoring should ensure that no coal ash contaminants are leaching into surrounding soil or groundwater.

²⁴ Source: US Environmental Protection Agency.

<http://www.epa.gov/epawaste/partnerships/c2p2/pubs/greenbk508.pdf>

²⁵ Source: Vermont Journal of Environmental Law. <http://www.vjel.org/news/NEWS100186.html>

- **Documentation:** Both the monitoring program log and the trip tickets of coal ash received should be retained in the landfill files for regulatory review.
- **Health and Safety:** Coal ash consists of heavy metals, therefore employees should practice good hygiene and wash hands before eating, smoking or using the restroom. Employees working with coal ash should wear personal protective equipment such as a face mask in case material becomes airborne during placement.

4.4.6.4 Availability

Inquiries have been made of the Broome County Landfill regarding the acceptance of coal ash.

4.4.7 Contaminated Soil as Alternative Daily Cover

4.4.7.1 Introduction

The use of non-hazardous, contaminated soils as ADC has been evaluated. The summary of findings includes the following:

- Protection of Public Health;
- Protection of the Environment;
- Durability;
- Operational Impact;
- Product Characteristics;
- Cost Impact; and
- Engineering Performance.

General characteristics and engineering properties of contaminated soils were evaluated and guidance for their use as ADC includes the following:

- Permitting;
- Acquisition of Contaminated Soil;
- Storage;
- Placement;
- Monitoring;
- Documentation; and
- Health and Safety.

4.4.7.2 Performance Evaluation

The findings of the evaluation criteria are summarized below:

- **Public Health:** When contaminated soil is used in accordance with NYSDEC Part 360 regulations, it meets public health requirements. However, there is potential for toxic substances like heavy metals to be present, that could be harmful to humans through ingestion, inhalation or skin contact.
- **Environment:** When used in accordance with NYSDEC Part 360 regulations, contaminated soil meets environmental protection requirements in regards to dust, litter, odor and erosion. However, contaminants should not be allowed to percolate into ground water, so a landfill liner is necessary to protect the surrounding environment.
- **Durability:** Contaminated soil is a durable material that should perform comparable to virgin raw material.
- **Operational Impact:** Contaminated soil as an ADC is similar to placement of virgin soil daily cover.
- **Product Characteristics:** Desirable ADC qualities of compost include: dust and litter control, good erosion control, and it is permeable. Undesirable qualities include: potential for contaminants to affect humans or the environment as described above. Contaminated soil from specific generators should be evaluated before use as an ADC is allowed
- **Cost Impact:** Tipping fees are currently received for accepting contaminated soil at the Landfill and it has been used in the past as ADC at the Landfill. Because the placement is similar to virgin soil, there is no additional cost incurred for application.

4.4.7.3 Guidance for Contaminated Soil use as ADC

Guidance for using contaminated soil as ADC includes the following:

- **Permitting:** The landfill owner/operator should issue a letter of intent regarding the use of contaminated soil as ADC and submit for approval to the NYSDEC.
- **Storage:** The soil can be stored in stockpiles, but care should be taken to ensure that contaminants do not enter the surrounding soils or leach to surface water or groundwater.
- **Placement:** The placement is the same as virgin soil.
- **Monitoring:** A program should be developed to ensure that the contaminated soil, when used as ADC, meets the performance standards for landfill daily cover. The County should obtain analytical data that documents that the material is non-hazardous, as well as maintain a log book of visual observations.
- **Documentation:** Both the monitoring program log and the trip tickets of contaminated soil received should be retained in the landfill files for regulatory review.
- **Health and Safety:** Contaminated soil should be designated as non-hazardous for use in the Landfill. However, employees should practice good hygiene and wash

hands before eating, smoking or using the restroom. Employees working with the contaminated soil may also wish to wear personal protective equipment.

4.4.7.4 Availability

The Broome County Landfill currently accepts contaminated soil,²⁶ and has used it as ADC in the past, however the availability for sustainable quantities is unlikely. The County accepted 13,800 tons of contaminated soil in 2006 and 7,800 tons in 2007.

4.4.8 Auto Fluff as Alternative Daily Cover

4.4.8.1 Introduction

Auto Shredder Residue (ASR) or Auto Fluff is the non-metallic waste product of processing automobiles and household appliances for recycling. It accounts for approximately 25% of a vehicle's weight, and consists of a combination of plastics, rubber, glass, wood products, cloth, paper, foam, dirt, and electrical wiring. The residue comes from things like seat covers and cushions, wire, rubber gaskets and windows.²⁷ This summary of findings is based on the following criteria:

- Protection of Public Health;
- Protection of the Environment;
- Durability;
- Operational Impact;
- Product Characteristics; and
- Cost Impact.

General characteristics and engineering properties of ASR were evaluated and guidance for its use as ADC includes the following:

- Permitting;
- Storage;
- Mixing with soil (optional);
- Placement;
- Monitoring;
- Documentation; and
- Health and Safety.

²⁶ The Landfill accepts contaminated soil that has been tested and/or meets NYS specifications. The hauler is required to have a valid NYSDEC 364 Permit on file with the Landfill scalehouse and a manifest must accompany each load.

²⁷ Source: Rhode Island Department of Environmental Management.
<http://www.dem.ri.gov/programs/benviron/waste/central/asrfact.htm>

4.4.8.2 Performance Evaluation

The findings of the evaluation criteria are summarized below:

- **Public Health:** ASR may include toxic elements such as polychlorinated biphenyls (PCBs) which is an oily liquid that was used as a dielectric fluid in appliance capacitors that were manufactured prior to 1979; lead and cadmium; total petroleum hydrocarbons (THP) from automobile parts that contain oil; and low levels of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). All of these could be harmful to humans through ingestion, inhalation or skin contact.
- **Environment:** When used in accordance with NYSDEC Part 360 regulations, ASR meets environmental protection requirements in regards to litter, odor and erosion. However, contaminants should not be allowed to percolate into ground water, so a landfill liner is necessary to protect the surrounding environment.
- **Durability:** ASR is a durable material that should perform comparable to virgin raw material, depending on gradation.
- **Operational Impact:** ASR as an ADC is similar to placement of soil daily cover and can be mixed with soil as necessary.
- **Product Characteristics:** Desirable ADC qualities of ASR include: no nutrient source for animals, good erosion control depending on gradation, and it can be placed easily. Undesirable qualities include: potential for PCB, THP and metal contaminants. ASR from specific generators should be evaluated before use as an ADC is allowed
- **Cost Impact:** The County has accepted ASR in the past and has charged a tipping fee for the material. Because the placement of ASR is similar to that of soil, there is no additional cost incurred for its application. However, storage separation from surrounding soil and water may add extra costs.

4.4.8.3 Guidance for ASR use as ADC

Guidance for using ASR as ADC includes the following:

- **Permitting:** Because ASR has been used as ADC previously, the Landfill should inquire with the NYSDEC regarding the need to submit a letter of intent for approval.
- **Storage:** The ASR should be stored where water is not allowed to percolate a stockpile that could leach into the groundwater, vegetation or soil.
- **Mixing with Soil (Optional):** Mixing the ASR with soil may help to reduce the percentage of any contaminants in a given volume of cover and make placement easier if the gradation isn't optimal.
- **Placement:** The placement is similar to soil.
- **Monitoring:** A program should be developed to ensure that the ASR, when used as ADC, meets the performance standards for landfill daily cover. This could include visual observations and a log book. Monitoring should ensure that no

ASR contaminants are leaching into surrounding soil or groundwater. The County should also obtain analytical data documenting the contaminant levels of the material to be received by ASR generators.

- **Documentation:** Both the monitoring program log and the trip tickets of ASR received should be retained in the landfill files for regulatory review.
- **Health and Safety:** ASR consists of contaminants, therefore employees should practice good hygiene and wash hands before eating, smoking or using the restroom. Employees working with ASR should wear personal protective equipment.

4.4.8.4 Availability

The Broome County Landfill accepted approximately 28,000 tons of ASR in 2006 and 29,200 tons in 2007 and used it as ADC. The Landfill previously had a contract with a local scrap metal dealer (Ben Weitsman & Son), but stopped using the ASR as ADC because PCBs were found in the leachate. The levels of PCBs were below the regulatory limit but the Landfill stopped taking the auto fluff as a precaution. The use of ASR as an ADC remains an option.

4.4.9 Green Waste and Compost as Alternative Daily Cover

Green waste does not appear to be a viable option as an ADC for the Broome County Landfill because finished compost is typically too valuable and would not be cost effective as an ADC. In addition, if green waste or compost was used as an ADC, it would not count towards diversion.

4.4.10 Paper Mill Sludge

Paper mill sludge does not appear to be a viable option as an ADC for the Landfill because there are no large paper mills near Broome County from which to obtain sustainable volumes of materials.

4.4.11 Water Treatment Plant Sludge as Alternative Daily Cover

Water treatment plant sludge does not appear to be a viable option as an ADC for the Landfill because it is not likely there is enough volume to be a sustainable option.

4.5 Impact of ADC Options on Landfill Gas Production/Collection

4.5.1 Shredded Tires

Shredded tires should not significantly impact LFG production or collection.

4.5.2 C&D Debris

C&D debris should not significantly impact LFG production or collection when processed into a permeable material. As noted under Section 4.4.2.2, C&D containing gypsum (drywall) can generate additional hydrogen sulfide gas. Because this gas is generated near the working surface of the landfill, this gas will not be collected until the horizontal or vertical LFG collection is extended closer to the working surface.

4.5.3 Spray-on Slurries

Spray-on slurries typically create a “shell” which will shed stormwater and contain LFG emissions after placement. Once that shell has been broken by equipment, usually the next day, the spray-on slurries should not have a significant impact on LFG production or collection.

4.5.4 Foundry Sand

Foundry sand should not significantly impact LFG production or collection.

4.5.5 Coal / Incinerator Ash

Coal and incinerator ash can consist of bottom ash and/or fly ash. Bottom ash is a permeable material that should not significantly impact LFG production or collection. Fly ash, depending on the specific characteristics of the material, can become relatively impermeable compared to other ADC materials. Individual layers of fly ash can create “ceilings” to the vertical migration of landfill gas. Depending on how these layers are graded they may direct LFG toward the center or edges of the landfill footprint. This must be taken into account when designing the LFG collection system. Breaking up the fly ash at the beginning of daily operations can reduce the gross permeability of the material and reduce its impact on LFG collection. Fly ash should not impact the production of LFG.

4.5.6 Contaminated Soil

Depending on the nature of the contaminated soil, this material can impact the collection of LFG, but should not impact LFG production. If the contaminated soil creates a lower permeability layer when compacted as an ADC, it can create a barrier to the vertical migration of LFG. This should be addressed as part of landfill operations and LFG collection system design. Breaking up the contaminated soil at

the beginning of daily operations can reduce the gross permeability of the soil and reduce its impact on LFG collection.

4.5.7 Green Waste/Composted Material

Not a viable ADC option based on the findings of this Issue Paper.

4.5.8 Autofluff

Autofluff should not significantly impact LFG production or collection.

4.5.9 Paper Mill Sludge

Paper mill sludge could impact the collection of LFG depending on its physical characteristics. Paper sludge can contain kaolin (a clay material) and other fillers. If the paper mill sludge creates a lower permeability layer when compacted as an ADC, it can create a barrier to the vertical migration of LFG. This should be addressed as part of landfill operations and the LFG collection system design. Paper mill sludge can contribute to LFG production. Paper mill sludge contains organic material (primarily short paper fibers) and may generate its own gas.

4.5.10 Water Treatment Plant Sludge

Depending on the nature of the sludge, this material can impact the collection of LFG. If the sludge creates a lower permeability layer when compacted as an ADC, it can create a barrier to the vertical migration of LFG. This should be addressed as part of landfill operations and LFG collection system design. Trafficking the sludge at the beginning of daily operations can reduce the gross permeability of the sludge and reduce its impact on LFG collection. Water treatment plant sludge can contribute to LFG production as it contains organic material.

4.6 Capital and Operating Expenses

Implementing one or more ADC options may incur costs, which may be more or less expensive than using 6 inches of soil. Each option should be analyzed for material costs, the cost of machinery to process or apply the product, the labor costs associated with preparing and applying the material, and should be compared with existing daily cover costs and diversion goals to determine the suitability of the option.

See Table 4-1 for planning level cost estimates for the ADC options discussed in this paper.

4.7 Implementation Requirements

Currently the Landfill uses six inches of soil for daily cover. The Landfill also has a tarp that can be used under ideal conditions (no wind, working on a flat surface area,

etc.). The use of a permeable ADC would require the County to evaluate each option as it relates to:

- Permitting;
- Acquisition of material;
- Storage;
- Handling (i.e., shredding);
- Staffing requirements;
- Placement;
- Monitoring;
- Health and Safety;
- Cost; and
- Other site-specific considerations.

4.8 Addressing Stakeholder Concerns

The stakeholder group most likely to be concerned with the Landfill's use of a permeable ADC would be the Landfill Citizen Advisory Committee (CAC). As a subgroup of the Environmental Management Council, the CAC acts as a liaison between the County and the communities adjacent to the Landfill and provides public input regarding the design, construction and operation of the Landfill. The County retains all power and responsibility for decisions at the Landfill but must consult with, solicit and consider the views of the CAC.

Stakeholder concerns regarding Permeable ADC may include:

- Concern that the costs associated with ADC will be higher than the costs associated with traditional materials;
- Concern that the quality of ADC products may be inferior to virgin soil or lack adequate standards and specifications; and
- Concerns about the use of materials that have public health risks associated with them.

The County could address these concerns by scheduling meetings with the CAC to first discuss the ADC options that the County is considering and get feedback from the CAC, and then keep them updated as the County moves forward with choosing an option, going out for bids, etc. The County should also obtain analytical data and/or MSDS sheets for materials that may pose public health risks to evaluate their use at the Landfill.

4.9 Benefits and Drawbacks

The use of ADC has benefits as well as drawbacks, as outlined below.

4.9.1 Benefits

The benefits to the County of using a permeable ADC may include, but not be limited to the following:

- Conservation of natural resources by utilizing material other than virgin soil;
- Potential revenue generation and increased diversion from accepting certain materials for use as ADC (e.g., contaminated soil, auto fluff, foundry sand, coal ash, etc.);
- Potential cost savings for ADC materials and product application;
- Potential decrease in the amount of daily cover used (especially with spray-on slurries), thus increasing the life of the Landfill; and
- Potential ease of application compared to placing six inches of soil (especially with spray-on slurries).

4.9.2 Drawbacks

Potential drawbacks of using a permeable ADC may include:

- Could lead to less than desirable surface compaction;
- Tests may be required of the ADC material and results made available to the Landfill before the ADC can be accepted for use;
- Potential exposure of workers to hazardous materials (depending on the ADC);
- Very fine ADC materials near the bottom of a new liner system could potentially clog the leachate collection and removal system and/or it could clog Landfill equipment;
- Weather limitations for the application of certain ADC options (e.g., spray-on slurries); and
- Some ADC options require more airspace, especially when compared to using tarps.

Table 4-1
Planning Level Cost Estimates

ADC Option	Equipment Required (in addition to virgin soil placement needs)	Equipment Cost (additional to virgin soil placement needs)	Product Cost	Operating Cost (other than placement cost similar to virgin soil)	Additional Information
Contaminated Soil	NA	NA	Tipping fee for contaminated soil is currently collected at the Landfill.	NA	Currently at the Landfill, contaminated soil is stored only on the active working face of the lined cell.
Foundry Sand	NA	NA	Tipping fee may be collected at the Landfill.	NA	NA
Coal Ash	NA	NA	Tipping fee may be collected at the Landfill.	NA	Storage for coal ash should be in a location where it cannot contaminate surrounding soils, vegetation or groundwater. Any costs incurred should be included.
Spray-on Slurries	Hydroseeder	Approx. \$10,000-\$15,000 ¹ Lease: \$2,000-4,950/month ⁵	Approx. \$0.02-\$0.03 per sq ft of coverage ³ \$85,500-94,500/yr ⁵	Mixing, loading and spraying can be done by 1-2 people. \$7500-10,000/month ⁵	Placement thickness is approx. 1/4 inch, saving airspace, thus this cost savings should be considered in the analysis.
Shredded Tires	Tire Shredder if shreds are not purchased from an offsite vendor	<u>Shredded on-site:</u> approx. \$250,000-\$500,000 for the shredder ² <u>Shredded off site:</u> \$0	<u>Shredded on-site:</u> Disposal fee is currently collected for tires. <u>Shredded off site:</u> Potential cost of approx. \$4-\$10/ton for tire chips 3"-6" with minimal wire. ⁴	<u>Shredded on-site:</u> \$12-\$25/ton processed; placement cost is additional and similar to soil. <u>Shredded off site:</u> Placement cost is additional and similar to soil.	Price of purchased chips may increase with delivery distance, as processors that sell shreds within 100 miles were not located.
C&D	Shredder/Grinder	Approx. \$250,000-\$750,000	Tipping fee for C&D is currently collected at the Landfill.	Approx. \$25/ton processed; placement cost is additional and similar to soil.	NA
Glass Aggregate	NA	NA	Tipping fee for Glass Aggregate is currently collected at the Landfill	NA	NA
Tarp	Deployment Attachment for Dozer	Landfill already has equipment	\$11,000 - 12,000/yr ⁵	\$2,500 - 5,000/yr ⁵	The Landfill currently uses the tarp as ADC

¹ Source: <http://www.rittenhouse.ca/asp/menu.asp?MID=99>

² Source: <http://www.ssiworld.com/docs/Scrap-Tire-Shredding-Information.pdf>

³ Source: <http://www.nwci.com/lib-infosheets/squarefeet.pdf>

⁴ Source: http://www.empire.state.ny.us/pdf/polution_prevention_recycle/TireReport06.pdf

⁵ Source: Broome County

5.1 Definition and Purpose of Franchising

A franchise is generally considered to be authorization to sell or provide a service in a particular area. Having a franchise implies ownership of a right. Terms of the arrangement are spelled out in a franchise agreement. If the agreement is cut short for some reason, because the franchise involves ownership of a right, often the party terminating the relationship must “buy out” the remainder of the franchise. For some services, such as cable or sanitation/recycling services, often a government entity grants a franchise to a specific service provider. The franchise may be exclusive (granted to only one service provider) or non-exclusive (granted to several businesses who compete within the jurisdiction for customers). Typically the franchised service provider (such as a hauler) pays a franchise fee to the entity granting the franchise. The franchise fee is often a portion of gross receipts, but may also be a flat annual fee or a per-vehicle fee, or some combination thereof. The franchise fee can range in value to nominal (e.g., some communities require haulers pay a \$50-per-vehicle fee each year) to significant (for example, the City of Boise, Idaho earns over \$1 million per year in franchise fees from their solid waste collection franchise fees). Often local governments indicate that the franchise fees are to cover costs associated with the franchised service, such as administrative costs, wear and tear on municipal roads, etc.

A local government might choose to grant several haulers exclusive franchises. They would do this by dividing the municipality or county into specific geographic regions, and having the haulers bid on a region(s).

Franchising is one means of organizing garbage/recycling collection services. Organized collection of garbage/recyclable materials is when the local government ensures that solid waste and recycling services are provided in the manner requested. Besides franchising, this could be done by:

- 1) Providing the service directly; or
- 2) Contracting with one or more service providers.

The benefits of organized collection include:

- All residents receive the same level of service, which:
 - Ensures that garbage is managed properly, particularly if residents do not have the option to “opt out” of the program;
 - Increases the likelihood that recycling services will be utilized, if included in the program;

- The local government has more control over the level of service provided, as service requirements, penalties and remedies for poor or non-performance are specifically laid out in the contract or franchise agreement; and
- Makes outreach and education easier to implement, as services are standardized, therefore the same education and outreach materials can generally be used for the entire area served.
- Efficiencies can be gained by either having one hauler serve all residents, or having one hauler serve contiguous geographic areas, which hopefully leads to lower service costs; and
- There are fewer vehicles collecting materials, resulting in less wear on public roads, enhanced safety and reduced noise and air pollution.

As stated above, organized collection through a private service provider (or service providers) can be accomplished through a contract or through a franchise agreement. These two terms, and their differences, are described below.

Contract: A contract is a formal agreement between two entities (in this context, a county and a private hauler) for specified services to be provided at a certain price for a certain length of time. Typically the contract is awarded through a competitive bid or proposal process, which also may include a negotiation process. When a local government contracts with a hauler, the government tends to have more oversight and involvement in the services. For example, the local government often pays the hauler(s) directly and bills residents either on their property tax bill or on a utility bill. Similarly, the local government may have more involvement in monitoring customer service. The degree to which the local government is involved varies, however. By definition, a contract is exclusive. It stipulates that a hauler will be the service provider for a specific, defined area or group of customers.

Franchise: A franchise is a formal agreement between a public entity and one or more private entities (depending on whether the agreement is exclusive or not) to provide services in a particular area (e.g., municipality, county or district). Franchises often are awarded through a competitive procurement process, which also may include a negotiation process. When a local government has a franchise agreement with a hauler, it tends to have less involvement in the service than it would if the hauler were contracted. For example, the billing and customer service is more commonly handled by the hauler(s) under a franchise agreement. In some regions of the country, the local government sets the rates and franchisees must charge the rates prescribed. In some cases franchised haulers are allowed to earn a certain profit level, and must submit annual reports indicating expenses and revenues. Franchise agreements can be “exclusive” or “nonexclusive”, as described in more detail below.

Changing a business or service from public ownership or control to private ownership or control, either through a contract or a franchise agreement, is referred to as **privatization**.

If a local government does not organize collection, but instead allows the private sector to compete for business, this is referred to as “open” or subscription service.

A more in-depth discussion of franchising and contracting the collection of garbage/recyclable materials is provided below.

5.2 Franchise Collection

Under a franchise collection system, the County would establish one or more franchise areas and would award a collection franchise through negotiations or through a competitive procurement with a single hauler or multiple haulers for the entire area. If it were determined that the County wished to have exclusive franchise agreements with several haulers, then the County would first divide the geographic area of the County into the desired number of districts. Haulers would then bid on the geographic area(s) they were interested in serving. In some cases local governments limit the number of geographic areas for which haulers can bid to be a service provider.

The franchise can be considered a property right for the designated hauler(s) for the term of the franchise agreement. Thus, if the County determines at any time during the franchise agreement to discontinue the franchise (except for reasons of non-performance), the franchisee might need to be compensated for lost earnings.

Under a franchise system, the responsibility for billing and collections typically, though not always, falls on the franchisee. The franchisee retains ownership of the collected waste, and can deliver this waste to any acceptance facility. Other than the submission of reports and/or franchise fees to the authorizing jurisdiction (and maintaining minimum equipment and health/safety standards), the franchisee would continue to do business the way they would in an open collection system.

Many options exist under a franchise system, including:

- **The franchise can be exclusive or non-exclusive.** In an exclusive franchise, the franchisee would be the only acceptable service provider for the designated services. In a non-exclusive franchise, multiple franchisees would be authorized to compete within the designated service territory. As a rule of thumb, the fewer number of franchisees, the lower the rates that would be expected to be available to customers within the service area.
- **Participation can be mandatory or non-mandatory.** In a mandatory franchise, all customers would be required to use and/or pay for the franchisee(s)’ services. In a non-mandatory system, those customers that elected to receive the services would elect to use (and pay for) the services provided by the franchisee(s).
- **Franchises can include some or all services and generators.** Franchises can address all collection services to all sectors (residential and commercial) or be limited to a specific generating sector (e.g., residential only) or waste stream (e.g., recycling, bulky waste, yard waste, etc.). Note that the ability to include certain sectors or types of materials may be impacted by state or local law.

- **A franchise can be bid or negotiated.** A franchise system can be established through a negotiated agreement with an existing hauler (or haulers), or via a competitive procurement process.
- **Franchises can be long-term.** Franchises are most commonly established over a long period of time, in some cases as long as 20 years. Some long-term franchises may involve an annual renewal fee or a renewal fee every five years.

5.3 Contracted Collection

Many local governments contract with private haulers to provide a specific, contractually-defined set of services with associated performance criteria. By definition a contract is exclusive – the agreement is between the local government and a single service provider. Under a contract collection system, it is possible to establish more than one service area, which could include residential and/or commercial collection services. In that instance, the local government might have a contract with more than one service provider – each of whom would provide specified services in a designated portion of the jurisdiction. Communities typically award collection contracts through a competitive procurement process. Contract collection is very similar to franchise collection, with the following notable characteristics:

- **Contracts are exclusive.** In a contract, the contractor would be the only acceptable service provider for the designated services in the designated service area(s).
- **Mandatory or non-mandatory.** In a mandatory contract arrangement, all customers would be required to use and/or pay for the contracted services. In a non-mandatory system, those customers that elected to receive the services would be required to use (and pay for) the service provided by the designated contractor(s).
- **Include some or all services and/or sectors.** The collection contract could address all collection services to all sectors or be limited to a specific generating sector (e.g., residential) or waste stream (e.g., recycling, bulky waste, etc.). In some communities, for example, only refuse collection or only recycling collection might be provided under contract, and in some cases refuse and recycling collection services are both provided under the same contract.
- **The local government may retain ownership of materials.** With most contracts, the contracting government typically has the responsibility for billing and collections for at least the residential component of the service area. By retaining billing responsibility, some state/district courts have determined that the local government remains “a market participant” and therefore owns the waste that is collected. As owner of the waste, the jurisdiction can require the contract holder to dispose of collected materials to a specified facility.
- **The local government typically pays the contracted hauler.** Usually the local government pays the hauler directly, based on the number of customers or

households and/or the type of services provided. It is common for the governing jurisdiction (i.e., the County) in a contract system to bill customers directly and bear the administrative burden and costs of billing, collections, customer turnover, and complaint management, at least for the residential sector. However, the local government may require that the hauler be responsible for billing and customer service.

- **May ensure flow control over franchise agreements.** In Florida, particularly with commercial waste, many communities have issued contracts with haulers who agree in their contract to “knowingly and willingly” deliver commercial refuse they collect to a specified disposal facility. Courts have ruled, however, in the state of Florida that for a local government to contract for the collection of commercial recyclables would violate the commerce clause, as recyclables are seen as commodities, not a municipal responsibility.

Contracts typically last for a base period (usually between three and 10 years), and have one or two optional renewal periods. Based on research reported by the Solid Waste Association of North America (SWANA), contract terms that more closely approximate the useful life of vehicles (e.g., seven years, on average) tend to result in lower contract rates. Through the request-for-proposal (RFP) process and bidder selection, the County sets the criteria for services and therefore is able to better leverage and negotiate collection and/or disposal rates with the interested bidders. These steps are described more below.

Table 5-1 summarizes the advantages and disadvantages of subscription (open), franchise, and contract approaches to organizing solid waste management systems.

Table 5-1
Advantages and Disadvantages of Subscription, Franchise, and Contract Systems

Service Delivery Option	Advantages	Disadvantages
Subscription-Based	▪ Maximum customer choice ▪ Very limited government involvement – low administrative cost impacts ▪ Provides opportunities for small haulers ▪ Competition is assumed to ensure lower costs to customers (though costs may actually be higher than in “organized” systems)	▪ Increased air pollution and road impacts from multiple haulers serving a community ▪ Neighborhood aesthetic/safety impacts ▪ Lack of uniformity in service levels ▪ Low ability to enforce policies/goals and improvements ▪ Higher costs to ratepayers because of routing inefficiencies ▪ No financial assurance generally provided, unless if required by licensure ▪ May not be able to fund recycling in part or in whole with refuse collection fees.
Competitively Procured Franchise Agreement	▪ Competitive bid process can result in low rates ▪ Service providers selected on the basis of technical and financial ability to provide the requested services ▪ Contract items often include penalties/remedies for poor or non-performance ▪ Financial assurance provided ▪ Depending on how structured, may be able to have solid waste collection fees help offset recycling collection costs.	▪ Small haulers may not be able to compete with larger regional or national service providers ▪ Costs of procurement ▪ Potential disruption to customers resulting from change to successful bidder ▪ Transition costs (start-up time for learning new routes, etc.) ▪ Potential quality of service issues due to “low-ball” pricing

Table 5-1
Advantages and Disadvantages of Subscription, Franchise, and Contract Systems

Service Delivery Option	Advantages	Disadvantages
Competitively Bid Contract	▪ Jurisdiction has more control over flow of waste and recyclables than under franchise or open systems ▪ Efficiencies are gained by having one hauler service each region, which generally result in lower costs to residents ▪ Contract items often include penalties/remedies for poor or non-performance ▪ Competitive bid process can result in low rates ▪ Financial assurance provided ▪ Depending on how structured, may be able to have solid waste collection fees offset recycling collection costs.	▪ Small haulers may not be able to compete with larger regional or national service providers ▪ Costs of procurement ▪ Potential disruption to customers resulting from change in winning hauler ▪ Transition costs (start-up time for learning new routes, etc.) ▪ Potential quality of service issues due to "low-ball" pricing

5.4 Implementation Requirements

In the state of New York, it appears that Towns and Counties may form solid waste disposal districts, pursuant to County Law § 250 et. Seq. Prior to the formation of a solid waste district, County Law § 256 requires the submission of evidence supporting the formation of such a district. Such evidence must be filed with the county's board of supervisors. After due consideration and making a finding that the applicable statutory guidelines have been followed, the county board may adopt a resolution approving the establishment of a solid waste district, subject to a permissive referendum pursuant to County Law § 256.

Upon approval of the resolution via referendum, the jurisdiction must submit an application to the State Department of Audit and Control for permission to establish the district, pursuant to County Law § 258. If the State Comptroller grants permission, the board may adopt an order establishing the district. The order must be recorded in the office of the county clerk and filed with the State Department of Audit and Control. Any interested party aggrieved by the final determination or order establishing the district may apply, within 30 days of recording the order, for review

of all the final determinations made by the board in connection with the establishment of the district.¹

It appears that case law supports the fact that a municipality may create a solid waste district and grant a private company an exclusive license to collect the garbage, both commercial and residential, within the district. One case that supports this includes *USA Recycling v. Town of Babylon*, 66 F.3d 1272 (2d Cir. 1995), in which the Town of Babylon, NY created Commercial Garbage Collection District No. 2 to cover most commercial real estate in town. The Town solicited bids and after reviewing the bids received, entered into a five-year service agreement with a private company to provide garbage hauling services to all improved commercial property within the district. Under the Service Agreement the Town agreed to grant the private company an exclusive license to collect commercial garbage within the district.²

In Babylon, it appears that the residential “license agreement” is analogous to an exclusive franchise agreement. The agreement with their hauler, BSSI, includes weekly collection of garbage and recycling for residential customers. Residents are billed on a line item on their property tax bill, however, not by the hauler. The hauler handles customer service calls directly. It is not legal for another hauler to provide residents with garbage or recycling services. BSSI must pay annual licensing fees.

Babylon’s commercial program is a bit more like a contract, in the sense that the agreement is only for five years. Also, the agreement is exclusive for the collection of garbage, but not for recycling. Commercial entities can hire any licensed recycler to collect their recyclable materials. Commercial entities are billed for a base level of service (1.5 yards per taxable property per week) on their property tax bills, and are issued separate bills through the Town for additional service. Again, haulers serving commercial entities pay annual licensing fees, as described below. The fees consist of a flat annual fee, and a flat per-vehicle annual fee, as well as a flat per-compactor/roll-off/dumpster fee. Fee levels vary for different classes of haulers (residential/commercial and refuse/recycling).

Another case that supported the right of a municipality to have an exclusive agreement with a hauler was *Southern Waste Systems, LLC v. City of Delray Beach*, 420 F3d 1288 (11th Cir. 2005), which pertained to the City of Delray Beach, Florida hiring a successful bidder to be the exclusive provider of residential waste collection services, residential waste recycling services, and commercial waste collection services throughout the City. The arrangement was challenged, but the court held that the City’s exclusive waste-hauling agreement did not offend the constitution.³

Implementation of a contract or a franchise agreement typically begins with the development of a request for proposals (RFPs) or a request for bids (RFBs). Ideally,

¹ Per Memorandum to Josh J. Meyer, Esq. from William A. Lawrence, Esq., of Pannone Lopes Devereaux & West LLC, New York, NY of March 12, 2009.

² Ibid.

³ Ibid.

the RFP or RFB would be detailed and explicit enough to be used as the contract or franchise agreement language. A request for bids is when specific services are outlined and price is the only deciding factor among proposals. A request for proposals invites bidders to describe how they would provide some level of service, where they determine the technology and method, and the bidder also provides the price at which the service would be provided. Therefore, there is generally more leeway in an RFP, and RFPs can be more challenging to compare, as they are not always “apples to apples” comparisons. One way local governments can obtain more information but still have it be comparable is to request pricing for different scenarios, for example weekly and bi-weekly collection of recyclables.

The steps to effective contracting/franchising include:

1) Develop a Procurement Team. It is important that the local government procuring recycling and/or solid waste services assemble a team to assist with selecting the appropriate service provider. Ideally these procurement team members’ input would be solicited early in the process such that their input can be used to develop appropriate RFP language. Potential procurement team members include:

- Public works or sanitation department representatives;
- Recycling manager or coordinator;
- County commissioner or city manager;
- Billing and customer service representatives;
- Purchasing department representatives;
- Legal counsel;
- Elected officials;
- Citizen group representative(s); and
- Consultants or other outside advisors.

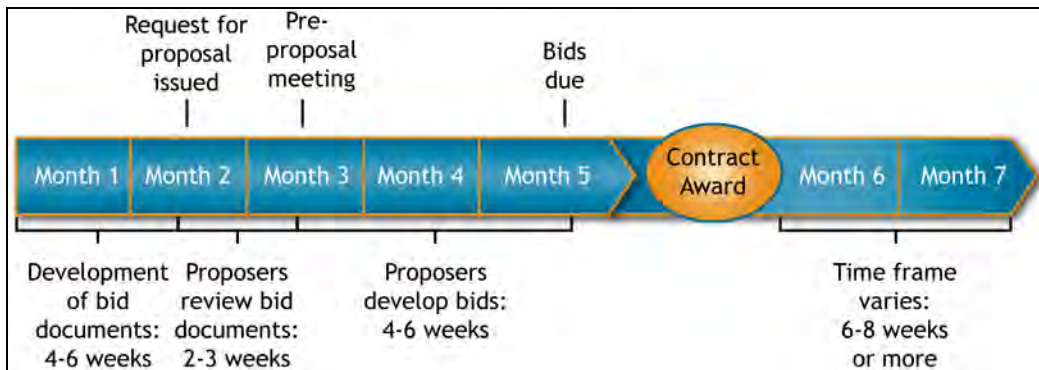
It is important that the local government form a procurement team that has the knowledge and availability to conduct the procurement. The question of whether to hire a consultant to assist with the procurement effort depends upon the experience, skills, and availability of the internal team. Hiring outside consultants adds to the cost of the project, however in some cases such costs have been paid by the selected contractor.

2) Develop a Timeline. Successful procurement requires adequate time for each step of the process. At the beginning of the process, the team should establish a timeline for the procurement. Figure 1, below, presents a sample solid waste procurement timeline. Some steps may take more time and others less, depending on the unique characteristics of the procurement.

It is critical to account for the transition period after the award of a contract. The transition period allows the successful bidders to purchase the required equipment,

hire experienced personnel, and conduct other tasks associated with providing services. The required transition period will be longer if the successful firm is required to build new facilities, such as a materials recovery facility (MRF) or transfer station.

Figure 5-1
Sample Procurement Timeline



3) Precisely define the services to be contracted or included in the franchise agreement. The geographic area, population, and number of municipalities that are to be serviced must be defined for potential service providers. The complete range of services desired must also be specified in a manner that is easily understood. For example, collection method of refuse (cans or carts), collection method of recycling (bins or carts), processing, transportation, marketing of materials, communication and education, program administration and operation (including billing), etc., should all be defined.

The length of the contract should be designed to reflect both the needs of the local government and the realistic capabilities of the potential bidders. If a service provider is expected to have to purchase new equipment, for example, the contract should ideally match the life cycle of the equipment being supplied. If the contract is too short, the contractor must capitalize the equipment over the period of the contract resulting in sub-optimal pricing and cost. If the contract exceeds the equipment lifespan by a year or more, the contractor may incur expensive extended maintenance costs or costly new equipment that must be built into the price. Current lifecycle expectations for new collection trucks are approximately seven years; new MRF equipment is expected to have a lifespan of 10 to 15 years.

It is important to evaluate options prior to the proposal/bid process through informal dialogue with potential service providers and other stakeholders. To define expectations clearly and specifically, the County should:

- Review agreements from other communities;
- Address both short- and long-term needs;

- Consider surveying the community to better predict the desired/required level of service;
- Build in flexibility, but don't leave too much open to interpretation; and
- Provide adequate data and technical specifications for accurate pricing of services.

It is important to consider whether there would be a separate contract with a MRF for processing of recyclable materials. Communities should consider requesting a revenue sharing arrangement either with the recycling collection franchisee or via a separate contract with a MRF.

4) Determine the service provider pool and market position. The County should determine whether the customer base is large enough that the County has significant bargaining power. Also, for best results there should be a minimum of three to five bidders. In rural areas, bargaining power may be improved by bundling services (e.g., including several services in one franchise agreement or contract) or partnering with other communities to increase the attractiveness of the potential business. If the service area is too large, this can also limit the number of suitable contractors, as some haulers may not have adequate resources to service a large area. In this event, it may be desirable to un-bundle services or break up the service area into districts to allow more bidders the opportunity to compete.

With respect to recycling collection and processing, the common practice is to structure the procurement process to allow for separate contracting for collection and processing when possible. With this approach, it is most desirable to procure the processing services in advance of collection services or to specify a MRF location so collection service providers will know where the MRF will be located so they can structure their proposals/bids accordingly. Additionally, it is desirable to obtain separate prices for the collection and the processing of recyclables, even if under one contract or franchise agreement, and to request pricing for the handling of any material (or geographic area) that might be added during the term of the contract.

5) Prepare a detailed, unambiguous Request for Proposals or Request for Bids The County will have to decide whether the services requested warrant an RFP or RFB. An RFB works best when services are already defined, all bidders are qualified, and the price is the sole deciding factor. An RFP is normally used when the job demands more complex requirements. An RFP is appropriate when the local government is receptive to different approaches to delivering service. Advantages to an RFP include:

- Allows the local government to evaluate potential contractors based on criteria beyond price (e.g., experience, financial stability, and references);
- Provides incentive for potential vendors to propose a higher level of service as opposed to satisfying a minimum threshold (which may be the case with an RFB or Invitation for Bids, IFB);

- Allows proposers to present alternatives to providing service and show the variation in price based on differing alternatives; and
- Allows potential service providers to provide input and feedback to the local government on issues such as program design and contract terms.

There are some disadvantages to the RFP process. Unlike the RFB/IFB structure, RFPs generally require a high level of effort from the local government or consultants, especially when it comes to proposal evaluation. When contractors are able to provide alternatives to providing service, financial evaluation of proposals can be complex. However, this can be mitigated by requiring that proposers submit a price for some “baseline” level of service for an apples-to-apples comparison. All other alternatives can be offered in addition to the base level of service. In addition, it may be beneficial to have consultants conduct the financial analysis of the proposals.

In addition, RFPs present a higher potential for protest from unsuccessful proposers. However, this risk of protest can be mitigated by clearly defining the evaluation process and criteria in the procurement instruction documents.

Carefully defining the desired results or outcomes and allowing the bidders to present their own means to reach the end often may yield additional value opportunity. For example, the bidder may offer ideas or additional complementary services that the local government had not previously considered. Some local governments use a “two envelope” system in evaluating proposals generated by an RFP – the technical proposals are placed in one package, and are evaluated and ranked. Next, a specified number of cost proposals associated with the top-ranked technical proposals are removed from the second package and evaluated. The remaining cost proposals are returned, unopened, to the submitters. Components of a well-written RFP and contract include the following:

- Clearly defined terms;
- Detailed description of service(s) to be provided;
- Adequate background information and data;
- Clear expectations regarding qualifications and experience;
- Detailed performance specifications, including details addressing:
 - Regulatory compliance
 - Recyclable materials accepted (initial and provisions for the future)
 - Markets for processed recyclable material
 - MRF residue management and limits
 - Start-up-schedule
 - Handling of complaints
 - Record-keeping and reporting

- Cart/container provision, maintenance, and distribution requirements
- Training and public education(if included)
- Equipment requirements;
- Incentives for increasing recycling participation;
- Opportunities for amending the scope to address changing circumstances;
- Avenues for resolving disagreements – including a mandatory third-party mediation clause;
- Clear financial/cost proposal instructions;
- Provisions for contract fee adjustments (e.g., based on a CPI or other index);
- Proposal submission instructions; and
- Description of selection process and evaluation criteria.

6) Employ a fair and transparent contractor/franchisee selection process. To be sure that all potentially qualified companies have the opportunity to respond and to avoid challenges to the RFP, the County should use a fair, transparent and defensible contractor selection process. It is important that the County follow local government procurement guidelines, and try to reach as many companies as possible. The County and applicable municipal web pages, mailing lists, trade press and business publications are typical means of advertising RFPs.

In order to learn about the capabilities and interests of potential contractors in advance, the County might consider pre-qualifying bidders through either a request for qualifications (RFQ) in advance of the RFP or through a pre-proposal/bid meeting with potential contractors. The number of companies that respond to the pre-qualification process will reveal the effectiveness of the advertising and promotion of the RFP. During proposal and bid development, there should be a clear process for potential bidders to ask questions. The questions and answers should be provided in a transparent process so that all potential bidders have an opportunity to view them.

It is important that the evaluation criteria be described clearly to ensure that contractors who are not qualified do not spend time developing a proposal, and ensures that the bidders respond to the RFP by providing all requested information. References should always be required and should be verified. Potential selection criteria include:

- Cost;
- Responsiveness to RFQ, RFP or RFB;
- Technical soundness of response;
- Innovativeness;
- Related experience;
- Facility/operational capacity;

- Qualifications (e.g. organization/management);
- Financial stability; and
- References.

7) Negotiate a partnership-oriented contract/franchise agreement. In developing the contract/franchise agreement, build upon the terms and conditions specified in the RFP. Incorporate incentives for improving performance on the part of the contractor. Allow flexibility for amending the scope of work to address changing circumstances, including a means of addressing unexpected events, such as adding new commodities (or regions) to the program. Consider index-based annual payment escalation to accommodate future price fluctuations in an equitable manner. When such escalations are built into the agreement language, then bidders do not need to inflate the cost of the proposal to cover potential risks. It is also important to provide procedures for resolving disagreements and build in ongoing communication and feedback mechanisms such as regular meetings and reports. It is best to use straightforward language to ensure compliance and make sure the terms and conditions are understood clearly by both the contractor and the contract administrator.

8) Maintain a partnership approach in contract administration and monitoring through the entire contract/franchise agreement term. Once the contract/franchise agreement is in place, realize that both parties are partners in the arrangement. The County would likely have an ongoing role in requesting and/or receiving certain reports from the service provider, and in working out any issues that arise. The methods for working out such issues should be spelled out in the agreement. A contract should result in the local government selecting a qualified hauler that can provide service under an agreement that is mutually beneficial to both the hauler and the local government. Naturally the local government aims to pay a low price for service. Ideally, contract specifications will:

- Be mutually beneficial to the hauler and the local government;
- Encourage higher recyclable materials recovery rates;
- Yield higher quality recyclable materials;
- Increase revenues from the sale of recyclable materials; and
- Enhance working relationships with service providers.

5.5 Additional Considerations

5.5.1 Mandatory Participation/Payment

The County should consider whether they want participation in the collection program to be mandatory for all single-family households (or households of up to a certain number of units – typically multi-family dwellings with more than four to six units are

considered to be “commercial” from the waste and recyclables hauling perspective). Having all households participate is beneficial in that it is easier to predict the revenue stream, and economies of scale are more fully realized. Having all households participate also makes data-gathering easier. Often, a benefit of mandatory participation for refuse collection is fewer incidences of illegal disposal of waste. Mandatory recycling programs typically result in higher recycling rates and increases in tonnages diverted.

In some communities however, residents prefer to have the option to self-haul trash and/or recyclables to a landfill/transfer station/drop-off site – whether it is to save money or out of habit. Further, many residents simply do not like being “forced” to participate in a program.

Some communities mandate participation in the garbage program, but participation in the recycling program is voluntary. Payment, however, is mandatory. This is generally due to the fact that it is easier to monitor and enforce non-payment than it is to enforce non-participation. In general, residents are more likely to use a program if they are paying for it. Some communities essentially mandate payment by including the cost of the recycling program in the base fee for trash collection. Often pay-as-you throw (PAYT) programs, for example, will include a certain base level of trash and unlimited recycling for a basic fee, and those households generating additional waste must pay extra (on a per-bag, per-sticker or tag, or per-cart basis, for example).

Often times, communities implement mandatory collection at the same time they implement “no burn” ordinances. In many communities, particularly rural areas, residents have relied upon burning trash as a means of managing their waste. Due to concerns about fire and air quality, many communities have implemented no burn ordinances. In Pennsylvania the eligibility of communities to apply for certain types of grants is dependent upon passing no-burn ordinances. An example no-burn ordinance is provided in Appendix A.

In many communities, particularly those with landfills and recycling drop-off centers, there is a provision for those that wish to “opt out” of the curbside collection service, however they typically must pay an annual fee to have the right to deliver materials to the landfill/transfer station/drop-off site. Also, some communities charge a base fee for certain services such as the management of household hazardous waste and litter cleanup, regardless of whether the residential dwelling receives refuse collection services.

5.5.2 Identifying Municipalities that Could Join the County’s Contract/Franchise Agreement

Before the County undertakes the steps outlined above, it might consider surveying municipalities within the County to determine the level of service each provides, the length of the service contract, etc., to see what possibilities exist for joining with the County in a more comprehensive contract. The County could also query the municipalities directly to see whether they have an interest in potentially taking part in

a Countywide contract or service agreement. The Town of Dickinson and the Village of Whitney Point, for example, already have collection contracts in place for the collection of garbage and recyclable materials, however they might be open to the possibility of joining in on a County contract when their contracts expire. In some areas, homeowner associations also have contracts with haulers. If this is the case in Broome County, such entities should also be queried. Potential survey questions could include:

- What services are included in the contract (e.g., collection and disposal of waste, collection of recyclables, processing of recyclables, yard waste collection/processing)?
- What is the frequency of collection for each service?
- Who is the service provider?
- What is the monthly cost per household for each/all service(s)?
- What collection technologies/container types are employed for each service?
- Which items are included in each service, what are the associated additional fees, and how must items be prepared (e.g., bulky waste, recyclables, etc.)?
- Are variable rates charged for different levels of waste generated?
- Does the contract stipulate where waste is to be disposed (if so, where is waste delivered)?
- Does the contract stipulate where recyclable materials are to be delivered (if so, where)?
- What are the funding mechanism(s) for service?
- Is it mandatory that residents participate (and/or pay) for the program?
- If participation is not mandatory, how does the self-haul option work?
- Does the municipality have a no-burn ordinance in place?

5.5.3 Non-Exclusive Franchises/ Licensing/Permitting Requirements for Haulers

In some communities the idea of organized collection has been a difficult sell. Some communities have, instead of organizing collection, passed legislation that stipulates that only franchised or licensed haulers can operate in the jurisdiction (city or county). The resulting franchise agreements would be non-exclusive. Collection services remain similar to an “open” or “subscription” system whereby residents hire their own hauler, however haulers would need to be licensed or franchised in order to operate in the jurisdiction. The local government could then impose certain limitations or guidelines on the haulers. These might include:

- Specifying where waste/recyclables are to be delivered;

- Stipulating that haulers offering trash service must also offer recycling services;
- Stipulating that haulers must provide recycling services at no additional cost to residents;
- Stipulating that haulers must also provide separate yard waste collection services and subsequent recovery of yard waste;
- Stipulating the types of recyclables that need to be included in the recycling program, at a minimum;
- Stipulating certain operating details, such as hours of operation, condition of vehicles, condition of containers, etc.; and
- Requesting liability insurance information.

In many communities, the local government requires haulers to be licensed or permitted, and the conditions of the permit or license include certain stipulations. In Broome County, haulers need a permit to use the County solid waste facilities (Part IV, Section 179 of the County Charter). Other typical provisions of permits or licenses include:

- Limitations on operating hours;
- Condition of equipment;
- Liability insurance requirements;
- Bond;
- Assurance that business will be conducted in accordance with all federal, state and local laws;
- Copy of agreement with receiving landfill, transfer station, and/or processing facility; and
- Stipulation that haulers collecting garbage will also collect separated recyclables for recovery (as is the case in Broome County, per Section 179-26 of the County Charter).

Often, such ordinances specifically express that the requirements do not apply to roll-off service providers, construction and demolition (C&D) debris haulers or other specialty haulers.

The main benefit of such an approach is that it can increase the provision of and participation in recycling programs without completely revamping the collection system. This can be easier to implement, politically and logistically, as residents still have the freedom to select their own hauler. The drawback, however, is that many of the benefits of organized collection are not realized, such as decreased hauler traffic, more efficient routing, and increased economies of scale.

In Fairfax County Virginia, for example, it is illegal for residents and businesses to contract with a hauler that is not permitted with the county. It is also illegal for a hauler to operate in the county without obtaining a permit. Permitted haulers hold a

“Certificate to Operate.” Before such a certificate is issued, certain information pertaining to the hauler’s operations must be submitted to the county, including (but not limited to):

- Customer fees and service level information;
- Facility address where vehicles are stored, maintained and washed;
- Proof of liability insurance, and assurance that they will notify the county upon change of insurance provider;
- A bond or alternate surety;
- Street addresses for each collection route;
- Notification to customers to be dispensed at least annually, that includes information about recycling, which must include, at a minimum, the county’s base recycling requirements; and
- Information about holiday collection schedule changes.

Typically haulers must pay a fee to license/become permitted, however the fee generally only covers the cost (or a portion thereof) of administering the licensing permit.

5.6 Capital and Operating Expenses

Typically communities earn some revenues in the form of franchise fees when they enter into a franchise agreement with a hauler. The amount of this franchise fee varies significantly. As mentioned previously, franchise fees can be relatively insignificant (for example, some communities charge an annual \$50-per-vehicle fee), and some can be more significant (for example, a percentage of gross receipts can add up to up to \$1 million per year or more, depending on the size of the community and cost of services provided).

The Town of Babylon New York, for example, refers to their program as a licensing program, however it essentially operates as a franchise. In Babylon, a Class 1 license is required of all persons engaged in the collection and transportation of garbage, refuse, recyclable material, ashes or solid waste **outside the improvement areas** or for collection and transportation of **recyclable material only within the commercial improvement area if properly authorized by the property owner**. The annual fee for such license is \$2,000, plus \$450 for each truck and \$1 for each sticker for roll-offs and compactors. A Class 2 license is required of all persons engaged in the collection and transportation of garbage, refuse, solid waste and recyclable material **within an improvement area authorized pursuant to a contract with the Town to collect and transport solid waste, garbage, refuse or recyclable material**. The annual fee for such a license is \$1,000, plus \$50 for each truck, roll-off and compactor used by the licensee in such collection and transportation. There is also a Class 3 license which applies to haulers collecting C&D debris (\$2,000 per year plus \$450 per truck

per year and \$1 per roll-off container and compactor per year) and a Class 4 license which applies to collectors of donated textiles (\$1,000 per year plus \$350 per vehicle and \$1 per container per year). These licensing fees for the non-contracted haulers sums to about \$300,000 per year, according to a town official.

Organizing collection through privatization is not expected to require capital expenditure outlays, however it may require a fairly significant amount of staff time in order to develop an RFQ, RFP or RFB, and assess all proposals or bids. It is also expected that some County staff time would be required to solicit feedback from the public and educate the public about the program. Additional staff resources would be required on an ongoing basis to monitor (audit) the performance of the hauler(s), serve as liaison with the hauler, and respond to customer complaints. In addition, education and outreach regarding the privatized services would need to take place both before and during service implementation. The extent to which staff hours would be required depends, in large part, on the extent to which the contract or franchise agreement with the hauler stipulates that the hauler(s) is to provide customer service and public outreach and education.

Under organized collection provided by a private hauler, fees for recycling and/or solid waste collection services can be paid through different means. The costs of service provision, however, are expected to be similar, on a dollar-per-household-basis, to the costs individual families currently pay their haulers directly. In fact, costs may even be reduced due to economies of scale gained by one hauler serving a contiguous area. Under a franchise arrangement, it is common for haulers to bill customers directly. Generally the hauler(s) must pay a franchise fee to the local government. The franchise fees are usually collected, in theory, to cover any costs associated with wear and tear of roads that haulers cause in the course of doing business. Franchise fees are often levied on each vehicle (e.g., a certain dollar value per vehicle per year) but in some regions, franchise fees are a percentage of revenues or profits earned by the hauling company. Typically, haulers operating under a contract with the local government would be paid on a monthly basis by the local government. The local government would secure funding for the services through one or more of the following funding mechanisms:

- User fees on utility bill (e.g., based on level of service or amount of waste generated);
- *Ad-valorem* fee on property tax bill (e.g., amount of fee is linked to value of property);
- *Non ad-valorem* fee on property tax bill (e.g., amount of fee is not linked to value of property);
- Fees per unit of trash generated, paid by households through the purchase of bags, tags, or stickers; and
- Tip fees on waste disposal at the local landfill.

In addition, some communities earn the following revenues, which usually help supplement the cost of solid waste management services:

- Host fees (if the county hosts a landfill, transfer station, waste-to-energy facility, or MRF); and
- Revenues from the sale of recyclable materials.

5.7 Education Tactics

When recycling and/or trash services are organized, one benefit is that services are identical among the customer base served. This means that the local government can develop education and outreach programs that are associated with a “brand” or logo which may, upon repetition of the same message and logo, resonate more meaningfully with residents. Figure 5-2 provides an example of an outreach message that the City of El Paso, Texas disseminated via billboard and vehicles when they rolled out their citywide curbside recycling program. Municipal crews collect recyclable materials and a private MRF is contracted to process them.

Figure 5-2
City of El Paso Recycling Messaging





In addition, when a relatively large geographic area is serviced under one program, the education and outreach materials can provide more specific instructions and details about the program. For example, instead of simply informing residents to “check with your hauler to see which items you can recycle,” the County could develop education and outreach materials that specify:

- What materials are recyclable;
- How recyclables are to be prepared;
- The frequency of collection;
- The types of containers provided; and
- Who to contact for more information and/or issues.

This is most beneficial in areas where the alternative to organized collection is a variety of recycling programs that vary significantly. In some areas, multiple programs may exist, but they may be fairly homogenous in nature – perhaps because the recyclable materials are collected by the same hauler under different contracts, or because they are serviced by the same MRF which accepts the same material types from all communities.

Having one cohesive program would also allow the County to be able to make changes to the program, within the parameters of the contract/franchise agreement, with relatively little effort. The program, in other words, could be more responsive to changes that might be initiated in response to processing or collection technologies, material generation, markets for collected materials, and other factors.

Yet another benefit to organized collection is that data, such as tons of materials collected by material type, participation rates, contamination rates, etc. are more likely to be available under such an arrangement, particularly if the contract or franchise agreement stipulates reporting requirements clearly.

5.8 Diversion Potential

It is difficult to quantify the diversion potential that would result from franchising. Because most households in Broome County have access to some sort of recycling, whether it is curbside or drop-off opportunities, it is difficult to estimate how much additional recycling activity would take place if organized collection were implemented. In general, residents tend to recycle more when recycling is convenient, therefore tonnages recovered typically increase when communities switch from drop-off to curbside programs. Therefore, it is expected that participation rates (the portion of households participating in a recycling program) as well as capture rates (the portion of each recyclable commodity collected for recycling) would increase if households that now only have access to drop-off programs were provided with the opportunity for curbside recycling. Additional measures would also increase the likelihood of increased participation, including:

- The use of a PAYT program for garbage disposal;
- Other financial incentives to participate in recycling (such as a reduced rate if the household participates in recycling on a regular basis);
- The implementation of a no-burn ordinance;
- Well-designed education and outreach programs; and
- Adding more materials to the list of accepted recyclable materials.

In addition, organized collection would make it easier to track the amount of waste disposed and recovered through recycling programs.

5.9 Case Studies

Provided below are two case studies regarding communities that organized the collection of their trash and/or recyclable materials.

5.9.1 Cranberry Township, Pennsylvania

Cranberry Township, a community of approximately 28,000 residents in Butler County, used to have subscription-based service, with five different haulers serving residents. In November of 2004 the Township implemented variable-rate pricing (automated and/or semi-automated collection). Under the subscription service, residents were typically provided with weekly collection of trash and weekly or bi-weekly collection of recyclables, but no yard waste collection. Prices per household varied considerably, from \$10.00 to \$18.00 per month. Some haulers included bulky waste collection in that fee, and some did not.

Under the new program, Vogel Disposal, Inc. (Vogel) provides weekly collection of trash, recyclable materials (and yard waste, in season – April through November). A wheeled cart is provided for each of these material streams. Residents can select their

recycling and trash cart size (35, 64, or 96-gallon) or they can select a no-cart option for trash (tags are used instead). Household costs range from about \$11.92 per month to \$14.15 per month, depending on the trash option selected. Residents can also select a no-cart option for yard waste, and can set their yard waste out in biodegradable bags instead. This does not impact the cost of service. Recyclable materials are processed at a single-stream MRF (TC Recycling, LLC in Mars, PA). Because the carts hold more materials than the previous bins, residents can recycle additional materials, including chip board, junk mail, phone books, construction paper, baby wipe containers, and bundled plastic bags. Vogel is required, by contract, to process yard waste, not dispose of it. Vogel constructed their own composting facility (located next to the landfill) to do so. If residents have more trash than will fit in their 95-gallon cart then they must purchase a tag for \$0.65 per bag. Bulky items are collected for a fee -- \$4 for a bulky or large item, \$10 for major appliances, and \$15 for a large volume pickup of up to twelve 32-gallon bags. Residents are asked to call in advance to schedule their bulky waste collection. The Township bills the residents on a quarterly basis, with the water/sewer bill. The Township purchased the carts and 90 percent of the cost of the yard waste and recycling carts were paid with Pennsylvania Department of Environmental Protection (DEP) grants. The County paid a significant amount of money for the garbage carts.

Figure 5-3 summarizes the solid waste management options available to residents.

Figure 5-3
Cranberry Township Solid Waste Management Service Options

GARBAGE, RECYCLING, and YARD WASTE Cart Selection



GRAY-TOP Garbage Cart: Check your preferences. Keep this for your records.

- ☐ 35 Gallon \$39.30 per quarter ___# Additional 35 gallon cart(s) @ \$4.65 extra per quarter
- ☐ 64 Gallon \$40.71 per quarter ___# Additional 64 gallon cart(s) @ \$6.75 extra per quarter
- ☐ 96 Gallon \$42.45 per quarter ___# Additional 96 gallon cart(s) @ \$8.45 extra per quarter
- ☐ No cart; bag service only. \$35.76 per quarter plus 65¢ tag for each 32-gallon trash bag.

Tags required for extra bags, bulky items, major appliances and volume pickup are sold separately. Go to www.cranberrytownship.org for details.



BLUE-TOP Recycling Cart

- ☐ 35 Gallon Included in basic service
- ☐ 64 Gallon Included in basic service
- ☐ 96 Gallon Included in basic service



GREEN-TOP Yard Waste Cart

- ☐ 96 Gallon Included in basic service
- ☐ No yard waste cart. You may use biodegradable paper bags bought from a store. No collection charge

Size Matters

Your base rate depends on the size of your gray top garbage cart: 35, 64, or 96 gallons. How big are they?

Here's what each size cart can hold:

35 gallon



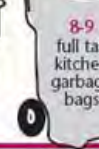
2-3 full tall kitchen garbage bags

64 gallon



5-6 full tall kitchen garbage bags

96 gallon



8-9 full tall kitchen garbage bags

Currently out of 7,594 customers, 5,589 (74 percent) have 96-gallon waste carts, 1,384 (18 percent) have 64-gallon waste carts, and 621 (8 percent) have 35-gallon waste carts. Thirty-six customers (less than 1 percent) selected the pay-per-bag option.

Customer service is handled by both Vogel and the Township. The Township handles move-ins, move-outs, cart changes, and entering new customers into a work order system, which is transferred to Vogel. Complaints are handled by Vogel directly, however sometimes customers call the Township directly. The hauler provides the Township with monthly, quarterly, and annual reports that contain tonnage and customer service information.

Cranberry Township's Collection Connection™ residential solid waste program has been selected as a recipient of the 2005 Governor's Award for Environmental Excellence. During just the first quarter of that program, the Township's recovery of recyclable and compostable material jumped from its historic level of 9 percent to 33 percent and then as high as 40 percent during the summer landscaping season. In 2005 the Township obtained a recycling rate of 37 percent overall, including the recycling of yard waste. Another benefit of the program is that the Township's recycling performance grant, through the DEP, has tripled due to increased recycling. Also, residents are extremely pleased with the addition of curbside yard waste collection. They find this to be much more convenient than delivering yard waste to another site. The Township never had a significant issue with illegal disposal of garbage, therefore did not notice an appreciable decline in illegal dumping when the program was implemented.

Cranberry Township's solid waste ordinance (Section 20-206)⁴ specifically states that "the Township may authorize a designated agent to award and administer an exclusive contract for the collection and transportation of such material. The Township or its designated agent may, through a competitive bidding process, award an exclusive service contract to a licensed hauler for all or part of residential municipal waste, yard waste, recycling collection, processing and disposal" (Ord. 2004-353, 9/2/2004). The ordinance further states (Section 20-207) that "except as specifically provided herein, it shall be a violation of this Chapter for any person(s) other than a licensed hauler to collect, remove or transport or cause to be collected, removed or transported any municipal waste, recyclables and yard waste. Each collection in violation hereof shall constitute a separate and distinct offense punishable as provided for in this Chapter." The solid waste ordinance allows for exclusion from the curbside collection requirements if the resident can demonstrate that they have collection and disposal services through a written agreement with a commercial, industrial or institutional property that maintains a contract for services with a licensed hauler that otherwise complies with Township ordinances. Occupants of farm properties are also excluded, however such residents shall comply with all other provisions of the Chapter.

⁴ Source: <http://www.cranberrytownship.org/DocumentView.asp?DID=184>

5.9.2 City of Fernley, Nevada

The City of Fernley, Nevada is a rapidly developing community of approximately 20,000 people. It is in Lyon County, and is approximately 28 miles east of Reno, Nevada. The City is relatively young, having incorporated in 2001. In previous years, Fernley's refuse collection was included in Lyon County's franchise agreement with Waste Management. Waste Management had a franchise for the collection of residential, commercial, and C&D waste, although the commercial and C&D sectors were perceived by competitors to be 'loosely written' and these other haulers competed in those sectors. For residential service, Waste Management charged \$17 per month for collection of a 96-gallon cart of refuse. Residents could self-haul to the Waste Management transfer station for \$8 per load.

The County's franchise agreement with Waste Management was due to expire in early January 2009, and the City of Fernley decided they would consider initiating their own franchise agreement with a hauler.

The City issued an RFP in the fall of 2008. They received three bids. The winning bid was TrashPros, a newly formed hauling company.

The RFP (provided in Appendix B) requested bidders to provide cost estimates assuming:

- Mandatory participation for all households under two acres;
- Container provided by the hauler;
- Senior citizen discount;
- An annual audit;
- Franchise fee of 6, 7, or 8 percent of gross revenue collected;
- Monthly reports of gross revenues collected to be submitted to the City;
- The franchised hauler would also operate a waste transfer station in Fernley;
- CPI annual increases;
- Emergency contingencies;
- The agreement would be for ten years; and
- Recycling may be requested, in which case residents would receive a standard recycling container from the hauler, and there would be three drop-off sites for recycling in the community.

To ensure that bids were comparable, the City requested that bidders complete the "Waste Franchise Waste Scenarios Report Form" (provided in Appendix C). The deadline for proposal submittals was October 1, 2008, and the City entered into an agreement with TrashPros on December 3, 2008.

Under the agreement with TrashPros (provided in Appendix D), residents receive weekly collection of trash (using a 96-gallon cart and allowing for up to seven

additional bags to be set out), for \$21 per month. Residents can self-haul large loads or bulky items to the Wadsworth transfer station for \$10 minimum per load. Senior citizens and public buildings are provided a 25 percent discount. TrashPros provides the City with a franchise fee of 8 percent on gross receipts quarterly. TrashPros allows residents to deliver cardboard, newspapers, paper, aluminum and used motor oil to the Wadsworth transfer station for recycling free of charge. At this point in time, TrashPros does not provide curbside recycling, due to economic factors (low market commodity prices and extremely low tip fees in the region), however curbside collection is a consideration for the City in the future.

TrashPros bills residents on a quarterly basis (in advance of service), and handles customer service calls. Other stipulations of the exclusive residential franchise agreement include:

- Service will be provided for 10 years, with two automatic five-year extensions, unless either party provides notification to the other in advance of at least one year;
- The franchisee will use due diligence to ensure that solid waste is properly contained in vehicles, equipment is modern and in good repair, etc.;
- The franchisee shall maintain an in-City office and telephone number for customer service calls;
- The franchisee shall annually survey customers through an independent third-party consultant; and
- The franchisee will provide backdoor service to handicapped customers, provided they do not have a non-handicapped person living with them.

A representative of the City indicates that mandating service among all residents caused tension among residents, as many were used to self-hauling to the transfer station. The City representative indicated that the term “mandatory collection” tended to inflame residents, and suggests the term “universal community service” as a more palatable phrase. The City representative also suggests that communities request prices for more scenarios, such as rates for small-quantity generators (perhaps using a smaller cart) and prices for bi-weekly collection.

The City implemented a non-exclusive franchise agreement for haulers serving commercial and industrial customers. There are three non-exclusive franchisees servicing commercial customers in the City. This non-exclusive agreement, provided in Appendix E, stipulates that:

- Hauling companies will provide proof of insurance;
- Hauling companies will provide a copy of their disposal agreements;
- Hauling companies will pay the City \$2,500 in annual fees (\$1,500 for a franchise processing fee, and \$1,000 for a cleanup fee);

- Hauling companies will pay the City, quarterly, a franchise fee of 8 percent of gross revenues; and
- Rates will be agreed upon by the franchisee and the customer.

5.10 Addressing Stakeholder Concerns

Stakeholder concerns regarding organized/franchised collection may include:

- Residents’ resistance to mandatory collection (if required);
- Lack of residents’ ability to select their own hauler;
- Residents’ concern of losing special services, such as backdoor collection;
- Concern that some haulers may not be able to compete for the business; and
- Concern that some haulers may be put out of business if they do not win the business, which may result in lack of long-term competition.

Ways to address or assuage these concerns are described below.

5.10.1 Resistance to Mandatory Participation

In some communities residents can “opt out” of curbside collection if they prefer to deliver their garbage and recyclables to the landfill/transfer station/drop-off site themselves. In most instances, however, participation (or payment) in the system is mandatory. Resistance is generally more likely to be met where households are happy with their hauler, feel that the service they receive is adequate, and where a large portion of the residents have lived in the community for a long time (and have therefore developed a sense of loyalty to their hauler). Residents are more likely to be amenable to organized collection in more transient locations, where residents may perceive the service as being inadequate (for example, residents may be frustrated at the lack of availability of curbside collection of recyclables), where residents perceive that there is a lack of competition (resulting in high pricing and low service levels), and where residents are involved early in the process of considering organized collection.

R. W. Beck is currently working with Queen Creek, Arizona to help that community develop and issue an RFP for trash, recycling, and yard waste collection services. Part of what is prompting the change is the imminent closure of the local landfill. Collection of solid waste has historically been under an “open system” in Queen Creek, with some residents opting to self-haul their trash to the landfill. Bins for recyclables have been available at the town hall.

Residents of Queen Creek were surveyed regarding their level of satisfaction with services provided and their receptivity to organized collection. Despite the fact that 49 percent of respondents said they were “very satisfied” with their hauler and 39 percent indicated they were “somewhat satisfied” with their hauler, 62 percent said that they would rather the town negotiate with the hauler (as opposed to negotiating themselves

or having a homeowner's association negotiate for them), and only 1 respondent indicated that they would prefer not to have garbage collection (0 percent of responses). Seventy-eight percent indicated that they would be receptive to the Town of Queen Creek negotiating an exclusive contract with a garbage company to collect garbage and recyclable materials. The project team attributes the respondents' receptiveness to organized collection to the fact that haulers have been slow to offer curbside recycling, a service that residents desire.

In the case of Fernley, Nevada, several residents voiced their concern over collection being mandatory, whereas under the previous franchise agreement participation was not mandatory and residents could self-haul to a transfer station. City officials estimate that of the 7,000 households, approximately 1,000 did not participate in the refuse collection program. City officials also note that many households self-hauled waste to a transfer station, some brought their trash to work to dispose, and others illegally disposed of waste. There is also a considerable amount of illegal dumping in the desert.

In some communities participation in trash collection is mandatory, but participation in recycling is voluntary. In some cases residents are encouraged to participate in recycling by being offered a low trash collection/disposal rate if they participate in curbside collection of recyclables. The City of Boise, Idaho is an example of such a community. Residents there are charged \$13.80 per month for trash and recycling collection services if they participate in recycling. If they do not participate in recycling they are charged \$17.80 per month. The City of Boise now also charges the owners of unoccupied residential units a fee of \$2.14 per month to cover a portion of certain fixed costs, such as the management of household hazardous waste and city staff resources used to manage solid waste.

5.10.2 Lack of Ability to Select own Hauler

In some communities residents resist losing the ability to select their own hauler, which can make organizing collection politically difficult, particularly in areas where a large portion of residents have lived in the community for a long period of time. Residents often become accustomed to and develop a loyalty toward their hauler, and do not want the local government telling them they can't hire that hauler, even if the cost could go down under an organized program.

Some communities have developed a licensing program such that haulers servicing the area must provide certain services (e.g., if the hauler provides collection of refuse, the license may stipulate that the hauler must also provide collection of recyclables), rather than have a single hauler service the entire area. Of course, the down side is that most of the benefits associated with a single hauler, such as reduced vehicle traffic, increased efficiencies and economies of scale, are not realized under this scenario.

Other communities, as described above, have allowed for a consortium of haulers to bid on service for the community (or sections of the community), which can mitigate

some hauler changes. Because there are still several different haulers operating, however, efficiencies gained due to economies of scale are limited.

5.10.3 Concern of Losing Special Services

Many hauling contracts are structured such that residents can, for an additional fee, receive backdoor service. In some communities elderly and/or handicapped residents can apply for backdoor service which is provided at no extra charge. Often a certain number (percent of total households served) of backdoor service customers are “built into” the collection contract at no additional fee. Some communities also build in an option for a second collection day (such as Saturdays) at an additional cost. This may be especially relevant in warm-weather climates or in tourist communities. Backdoor service may also be imperative to offer in tourist communities, as it is important to ensure not only that trash is collected, but that empty carts/cans are returned to their proper place if homeowners are absent.

In the City of Fernley, TrashPros included a 25 percent discount for public buildings and senior citizens, and also provides approximately \$7,500 per year in community cleanup services.

5.10.4 Concern that Small Haulers Can’t Compete/Lack of Long-Term Competition

Some communities have allowed the formation of consortiums of small haulers to bid on a service area or for service in the entire community. When this is the case, haulers divide the area into contiguous routes, such that each area is serviced by one hauler, therefore the benefits associated with reduced hauler traffic are maintained.

Another way in which some communities encourage small haulers to compete is by ensuring that bonding requirements are not overly onerous.

Other communities allow small haulers to compete for servicing a particular service area or district. In some cases, haulers have naturally “carved out” portions of a geographic area. Frederick County Maryland, for example, is considering a franchise system in order to ensure that smaller haulers can stay in business. The County envisions the franchise system as being a way to maximize efficiencies while helping to protect the viability of small haulers and ensure long-term competition.

Interestingly, TrashPros, the franchised hauler of Fernley, Nevada, began operating specifically to respond to an RFP for exclusive residential service in the City of Fernley. Although the family that started the business had extensive experience in the trash hauling business in the Pacific Northwest, they were not operating in the area when the RFP was issued. The fact that Waste Management had held the exclusive franchise in the county for the past 20 years did not thwart competition.

5.11 Benefits and Drawbacks of Organized Collection

The implementation of organized collection through privatization, either through contracted collection or through an exclusive or non-exclusive franchise, has benefits as well as drawbacks, as described below.

5.11.1 Benefits

- Organized collection throughout the unincorporated areas of the County could increase access to curbside recycling, thus increasing tons of materials recycled and decrease tons delivered to the Broome County Landfill (Landfill) for disposal, extending the life of the Landfill.
- By having only one hauler (assuming a contract or exclusive franchise agreement would be issued) serving the geographic area, the County would find it easier to enforce and audit the program. When multiple haulers serve an area, it can be difficult to pinpoint which hauler is in violation of specific ordinance provisions, for example, not collecting separated recyclables or allowing litter to blow out of the back of the collection vehicles.
- In general, economies of scale are gained through the use of one hauler serving an entire region or portion of a geographic region. This can result in lower cost services.
- Having one hauler service the entire geographic area, or a portion thereof, would result in less hauler traffic, less wear and tear on the roads, reduced noise and air pollution caused by hauler vehicles, and enhanced safety.
- Organized collection results in more consistent and standard services. This can allow for more targeted, specific, and branded outreach and education strategies, which can also improve participation in recycling programs.
- The County would have more control over the program, and therefore would be able to make changes to the program relatively easily, within the confines of the contract or franchise agreement. Changes might be in response to materials generated, collection or processing technology, materials markets, etc.
- Organized collection would likely not only result in increased tonnage diverted from the Landfill, but also improved reporting regarding tonnage diverted, participation in recycling programs, etc.
- Organized collection makes it more likely that some of the costs associated with collecting recyclables can be offset, at least partially, with solid waste collection fees.

5.11.2 Drawbacks

- With organized collection, residents are not able to select their own hauler, which would be unacceptable to some residents.
- With organized collection, the local government generally becomes more involved in the process of solid waste and recycling collection – including development of RFP/RFB, review of bids, selection of contracted/franchised hauler, development of contract/franchise agreement, monitoring of service, billing for service, customer service, and auditing performance. The degree of involvement can vary considerably, particularly with respect to billing and customer service.
- If participation in the program were mandatory, some residents would argue that the program is too costly, and might prefer to “self-haul” waste and recyclable materials to the Landfill/drop-off site. There are communities that have successfully allowed for this to occur through an “opt out” provision.
- There is the possibility that small haulers might not be able to compete with larger haulers to serve a large geographic area. It should be noted, however, that some communities have allowed small haulers to form consortiums that bid, as a single entity, on service for a specific hauling district or on an entire geographic region.

5.12 Resources

Boise, Idaho Solid Waste Management Ordinance

http://www.cityofboise.org/Departments/City_Clerk/PDF/CityCode/Title8/0810.pdf

Boise, Idaho Solid Waste Services, Solid Waste Collection Fees

http://www.cityofboise.org/Departments/Public_Works/PDF/solidwastecustomerfees.pdf

Babylon, New York, Code of Ordinances, Hauler Licensing Fees, Article IV, Section 133-14

<http://www.ecode360.com/?custId=BA0924>

Boise, Idaho Franchise Hauler Measures for Success, 2008

http://www.cityofboise.org/Departments/Public_Works/PDF/BoardsAndCommissions/PWCommission2008/2008-09-18/Agenda%20Items/ITEM5AWATTACHD.pdf

CIWMB, Sample Contracts and Agreements

<http://www.ciwmb.ca.gov/lglibrary/LocalDocs/Contract.htm>

CIWMB, Sample Solid Waste/Recycling Ordinances

<http://www.ciwmb.ca.gov/lglibrary/LocalDocs/Policy.htm>

Cranberry Township, Pennsylvania's, Solid Waste Ordinance, Chapter 20

<http://www.cranberrytownship.org/DocumentView.asp?DID=184>

Dallas, Texas Non-Exclusive Franchise Fee Ordinance

<http://www.dallascityhall.com/sanitation/pdf/SolidWasteFeeOrdinance.pdf>

Exeter Township, Berks County Pennsylvania, No-Burn Ordinance

<http://co.berks.pa.us/exeter/lib/exeter/ordinances/burningordinance.pdf>

Fairfax County, Virginia's information pertaining to permitted hauling companies

<http://www.fairfaxcounty.gov/dpwes/trash/disphaulers.htm>

Fernley, Nevada Ordinance authorizing City to Collect Solid Waste

<http://www.cityoffernley.org/DocumentView.asp?DID=2526>

Fernley, Nevada, Request for Bids for Solid Waste and Recycling Collection Services

<http://www.cityoffernley.org/Bids.asp?bidID=34>

Florida Center for Solid and Hazardous Waste Management, "The Use of Franchise Fees in Commercial Solid Waste Management in Florida," September 2000

http://www.hinkleycenter.com/publications/franchise_fees_00-06.pdf

Frederick County, MD "Questions and Answers about the Proposed Solid Waste Management Franchise Enabling Legislation"

<http://www.co.frederick.md.us/documents/Utilities%20&%20Solid%20Waste%20Management/Proposed%20Solid%20Waste%20Franchise%20Legislation/Solid%20Waste%20FAQ%20Solid%20Waste%20Franchising.pdf>

New York State Laws pertaining to Counties (CNT), Article 5-A, County Water, Sewer, Drainage and Refuse Districts

<http://public.leginfo.state.ny.us/menuf.cgi>

**EXETER TOWNSHIP
BERKS COUNTY, PENNSYLVANIA**

ORDINANCE NO #638

AN ORDINANCE OF THE TOWNSHIP OF EXETER, BERKS COUNTY, PENNSYLVANIA, REPLACING ORDINANCE #576. PROMOTING THE HEALTH, SAFETY AND GENERAL WELFARE OF EXETER TOWNSHIP BY REGULATING OPEN BURNING AND, OR OUTDOOR FIRES AND REGULATING BONFIRES, OUTDOOR FIREPLACES, INDOOR FIREPLACES, INDOOR WOOD BURNING AND COAL STOVES, INCINERATORS, HANDLING OF ASHES AND COMBUSTIBLE RUBBISH AND PROVIDING THE ENFORCEMENT THEREOF.

BE IT AND ORDAINED by the Board of Supervisors of the Township of Exeter, Berks County, Pennsylvania, and it is hereby ***ENACTED AND ORDAINED*** by the authority of the same, as follows:

ARTICLE I. DEFINITIONS

For the purposes of this Ordinance, the following terms shall be defined as set forth below, unless a different meaning is plainly required by the context.

- 1.01 “PERSON” shall mean any natural person, partnership, firm, association or corporation.
- 1.02 “ORGANIC MATERIAL” shall mean material derived from living organisms such as wood, paper and yard scraps.
- 1.03 “NON-ORGANIC MATERIAL” shall mean material derived or formed from inanimate objects, other than vegetable, such as tin cans, glass crockery, metals, plastic and similar materials.
- 1.04 “BRUSH” shall mean bushes, shrubs, thickets, tree trimmings, hedge clippings and small trees.
- 1.05 “OPEN BURNING” shall mean burning any material in the open atmosphere, including burning in 55-gallon drums, outdoor fireplaces or other containers.
- 1.06 “RECYCLABLE” shall mean any material that is required to be recycled in Exeter Township under the Pennsylvania Act 101, including scrap lumber (non-treated/painted) and brush.
- 1.07 “AUTHORITY HAVING JURISDICTION” (AHJ) shall mean Fire Code Official, Police Officer or Code Enforcement Officer.

ARTICLE II. OPEN FIRES AND OUTDOOR FIRES

- 2.01 It shall be unlawful for any person to open burn any material, including the following at any time in any zone within Exeter Township.

Household trash, books magazines, newspapers, cardboard and/or any items that are required to be recycled in Exeter Township under the Pennsylvania Act 101, including brush and scrap lumber or any vegetation, plywood, drywall plastic products, insulation material, upholstered furniture, garbage, dead animals, human and animal excrement, human and animal hair, rubber products including tires, hydrocarbon products or flammable liquids, asphalt or tar shingles or roofing materials, bedding, foam rubber, nylon, rayon, cotton, wool, polyester or other synthetic material, insulation from copper or other wiring, solid waste and/or construction waste as defined by the Pennsylvania Solid Waste Management Act and 25 PA Code 271.1.

EXCEPT where fire or burning operations result from:

- A. Any fire set for the purpose of training and instructing authorized personnel in fire fighting, and training of persons in the use of portable fire extinguishers. (permit required)
- B. Any campfire or bon-fire solely for organized recreational or ceremonial purposes. (permit required)
- C. Any fire set for the prevention and/or control of disease of pests, rats, snakes, bees, etc. (permit required)
- D. The burning of ONLY brush, exclusively for agricultural management and conservation practices & protection, and provided burning is located 100 feet or more from any building or structure. Brush must originate from the same property (first full weekend of the month, permit required)
 - 1. Burning is permitted from 6:00 A.M. to 6:00 P.M. on Saturday and Sunday. No burning or smoldering shall occur outside of the above stated hours.

2.02 The AHJ may suspend the above regulations at any time when the following conditions exist:

- A. When smoke and/or ash emission are or may be objectionable, offensive or deleterious to human or animal health or permeate or crosses neighboring properties, and/or falls on buildings, vehicles or vegetation.
- B. When extreme dry conditions or drought warrant a ban on all burning.

ARTICLE III. OUTDOOR FIREPLACES AND CHARCOAL GRILLS

3.01 Outdoor fireplaces and charcoal grills shall be permitted upon private property within Exeter Township solely for the purpose of cooking foods. The following regulations shall apply:

- A. No person shall use such fireplaces or grills for burning of materials as outlined in Article II, Section 2.01 of this Ordinance.
- B. Outdoor fireplaces or outdoor grills shall not be used for such purposes other than cooking food.

- C. Outdoor grills shall not be used indoors or in any enclosed areas that are not properly ventilated, i.e. garages, etc.

ARTICLE IV. OUTDOOR PATIO STOVES, CHIMINEAS, FACTORY BUILT METAL NOVELTY STOVES.

- 4.01 Outdoor Patio stoves, Chimineas, or Factory built metal novelty stoves shall be permitted outside residential private property within all zones of Exeter Township, provided that the following regulations apply.
 - A. No persons shall use such Patio stoves, Chimineas or Factory built novelty stoves, for the burning of any material outlined in Article II, Section 2.01 of this Ordinance.
 - B. If smoke, ash, or smell omitting from such Patio stoves, Chimineas, or Factory built novelty stoves, become objectionable or offensive to neighboring properties, the AHJ may suspend the operation of same.

ARTICLE V. INDOOR FIREPLACES, WOOD BURNING, COAL STOVES OR SOLID FUEL HEATERS

- 5.01 Fireplaces, wood burning and coal stoves shall be permitted inside residential private property within all zones of Exeter Township solely for the purpose of heating the dwelling unit. The following regulations shall apply:
 - A. Only seasoned fire wood, coal or solid fuels recommended by the manufacturer may be burned in such fireplaces, wood burning, coal stoves or solid fuel heaters.
 - B. No person may use such fireplaces, wood burning, coal stoves or solid fuel heaters for the burning of any material as outlined in Article II, Section 2.01 of this Ordinance.
 - C. Such fireplaces, wood burning, coal stoves or solid fuel heaters shall not be used for such purpose when, in the judgment of AHJ, a fire hazard is created by such use and operation and/or any danger is posed to the occupants therein or the neighboring buildings and/or occupants.
 - D. If the smoke, ashes and/or smell emitting to the outside atmosphere from the chimney, stove pipe or flue are, objectionable or offensive to the general public, the operation of such fireplace, wood burning, coal stove or solid fuel heater shall be suspended by the AHJ.

ARTICLE VI. INCINERATORS

- 6.01 It shall be lawful to burn combustible rubbish and materials within Exeter Township by means of an enclosed outdoor or indoor incinerator operated by chemical or thermal means, provided the incinerator is attached to a proper stack or chimney and complies with the current Exeter Township ICC Codes, and provided the following regulations are adhered to:

- A. The incinerator shall be the type approved by an authorized representative of the Pennsylvania Department of health AND the Pennsylvania Department of Environmental Protection. Both, of the above departments, shall give evidence of approval in written certification of inspection, and approval.
- B. All owners of property within Exeter Township on or in which there exists an incinerator shall, advise the Township Office of such incinerator and the location of the same.
- C. The AHJ may terminate the use of any incinerator when found to be faulty or for the reasons stated in Article II, Section 2.02, Subsections A and B of this Ordinance.

ARTICLE VII. HANDLING OF ASHES AND COMBUSTIBLE RUBBISH

- 7.01 Ashes, smoldering coals, wood and embers or other material liable to spontaneous ignite, shall not be deposited or allowed to remain within ten (10) feet of any combustible materials, but shall be deposited in non-combustible containers. Rubbish of any kind shall not be allowed to accumulate.

ARTICLE VIII. PERMITS

- 8.01 All permits required under any provisions of this Ordinance, shall be issued in accordance with Section 105 of the International Fire Code adopted by Exeter Township with the following provisions.
- A. A Fire Prevention “Operational” Permit shall be obtained from the Township Office a minimum of 48 hours prior to burning. The applicant shall provide name, address, phone number, the purpose for the permit and attach a drawing of the proposed burning site.
 - B. Permits to burn the first full weekend of the month may be obtained for a single month or for an entire calendar year. Other Operational permits must be obtained for each Special Event (ie: bonfires, campfires and cookouts)
 - C. Before the permit is issued, an inspection may be made by the AHJ to assure that the use of the permit complies with the provisions of the Ordinance and the International Fire Code.
 - D. Any permit issued may be revoked for the protection of life or property or to prevent or abate the nuisances caused by such burning. (A nuisance would be defined as ash fallout or smoke accumulation in the area of residential occupancies.)
 - E. If a person starts a fire without a permit or if a permit holder fails to comply with any term or condition of the permit, and as a result of that failure the fire department is required to suppress a fire, the person or permit holder is liable for the cost of fire suppression and subject to fines in District Court
 - F. Permit Fees will be set from time to time by a duly adopted resolution of the Board of Supervisors.

ARTICLE IX. PENALTIES

- 9.01 Any person violating any of the provisions of this Ordinance or neglecting to comply with any order or notice issued pursuant hereto for violation of any section hereto, shall upon conviction before any District Justice, be subject to the payment of a fine of not less than three hundred dollars (\$300.00) or more than one thousand dollars (\$1,000.00) and the payment of costs of prosecution for each offense, or shall be subject to imprisonment for a period not exceeding thirty days (30) days. Each day's continuance of any violation of this Ordinance shall constitute a separate offense, punishable by a like fine and imprisonment in default of payment thereof.

ARTICLE X. SEVERANCE CLAUSE

- 10.01 Should a court of competent jurisdiction declare any section, paragraph, clause or phrase of this Ordinance unconstitutional or invalid, the remainder of said Ordinance shall not be affected thereby, and shall remain in full force and effect.

ARTICLE XI. REPEALER CLAUSE

- 11.01 All Ordinances or parts of Ordinances or Resolutions conflicting with the provisions of this Ordinance are hereby repealed to the extent of such conflict.

ENACTED AND ORDAINED into an Ordinance this 25TH day of June 2007.

**EXETER TOWNSHIP
BOARD OF SUPERVISORS**

Chairman

Attest:

Secretary

Request for Proposals Regarding Waste Franchise Agreements

The City of Fernley is requesting rate proposals for waste franchise agreements. The City of Fernley welcomes your rate proposals as outlined in the different scenarios below. For purposes of uniformity and clarity, please submit your proposals by completing the entire "Waste Franchise Rate Scenarios Form." If additional comments, explanations, or presentations are desired, please submit and include such after the completed form. This Request for Proposals and waste franchise rate scenarios form can be obtained at the City Manager's Office and can be downloaded on the City of Fernley's website www.cityoffernley.org.

The City of Fernley desires your proposals on a number of different scenarios so that City Council can make the most informed decision possible. As is indicated, certain variables will change, however, City Council has tentatively agreed upon certain terms.

The proposed rates below must reflect the following tentative assumptions:

- 1) Exclusive franchise agreement for mandatory wet waste for all residential properties less than two acres including:
 - a. A standard waste container
 - b. Senior discounts and exceptions for non-profit organizations
- 2) An annual audit
- 3) Franchise fee of six, seven, or eight percent of gross revenue collected
- 4) Monthly report of gross revenue collect
- 5) Waste Transfer Station in City of Fernley
- 6) CPI annual increase
- 7) Emergency Contingencies
- 8) Ten year agreement
- 9) Where recycling is requested,
 - a. Residential recycling: a standard recycling container
 - b. Community recycling: three recycling stations within community
- 10) Definitions:
 - a. Wet waste: includes putrescible waste, household waste, green waste, organic waste, other solid or liquid waste which may undergo microbiological decomposition
 - b. Dry waste: includes non-putrescible waste, construction and demolition ("C & D") waste, commercial and industrial waste ("C & I")
- 11) Compliance with all local, state, and federal laws including obtaining all necessary and required permits and licenses
- 12) Finalizing and completing a formal contract with the City of Fernley

Proposals must be submitted by October 1, 2008, in order for consideration by City Council and must be submitted to the City Manager's office at 395 Silver Lace Blvd., Fernley, Nevada, 89408 or may be submitted via email at gbacock@cityoffernley.org. Proposals will not be considered if not timely received or for lack of compliance with the proscribed terms of the proposal documents. Each entity making a proposal will be notified when City Council will consider the proposals.

Waste Franchise Rate Scenarios Form

Name of Entity:
Representative:

Scenario 1

Type	Rate (6% Franchise Fee)	Rate (7% Franchise Fee)	Rate (8% Franchise Fee)
Exclusive Franchise Agreement for residential	Residential Rate:	Residential Rate:	Residential Rate:
Exclusive Franchise Agreement for residential <i>with Residential Recycling</i>	Residential Rate:	Residential Rate:	Residential Rate:
Exclusive Franchise Agreement for residential <i>with Community Recycling</i>	Residential Rate:	Residential Rate:	Residential Rate:
Open Franchise System for Remainder: Commercial wet waste, Dry waste for both "C & I" and "C & D"	Rates will vary according to each collector and customer	Rates will vary according to each collector and customer	Rates will vary according to each collector and customer

Comments:

Name of Entity:
Representative:

Scenario 2

Type	Rate (6% Franchise Fee)	Rate (7% Franchise Fee)	Rate (8% Franchise Fee)
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste	Residential Rate: All other wet waste rate:	Residential Rate: All other wet waste rate:	Residential Rate: All other wet waste rate:
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste <i>with Residential Recycling</i>	Residential Rate: All other wet waste rate:	Residential Rate: All other wet waste rate:	Residential Rate: All other wet waste rate:
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste <i>with Community Recycling</i>	Residential Rate: All other wet waste rate:	Residential Rate: All other wet waste rate:	Residential Rate: All other wet waste rate:
Open Franchise System for Remainder: Dry waste for both "C & I" and "C & D"	Rates will vary according to each collector and customer	Rates will vary according to each collector and customer	Rates will vary according to each collector and customer

Comments:

Name of Entity:

Representative:

Scenario 3

Type	Rate (6% Franchise Fee)	Rate (7% Franchise Fee)	Rate (8% Franchise Fee)
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste AND “C & I” dry waste	Residential Rate: All other wet waste rate: “C & I” dry waste rate:	Residential Rate: All other wet waste rate: “C & I” dry waste rate:	Residential Rate: All other wet waste rate: “C & I” dry waste rate:
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste AND “C & I” dry waste <i>with Residential Recycling</i>	Residential Rate: All other wet waste rate: “C & I” dry waste rate:	Residential Rate: All other wet waste rate: “C & I” dry waste rate:	Residential Rate: All other wet waste rate: “C & I” dry waste rate:
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste AND “C & I” dry waste <i>with Community Recycling</i>	Residential Rate: All other wet waste rate: “C & I” dry waste rate:	Residential Rate: All other wet waste rate: “C & I” dry waste rate:	Residential Rate: All other wet waste rate: “C & I” dry waste rate:
Open Franchise System for Remainder: Dry waste for “C & D”	Rates will vary according to each collector and customer	Rates will vary according to each collector and customer	Rates will vary according to each collector and customer

Comments:

Name of Entity:

Representative:

Scenario 4

Type	Rate (6% Franchise Fee)	Rate (7% Franchise Fee)	Rate (8% Franchise Fee)
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste AND "C & D" dry waste	Residential Rate: All other wet waste rate: "C & D" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate:
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste AND "C & D" dry waste <i>with Residential Recycling</i>	Residential Rate: All other wet waste rate: "C & D" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate:
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste AND "C & D" dry waste <i>with Community Recycling</i>	Residential Rate: All other wet waste rate: "C & D" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate:
Open Franchise System for Remainder: Dry waste for "C & I"	Rates will vary according to each collector and customer	Rates will vary according to each collector and customer	Rates will vary according to each collector and customer

Comments:

Name of Entity:

Representative:

Scenario 5

Type	Rate (6% Franchise Fee)	Rate (7% Franchise Fee)	Rate (8% Franchise Fee)
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste AND "C & D" and "C & I" dry waste	Residential Rate: All other wet waste rate: "C & D" dry waste rate: "C & I" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate: "C & I" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate: "C & I" dry waste rate:
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste AND "C & D" and "C & I" dry waste <i>with Residential Recycling</i>	Residential Rate: All other wet waste rate: "C & D" dry waste rate: "C & I" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate: "C & I" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate: "C & I" dry waste rate:
Exclusive Franchise Agreement for all wet waste, including residential, commercial, industrial wet waste AND "C & D" and "C & I" dry waste <i>with Community Recycling</i>	Residential Rate: All other wet waste rate: "C & D" dry waste rate: "C & I" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate: "C & I" dry waste rate:	Residential Rate: All other wet waste rate: "C & D" dry waste rate: "C & I" dry waste rate:
Open Franchise System for Remainder: None exists – all waste under exclusive agreement			

Comments:

Name of Entity:
Representative:

By submitting proposed rates to the City of Fernley, I, _____ (insert name and title) _____, official representative for
_____ (insert name of entity) _____ agree and understand the following:

Reliance upon assumptions presented within the proposal documents and this proposal is not warranted for inclusion of the final contract between the City of Fernley and the potential contractor. The presented tentative agreed upon assumptions may change, and the City of Fernley has the right to change and may change any term or assumption at its pleasure. Nothing contained within the proposal documents and this proposal creates any legal right or entitlement by the entity submitting proposals or any third party. Nothing contained within the proposal documents and this proposal binds or limits the City of Fernley in any manner. The City of Fernley will *only* agree to terms, rates, or any related matter after a contract has been drafted, the contract approval is brought before a properly agendized meeting, and the City Council approves the Contract. The City of Fernley is not bound to accept the lowest rate proposal, and can accept any proposal for any reason. The City of Fernley has the right to refuse any proposal for any reason. The City of Fernley can make any adjustment to the proposal process.

ENTITY:

REPRESENTATIVE:

TITLE:

Address:

City: State: Zip Code:

Telephone: Fax #:

E-mail Address:

(Signature of Representative, Title)

DATED this _____ day of _____, 2008.

**EXCLUSIVE SINGLE FAMILY DWELLING WASTE FRANCHISE AGREEMENT
BETWEEN
THE CITY OF FERNLEY
AND
TRASHPROS, LLC**

This Agreement, made and entered into this 3rd day of December 2008, by and between the CITY OF FERNLEY, a political subdivision of the State of Nevada, (hereinafter referred to as "City") and TRASHPROS, LLC, a Nevada limited liability company, (hereinafter referred to as "Franchisee").

WITNESSETH:

WHEREAS, NRS 268.081 authorizes a City to displace or limit competition in the area of collection and disposal of garbage and other waste; and

WHEREAS, NRS 268.083 authorizes a City to grant an exclusive franchise to any person to provide garbage and waste collection and disposal services within the boundaries of a City;

WHEREAS, Franchisee has represented and warranted to City that it has the experience, responsibility, and qualifications to provide residents in the City, the collection and safe transport to permanent disposal facilities of Single Family Dwelling waste generated by the residents of the City;

WHEREAS, City declares its intention of maintaining reasonable rates for reliable, proven collection, transportation and disposal of garbage and recyclable material within the City;

WHEREAS, City's existing exclusive franchise agreement for the operation of a garbage and refuse collection and disposal service terminates on January 3, 2009; and

WHEREAS, City and Franchisee have agreed to enter into a franchise agreement and wish to set out the terms and conditions of that agreement in writing.

NOW, THEREFORE, for and in consideration of the covenants and agreements herein contained and for other valuable consideration, the receipt of which is hereby specifically acknowledged, the parties hereto do agree as follows:

1 – DEFINITIONS

As used in this Agreement, the following definitions apply:

1.02 Solid Waste All putrescible and nonputrescible materials in solid or semisolid form that have been discarded or abandoned by their owner, including domestic or household waste resulting from the ordinary domestic use or occupation of a house, flat,

apartment, unit, boarding house, hostel or guesthouse; garbage, rubbish such as paper, cardboard, automobiles, cans, wood, glass, bedding, crockery and similar materials, junk vehicles and parts, ashes or incinerator residue, street refuse, dead animals, construction or demolition waste, commercial or industrial waste, garbage, sewage waste, commingled recyclables, source separated recyclables and other refuse which includes discarded materials that have no useful physical, chemical or biological properties after serving their original purpose and that cannot be reused or recycled for the same or other purposes. The term "solid waste" does not include hazardous waste.

1.03 Garbage. The term "garbage" means:

Putrescible animal and vegetable waste resulting from the handling, storage, preparation, cooking, and sale and serving of food and beverage.

This includes, but is not limited to:

1. Offal, swill, kitchen and table waste, and other organic animal and vegetable waste;
2. Bottles, cans, cups, plates, utensils, containers, and/or covering of any construction or material that has been in intimate contact with food, confection and/or beverage; and
3. Any component used in the preparation or manufacture of matter intended for animal or human consumption, and;
4. Such matter and/or materials listed in (1) through (3) above that have been discarded without first being sanitized.
5. Infectious Waste as defined by the Nevada State Health Division.

The mixing, addition, or commingling of garbage with rubbish, trash, or other waste matter renders the entire resulting mixture as garbage and requires the mixture to be handled as garbage.

1.04 Single Family Dwelling Waste. The term "single family dwelling waste" means waste produced by residents owning or having control over a single family dwelling located on a property within the City of Fernley.

1.05 Putrescible Waste. The term "putrescible" means wastes that are capable of being decomposed by microorganisms with sufficient rapidity as to cause nuisances from odors, gasses and similar objectionable conditions. Food wastes, offal, and dead animals are examples of putrescible waste.

1.06 Refuse. The term "refuse" refers generally to all forms of discarded solid waste, including garbage, rubbish and waste matter.

1.07 Recyclable Material has the meaning ascribed to it in NRS 444A.013 and means solid waste that can be processed and returned to the economic mainstream in the form of raw materials or products, as determined by regulations adopted by the Nevada State Environmental Commission and the Nevada State Division of Health.

1.08 Franchisee as used in this Agreement is Trashpros, LLC., which is the entity awarded an exclusive single family dwelling waste franchise according to the terms of this agreement.

1.09 Hazardous Waste. The term "hazardous waste" means any waste or combination of wastes, including solids, semisolids, liquids or contained gases which:

(A) Because of its quantity or concentration or its physical, chemical or infectious characteristics may:

(1) Cause or significantly contribute to an increase in mortality or serious irreversible or incapacitating illness; or

(2) Pose a substantial hazard or potential hazard to human health, public safety or the environment when it is given improper treatment, storage, transportation, disposal or other management;

(B) Is identified as hazardous waste by the Nevada Department of Conservation and Natural Resources as a result of studies undertaken for the purpose of identifying hazardous wastes; and

(C) Includes, among other wastes, toxins, corrosives, flammable materials, irritants, strong sensitizers and materials which generate pressure by decomposition, heat or otherwise.

1.10 Single Family Dwelling. The term "single family dwelling" means a building or dwelling designed or used for single-family occupancy and where no business is conducted (other than a licensed home occupation business), and includes a mobile home, modular home, and multi-unit attached occupancies consisting of four units or less which includes, but is not limited to, duplexes, apartments, condominiums, or other attached occupancies consisting of four units or less.

1.11 Customer. The term "customer" means the occupant or owner of a single family dwelling unit that is paying the invoices for services and is current on their account. Franchisee, at its discretion, may invoice for its services either the occupant and/or owner of a dwelling; however regardless of who is invoiced as the "customer," the owner of the real property for which service is provided is ultimately responsible for the service provided.

1.12 Senior Resident. Any resident and customer 65 years of age or older as documented by a governmental identification.

1.13 Holidays. Franchisee shall not be required to collect single family dwelling customers on the following holidays; New Years Day, Independence Day, Thanksgiving and Christmas. Collection shall occur the following day, for the entire week following the holiday.

1.14 City of Fernley or City. The term "City of Fernley" or "City" refers to the incorporated boundaries of the City of Fernley, County of Lyon, State of Nevada as may be modified.

1.15 Multiple Family Dwelling. The term "Multiple Family Dwelling" refers any premises on which there are five or more attached dwelling units which are grouped together under the management of one person and which do not require separate individual collection of solid waste.

2 - GRANT OF EXCLUSIVE GARBAGE FRANCHISE

2.01 Grant of Exclusive Franchise. Subject to the terms of this Agreement, the City does hereby grant to Franchisee, and Franchisee does hereby accept, the exclusive duty, right and privilege of collecting, removing, transporting and disposing or otherwise handling all single family dwelling waste, generated, deposited and accumulated from single family dwelling establishments within the City, including any area hereinafter annexed by the City.

The term "exclusive" as used herein means that the City has exercised its authority under NRS 268.081 to displace and limit all competition so that Franchisee shall be the sole provider of collection, transport and disposal services for single family dwelling waste under this Agreement and under City ordinances as may be adopted in the future.

Except as provided in section 2.02 below, all single family dwelling activities within the City shall be required to utilize the collection container services provided by Franchisee for the collection and disposal of garbage.

2.02 Exclusivity. This franchise is exclusive in nature, and neither the City nor its residents shall make or enter into any other agreement or arrangement for the collection, transport, removal, or disposal of single family dwelling waste from within said City boundaries during the term of this Agreement.

2.03 Enforcement of Exclusivity of Franchise. All single family dwellings located on two (2) acres or less in the City shall be required by City to utilize the collection and container services of Franchisee provided for herein.

A. To the extent permitted by law, the City and/or Franchisee shall prohibit any person from providing the same or similar service for the collection, hauling and disposing of single family dwelling waste within the City that is in violation of the terms of this exclusive franchise Agreement.

B. Franchisee and City will observe and follow City Code and/or Ordinances relating to solid waste.

2.04 Term. This exclusive franchise shall commence upon the effective date hereof, and continue in full force and effect for a period of ten (10) years. This exclusive franchise shall automatically extend for two (2) additional five (5) year terms, unless either party notifies the other in writing at least twelve (12) months prior to expiration of the then current term of its intent not to extend this agreement.

2.05 Title to Solid Waste Stream. The title to the single family dwelling waste stream (excluding Hazardous Wastes) and the property rights associated therewith for the collection and disposal of single family dwelling waste under this Agreement shall be the sole property of Franchisee. For purposes of this Agreement, the transfer of title occurs at the time that the waste is deposited by single family dwelling customers in containers and left at the collection point for collection by Franchisee.

3 - OBLIGATIONS OF FRANCHISE HOLDER

3.01 Equipment. Franchisee shall at its cost and expense, furnish a sufficient number of trucks and other equipment, including all drivers and workers required for the service, operation, and maintenance of said trucks and other equipment for the purposes of providing a weekly, unless otherwise provided for, and satisfactory solid waste collection and disposal service in the areas covered hereby.

3.02 Sanitary Operation. Franchisee shall at all times exercise diligence in the supervision of its personnel to the end that care is taken to deposit all solid waste inside collection vehicles, leaving no garbage or other waste matter upon any street, alley, walkway or other public place within the City, or upon any private property used for the collection of garbage and other waste matter. Collection vehicles shall be safe, adequate and clean, constructed in such a manner to be covered so as to prevent the spilling, dripping or blowing of any contents from the vehicle. Franchisee's collection equipment shall be modern, up-to-date, maintained in good repair, and reasonably water tight. The exterior of the equipment shall be kept clean, presentable and cleaned of any debris and/or litter after dumping.

3.03 Public Relations and Customer Service. The City and Franchisee acknowledge and agree that the Franchisee shall at all times in the performance of its duties and responsibilities under this Agreement, maintain good relations with the public and shall promptly respond to customer issues. To this end:

A. Franchisee shall diligently exercise supervision and training of its personnel so that the public coming into contact with such personnel shall be treated decently and courteously at all times.

B. Franchisee shall provide an office and telephone number within City of Fernley wherein customers can transact business with Franchisee, during regular and posted office hours, which shall be not less than eight hours per day between 8 a.m. and 4:30 p.m., Monday through Friday, except holidays. The office shall accept and administer all requests for service initiations, terminations, and modifications, including special services and complaints.

C. Franchisee shall maintain a computer log of all oral and written service complaints registered with Franchisee from customers. Franchisee shall be

responsible for the prompt and courteous attention to, and prompt and reasonable resolution of, all customer complaints.

D. Franchisee shall annually survey its single family dwelling customers, preferably by an independent outside consultant, to determine the level of satisfaction of customers with the service provided by Franchisee. The results of that survey shall be included in the annual report to the City Manager and/or City Council described in subsection F hereof, or sooner as requested by the City.

E. Franchisee shall maintain and actively pursue public information programs such as the "snapshot program," to encourage customer compliance with Federal, State, and local laws and ordinances. Franchisee shall support any City public information programs that shall be designed, with input from Franchisee, to promote public adherence to Franchisee's and City's policies.

F. Franchisee shall report annually to the City Manager or City Council, as requested by the City, regarding compliance with its responsibilities under this section.

G. Beginning in the spring of 2010, Franchisee shall provide annually to each single family dwelling customer that is current on their account, a voucher allowing the customer to dispose of a load of no more than three yards of garbage during a designated thirty (30) day period each year at the transfer station owned or operated by Franchisee.

F. Franchisee shall provide services to the City of Fernley of a value not to exceed \$7,500 annually for City Events or Code Enforcements, not part of the standard trash service provided for in Section 5.09 below.

3.04 Approved Landfill. Franchisee shall be required to deposit all solid waste collected pursuant to this Franchise Agreement at an approved landfill site. For purposes of this Franchise Agreement, an approved landfill site is one holding a valid permit to permanently deposit municipal solid waste in accordance with all applicable laws and regulations of the United States and/or the State of Nevada, including the Nevada Environmental Commission and the Nevada State Health Division.

It shall be the sole responsibility of Franchisee to provide for the permanent deposit of single family dwelling waste collected pursuant to this Agreement, in accordance with all applicable Federal, State and Local laws and regulations. Franchisee shall comply with this requirement by operating its own landfill or by entering into an agreement with the operator of a landfill that meets the requirements of this Agreement. As part of this contract, Franchisee shall submit to the City a request for approval of the selected landfill or landfills to be utilized by Franchisee prior to utilizing the landfill(s) during the term of this Agreement. City shall approve such request in a timely manner and shall not unreasonably withhold their approval.

3.05 Transfer Station. Franchisee shall be required to utilize an approved transfer station within a ten (10) mile radius of the Fernley City Hall. Nothing in this Agreement shall prohibit Franchisee from direct hauling solid waste to an approved landfill.

The transfer station shall provide for the temporary collection and compaction of solid waste so that an economical method of transportation of solid waste to an approved landfill is utilized by Franchisee.

For purposes of this Franchise Agreement, an approved transfer station is one holding a valid permit for the temporary storage of municipal solid waste in accordance with all applicable federal and/or local laws and regulations.

It shall be the sole responsibility of Franchisee to provide for a transfer station meeting the requirements of this Agreement. Franchisee may comply with this requirement by operating its own transfer station or by entering into an agreement with the operator of a transfer station which meets the requirements of this Agreement.

Franchisee shall make available for use at the transfer station a program for the separation at the source of recyclable material from other solid waste originating from the single family dwelling premises and public buildings where services for the collection of solid waste are provided.

Upon approval of this Agreement, Franchisee shall make commercially reasonable efforts to locate and develop a waste transfer station meeting State and City regulations, within the city limits of Fernley. Franchisee shall have nine (9) months from the date of this Agreement to show substantial progress toward the location and development of such a transfer station. In the event that substantial progress has been made, Franchisee shall have an additional six (6) months to complete and begin operating the transfer station within the city limits of Fernley. The above timelines are exclusive of any administrative or judicial appeal period applicable to the land use permitting process required for the initial construction or operation of the Transfer Station or the final disposition of any such appeal if filed.

City agrees to provide timely review and consideration of applications in relation to locating and building a transfer station where the City has jurisdiction to review and consider. The City agrees to cooperate with other governmental agencies as may be necessary to secure all land use entitlements for the Transfer Station.

4 - FRANCHISE FEE

4.01 Franchise Fee. Franchisee, its successors and assigns, shall pay to City, in quarterly installments on the 15th of the month following each calendar quarter during the term hereof, in an amount equal to eight (8%) percent of the "gross revenues" collected by Franchisee under this Agreement. If a franchise fee is received by the City

after the due date, a late fee of ten percent per month of the delinquent amount will be assessed to the franchisee.

4.02 Definition of "Gross Revenue". The term "gross revenue" as used in this Agreement includes all money, cash, receipts, property, or other things of value collected by Franchisee from both single family dwelling and commercial customers who use the service of Franchisee under this Agreement.

4.03 Record Keeping. During the life of this Agreement, Franchisee shall keep full, true, and correct books, records, and accounts, establishing the identity and number of customers served by it, and the amount of its gross monthly revenues which said books, records, and accounts shall at all times be open to inspection by the duly authorized representatives of City during regular business hours. Further, Franchisee shall furnish to City monthly a statement of all of its gross revenues attested as being correct by a representative of Franchisee duly authorized to do so.

4.04 Audit Requirement. Franchisee shall be required to submit to certain "agreed upon procedures" performed by City staff or a qualified independent person or firm to verify gross revenues as defined in this Agreement and the associated franchise fees payable or paid to the City. The verification and review to be conducted shall be limited to an analysis of Franchisee's revenue and shall not include any analysis or review of Franchisee's expenses or costs associated with performance under the terms of this Agreement. The Franchisee shall reimburse the City for the cost of conducting the agreed upon procedures in an amount not to exceed Seven Thousand Five Hundred Dollars (\$7500.00). The City will not require the agreed upon procedures more often than every three (3) calendar years, with the procedure generally covering a three (3) year period. Following completion of the agreed upon procedures, the Franchisee will be provided a copy of the report of the procedures performed, the results and summary of amount due to City or to be refunded to Franchisee. Franchisee shall have thirty (30) days following receipt of the report to appeal the results of the report to the City Council. Following expiration of any appeal period, either the Franchisee shall remit amounts due the City or the City shall process refund of franchise fees, depending upon the results of the agreed upon procedures report.

5 - GARBAGE COLLECTION RATES AND PROCEDURES

5.01 Establishing Rates for Collection. The rates for collection are outlined in Exhibit A.

5.02 Rates Adjustment by Cost Of Living Index. The Rates to be charged by Franchisee to subscribers as established by the City as of the effective date of this Agreement are set out in Exhibit "A" and incorporated herein by reference. When any changes occur to the rate structure, Franchisee will forward an updated Exhibit "A" to the City Manager.

The rates in effect as of the effective date of this Agreement, and all rates established by the City hereafter shall be subject to annual increases based upon the percentage of change in the Consumer Price Index, All Urban Consumers, U.S. City Average- Item: Garbage and Trash Collection (1983=100) ("CPI") as published by the Bureau of Labor Statistics, Washington, D.C.

The first adjustment shall be made effective as of January 1, 2010, and shall be based upon the CPI increase for the period November, 2008 to November, 2009, and rates shall be adjusted in the same manner annually thereafter. Rates adjusted in accordance with the CPI shall not be greater than six percent (6%) nor less than zero percent (0%) in any one year regardless of the percentage change in the CPI. If the percentage change is less than zero percent (0%), Franchisee shall not be required to reduce rates.

Notwithstanding the method of establishing rates described above, Franchisee shall have the right to request an adjustment to rates where unforeseen or extraordinary circumstances resulting from governmental regulatory changes or significantly higher costs of operation that could not be reasonably anticipated. The adjustment to rates shall be within the sole discretion of City Council.

5.03 Scope of Single Family Dwelling Rates. For single family dwelling services, Franchisee shall be entitled to collect the rate as outlined in Exhibit A based upon the following criteria:

A. The charge for collection of single family dwelling waste shall be on a weekly basis and shall include one "designated container". The designated container shall be provided by Franchisee to each owner or person having control of any single family dwelling unit within the City. The designated container provided by the Franchisee shall be a durable plastic container of approximately ninety-six (96) gallons in capacity, which is watertight, fitted with a lid, and equipped with wheels for easy handling. The designated container remains the property of the Franchisee. For each additional designated container for garbage, an additional rate shall be charged by the franchise holder.

B. The rate for single family dwelling service includes, in addition to the designated 96 Gallon container, seven extra bags or trash cans per week, not to exceed 32 gals and that do not exceed 50lbs each. Additional bundles of brush trimmings may be put out in place of bags or cans, but must not exceed 50lbs each, exceed four feet in length or be more than one cubic yard.

C. When requested by the customer, the franchise holder shall provide additional containers or more frequent collections on an on-call basis. The rate for such additional containers or collections shall be set out in Exhibit "A."

D. Senior citizens that are both residents and customers as defined in this agreement shall be entitled to a 25% discount rate off the basic single family single family dwelling service outlined in Exhibit 'A'.

E. The single family dwelling rate charged by the franchise holder shall require that the designated container be placed behind the curb or on the edge of the alley or the designated location by 6:00 a.m. on the regular collection day. The Franchisee does not guarantee that service will be provided at exactly the same time on each service day, as unforeseen circumstances may cause an interruption in service; however, every effort will be made to provide consistency in single family dwelling service. The franchise holder shall be entitled to collect an additional charge based on a per 32 gal bag, trash can or bundle basis for any additional containers of garbage, rubbish or waste matter which would be in addition to the regular single family dwelling service as set forth in Exhibit "A."

F. Rollout service will be provided at no charge to any resident who is handicapped and cannot bring their container to the curb for pickup service, as determined by Franchisee, providing no other resident living at the household is not handicapped. Such customers' containers must be located in an easily accessible area, as Franchisee will not be responsible for entering a customer's garage, gate, locked area or other structure.

G. Multiple family dwelling buildings, as included under this agreement, shall be charged for each container or service as outlined in Exhibit A.

H. It is the responsibility of each customer to provide access to and from the designated container to allow regular collection service of the designated container in accordance with the Franchisee's normal method of operation. The Franchisee will not be required to service the container where there is a lack of proper access, and no credit will be provided.

5.05 Rates for New Areas. As of the effective date hereof, the current rate structure covers the existing city limits of the City. The rates of single family dwelling areas which are annexed into the City and are subject to mandatory service under this agreement are the same rates as outlined in Exhibit A. However, Franchisee shall have the option of requesting to City Council an increased rate based upon potential hardship of providing service to a newly annexed single family dwelling area. The adjustment to rates shall be within the sole discretion of City Council.

5.06 Unlawful Accumulations. In any area of the City where a rate has been established, the designated City employee or City Code Enforcement Officer, upon application of either the franchise holder or any owner requesting service, shall have the power and authority to determine whether the service requested by an individual is adequate to prevent the unlawful accumulation of garbage or to prevent a health hazard or nuisance.

The Franchisee, at the request of the City, a complainant, or at their own discretion shall maintain a "Snap Shot" program whereby drivers are able to document inadequate service levels by the use of a digital camera. The primary purpose of the program is to ensure that customers have adequate service for their needs and that unlawful

accumulations of solid waste do not occur. Rates for extra waste beyond basic single family dwelling service are set out in Exhibit A.

5.07 Service.

A. **Mandatory Service.** The rates for collection and disposal of single family dwelling waste as set forth herein have been established upon the condition that mandatory single family dwelling garbage service will be in effect for the entire area within the boundaries of City and for the entire period that a rate is in effect. Upon approval of this Agreement, the City will adopt the appropriate ordinance or ordinances mandating of its residents single family dwelling waste service in accordance with the terms of this Agreement.

B. **Non-mandatory Service.** The rates for collection and disposal of single family dwelling waste as set forth herein have been established upon the condition single family waste service will be in effect for the entire area within the boundaries of City and for the entire period that a rate is in effect. Upon approval of this Agreement, the City will adopt the appropriate ordinance or ordinances mandating that single family dwelling waste service for parcels over 2 acres be provided only by Franchisee in accordance with the terms of this Agreement.

5.08 Collection Procedures. Franchisee shall be responsible for collection procedures in accordance with all federal, state, and local laws. Franchisee shall bill quarterly in advance on or about January 1st, April 1st, July 1st, October 1st. Customers shall pay for services within 10 days of the date of the Franchisee's Invoice. Franchisee may, in its discretion and as otherwise legally permitted, impose a service charge on all past due amounts accruing from the date of the invoice. In the event that a customer fails to pay for services for 90 days, Franchisee shall have the right to discontinue service until such time as payment is received.

5.09 Service to City Facilities. Franchisee agrees to collect and dispose of all refuse, not including sewage sludge, at all buildings, parks and other facilities owned by City which are open to the public and operating under normal conditions at a rate that is 25% less than Franchisee's standard rate for such service, as set out in Exhibit A. This reduced rate service provided by Franchisee shall apply to the disposal of City generated solid waste including waste resulting from natural disasters on City properties, and any special community event operated or sponsored by City. This discount specifically does not apply to any third party or contracted businesses. The cost of providing this service at the reduced rate shall be considered as a reasonable cost of operation for purposes of determining collection rates under paragraph 5.01 hereof.

5.10 Service in Time of Emergency. Franchisee agrees to the rate schedule as attached in Exhibit A under "Emergency Rates" for use requested by the City. Emergency Rates shall apply when a Federal, State, County, or City Emergency has been declared.

6 - SURETY

6.01 Surety. Franchisee shall forthwith furnish to City a bond running to City in the penal sum of \$75,000 on the condition that said Franchisee shall well and truly observe, fulfill and perform each and every term and condition of this Agreement. Said bond shall be filed with the City Clerk.

7 - INDEMNITY AND HOLD HARMLESS AGREEMENT

7.01 General Indemnity. Franchisee, its assigns or successors, shall protect, indemnify, defend, and hold harmless the City, its officers, officials, employees, and agents from and against any and all claims for damages, liability, loss, expense, costs (including without limitation costs and fees of litigation) of every nature arising out of or in connection with to the extent caused by, or arising from or in connection with the breach of any representations, covenants or warranties of the Franchisee set forth in this Agreement, or any negligent actions or omissions or willful misconduct of the Franchisee, except for any such loss or damage to the extent caused by the sole negligence or willful misconduct of the City, its officers, officials, employees and agents.

7.02 Environmental Indemnity. Further, Franchisee shall protect, defend, indemnify, and hold harmless the City, its officers, employees, and agents from and against any and all claims for actual damage, natural resources damages, remediation and removal costs, and losses of every kind and description, arising out of or resulting from any cleanup, removal, remedial, or other plan, concerning the release of any hazardous substance or hazardous waste, as hazardous substance and hazardous waste shall be defined by state and federal laws, as amended from time to time. This indemnity shall not apply with respect to any hazardous waste or hazardous substance generated by the City or its residents or business and delivered by City to Franchisee. The foregoing indemnity is for the exclusive benefit of the City and parties indemnified, and in no event shall such indemnity inure to the benefit of any third party.

7.03 Notice. Franchisee shall have no obligation to indemnify or defend hereunder unless the City provides written notice to Franchisee upon the City being served a written complaint giving rise to Franchisee's obligation to indemnify hereunder within fifteen (15) days or within ninety (90) days if the City files an answer in response to the Complaint.

8 - LIABILITY INSURANCE

8.01 Coverage. Franchisee shall guarantee that in the exercise of duties under the franchise, every reasonable and proper precaution to avoid damage or injury to persons or property shall be used and that the franchisee shall at all times and under all circumstances indemnify and hold harmless the City of Fernley, the Fernley City Council, the Mayor, and the employees of the City for any and all liability from each and all such damage, injury, loss or expenses caused or occasioned by reason of any act, or failure to act of the franchisee, its officers, agents, and employees. The Franchisee further agrees that if the City is sued by any person or business of any kind to recover

damages for injury to any person or property on account of actions during performance of duties under the franchise, the Franchisee, its successors and assigns, shall defend all such suits and pay all judgments courts may enter in such suits.

Franchisee shall be required to provide and maintain in full force and effect Commercial General (and Auto) Liability Insurance on an occurrence form, with insurers licensed in the State of Nevada with a current A.M. Best rating of no less than A: VII.

Limits of liability shall be at least \$3,000,000 combined single limit per occurrence and aggregate.

Any deductibles and self-insured retentions over \$5,000 must be approved by the city.

The City, its officers, employees, agents, and volunteers shall be named as additional insured. The Franchisee's insurance shall be primary as respects the City as it relates to the performance of this agreement. Failure to comply with reporting or other provisions of the policy shall not affect coverage provided to the City. Coverage shall apply separately to each insured against whom a claim is made or suit is brought, except with respect to the limits of the insurer's liability; and shall be endorsed to state that coverage will not be voided, suspended, cancelled or reduced except after 30 days prior written notice, certified mail, return receipt requested has been given to the City. Franchisee shall furnish the City with certificates and original endorsements effecting coverage required by this clause. Endorsements must be signed by a person authorized by that insurer to bind coverage on its behalf.

Pursuant to NRS Chapters 616A through 616D, Franchisee shall provide Workers' Compensation insurance to statutory limits and employer's liability of at least \$1,000,000.

Franchisee shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

9 - TRANSFER, ASSIGNMENT AND SUBCONTRACTS

9.01 Franchisee's Right to Assign. Franchisee reserves the right to assign or transfer its rights hereunder, provided that in such event, Franchisee shall file with the City Clerk written notice of any contemplated sale, transfer, assignment, or lease of such franchise or any part thereof, or of any other rights or privileges granted hereby, 30 days before such sale, transfer, assignment or lease is to become effective. No such sale, transfer, or assignment or lease of such franchise, or any part hereof, shall be effective until and unless approved by the City, which consent and approval shall not be unreasonably delayed or withheld. Notwithstanding the foregoing, Franchisee shall have the right, without seeking or obtaining approval or authority from the City, to assign or transfer this Agreement to any affiliate of Franchisee or its parent corporation.

9.02 Subcontracts. Franchisee shall have the right to enter into subcontracts for the collection and disposal services required by this Agreement, provided that Franchisee shall remain responsible to City for the complete performance of all terms and conditions of this Agreement by such subcontractors. The term "subcontract" does not include any operations conducted under this Agreement by affiliated companies with Franchisee, including all companies owned or controlled by Franchisee's parent corporation.

All subcontracts require the prior approval of the City, which approval the City agrees will be timely and shall not be unreasonably withheld. All subcontractors shall be required to fully perform all terms and conditions of this Franchise Agreement and the City Codes pertaining to garbage and collection services, and subcontractors shall be required to collect at the rates established by City.

10 - DEFAULT; FORCE MAJEURE; CHANGE IN LAW

10.01 Default. In the event of any material failure or refusal of Franchisee to comply with any obligation or duty imposed on Franchisee under this Agreement, the parties shall meet and confer in good faith in an effort to agree on a resolution and cure of the breach. In the event the parties are unable to agree, and the City may declare an event of default hereunder; and in the event of such default Franchisee shall cure such default within 15 days after receipt of written notice of such default, breach or deficiency from the City. If any such default is of such nature that it cannot be completely cured within 15 days as determined by the City Manager, then unless Franchisee shall commence such cure within 15 days after notice of such default given by City and shall thereafter diligently and in good faith proceed and continue to cure such default and shall succeed in curing such default within 45 days or a reasonable period of time as may be determined by City Council, the City may, at its option, terminate this Agreement. Notwithstanding, the City Council may terminate this Agreement after notice and 15 days after receipt of notice by the Franchisee where the Franchisee fails to materially perform the collection of single family dwelling waste or deposit of waste at approved landfill provisions of this agreement.

10.02 Force Majeure. The performance of this Agreement may be discontinued or temporarily suspended in the event of circumstances beyond the City's or Franchisee's control, whether or not foreseeable, including, without limitation Force Majeure. Franchisee shall not be deemed to be in default and shall not be liable for failure to perform under this Agreement if Franchisee's performance is prevented or delayed by circumstances beyond the City's or Franchisee's control, whether or not foreseeable, including, without limitation, Force Majeure. For purposes of this Agreement, the term "Force Majeure" means acts of God, landslides, lightning, forest fires, storms, floods, freezing and earthquakes, civil disturbances, acts of the public enemy, wars, blockades, acts of terrorism, public riots, explosions, and governmental restraint.

10.03 Changes in Law. In the event that new or amended local, state or federal laws, rulings or regulations are enacted after the effective date of this Agreement and have

the effect of preventing or precluding compliance with one or more provisions of this Agreement, such provisions of this Agreement shall be modified or suspended as may be necessary to comply with such new or amended local, state or federal laws or regulations, and the parties shall enter into an amendment of this Agreement that reflects the extent to which the provisions hereof have been so modified or suspended. Nothing in this Agreement shall prohibit Franchisee from obtaining or seeking to obtain modification, reversal or repeal of such law, ruling or regulation or restrict Franchisee's right to legally contest the validity of such law, ruling or regulation. Franchisee shall not be considered in breach of this Agreement during such time as Franchisee is contesting or appealing any notice of violation, ordinance, rule, regulation, ruling or law.

11 - MISCELLANEOUS PROVISIONS

11.01 Binding Effect. This Agreement shall inure to the benefit of, and be binding upon, the parties, and their respective successors and permitted assigns.

11.02 Independent Contractor. Franchisee is an independent contractor and shall not be deemed an employee of the City.

11.03 Additional Fees. Franchisee shall pay, in the same manner as any other business, a City business license, real and personal property taxes, building permit fees, and other such fees.

11.04 Amendment. This Agreement, including any term or provision hereof, may be amended only by an instrument in writing and signed by the parties hereto.

11.05 Saving Clause and Entirety. If any non-material provision of this Franchise Agreement shall for any reason be held to be invalid or unenforceable, the invalidity or unenforceability of such provision shall not affect the validity and enforceability of any of the remaining provisions of this Franchise Agreement.

11.06 Notices. All notices required or permitted to be given under this Franchise Agreement shall be in writing and shall be personally delivered or sent by telecopier or US certified mail, postage prepaid, return receipt requested, addressed as follows:

To Franchisee:
Trashpros, LLC
Attention: Keith Alexander
P.O. Box 680
Fernley, NV 89408

To City:
City Manager
City of Fernley
595 Silver Lace Blvd.
Fernley, NV 89408

Or to such other address as either party may from time to time designate by notice to the other given in accordance with this paragraph. Notice shall be deemed effective on the date personally served or sent by telecopier or, if mailed, three (3) business days from the date such notice is deposited in the US mail.

11.07 Dispute Resolution. In the event of any dispute, claim, question or disagreement arising from or relating to the parties' obligations hereunder or arising out of this Agreement or the breach thereof, the parties shall first attempt resolution through mutual discussion.

In the event that the parties are unable to reach a resolution, either party may initiate a civil action in the Third Judicial District Court for the State of Nevada for the purpose of enforcing the terms of this Agreement. It is the intent of the parties that the obligations contemplated in the agreement herein will not be interrupted by the dispute but will continue to move forward until the dispute can be resolved.

In Witness Whereof, the parties have executed this Agreement effective the day and year first above written.

CITY OF FERNLEY,
a Political Subdivision of the State of Nevada

By: Todd Cutler
TODD CUTLER
MAYOR, CITY OF FERNLEY

ATTEST: Lena Shumway
By: Lena Shumway
LENA SHUMWAY
CITY CLERK, CITY OF FERNLEY

TRASHPROS, LLC, a Nevada Limited Liability Company
By: [Signature]



**APPLICATION FOR WASTE
HAULER PERMIT
CITY OF FERNLEY**

For Office use only:
Agenda _____
Permit _____

PLEASE SEE PAGE 2 OF THIS FORM FOR INSTRUCTIONS FOR COMPLETION

APPLICANT INFORMATION

APPLICATION FOR: ☐ NEW PERMIT ☐ RENEWAL PERMIT

APPLICANT NAME: _____

BUSINESS NAME: _____

BUSINESS ADDRESS: _____

STREET

CITY/STATE/ZIP

PHONE NUMBER: _____ FAX NUMBER: _____

E-MAIL: _____ CONTACT PERSON: _____

MAILING ADDRESS (if different from business address) _____

STREET

CITY/STATE/ZIP

LICENSE TO COVER: (please check all appropriate services)

☐ **COMMERCIAL HAULING**

☐ **INDUSTRIAL HAULING**

List all vehicles owned by applicant which will be utilized in the business operation within the City of Fernley limits:

VT. PLATE	MAKE	MODEL	YEAR	CAPACITY

I certify that the statements on the application are correct and shall bind the applicant and his agents to the terms and conditions of the permit. I certify that I am familiar with the ordinance of the City of Fernley, which regulates the collection and disposal of commercial solid waste and existing related regulations.

I AGREE TO THE FOLLOWING:

- to only use waste hauling vehicles identified above
- to provide all required certifications of compliance, agreements, insurance and licenses upon issuance of a waste hauler permit and that such certifications of compliance, agreements, insurance and licenses are true and accurate.
- to collect all components of solid waste handled under this permit in the City of Fernley in enclosed equipment and disposed by utilizing facilities and following procedures established by the City of Fernley.
- to provide all requested records and documentation on the amount of solid waste collected, the facilities that accepted the solid waste, the gross revenue and franchise fees generated, and remittance of franchise fees to the City.

I do accept and am bound by the provisions of Ordinance # 2008-013 under penalty of loss of permit.

Signed: _____
Applicant

Date: _____

INSTRUCTIONS

This application for WASTE HAULER PERMIT form must be completed and submitted to the City Clerk's office. Incomplete applications will not be processed. Applications for new Waste Hauler Permits are accepted any time during the year. Only applications bearing live signatures will be processed: faxed or e-mailed applications will not be accepted. In addition to this Application form, the following items must be submitted to be considered for a Waste Hauler Permit.

1. A signed copy of "Non-exclusive ("Open") Franchise Agreement"
2. Evidence of Insurance for the current Permit year for each waste hauling vehicle
3. Copy of the Waste Services license should be enclosed with the application. Pro-rated fees are not authorized.
4. Fees totaling \$2,500.00 per the "Non-exclusive ("Open") Franchise Agreement" (\$1,500.00 annual processing fee plus \$1,000.00 annual Community Clean-up fee).
5. Proof of insurance as outlined in Section 7.01 of Non-Exclusive Franchise Agreement
6. Agreement with landfill and /or transfer station
7. Proof of Worker's Compensation Insurance as outlined in section 7.01 of the Non-Exclusive Franchise Agreement.

**NON-EXCLUSIVE ("OPEN") FRANCHISE AGREEMENT BETWEEN
THE CITY OF FERNLEY
AND**

This Agreement, made and entered into this _____ day of _____, 2008, by and between the CITY OF FERNLEY, a political subdivision of the State of Nevada, (hereinafter referred to as "City") and _____, (hereinafter referred to as "Franchisee").

WITNESSETH:

WHEREAS, NRS 268.083 authorizes a City to adopt a regulatory scheme for providing waste collection and disposal services within the boundaries of a City through issuance of a franchise;

WHEREAS, Franchisee has represented and warranted to City that it has the experience, responsibility, and qualifications to provide for the collection and safe transport to permanent disposal facilities of solid waste generated by the commercial and industrial businesses within the City;

WHEREAS, City desires to have an open franchise system for solid waste collection for commercial entities;

WHEREAS, City and Franchisee have agreed to enter into a franchise agreement and wish to set out the terms and conditions of that agreement in writing.

NOW, THEREFORE, for and in consideration of the covenants and agreements herein contained and for other valuable consideration, the receipt of which is hereby specifically acknowledged, the parties hereto do agree as follows:

1 – DEFINITIONS

As used in this Franchise Agreement, the following definitions apply:

1.01 Effective Date. The effective date of a non-exclusive franchise agreement shall be the date upon approval by City Council and proper execution of the non-exclusive franchise agreement by both parties.

1.02 Solid Waste All putrescible and nonputrescible materials in solid or semisolid form that have been discarded or abandoned by their owner, including domestic or household waste resulting from the ordinary domestic use or occupation of a house, flat, apartment, unit, boarding house, hostel or guesthouse; garbage, rubbish such as paper, cardboard, automobiles, cans, wood, glass, bedding, crockery and similar materials, junk vehicles and parts, ashes or incinerator residue, street refuse, dead animals, construction or demolition waste, commercial or industrial waste, garbage, sewage waste, commingled recyclables and other refuse which includes discarded materials

that have no useful physical, chemical or biological properties after serving their original purpose and that cannot be reused or recycled for the same or other purposes. The term "solid waste" does not include hazardous waste.

1.03 Garbage. The term "garbage" means:

Putrescible animal and vegetable waste resulting from the handling, storage, preparation, cooking, and sale and serving of food and beverage.

This includes, but is not limited to:

1. Offal, swill, kitchen and table waste, and other organic animal and vegetable waste;
2. Bottles, cans, cups, plates, utensils, containers, and/or covering of any construction or material that has been in intimate contact with food, confection and/or beverage; and
3. Any component used in the preparation or manufacture of matter intended for animal or human consumption, and;
4. Such matter and/or materials listed in (1) through (3) above that have been discarded without first being sanitized.
5. Infectious Waste as defined by the Nevada State Health Division.

The mixing, addition, or commingling of garbage with rubbish, trash, or other waste matter renders the entire resulting mixture as garbage and requires the mixture to be handled as garbage.

1.04 Residential Solid Waste. The term "residential solid waste" means solid waste produced by residents owning or having control over a single family dwelling.

1.05 Putrescible Waste. The term "putrescible" means wastes that are capable of being decomposed by microorganisms with sufficient rapidity as to cause nuisances from odors, gasses and similar objectionable conditions. Food wastes, offal, and dead animals are examples of putrescible waste.

1.06 Refuse. The term "refuse" refers generally to all forms of discarded solid waste, including garbage, rubbish and waste matter.

1.07 Recyclable Material has the meaning ascribed to it in NRS 444A.013 and means solid waste that can be processed and returned to the economic mainstream in the form of raw materials or products, as determined by regulations adopted by the Nevada State Environmental Commission and the Nevada State Division of Health.

1.08 Franchisee as used in this agreement, any person who has contracted with the City for collection, transportation and disposal of solid waste.

1.09 Permittee. The same as Franchisee.

1.10 Transfer Station: A collection site where solid waste and recyclables may be taken by persons and deposited into designated containers as provided for in this

Chapter.

1.11 Hazardous Waste. The term "hazardous waste" means any waste or combination of wastes, including solids, semisolids, liquids or contained gases which:

(A) Because of its quantity or concentration or its physical, chemical or infectious characteristics may:

(1) Cause or significantly contribute to an increase in mortality or serious irreversible or incapacitating illness; or

(2) Pose a substantial hazard or potential hazard to human health, public safety or the environment when it is given improper treatment, storage, transportation, disposal or other management;

(B) Is identified as hazardous waste by the Nevada Department of Conservation and Natural Resources as a result of studies undertaken for the purpose of identifying hazardous wastes; and

(C) Includes, among other wastes, toxins, corrosives, flammable materials, irritants, strong sensitizers and materials which generate pressure by decomposition, heat or otherwise.

1.12 Single Family Dwelling. The term "single family dwelling" means a building or dwelling designed and used for single family occupancy and where no business is conducted (other than a licensed home occupation business) and includes single-family residences, multiple dwelling buildings consisting of four units or less, including but not limited to, duplexes, apartments, condominiums, cooperatives, mobile homes, trailer parks and any other multiple residential dwelling consisting of four units or less located on a property within the City of Fernley.

1.13 City of Fernley or City. The term "City of Fernley" or "City" refers to the incorporated boundaries of the City of Fernley, County of Lyon, State of Nevada as may be modified.

2 - GRANT OF OPEN SOLID WASTE FRANCHISE

2.01 Grant of Open Solid Waste Franchise. Subject to the terms of this Agreement, the City does hereby grant to Franchisee, and Franchisee does hereby accept, the duty, right and privilege of collecting, removing, transporting and disposing or otherwise handling solid waste from non-single family dwelling establishments within the City, including any area hereinafter annexed by the City.

2.02 Exclusivity. This open solid waste franchise is not exclusive in nature, and is open to an entity who qualifies under the terms of this agreement and City Code.

2.03 Enforcement of Open Solid Waste Franchise. All non-single family dwelling establishments shall be required by the City to utilize the collection solid waste services of a licensed and permitted Franchisee.

2.04 Term. This non-exclusive franchise shall commence upon the effective date

hereof, and continue in full force and effect for a period of one year.

2.05 Title to Solid Waste Stream. The title to the solid waste stream and the property rights associated therewith for the collection and disposal solid waste under this Agreement shall be the sole property of Franchisee. For purposes of this Agreement, the transfer of title occurs at the time that the waste is deposited by the customer in container(s) and left at the collection point for collection by Franchisee.

3 - OBLIGATIONS OF FRANCHISE HOLDER

3.01 Equipment. Franchisee shall at its cost and expense, furnish a sufficient number of trucks and other equipment, including all drivers and workers required for the service, operation, and maintenance of said trucks and other equipment for the purposes of providing for the services contracted for, unless otherwise provided for, and satisfactory solid waste collection and disposal service in the areas covered hereby.

3.02 Sanitary Operation. Franchisee shall at all times exercise diligence in the supervision of its personnel to the end that care is taken to deposit all solid waste inside collection vehicles, leaving no garbage or other waste matter upon any street, alley, walkway or other public place within the City, or upon any private property used for the collection of garbage and other waste matter. Collection vehicles shall be safe, adequate and clean, constructed in such a manner to be covered so as to prevent the spilling, dripping or blowing of any contents from the vehicle. Franchisee's collection equipment shall be modern, up-to-date, maintained in good repair, and reasonably water tight. The exterior of the equipment shall be kept clean, presentable and cleaned of any debris and/or litter after dumping.

3.03 Public Relations and Customer Service. The City and Franchisee acknowledge and agree that the Franchisee shall at all times in the performance of its duties and responsibilities under this Agreement, maintain good relations with the public and shall promptly respond to customer issues.

3.04 Approved Landfill and/or Transfer Station. Franchisee shall be required to deposit all solid waste collected pursuant to this Franchise Agreement at an approved landfill site and/or transfer station. For purposes of this Franchise Agreement, an approved landfill site is one holding a valid permit to permanently deposit municipal solid waste in accordance with all applicable laws and regulations of the United States and/or the State of Nevada, including the Nevada Environmental Commission and the Nevada State Health Division.

It shall be the sole responsibility of Franchisee to provide for the permanent deposit of non-single family dwelling waste collected pursuant to this Agreement, in accordance with all applicable Federal, State and Local laws and regulations. Franchisee shall comply with this requirement by operating its own landfill or by entering into an agreement with the operator of a landfill and/ or transfer station that meets the requirements of this Agreement. As part of this contract, Franchisee shall submit to the

City a request for approval of the selected landfill or landfills and/or transfer station to be utilized by Franchisee prior to utilizing the landfill(s) and/or transfer station during the term of this Agreement. City shall approve such request in a timely manner and shall not unreasonably withhold their approval.

3.05 General.

(A) Each permittee shall:

1. Provide waste receptacles or bins of sufficient capacity and quantity so as to contain all refuse generated by an account;
2. Be responsible for the collection and disposal of overflow refuse around receptacles. Following the collection of refuse or the emptying of waste receptacles, the area where the refuse was placed for collection shall be left free of refuse, litter, liquid waste and other debris;
3. Provide bulky item collection service for each account. The permittee is responsible for the removal and proper disposal of all bulky items placed for collection for each account it services. The permittees shall remove such items within forty-eight hours of servicing an account or receiving a request for collection from the account or from the City. Each permittee shall maintain a log of such requests for bulky item collection and make such log available for inspection by the City.
4. Pay an annual application processing fee of \$1500.00.
5. Pay an annual Community Clean-up fee of \$1000.00 (One thousand dollars) for the cleanup of abandoned or dumped waste or for use by the City for abatement procedures.

(B) All permittees providing solid waste collection services shall comply with the American with Disabilities Act (42 U.S.C. 12101 et seq.) as it may be amended from time to time.

(C) Nothing in this section shall excuse compliance with any other Municipal Code section nor any other applicable law or regulation.

4 - FRANCHISE FEE

4.01 Franchise Fee. Franchisee, its successors and assigns, shall pay to City, in quarterly installments on the 15th of the month following each calendar quarter during the term hereof, in an amount equal to eight (8%) percent of the "gross revenues" collected by Franchisee under this Agreement. If a franchise fee is received by the City after the due date, a late fee of ten percent per month of the delinquent amount will be assessed to the Franchisee.

4.02 Definition of "Gross Revenue". The term "gross revenue" as used in this Agreement includes all money, cash, receipts, property, or other things of value collected by Franchisee from both non single family dwelling and commercial customers who use the service of Franchisee under this Agreement.

4.03 Record Keeping. During the life of this Agreement, Franchisee shall keep full, true, and correct books, records, and accounts, establishing the identity and number of customers served by it, and the amount of its gross monthly revenues which said books, records, and accounts shall at all times be open to inspection by the duly authorized representatives of City during regular business hours. Further, Franchisee shall furnish to City monthly a statement of all of its gross revenues attested as being correct by a representative of Franchisee duly authorized to do so.

4.04 Audit Requirement. Franchisee shall be required to submit to certain "agreed upon procedures" performed by City staff or a qualified independent person or firm to verify gross revenues as defined in this Agreement and the associated franchise fees payable or paid to the City. The verification and review to be conducted shall be limited to an analysis of Franchisee's revenue and shall not include any analysis or review of Franchisee's expenses or costs associated with performance under the terms of this Agreement. The Franchisee shall reimburse the City for the cost of conducting the agreed upon procedures in an amount not to exceed Seven Thousand Five Hundred Dollars (\$7500.00). The City will not require the agreed upon procedures more often than every three (3) calendar years, with the procedure generally covering a three (3) year period. Following completion of the agreed upon procedures, the Franchisee will be provided a copy of the report of the procedures performed, the results and summary of amount due to City or to be refunded to Franchisee. Franchisee shall have thirty (30) days following receipt of the report to appeal the results of the report to the City Council. Following expiration of any appeal period, either the Franchisee shall remit amounts due the City or the City shall process a refund of franchise fees, depending upon the results of the agreed upon procedures report.

City shall have the right, at any time, to audit and otherwise review any Franchisee's records with regard to Franchisee's revenues generated from activities conducted pursuant to this Agreement.

5 - WASTE COLLECTION RATES AND PROCEDURES

5.01 Establishing Rates for Collection. The rates for collection shall be established between Franchisee and the customer.

6 - INDEMNITY AND HOLD HARMLESS AGREEMENT

6.01 General Indemnity. Franchisee, its assigns or successors, shall protect, indemnify, defend, and hold harmless the City, its officers, officials, employees, and agents from and against any and all claims for damages, liability, loss, expense, costs (including without limitation costs and fees of litigation) of every nature arising out of or in connection with to the extent caused by, or arising from or in connection with the breach of any representations, covenants or warranties of the Franchisee set forth in this Agreement, or any negligent actions or omissions or willful misconduct of the Franchisee, except for any such loss or damage to the extent caused by the sole negligence or willful misconduct of the City, its officers, officials, employees and agents.

6.02 Environmental Indemnity. Further, Franchisee shall protect, defend, indemnify, and hold harmless the City, its officers, employees, and agents from and against any and all claims for actual damage, natural resources damages, remediation and removal costs, and losses of every kind and description, arising out of or resulting from any cleanup, removal, remedial, or other plan, concerning the release of any hazardous substance or hazardous waste, as hazardous substance and hazardous waste shall be defined by state and federal laws, as amended from time to time. This indemnity shall not apply with respect to any hazardous waste or hazardous substance generated by the City or its residents or business and delivered by City to Franchisee. The foregoing indemnity is for the exclusive benefit of the City and parties indemnified, and in no event shall such indemnity inure to the benefit of any third party.

6.03 Notice. Franchisee shall have no obligation to indemnify or defend hereunder unless the City provides written notice to Franchisee upon the City being served a written complaint giving rise to Franchisee's obligation to indemnify hereunder within fifteen (15) days or within ninety (90) days if the City files an answer in response to the Complaint.

7 - LIABILITY INSURANCE

7.01 Coverage. Franchisee shall guarantee that in the exercise of duties under the franchise, every reasonable and proper precaution to avoid damage or injury to persons or property shall be used and that the franchisee shall at all times and under all circumstances indemnify and hold harmless the City of Fernley, the Fernley City Council, the Mayor, and the employees of the City for any and all liability from each and all such damage, injury, loss or expenses caused or occasioned by reason of any act, or failure to act of the Franchisee, its officers, agents, and employees. The Franchisee further agrees that if the City is sued by any person or business of any kind to recover damages for injury to any person or property on account of actions during performance of duties under the franchise, the Franchisee, its successors and assigns, shall defend all such suits and pay all judgments courts may enter in such suits.

Franchisee shall be required to provide and maintain in full force and effect Commercial General (and Auto) Liability Insurance on an occurrence form, with insurers licensed in the State of Nevada with a current A.M. Best rating of no less than A: VII.

Limits of liability shall be at least \$1,000,000 combined single limit per occurrence and \$2,000,000.00 aggregate.

Any deductibles and self-insured retentions over \$5,000 must be approved by the City.

The City, its officers, employees, agents, and volunteers shall be named as additional insured. The Franchisee's insurance shall be primary as respects the City as it relates to the performance of this agreement. Failure to comply with reporting or other provisions of the policy shall not affect coverage provided to the City. Coverage shall

apply separately to each insured against whom a claim is made or suit is brought, except with respect to the limits of the insurer's liability; and shall be endorsed to state that coverage will not be voided, suspended, cancelled or reduced except after 30 days prior written notice, certified mail, return receipt requested has been given to the City. Franchisee shall furnish the City with certificates and original endorsements effecting coverage required by this clause. Endorsements must be signed by a person authorized by that insurer to bind coverage on its behalf.

Pursuant to NRS Chapters 616A through 616D, Franchisee shall provide Workers' Compensation insurance to statutory limits and employer's liability of at least \$1,000,000.

8 - DEFAULT; FORCE MAJEURE; CHANGE IN LAW

8.01 Default. In the event of any material failure or refusal of Franchisee to comply with any obligation or duty imposed on Franchisee under this Agreement, the parties shall meet and confer in good faith in an effort to agree on a resolution and cure of the breach. In the event the parties are unable to agree, and the City may declare an event of default hereunder; and in the event of such default Franchisee shall cure such default within 30 days after receipt of written notice of such default, breach or deficiency from the City.

(A) Grounds for default or revocation of a permit shall include, but are not limited to, the following:

1. Failure to comply with any of the provisions of this Agreement;
2. Failure to pay in a timely manner any fees imposed by the City;
3. Intentional misstatement of tonnage and origins of refuse collected or transported;
4. Violation of local, State or Federal law in any way related to the collection, transportation or disposal of any waste.

9 - MISCELLANEOUS PROVISIONS

9.01 Binding Effect. This Agreement shall inure to the benefit of, and be binding upon, the parties, and their respective successors and permitted assigns.

9.02 Independent Contractor. Franchisee is an independent contractor and shall not be deemed an employee of the City.

9.03 Additional Fees. Franchisee shall pay, in the same manner as any other business, a City business license, real and personal property taxes, building permit fees, and other such fees.

9.04 Amendment. This Agreement, including any term or provision hereof, may be amended only by an instrument in writing and signed by the parties hereto.

9.05 Saving Clause and Entirety. If any non-material provision of this Franchise

Agreement shall for any reason be held to be invalid or unenforceable, the invalidity or unenforceability of such provision shall not affect the validity and enforceability of any of the remaining provisions of this Franchise Agreement.

9.06 Notices. All notices required or permitted to be given under this Franchise Agreement shall be in writing and shall be personally delivered or sent by telecopier or US certified mail, postage prepaid, return receipt requested, addressed as follows:

To Franchisee:

To City:
City Manager
City of Fernley
595 Silver Lace Blvd.
Fernley, NV 89408

Or to such other address as either party may from time to time designate by notice to the other given in accordance with this paragraph. Notice shall be deemed effective on the date personally served or sent by telecopier or, if mailed, three (3) business days from the date such notice is deposited in the US mail.

In Witness Whereof, the parties have executed this Agreement effective the day and year first above written.

CITY OF FERNLEY,
a Political Subdivision
of the State of Nevada

By: _____
Todd Cutler, Mayor, City of Fernley

FRANCHISEE,

By: _____
Title: _____

ATTEST:

By: _____
Lena Shumway, Fernley City Clerk

6.1 Definition and Purpose of Collection Districts

A local government may choose to divide their jurisdiction into districts for the collection of garbage and/or recyclable materials, and have different service providers compete to provide service in these districts. Several local governments in various parts of the country have divided their jurisdictions into districts for this purpose, including Phoenix, AZ; Seattle, WA; Charlotte, NC; Indianapolis, IN; Palm Beach County, FL (unincorporated areas); Oklahoma City, OK; Minneapolis, MN; Pittsburgh, PA; and Hernando County, FL. The reasons some communities have multiple service districts include:

- 1) The community has many households and, at least when the decision was made to divide the jurisdiction into districts, they were unsure that one hauler could provide all of the services;
- 2) The local government wanted to ensure long-term competition and opportunity for several haulers to provide service;
- 3) Some haulers may have equipment that is better-suited to service specific areas with particular constraints;
- 4) One community may be annexed into another community that already has service established with a private hauler; and
- 5) The local government wanted to ensure that they had some collection equipment and crews on hand to retain the ability to respond quickly to a natural or man-made disaster, and simultaneously wanted to ensure that the city department was competitive – thus wanted to “bid out” a portion of the city which provides a “reality check” regarding the cost-effectiveness of city crews.

6.2 Considerations when Establishing Collection Districts

When establishing collection districts there are certain decisions to make, including:

- How many districts to establish;
- How to determine district boundaries;
- Who to include in the districts (i.e., residential units only or commercial establishments as well);

- Whether to limit the number of districts one hauler can bid on or service;
- Whether concessions will be made to “level the playing field” for small haulers;
- How service providers for each district will be decided; and
- Whether the local government will bid to provide service for one or more district(s).

These considerations are described in more detail below.

6.2.1 Establishing the Number of Districts

A local government’s goal for implementing districts may vary. Those goals will impact the number and size of the districts desired. For example, if the local government desires to implement collection districts in order to give small haulers an opportunity to compete in the marketplace, then one or more districts might be sized relatively small – suitable for a small hauler to service. If the goal is to establish economies of scale and efficiency, then districts would typically be relatively large – at least several thousand households. Similarly, current market participants and their ability to serve (or gain the resources needed to serve) the districts should also be considered. Many issues should be considered when establishing districts including: the number of haulers operating in the area and/or expressing an interest in bidding on the service; whether the local government will also bid on providing service; and whether haulers will be allowed to bid on multiple districts. The optimal size of a collection district depends on multiple factors, including:

- Type of technology employed (e.g., manual, automated or semi-automated collection);
- Density of area (i.e., the number of stops);
- Distance to disposal site and/or materials recovery facility (MRF);
- Existence of natural and other boundaries (described below);
- Whether the City/County provides service to a certain district or number of households (also known as managed competition); and
- Services to be provided within the districts.

6.2.2 Determining District Boundaries

Oftentimes district boundaries evolve due to annexation of areas into a jurisdiction, or due to high growth within a district. In other cases, boundaries essentially already exist in the form of rivers, highways, etc. In some communities, there are often neighborhoods that have been established and are known by local citizens, which can make sense for establishing hauling districts. Similarly, potential population growth should be considered. In some cases, demographics may come into play. In others, the existence of a particular collection challenge may guide the district boundaries – such as a cluster of high-density multi-family dwellings and/or alleys that require

smaller vehicles for collection. Possible factors to consider when establishing district boundaries include:

- **Geographic factors** (e.g., highways, water bodies, mountains, etc.). Geographic factors form the main division boundaries as they represent reductions in the flow of traffic or major collection disjoints. Split or four lane highways or rivers are often division boundaries.
- **Terrain or maneuverability** (wide/narrow streets, off-street parking, etc.). This aspect is very important in route development. Some collection vehicles may not be able to access certain areas and it is best to delineate routes such that one type of collection vehicle can be used for a complete, contiguous route.
- **Demographic factors** (e.g., set-out quantities, alley/curbside collection, income, housing density). Demographic factors are critical for weight loading. Some local governments field-check collection times as well as average weight per household. They might subsequently make adjustments to routes for streets that typically have more refuse. In addition, for denser housing areas, the total number of units per route may be increased because travel distance/time is lower.

Dense and hard-to-maneuver areas, such as alleys, must be considered, and should be delineated as a separate route if possible. Some communities have downtown improvement districts, for example, where smaller vehicles are used to access alley collections.

Alley assignments are critical to determine service levels and time of collection. Having this data is critical to avoid unnecessary overlap between routes. Alleys must also be considered in cold weather areas where snow is a factor. Servicing alleys requires a higher degree of cooperation with snow removal crews to reduce downtime related to snow events. Similar cooperation is needed for alleys that routinely have vegetation overgrowth in the summer, but this is usually easier to deal with compared to snow.

- **Location of service centers, disposal facilities and MRFs.** This is critical for determining the number of trips that could be completed in a day and the subsequent impact on cost of service.
- **High growth areas.** Some communities have high-growth areas and this type of information can usually be obtained from the local building or planning department. Some communities adjust routes periodically to “level them out” so that the number of households served in each district remains similar among districts. In Oklahoma City for example, residents located in the urban areas of the City receive additional services (yard waste collection and curbside recycling) yet pay less. Therefore, as subdivisions begin to develop on the edge of the rural/urban areas, residents request to be included in the urban boundaries in order to pay the reduced rate. In some communities, the number of households/customers per route is monitored/tracked, but not adjusted. This information is key, however, when it comes time to re-issue a request for proposals (RFP) or a request for bids (RFB) for the route.

- **Location of haulers' current customer base.** In some cases, haulers have a concentrated customer base in a specific part of a community. To the extent that this is the case, the local government may wish to consider that information in establishing collection districts.
- **Goals/vision for the community.** Oklahoma City decided to limit the number of haulers involved in providing service in their city. Although they requested bids for each service individually, having residents and City staff deal with different service providers in the same area could be confusing, so City officials ultimately did not feel that the relatively small cost savings justified complicating the system.

6.2.3 Deciding on the Customer Base

Whether to include commercial entities in a district may be decided by local or state law. Some communities have a special business district in downtown areas for garbage and/or recycling collection. In some cases, however, haulers have expressed that commercial service is unique from residential in that services can be specialized and with larger containers, routing efficiency is less of an issue (e.g., servicing compacting units and roll-off containers requires separate collection trips). Therefore, it is often argued that commercial services should be left to the open market. Some cities, however, have established special collection districts in downtown areas, in order to assure that service is provided on a timely basis (e.g., before morning traffic becomes an issue, to limit the number of collection vehicles in a typically congested area, and to make certain that unsightly bags are removed before business activity begins in the district) and to ensure that the hauler has the proper equipment to service the area. In many communities, small businesses can be included in the program, as long as the amount of garbage/recyclable materials fits in the containers provided.

6.2.4 Limiting the Number of Districts/Customers a Single Hauler Can Serve

If a single hauler provides service for all districts in a community, it is essentially analogous to having no districts. The benefits of having districts (ensuring long-term competition, providing opportunities for small haulers, etc.) are negated if that occurs. Therefore, many communities limit the number of service areas that a hauler can bid on, or that a hauler can service. Palm Beach County, for example, has 11 collection districts in its unincorporated areas. The County Solid Waste Authority limits the number of accounts any one hauler can serve to 55 percent of all accounts. In the past, the County had nine collection districts and no hauler could service more than three districts.

6.2.5 Deciding on a Process for Selecting the Hauler for Each District

In most cases, haulers bid on the collection district(s) they are interested in servicing. Even if a hauler has a strong presence in a particular district, the local government may open it up to bids, but often the existing hauler's bid is less costly because they are already familiar with the routes, have appropriate equipment for servicing the routes in the district, and in many cases have provided containers to the customers in the district.

In some cases a local government may work with the haulers to allocate specific districts for each hauler based on the current number of customers each hauler serves in the community. In some cities, the City crews service a certain area of the City, and bid out the remaining district(s). Some cities stipulate that the City must service at least a certain portion of the customer base. The City of Phoenix, for example, has a policy that City crews must service at least half of the customer base.

6.2.6 Including Concessions for Small Haulers

Allowing Consortium of Haulers to Bid on One or More Districts

In some cases, consortiums of small haulers have been allowed to effectively band together and act as one hauler in order to bid on providing service in a district. This allows smaller haulers to continue to operate, yet still provides many of the same benefits of having a single hauler (e.g., only one hauler serves a particular street, level of service is the same, etc.) The City of Minneapolis has approximately 107,000 households, and spans 54.9 square miles. The City is divided into two service districts – one of which is serviced by City crews, and the other by a private consortium of haulers. The private consortium, Minneapolis Refuse, Inc. (MRI), includes 15 companies. Waste Management and BFI (Allied Waste) comprise 30 percent of MRI, with 13 smaller haulers servicing the remainder of MRI's service area. Even though MRI provides collection services under contract to the City, residential solid waste collection services have not been bid competitively in more than 35 years. MRI has effectively renewed its contract so the City has not had to go through a competitive bid process. Minnesota law provides cities with an option whether or not to require competitive bids for services such as solid waste collection. When allowing a consortium of haulers to provide service, it must be explicitly established in the contract how service issues will be resolved (i.e., whether the resident calls the contractor or the City with questions related to service issues).

Creating Smaller or "Set Aside" Districts

An alternative to allowing consortiums of small haulers is to have "set-aside" districts comprised of fewer households in which smaller haulers could bid. In 2008, the Palm Beach County Solid Waste Authority increased the number of districts from nine to eleven, hoping to increase the pool of bidders and perhaps attracting smaller haulers that might not have the resources to service 40,000 to 50,000 customers. Two of the larger districts were therefore divided, resulting in eleven districts. The result was the

addition of one hauler that was new to the area. When the City of Pittsburgh engaged in managed competition in 2005, they allowed haulers to bid on the entire southern district, or a portion of the district. The reason they allowed haulers to bid on a portion was an attempt to attract smaller haulers. No small haulers submitted bids, however.

Limiting the Number of Districts in which a Hauler Can Bid

Limiting the number of districts that a single hauler can bid on, which is described above, is one strategy that often protects small haulers.

Limiting/Waiving Bonding Requirements

Some communities limit or waive bonding requirements for haulers or small haulers in order that the bonding requirements are not cost-prohibitive for them.

6.2.7 Managed Competition

Managed competition is when the local government competes to provide service in one or more collection districts. The benefit of managed competition is that it can allow a municipality with an existing staff and equipment to continue to operate, or to become involved in the marketplace if they feel there is not a significant level of competition in their area. Having the local government compete with private service providers also forces the local government to look closely at expenditures and revenues, and operate in a cost-efficient manner, like a business. In 2005 the City of Pittsburgh successfully bid on providing collection of garbage and recyclable materials in a district in the city (details provided below). In some cases, a city's collection staff might bid on services in a different community. For example, the City of Pittsburgh's collection department won the bid to collect recyclable materials in nearby Wilkesburg Borough. The initial one-year term, which commenced on January 1, 2007, was extended through the end of 2010.

6.3 Implementation Requirements

When collection service districts are implemented, there are several steps the local government must undertake. They will most likely dovetail with the implementation requirements for implementing contracted or franchised collection, which are provided in Issue Paper #5 on Franchising Collection Services. Steps to implement multi-district collection include:

- 1) Research all state and local laws pertaining to privatizing collection and establishing districts.
- 2) Solicit stakeholder involvement.
- 3) Consider goals/current level of competition in the area.
- 4) Establish district boundaries.
- 5) Consider the local government's goals relative to local marketplace.

- 6) Develop and issue an RFP/RFB (assuming competition) or allocate districts.
- 7) Monitor services.

Each of these steps is described in more detail below.

Understand and Ensure Compliance with State and Local Laws

As described in Issue Paper #5, state and local laws can have an impact on a local government's ability to privatize collection, as well as for dividing the community into districts. In Florida, for example, the Unfair Competition Act stipulates that communities must give haulers at least three years' notification if they make such a change in collection districts/service providers, or the local government may be required to compensate the haulers. In Missouri, there is a state law that stipulates that if a local government is to divide the community into collection districts, it must pass a public vote in all districts. Some municipalities have ordinances that state that the city must provide service to at least a portion of the community. In Minneapolis, for example, an ordinance stipulates that City crews must provide collection services for at least fifty percent of the City's households.

In the state of New York, it appears that Towns and Counties may form solid waste disposal districts, pursuant to County Law § 250 et. Seq. Prior to the formation of a solid waste district, County Law § 256 requires the submission of evidence supporting the formation of such a district. Such evidence must be filed with the county's board of supervisors. After due consideration and making a finding that the applicable statutory guidelines have been followed, the county board may adopt a resolution approving the establishment of a solid waste district, subject to a permissive referendum pursuant to County Law § 256.

Upon approval of the resolution via referendum, the jurisdiction must submit an application to the State Department of Audit and Control for permission to establish the district, pursuant to County Law § 258. If the State Comptroller grants permission, the board may adopt an order establishing the district. The order must be recorded in the office of the county clerk and filed with the State Department of Audit and Control. Any interested party aggrieved by the final determination or order establishing the district may apply, within 30 days of recording the order, for review of all the final determinations made by the board in connection with the establishment of the district.¹

It appears that case law supports the fact that a municipality may create a solid waste district and grant a private company an exclusive license to collect the garbage, both commercial and residential, within the district.

¹ Per Memorandum to Josh J. Meyer, Esq. from William A. Lawrence, Esq., of Pannone Lopes Devereaux & West LLC, New York, NY of March 12, 2009.

Solicit Stakeholder Involvement

It is important to gain stakeholder involvement from the very start of the process. If both the public and the collection haulers are not involved early on, implementation of organized collection and districts can be made more challenging. Additionally, haulers and customers may have some valuable insights into the logic behind boundaries. Also, there may be certain areas where some haulers have concentrated strongholds, which could make dividing the community into districts less disruptive.

Consider Needs/Goals of the Local Government Relative to Local Marketplace

As described above, establishing the number of districts, district boundaries, and services to be provided by the haulers is based on local government goals, community resources, and market factors such as the level of competition in the area, ability of haulers to provide desired services, etc. Identifying these goals, enumerating the municipality's priorities, and gaining an understanding of market factors will help the local government establish district boundaries and develop contract/franchise requirements.

Establish Districts

Establishing districts will help provide the geographic framework and customer base upon which haulers will bid on services. To the extent possible, it is important that the local government provide household/customer counts in each district, as well as indicate the types of households (multi-family, single-family, etc.). As mentioned above, the local government should also consider natural and man-made boundaries when establishing districts and gather feedback from stakeholders. Another consideration is special equipment requirements for particular districts.

Issue RFP/Begin Procurement Process (or Assign Districts)

Assuming the local government is undertaking a competitive process to initiate service in the district areas, an RFP/RFB will need to be developed and issued. These steps, which are described in depth in Issue Paper #5, include:

- 1) Establishing a procurement team;
- 2) Developing a timeline;
- 3) Precisely defining the services to be provided (in each district);
- 4) Determining the service provider pool and market position (which has also been considered previously, in defining the number of districts);
- 5) Preparing a detailed, unambiguous RFP/RFB;
- 6) Utilizing a fair and transparent selection process to select a hauler for each district;
- 7) Negotiating a partnership-oriented collection contract/franchise agreement with each hauler; and
- 8) Ongoing contract administration/monitoring with a partnership approach.

If the local government is not allocating districts through a competitive process, but instead is allocating based on current market share, then this will involve reviewing customer records to determine number and type of customers in the community serviced by each hauler. In this case, the local government generally negotiates with each hauler for pricing. When considering pricing, it is important to take into account not only the number of customers, but also the impediments to collection, the distance to the disposal site(s) and MRF, and costs associated with transitioning service to a new hauler, as appropriate.

Monitor Services

Managing collection operations with the haulers is considered to be part of the collection contract however, it is also important to manage the district boundaries themselves. As areas grow in population or become more dense, it might make sense to reallocate the customer base into additional districts. Similarly, it is important to keep abreast of the changing marketplace. Districts might change in the future based on increasing or decreasing numbers of haulers, changing technology, etc.

6.4 Capital and Operating Expenses

Establishing districts in a community is not expected to require increased capital costs, unless the local government is competing (under a managed competition scenario) to service one or more districts. In that case, the local government may have to spend resources on collection equipment and/or containers.

However, establishing collection districts is expected to require staff time in terms of conducting the implementation steps described above. Also, there would be some additional education and outreach (such as creating and distributing district maps), and more haulers to maintain relationships with, communicate concerns to, and monitor, as opposed to a single-hauler system. If the same level of service is provided in all districts, these impacts can be minimized.

If establishing districts is done in concert with establishing new exclusive franchise agreements, then the local government would likely receive franchise fees from the franchised haulers. These fees are described in Issue Paper #5.

6.5 Education Tactics

When recycling and/or garbage services are organized, to the extent that the services are identical throughout the community, education and outreach can be somewhat simplified. Information that should be conveyed to customers on a regular basis include:

- What materials are accepted in the recycling program;
- How recyclable materials are to be prepared;
- The frequency of garbage and recycling collection;

- The types of containers provided; and
- Who to contact for more information and/or service issues.

When multiple districts are established, keeping service levels the same throughout the municipality will help ensure that education and outreach materials will be relevant throughout the entire community. If that is not possible, perhaps due to special collection constraints in some areas, additional outreach materials will need to be developed for those districts.

In addition, it is critical that customers understand which district they are in, and what their district's collection schedule is, as well as who their hauler is, and how to contact the hauler (or municipality) if there is a service issue. Therefore, the local government should ensure that clear, easy-to-understand district maps are available online and mailed to residents at least annually. In addition, collection schedules should be available online and mailed to residents at least annually. It must be made clear which hauler is responsible for providing collection service in each district, and a contact number should be provided.

6.6 Diversion Potential

Organizing collection through a contract or franchise agreement, as described in Issue Paper #5, can increase diversion of targeted recyclable materials to the extent that organized collection may result in higher levels of participation in (and greater access to) recycling programs, especially in unincorporated areas of a community. Dividing a more urban community into districts may not have as much of an impact on the amount of material diverted from disposal.

Because collection districts tend to result in more consistent and standardized services, it allows the local government to provide targeted, specific, and branded outreach and education strategies, which can improve participation in recycling programs.

6.7 Case Studies

Provided below are three case studies regarding communities that organized the collection of their garbage and/or recyclable materials. While it is more common for larger communities to implement collection districts (because the haulers benefit from the increased economies of scale by having large districts), smaller communities may set up districts to ensure all haulers (especially small or independent haulers) have an opportunity to compete. In the case studies provided, the communities range in population size from 110,000 to 547,000. Per the U.S. Census Bureau, the estimated population of Broome County in 2008 was 195,018.

6.7.1 Town of Smithtown, New York

Smithtown, New York, is a community on Long Island (Suffolk County) with a population of 110,000 and approximately 40,000 households. The town's total area is

about 111 square miles, with land area of 54 square miles. The Town privatized the collection of garbage and recycling in the early 1990's. Prior to that, the Town used a subscription method in which residents hired their own haulers directly. Only residential properties are included in the program. Residential service is comprised of twice weekly collection of garbage and weekly collection of recyclable materials. There are 12 collection districts. In six districts, garbage collection is on Mondays and Thursdays, and in the other six districts, collection of garbage is provided on Tuesdays and Fridays. Collection of recyclables is every Wednesday throughout the Town, with paper and mixed containers being collected on alternate weeks. The garbage is delivered to the Hempstead Resource Recovery Facility (residents and businesses pay a waste generation fee to cover the cost of garbage disposal at this facility) and recyclable materials are delivered to the Town's MRF. Residents also receive bulky waste collection and yard waste collection which are provided by Town crews.

The Town's solid waste coordinator indicates that the town privatized collection in order to save costs. This benefit has been realized. The Town decided to use districts in order to not "have all their eggs in one basket" by having one hauler service the entire Town, and also to ensure that a monopoly situation did not ensue (e.g., protect long-term competition). The Town re-bids the districts every seven years. Currently they are about half-way through their seven-year term (contracts began in 2007). There are four haulers servicing the twelve districts. They include:

- Garofalo (servicing districts 1, 3, 4 and 7);
- Jody Enterprises (Servicing districts 5, 6, 8 and 9);
- Brothers (servicing districts 2 and 10); and
- Dejana (servicing districts 11 and 12).

Interestingly, in 2007 the Town required haulers bidding on collection districts to use vehicles powered by compressed natural gas.

The Town's solid waste coordinator is satisfied with the system Smithtown uses for garbage and recycling collection. He does not believe that customers' receiving different levels of service has been an issue, as all residents pay the same price for service, and all residents receive the same level of service. The Town mails residents a collection schedule and district map annually, and they are also available on the Town's web site. If a customer has an issue with a hauler, the customer contacts the hauler directly. However, if they do not receive satisfaction, the Town will step in. Residents pay the same rate, however the rate the town pays each hauler is dependent upon the bid price, and in general depends upon the complexity of the collection route.

6.7.2 City of Pittsburgh, Pennsylvania

The City of Pittsburgh (population 334,563) has 143,739 households. The City covers 55.6 square miles on very hilly terrain. The older neighborhoods tend to have fairly narrow, congested streets with limited off-street parking. The City of Pittsburgh provides weekly residential collection of garbage, bi-weekly collection of recyclable materials, and monthly collection of bulky items (weekly in the managed competition

area). Garbage is collected using a manual process. Recyclables are collected manually via a dual-stream system. Residents are required to recycle, via ordinance. Residential collection is provided to single-family homes and small apartments (five units or less).

The City is organized into four collection divisions to geographically cluster the service delivery by east, west, north and south areas. The number of collection units (households and public building stops) in each division is shown in Table 6-1.

Table 6-1
Number of Collection Units by Division,
City of Pittsburgh, PA

Collection Division	Number of Units
Central	25,500
Southern	31,972
Eastern	29,675
Northern	27,900

City crews have been collecting in all divisions since the inception of garbage collection. In the case of Pittsburgh, the divisions were established to bid out *disposal* services, more so than *collection* services. Currently the waste from two districts is delivered to a Waste Management disposal facility to the east, and the waste from the other two districts is delivered to a disposal facility to the west owned by Allied Waste.

In the fall of 2005, the City was forced to conduct a managed competition process on its solid waste and recycling collection services. The City of Pittsburgh is under the jurisdiction of “Act 47,” which is a Pennsylvania law that applies to municipalities that experience certain financial difficulties. It establishes a mechanism to create a supervised financial recovery plan. Part of Pittsburgh’s recovery plan has been to use managed competition as a process to reduce the costs of providing various types of services. Solid waste collection was one of those services identified to be subject to the managed competition process.

All four collection divisions are still served by City crews; only one district was put up for competition.

The managed competition was established to be a sealed proposal RFP process. The City engaged a consultant to assist in the development of the RFP process, and to assist in the evaluation of the proposals received. In addition, the City engaged a separate consultant (R. W. Beck) to independently work with the employees of the Pittsburgh Bureau of Environmental Services to evaluate and improve the in-house collection operations and to prepare their proposal. The entire process was overseen by the Act 47 Committee.

In the fall of 2005, the City issued an RFP for waste-related collection services, including the weekly collection of garbage, bi-weekly collection of recyclables, and the monthly collection of bulky items. The area of service included two options:

- Entire Southern Division (31,972 collection units - approximately one quarter of the City); and
- Portion of Southern Division (11,501 collection units - contiguous routes representing approximately 10 percent of the City's households).

The RFP called for proposals and pricing based alternatively on three- and five-year anticipated contract terms.

Three proposals were received from the City of Pittsburgh, Allied Waste, Inc. and Waste Management, Inc. The City's proposal was selected as the lowest and best. For example, in the entire Southern Division option, and assuming the three year contract term, the City's proposal was approximately \$1 million per year lower (or 8 to 10 percent lower) than the private haulers' proposals. Furthermore, the City proposed an alternative four-day-per-week collection schedule that could achieve approximately \$345,000 in additional savings and enable the City to increase the frequency of bulky goods collection from monthly to weekly.

The City's cost-savings proposal resulted in the City retaining the provision of services within the entire Southern Division. The City's costs are scrutinized closely to ensure that services are provided at the costs that were bid by the City. The cost savings measures have been implemented and are tracked for all collection divisions in the City. The City has actually increased the number of crew members per route from two to three, resulting in the ability to increase the number of stops per route by 35 percent, and decreased injury rates and worker's compensation costs. The City does not plan on doing another managed competition, however continues to scrutinize their costs and act more like a private business.

6.7.3 Oklahoma City, Oklahoma

Oklahoma City, Oklahoma spans a large geographic area of 621 square miles and has a population of about 547,274 (2007 estimate, U.S. Census). The City has both urban and rural areas. Residents in the urban area receive weekly collection of solid waste as well as monthly collection of bulk waste, provided by either City crews (eastern district, which is comprised of approximately 60,000 customers) or the contracted hauler, Waste Management (western district, which is comprised of approximately 91,000 customers). Waste Management provides curbside recycling, under contract, for the entire urban area of the City. The rural areas of the City are served by Waste Management, under contract, and receive only weekly garbage collection (no recycling) and monthly collection of bulky items. Collection of garbage throughout the City is automated – residents and small businesses can receive up to three “Big Blue” carts. Within the urban areas, however, crews will collect up to two bags if the carts are full. Additional bags are not collected in the rural areas. Recycling is collected commingled (or single-stream), using a “Small Blue” cart. The City provides service, either directly or indirectly, to single-family residents (up to three

units per dwelling) and small businesses. Larger businesses choose their own hauler, via subscription service.

City crews provided collection of refuse within the entire urban area of the City until 1979. At that time, the City decided to contract out a portion of the city's services, in order to provide "competition" for city crews. Although the City did not implement managed competition, having a private hauler compete to provide service for a portion of the City's households forced the City to ensure that their service was provided in an efficient manner – essentially acting more like a business, as the costs of city services are compared to those provided by the private sector. The City decided they wanted to maintain some equipment and crews, in order to ensure that they have access to collection equipment in the case of a natural disaster or some other emergency. If such a situation arose, they did not want to be completely dependent upon a contracted hauler.

In 1994, the City expanded the collection area to include the rural areas of the City (for garbage collection) and added curbside recycling to the urban area's services.

The City does not make concessions for smaller haulers and notes that when services began in the rural areas in 1994, small haulers were irate. Eventually a court order demanded that the City provide collection services in the rural section of the City. However, small haulers were successful in seeing that a state law was passed requiring municipalities to buy out existing contracts if they organized collection (or expanded the area into which they organized collection) in the future.

The City had an opportunity to save a relatively small sum of money by having one hauler collect garbage and a different hauler collect recyclables, however they decided to keep the system somewhat simple by having one hauler provide all services in each district.

6.8 Addressing Stakeholder Concerns

Stakeholders, including customers and haulers, may have concerns about switching to a multiple-district collection program. These potential issues and guidance on how to address them are provided below.

6.8.1 Impacts on Changes in Collection Days

If a local government transitions to a district collection system, it may involve switching customers' collection days, and possibly their hauler. It is important to inform residents well in advance of any changes in collection days and/or haulers. However, residents are usually not welcoming of change, and the local government should ensure that information, such as district boundaries, collection schedules, who to contact for a cart/bin, and who to contact for customer service issues is made known to the customers well in advance, and is also available (and easy to find) on the community's web site.

6.8.2 Lack of Ability to Select Own Hauler

For communities that are considering a switch from an open system to a districted system and contracting or franchising with a single hauler for each district, the customers will no longer have the ability to select their own hauler. The best approach for mitigating negative stakeholder feedback is keeping stakeholders involved in the process from the beginning, and explaining to them the benefits of having one hauler service each district. The benefits, which mirror the benefits of contracting/franchising with a single hauler for the entire municipality include:

- Reduced traffic on streets, which minimizes wear and tear and pollution, and increases safety;
- Improved neighborhood aesthetics due to the entire street being serviced by the same hauler with the same collection schedule – thus limiting the number of days that carts/bags/bins are on the side of the road; and
- Increased collection efficiencies, which often result in increased levels of service and/or decreased fees for service.

In addition, the local government can do their best to ensure that all levels of service and pricing are identical throughout the community by being specific in their requests for bids or proposals, and keeping all prices the same throughout the community. If the contract is written well and enforced properly, the likelihood of services being identical throughout the community are enhanced.

6.8.3 Equity Concerns on the Part of Haulers

Haulers may be concerned that they would lose a share of their customer base or face an inequitable situation if the local government transitions to a multiple-district system. Some ways of mitigating these fears include:

- Ensure that there are ample numbers of districts such that each hauler has at least a chance to win one or two districts (e.g., if there are three haulers servicing the area, divide the community into at least three districts, not two); and
- If going from an open “subscription” system to a multiple-district system in which each hauler has a contract or an exclusive franchise, consider bypassing a bid system, and instead providing each hauler with a district that provides an equal customer base as their current level. Having the same number of customers, but located in a contiguous area, provides the hauler with enhanced efficiencies that reduce the hauler’s costs. In addition, the hauler no longer needs to advertise in that community for customers. This is how Portland, Oregon transitioned from an open system to a franchised system in 1992. They have 28 exclusive franchised districts for garbage collection. However, not all of the haulers offer recycling service, so the City created two recycling districts. If a franchised garbage hauler does not offer recycling, that district is assigned to one of the two recycling collection districts.

6.9 Benefits and Drawbacks of Collection Districts

The potential benefits and drawbacks of collection districts are summarized below.

6.9.1 Benefits

- Allows for more haulers to service a community, rather than an exclusive franchise or contract with one hauler serving the entire community, thus enhancing the likelihood of long-term competition. From the haulers' perspective, this approach can minimize the potential negative impacts resulting from organized collection (e.g., loss of business altogether).
- Can allow small haulers or haulers with specialized equipment to bid on certain districts that they are particularly well-suited to serve, as opposed to a single-hauler system.
- To the extent that collection districts are replacing an "open" system, many of the benefits associated with having an exclusive franchise or contracted hauler also apply (as provided in Issue Paper #5). They include:
 - Fewer collection vehicles on the street, resulting in less wear-and-tear on roads, reduced pollution, and enhanced safety;
 - Improved neighborhood aesthetics;
 - Improved collection efficiency, which often results in reduced costs to customers and/or increased levels of service;
 - Potential for more consistent and standard services. Collection districts can allow for more targeted, specific, and branded outreach and education strategies, which can also improve participation in recycling programs.
 - Collection districts for the unincorporated areas of the County could increase access to curbside recycling, thus increasing tons of materials recycled and decrease tons delivered to the Broome County Landfill (Landfill) for disposal, extending the life of the Landfill.
 - The County would have more control over the collection program, and therefore would be able to make changes to the program relatively easily. Changes might be in response to materials generated, collection or processing technology, recyclable materials markets, etc.
 - By having only one hauler serving a geographic area, the County would find it easier to enforce and audit the program. When multiple haulers serve an area, it can be difficult to pinpoint which hauler is in violation of specific ordinance provisions, for example, not collecting separated recyclables or allowing litter to blow out of the back of the collection vehicles.
 - Collection districts could result in improved reporting regarding tonnage diverted, participation in recycling programs, etc.

- Collection districts make it more likely that some of the costs associated with collecting recyclables can be offset, at least partially, with solid waste collection fees.
- Provides the opportunity for municipal or county crews to compete to provide service. The City of Oklahoma City indicates that bidding out just half of the City’s urban area (and continuing to provide service with City crews in the other half) resulted in the City collection department having a sense of competition and thus enhanced efficiency, as cost comparisons are made regarding the services provided by the two different service providers (City crews vs. contracted hauler).

6.9.2 Drawbacks

- Local government must manage multiple contracts and multiple service providers and generally become more involved in the process of solid waste and recycling collection. This could include estimating the number of districts, determining district boundaries, the development of an RFP/RFB, review of bids, selection of haulers, development of contracts, monitoring of service (to ensure that levels of service are uniform between districts), billing for service, customer service, and auditing performance. The degree of involvement can vary considerably, particularly with respect to billing and customer service.
- Customer service issues can be challenging from both the customer perspective, and in terms of the local government identifying and addressing issues of non-compliance.
- The local government may see a need to monitor/adjust the size of each district from time-to-time, which can complicate the system.
- Education and outreach can be more challenging, particularly if levels of service or collection technologies differ from district to district.
- With collection districts, residents are not able to select their own hauler, which would be unacceptable to some residents.
- If participation in the program were mandatory, some residents might argue that the program is too costly, and might prefer to “self-haul” waste and recyclable materials to the Landfill/drop-off site. There are communities that have successfully allowed for this to occur through an “opt out” provision.
- There is the possibility that small haulers might not be able to compete with larger haulers to serve a large geographic area. It should be noted, however, that some communities have allowed small haulers to form consortiums that bid, as a single entity, on service for a specific hauling district or on an entire geographic region.
- The threat of litigation is possible from haulers who currently collect garbage and recycling from residents on a subscription basis, and through the bid process, may not win any districts, or end up with fewer accounts.

6.10 Resources

- The Allegheny Institute for Public Policy, “Can the City of Pittsburgh Really Compete with the Private Sector,” July 2008.
http://www.alleghenyinstitute.org/reports/08_02.pdf
- Oklahoma City, Oklahoma. Conversation with Charles Lombardy, City Field Operations Supervisor Coordinator, (405) 682-7038.
<http://www.okc.gov/trash/index.html>
- Palm Beach County, Florida. Conversation with Joe Howard, Assistant Field Service Manager, (540) 640-4000.
http://www.swa.org/site/about_swa_b.htm.
- Pittsburgh, Pennsylvania. Conversation with Leonard Huggins, Program Supervisor, (412) 255-2790.
http://www.city.pittsburgh.pa.us/pw/html/environmental_services.html.
- Ramsey County, Minnesota’s summary of Portland, Oregon’s system.
http://www.co.ramsey.mn.us/NR/rdonlyres/E18683EE-5B1F-4CB7-B64C-613DA4D888DF/5541/PC_Portland.pdf
- Town of Smithtown, New York. Conversation with Michael Engelmann, Town Solid Waste Coordinator, (631) 360-7514.
<http://www.smithtowninfo.com/templateproc.cfm?PageID=246>.

Issue Paper #7

Household Hazardous Waste and Electronics Recycling

7.1 Overview

7.1.1 Household Hazardous Waste

Household hazardous waste (HHW) typically makes up a small portion of the municipal solid waste (MSW) stream by volume (less than 1%),¹ however HHW contains potentially hazardous ingredients that warrant their diversion from landfills, transfer stations, waste-to-energy facilities, water supplies, etc. Collection programs for these materials play an important role in the integrated solid waste management systems of communities throughout the country.

HHW includes household products that contain corrosive, toxic, flammable, or reactive ingredients such as, but not limited to: cleaners, pool chemicals, herbicides, pesticides, automotive supplies, paints, stains, glue, batteries, fluorescent bulbs, mercury thermometers, etc.

Broome County hosted annual HHW collection events for residents prior to the County opening a permanent HHW collection facility (Facility) in March of 1996. The Facility, located at the Broome County Landfill (Landfill), is open three days per month (on average) from 7:30 a.m. to 11:30 a.m. Residents from both Broome and Tioga Counties may drop-off HHW materials for free without an appointment on the scheduled dates. The County has an inter-municipal agreement with Tioga County. The County charges Tioga County \$400 per month to manage/operate the program, plus \$0.75 per pound for all HHW and electronic waste collected from Tioga residents.

The County contracts with a hazardous waste management and disposal/recycling company for the packaging, transport and disposal of the HHW. County staff does some processing of waste such as bulking latex and oil-based paints into 55-gallon drums. (The latex paint is solidified and landfilled.) The County has several hazardous materials storage lockers to contain the materials until there is enough for a full truckload, at which time the contracted vendor is called to service the Facility.

Materials not accepted in the County's program include radioactive materials, smoke detectors, medical or infectious waste, explosives, and compressed gas cylinders.

¹ Source: Waste Age/Recycling Times' Recycling Handbook by John Aquino, 1995.

Commercial hazardous waste is accepted at the County's Facility for a fee and by appointment only, from small businesses in Broome and Tioga Counties that have gone through a permit process and have registered with the County. Eligible businesses are those that produce less than 220 pounds of hazardous waste, and less than 2.2 pounds of acutely hazardous waste per month. These businesses are considered conditionally exempt small quantity generators (CESQGs).

7.1.2 Electronic Waste

Used electronics or "e-waste" includes discarded computers, cell phones, televisions and other electronic products. Those with cathode ray tubes (CRTs), such as color computer monitors and televisions, are considered hazardous when discarded because of the presence of lead in the CRT. Televisions and computer monitors contain, on average, four pounds of lead (the exact amount depends on size and make).² Lead is not considered an environmental problem while the monitor or television is intact; however the lead can leach when compacted or broken and create an environmental hazard.

In addition to lead, electronics can contain chromium, cadmium, mercury, beryllium, nickel, zinc, and flame retardants. When electronics are not disposed of or recycled properly, these toxic materials can present environmental threats. Based on studies conducted by the United States Environmental Protection Agency (EPA), the CRTs and LCDs are likely to fail the Toxicity Characteristic Leaching Procedure (TCLP) test for heavy metals.

The EPA estimates that consumer electronics make up only 2% of the MSW stream, however the quantities of these materials being disposed has been steadily increasing for the past decade.³

The County accepts certain electronics from residents at its HHW Facility including computers, monitors, printers, laptops, keyboards, radios, stereos, modems, televisions, VCRs, fax machines, mobile phones and pagers. There is a limit of three televisions and three monitors per resident, per visit. The County also accepts e-waste from small businesses that have gone through the permit process and have registered with the County. Businesses are charged \$0.75 per pound for electronic waste.

In addition to the permanent Facility disposal option for e-waste, the County also provides e-waste collection events throughout the year. In 2007, the County held seven collection events and in 2008, the County held six events throughout the County. The events are free to residents, no business waste is accepted, and small household appliances are not accepted (e.g., telephones, answering machines, vacuum cleaners, etc.). The County collects and prepares the e-waste for transport and then it is picked up at the HHW Facility by Eco International, based in Vestal, New York (located in Broome County) for recycling and proper disposal.

² Source: "Electronics: A New Opportunity for Waste Prevention, Reuse, and Recycling," EPA, 2001. http://www.epa.gov/osw/conserve/downloads/elec_fs.pdf

³ Source: EPA website. <http://www.epa.gov/epawaste/conserve/materials/ecycling/manage.htm>

7.2 Rules and Regulations

7.2.1 Federal Requirements

7.2.1.1 HHW

Hazardous waste is regulated under the federal Resource Conservation and Recovery Act (RCRA), Subtitle C. Per this federal law, hazardous waste exhibits at least one of four characteristics – ignitability, corrosivity, reactivity, or toxicity. Household-generated hazardous waste (such as automotive products, cleaners, pesticides, herbicides, paints and solvents), is exempt under RCRA rules of the Code of Federal Regulations (40 CFR Part 261.4)⁴.

Also exempt under the Federal rules are conditionally exempt small quantity generators. CESQGs are small businesses that generate 100 kilograms or less (approximately 220 pounds or 25 gallons) of hazardous waste per month.

The federal Universal Waste regulations (40CFR Part 273) streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (e.g., thermostats) and lamps (e.g., fluorescent bulbs). The rule is designed to reduce hazardous waste in the MSW stream by making it easier for universal waste handlers to collect these items for recycling or proper disposal.

7.2.1.2 Electronics

Currently there are no Federal laws regarding recycling of e-waste. However, used CRTs exported for recycling must comply with requirements that are specified in 40 CFR 261.39(a)(5).⁵ Exporters must notify the EPA and receive written consent from the receiving country before shipments can be made.

In August 2005, the EPA made a ruling that added mercury-containing equipment (e.g., thermostats, barometers, mercury switches, etc.) to the federal list of Universal Waste.⁶ In July 2006, the EPA amended its regulations to include CRTs as Universal Waste.⁷ Under these regulations, used, unbroken CRTs are not regulated as hazardous waste unless they are stored for more than a year. The EPA set these more manageable standards for unbroken CRTs because “the risk of lead releases from them is very low. Since the risk is so low, the storage limitation on unbroken CRTs applies only to collectors or recyclers.”⁸

⁴ Source: Electronic Code of Federal Regulations. http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=4990e762d7b81851bef18f82dc851826;rgn=div5;view=text;node=40%3A25.0.1.1.2;idn_o=40;cc=ecfr#40:25.0.1.1.2.1.1.4

⁵ Source: EPA website. <http://www.epa.gov/epawaste/hazard/recycling/electron/index.htm>

⁶ Source: Federal Register, August 5, 2005. <http://www.epa.gov/fedrgstr/EPA-WASTE/2005/August/Day-05/f15437.pdf>

⁷ Source: Federal Register, July 2006. <http://www.epa.gov/epawaste/hazard/recycling/electron/crt-final.pdf>

⁸ Source: EPA Fact Sheet: Easier Recycling of Cathode Ray Tubes. <http://www.epa.gov/epawaste/hazard/recycling/electron/crt-fs06.htm>

7.2.2 State Requirements

7.2.2.1 HHW

The New York State Department of Environmental Conservation (NYSDEC) adopted the EPA's 1999 rule that added hazardous waste lamps to the Universal Waste Rule. This includes fluorescent, high-intensity discharge (HID), neon, mercury vapor, high pressure sodium, and metal halide lamps. The NYSDEC lists these materials as Special Wastes and requires special handling procedures and disposal methods to protect human health and the environment.⁹

In July 2004, New York passed a law that bans the sale of mercury-added novelty products and mercury-ferver thermometers in the state. Disposal of these products (thermostats, thermometers, switches, medical and scientific instruments, lamps and batteries, excluding button batteries) is not allowed in the regular garbage, but must be managed separately by a recycling facility, an authorized hazardous waste facility, or at a municipally-sponsored HHW collection program.

7.2.2.2 Electronics

Many states have instituted mandatory electronics recovery, recycling or producer take-back programs. New York has only mandated that all wireless telephone service providers that offer phones for sale must accept cell phones for reuse or recycling under the New York State Wireless Recycling Act that went into effect January 1, 2007.¹⁰

The City of New York passed a producer responsibility law in April of 2008 which requires manufacturers to submit plans for collection, transportation and recycling of computers, monitors, printers and televisions. Recycling programs must be implemented by July 1, 2009, or when specified in final Department of Sanitation (DSNY) regulation.¹¹ Effective July 1, 2010, it will be illegal for any person in New York City to discard any covered electronic equipment as trash.¹²

The NYSDEC offers guidance for handling used electronic equipment.¹³ Because some electronics contain hazardous materials, including mercury, they must be handled as hazardous waste. The NYSDEC is in the process of developing proposed rulemaking for used electronic equipment. The plan is to amend current regulations in an effort to streamline the management of used electronics so that collection and recycling becomes safer and more efficient.

⁹ Source: NYSDEC website. <http://www.dec.ny.gov/chemical/8787.html>

¹⁰ Source: NYSDEC website. <http://www.dec.ny.gov/chemical/8818.html>

¹¹ Source: National Electronics Recycling Infrastructure Clearinghouse website. <http://www.ecyclingresource.org/ContentPage.aspx?Pageid=28&ParentID=0>

¹² Source: New York City website. http://www.nyc.gov/html/nycwasteless/html/in_business/electroniclaw_reqs.shtml#whats_accepted

¹³ Source: NYSDEC website. <http://www.dec.ny.gov/chemical/8788.html>

7.3 HHW Program Expansion Considerations

Program parameters to consider when evaluating the County's HHW program include:

- Program Convenience;
- Participation Rates;
- Quantity and Types of Materials Collected/Managed; and
- Scope of Services Offered.

Each of these program parameters, and its application to Broome County, is discussed in detail below.

7.3.1 Program Convenience

Currently, the County's HHW Facility is open three days per month (on average) from 7:30 to 11:30 a.m. From R. W. Beck's research and experience with other HHW programs, most municipally-owned HHW permanent facilities in other parts of the country have more accessible hours and are open several days per week. From R. W. Beck's interviews with Broome County stakeholders in July of 2008, one suggestion for improving the program was to expand the hours of the HHW Facility so that it is open more hours and/or more days per month.

By extending the hours/days of operation, the County would most likely collect increased quantities of HHW materials. Depending on the details of the agreement with the contracted vendor, it is possible the County could benefit from increased economies of scale by collecting more materials.

Other collection options that the County may want to consider, in an effort to increase convenience to residents, include:

- Satellite collection system;
- Mobile collection unit;
- Curbside collection; and
- Other alternative options.

Each of these collection options is discussed in detail below.

7.3.1.1 Satellite Collection System

Satellite HHW collection facilities are designed to support a permanent processing site. Satellite facilities serve as permanent drop-off locations for program participants that typically would not travel the distance to deliver HHW materials to the central or main facility. To provide a full service program, the same HHW materials that are accepted at the permanent site should be collected at the satellite facilities. HHW materials are regularly collected from the satellites and transported to the "hub" permanent facility where materials are sorted, bulked and lab packed for recycling or disposal, or the site may be serviced directly by a hazardous materials vendor.

Depending on the needs and the budget of the County, a satellite facility could be as basic as a seasonal, open-air collection site with a hazardous materials storage locker (as shown in Figure 7-1), or it could include a fully enclosed building designed to be open year-round.



Figure 7-1. Satellite HHW Facility, Sarasota County, Florida

A year-round satellite facility design might include:

- A pre-engineered metal building to house a small office, a product exchange or re-use room, a mechanical room, and one unisex bathroom;
- A metal canopy attached to the building to cover two drive-through lanes of traffic and provide shelter for staff while they unload HHW materials from the vehicles;
- Adequate parking for up to four vehicles at one time for staff persons working at the facility; and
- A pre-engineered hazardous materials storage locker, enclosed with a chain-link fence and gate. The entire satellite facility property should also be surrounded by a chain-link fence that can be locked.

The County may also consider using an existing County-owned facility as an HHW (and electronics) collection facility. The size of the facility would determine if it would strictly be used as a collection and storage site or if any preliminary processing could be done on-site (such as bulking oil-based paints into 55-gallon drums). At least one hazardous materials storage locker (see Figure 7-2) would be required to store the waste. The storage locker would require electricity and most likely require a concrete slab be poured for its placement. The storage locker should be enclosed with a chain-link fence for safety reasons, as should the entire facility if possible. This may deter, but probably not eliminate, illegal dumping of HHW and electronics at the site.



Figure 7-2. Hazardous Materials Storage Locker

Limited hours of operation would be preferable when operating a satellite program, keeping staffing costs to a minimum. County staff operating the facility would need to be trained under the Occupational Safety and Health Administration's (OSHA) guidelines, including 40 hours of Hazardous Waste Operations and Emergency Response (HAZWOPER) training, and/or other requirements as determined by the State of New York.

The County could either transport the HHW materials to its permanent Facility or the County's contracted vendor could be scheduled for quarterly, semi-annual, or on-call collections to package, transport, and dispose and/or recycle the HHW and electronics materials.

The County would need to review local zoning ordinances to ensure this type of use would be allowable in a building/location chosen by the County. Depending on the facility, the County may also be required to apply for a solid waste management facility permit.

From R. W. Beck's stakeholder interviews, it was recommended that the County allow municipalities to collect HHW from their residents and then allow the municipality to bring consolidated loads to the HHW Facility. The County may consider working with one or more municipalities to provide satellite HHW collection sites. However, the County would need to provide guidance to the municipality(ies) wishing to establish a satellite collection site and assist in coordinating collection activities.

7.3.1.2 Mobile Collection Unit

In addition to its permanent HHW collection Facility, the County could also consider providing mobile collection events for communities located beyond a defined distance or radius from the permanent Facility located at the Landfill. A collection vehicle, such as a box truck and/or a trailer would be needed to conduct the mobile events (see example in Figure 7-3) and transport the materials to the main HHW Facility for processing. The County could coordinate the events and perhaps provide two or three staff persons to help with the collection, and request that the host community be responsible for providing volunteers to assist with the traffic and unloading of the vehicles. To provide a full service program, the same HHW materials that are accepted at the permanent site could be collected at the mobile events, however it may

be more feasible for the County to only accept certain items such as paint, used motor oil, etc. that are less hazardous and easier to transport.



Figure 7-3. Mobile HHW Trailer, Becker County, Minnesota

When the City of Kansas City, Missouri built its permanent facility in 1996, the staff originally considered satellite collection sites, however they opted for mobile collections instead because the staff considered this approach more manageable and cost effective. The City currently conducts 10 to 12 mobile collection events per year in cooperation with the Mid-America Regional Council (MARC). MARC arranges the mobile collection events to be held on certain Saturdays from April through October¹⁴. Each community pays its share of the cost of the event. Collection events usually take place at a park or a public facility with a large parking lot. Only antifreeze, batteries, motor oil and paint are accepted at the mobile collection events.

7.3.1.3 Curbside Collection

Another option for collecting HHW materials is to offer curbside collection to residents. (This may be more feasible in communities with higher population densities.) This option could be implemented in conjunction with mobile collection events or limited to only the elderly and disabled residents of a community, who may not be able to drive to the permanent facility.

The City of Denver, Colorado (population 588,000) has been offering free curbside collection of HHW to residents for approximately eight years through a contract with a vendor called Curbside, Inc. The program is funded through the City's stormwater management program.

Residents call the vendor's toll-free customer service phone number to schedule a pick-up and can only use the service once per year. The contractor then sends the resident a collection kit which contains a heavy duty clear plastic bag, instructions, labels, and a cable tie that cannot be re-opened once it has been secured. The bag of

¹⁴ Source: MARC website. <http://www.marc.org/Environment/SolidWaste/HHW/hhwevents.htm>

materials set out for collection cannot exceed 125 pounds. If the resident has more HHW than will fit in the bag, they may choose to set out the extra materials and pay for its collection. Residents also have the option of dropping off HHW materials at the vendor's facility, by appointment.

The City pays the contractor \$114 per curbside stop and \$106 per resident using the drop-off option. The City budgets about \$212,000 annually for the HHW program however, it has gone over budget the past two years, spending approximately \$258,000 in 2007 and \$265,000 in 2008 according to City of Denver staff. Approximately 1.5 percent of the City's population (that are customers of the City's Solid Waste program) currently participate in the program. For example, in 2007 and 2008, about 2,500 households out of the 165,000 households the City serves, participated in the program. In 2008, the average pounds per curbside stop was 77, and the average drop-off amount was 123 pounds. The City of Denver opted for this type of program as an alternative to building a permanent HHW collection facility.

The City of Laguna Beach, California (population 24,000) also contracts for the curbside collection of HHW as well as electronics. The residents do not pay the contractor directly for the service; the City pays the contractor monthly based on the number of stops and the types and quantities of materials collected. (There is a reduced cost to collect certain items such as antifreeze, batteries, used motor oil, and paint.) The City subsidizes this program through a solid waste fee incorporated into the residential refuse bill. Commercial businesses may also take advantage of the program, although they are required to pay the contractor directly.

Another option is to offer curbside collection of only certain HHW items. For example, municipalities in Sarasota County, Florida have been offering collection of used motor oil from the curb for several years with great success. The County (population 372,000) contracts with private haulers for the collection of residential municipal solid waste, including motor oil and electronics. As part of the regular refuse collection service, all residents of the County have the opportunity to set out used motor oil, oil filters, and electronics for collection at the curb.

7.3.1.4 Other Alternative Options

Listed below are other alternative program management approaches for the County to consider that could result in a more cost-effective collection program, and may enable the County to implement another collection option within the current budget. The potential savings realized from these alternative options could be allocated for additional advertising and/or additional collection events.

- **Establish collection events or facilities for recyclable HHW such as antifreeze, batteries, oil, and paint (also referred to as ABOPs).** These four materials typically compose about 25 percent of a municipality's total HHW disposal costs. ABOP collection sites have been used successfully in other portions of the United States. Many communities have ABOP collection sites located at municipal buildings such as maintenance facilities, public works buildings, fire stations, etc. These collection sites are staffed and are usually opened a limited number of hours

per month. In Kansas City, ABOP collection events are scheduled annually in which just those four material types are collected.

- **Contract separately for fluorescent bulb collection/recycling.** Currently the County crushes fluorescent bulbs at the HHW Facility and the material is recycled through the contracted vendor. The County may want to consider comparing the cost of crushing (including equipment, maintenance, and labor costs) and disposal costs to contracting out for the recycling of fluorescent bulbs through a lamp recycling company (that only handles fluorescent bulbs) for collection and disposal. A separate Request for Proposals (RFP) or Request for Bids (RFB) could be issued for recycling the bulbs. The competitive bid process may result in a lower per unit recycling cost than what the current vendor is charging, as well as save the County staff time in crushing the lamps. (Instead of being crushed, the lamps would need to be kept whole and placed in cardboard boxes or drums provided by the vendor.)
- **Continue to instruct residents to take certain items to various retailers.** Many retailers already accept certain HHW items at their place of business. For example, most automotive battery retailers take old batteries from customers in exchange for new auto battery purchases. Certain automotive repair businesses and retailers in New York are required to accept waste oil free of charge¹⁵ and all New York wireless telephone service providers that offer phones for sale must accept cell phones for reuse or recycling. In addition, local retailers Wegman's in Johnson City and Lowe's Home Improvement Warehouse in Vestal partner with the County in collecting dry-cell batteries at no charge. The County provides the collection drums, picks up the full drums and pays for the recycling of the material. Also, Home Depot in Binghamton accepts compact fluorescent lamps (CFLs) for recycling from residents and the County promotes the program in an effort to further divert CFLs from being brought to the HHW Facility. Over thirty retailers in Broome County are listed as accepting rechargeable batteries through the Rechargeable Battery Recycling Corporation's "Call 2 Recycle" program.¹⁶

Other materials that may currently be accepted by retailers or in which drop-sites could be established include: latex paint, antifreeze, explosives, fire extinguishers, propane tanks, and electronics. Diverting these materials through other outlets may save the County money in disposal and recycling costs.

7.3.2 HHW Participation Rates

The number of Broome County residents that reportedly used the County's HHW Facility from 2004 through 2008 is shown in Table 7-1. While the numbers seem to fluctuate from year to year, it appears the average number of participants is about 1,800 per year.

¹⁵ Source: NYSDEC website. <http://www.dec.ny.gov/chemical/8786.html>

¹⁶ Source: RBRC website. <http://www.rbrc.org/start.php>

Table 7-1
HHW Residential Participation Data¹
Broome County

	2004	2005	2006	2007	2008
Broome County	1,867	1,601	1,967	1,687	1,868

¹ Data does not include the number of participants that bring material to the HHW Facility on non-collection days. The County only recently began collecting this data.

In R. W. Beck's experience, we find that most permanent HHW collection facility participation rates are in the 1 to 5 percent range. When the number of Broome County participants is divided by the number of occupied housing units in the County, the participation rate is calculated to be between 1.98 and 2.43 percent, as shown in Table 7-2. The average participation rate for the Facility over the last five years is 2.23 percent.

Table 7-2
HHW Facility Participation Rates
Broome County

	2004	2005	2006	2007	2008
Broome County Participants ¹	1,867	1,601	1,967	1,687	1,868
Number of Occupied Housing Units – Broome County ²	80,800	80,800	80,800	80,800	80,800
Participation Rate	2.31%	1.98%	2.43%	2.09%	2.31%

¹ Data does not include the number of participants that bring material to the HHW Facility on non-collection days. The County only recently began collecting this data.

² Source: U.S. Census Bureau. The 2005-2007 estimate was 80,870. The 2000 census was 80,749. An average of 80,800 was used for this analysis.

The number of businesses participating in the County's CESQG program for the past five years is shown in Table 7-3.

Table 7-3
Broome County CESQG Participation Data

	2004	2005	2006	2007	2008
Number of CESQGs	58	94	98	94	65

Per the U.S. Census Bureau, the number of businesses in Broome County in 2002 (the most recent available data) was 12,642.¹⁷ While it is not known how many businesses

¹⁷ Source: U.S. Census Bureau, State and County Quick Facts.
<http://quickfacts.census.gov/qfd/states/36/36007.html>

are considered CESQGs of hazardous materials, the number of CESQGs participating in the County's program appears low.

7.3.3 Quantities and Types of HHW Materials Collected and Managed

The total quantities of HHW materials collected at the County's permanent Facility are shown in Table 7-4.

Table 7-4
Estimated Quantities of HHW & CESQG Waste Collected per Year (in Pounds)¹
through Broome County's HHW Program

	2004	2005	2006	2007	2008
Dry-cell Batteries	11,900	11,500	13,600	11,100	36,989
Automotive Batteries	50,680	48,240	54,780	48,800	22,140
Used Motor Oil	71,328	62,968	65,344	43,504	50,464
Used Antifreeze	9,896	11,496	9,840	8,520	7,824
Fluorescent Lamps	8,780	5,100	18,600	3,600	19,716
Latex Paint	45,780	76,000	101,020	74,450	70,900
Oil-based Paint	18,000	35,640	35,640	32,340	36,456
HHW - Broome	80,619	60,628	37,228	40,998	64,955
Total Pounds	296,983	311,572	336,052	263,312	309,444
Total Tons	148	156	168	132	155

¹ The following conversion factors were used to convert some of the original quantities from gallons to pounds:

Motor Oil – 1 gallon = 8 lbs

Latex Paint – 1 gallon = 10 lbs

Oil-based Paint – 1 gallon = 12 lbs

Antifreeze – 1 gallon = 8 lbs

The pounds collected per participant were not calculated for this analysis because the quantities reported by the County include both residential and CESQG waste combined.

The quantities of dry-cell batteries collected by the County for recycling are quite high. County staff stated that alkaline batteries are included in this category. From R. W. Beck's research, most HHW programs direct residents to place spent alkaline batteries in the regular trash, as they are no longer manufactured with mercury and are not considered hazardous. The County has an outlet for recycling alkaline batteries, so it is a more environmentally-sound option compared to landfilling. A detailed cost analysis was not performed for this issue paper, so it is uncertain what expenses are incurred by the County for alkaline battery recycling. If the recycling costs are high, the County may consider removing alkaline batteries from its list of materials accepted

at the HHW Facility. While it may take several years to educate the public about what types of batteries are hazardous, it has been accomplished in other communities. For example, the link below from Hennepin County, Minnesota's website provides battery education via the county's "Household Battery Fact Sheet":

<http://hennepin.us/portal/site/HCInternet/menuitem.3f94db53874f9b6f68ce1e10b1466498/?vgnextoid=c8dfbbf4099fc010VgnVCM1000000f094689RCRD&vgnnextfmt=default>

7.3.4 Scope of Services Offered

One recommendation for the County to consider is to create a product exchange or reuse room at the permanent Facility. The County could dedicate a segment of the permanent HHW Facility to a product reuse area in which Facility staff would place usable products on shelves for residents to take free of charge. Likely items in a reuse program include paint, household cleaners, and automotive products. By offering these materials for reuse, the County would realize savings from avoided disposal costs. Most product reuse programs require the resident or "customer" to sign a liability waiver that states they are over the age of 18 and they will use the product for its intended purpose. The County's legal counsel should be consulted to provide indemnification language. A list of municipal HHW product reuse programs is included in Section 7.12.2, Resources.

7.4 Electronics Collection Program Expansion Considerations

Program parameters to consider when evaluating the electronics recycling program include:

- Program Convenience;
- Participation Rates;
- Quantity of Materials Collected/Managed; and
- Scope of Services Offered.

Each of these program parameters, and its application to Broome County, is discussed in detail below

7.4.1 Convenience

The County currently provides two options for the collection of used electronics, free of charge to residents: the permanent HHW Facility and off-site collection events held throughout the County. In addition, County staff routinely recommend to residents a list of alternate recyclers that service the area. The recyclers require an appointment and charge a fee. As the quantities of discarded e-waste increases, the County may want to research other options for the disposal and recycling of used electronics, as described below.

7.4.1.1 Offer Curbside Collection of Electronics

As mentioned previously, some communities offer curbside collection of not only HHW, but also used electronics. This service is usually provided by garbage haulers, for a fee, and by appointment or scheduled pick-up only. The haulers typically send out a separate, dedicated collection vehicle (such as a box truck or pick-up truck) for these materials.

The County may want to consider inviting local licensed haulers to a work session to discuss this growing portion of the waste stream, provide resources for recycling, and gauge the interest of haulers in providing curbside collection service.

A list of cities and counties throughout the country that provide curbside collection of e-waste is provided in Section 7.12.3, Resources.

7.4.1.2 Provide Information to Residents and Businesses on E-Waste Take Back Programs

Nationally, as the quantity of used electronics in the waste stream continues to grow, there is more and more pressure being placed on the producers of electronic equipment to play some role in the proper disposal of the items they manufacture. Product stewardship has grown in recent years and some of the larger computer and electronics manufacturers as well as large retailers have implemented “take-back programs.”

(It should be noted that product stewardship not only considers the end of a product’s life, but also takes into consideration the entire life-cycle impacts of a product and its packaging to reduce the amount of energy, toxins, air and water emissions, etc. that go into making a product and its packaging. This will be discussed in more detail in the Zero Waste Issue Paper.)

The EPA has partnered with many electronics manufacturers and retailers to develop the “Plug-In To eCycling” program in an effort to make it easier to reuse and recycle used electronics. Some of the participating partners include Best Buy, Dell, Hewlett-Packard, Sony, Sprint, Staples, and Verizon, just to name a few.

It is recommended that the County keep up-to-date on take-back programs and make this information available to residents and businesses via the County’s website, periodic County newsletters, mailings and other correspondence. Residents and businesses should be encouraged to use manufacturer take-back programs first, before bringing used electronics to the County’s HHW Facility or to County-sponsored drop-off events.

7.4.2 E-Waste Participation Rates

The number of residents that participated in the County’s electronics collection program from 2004 through 2008 is shown in Table 7-5. While there was a decrease in the number of participants in 2007 (compared to 2006), overall the numbers show an upward trend.

Table 7-5
Electronics Collection Program - Participation Data
Broome County

	2004	2005	2006	2007	2008
Broome County Participants	836	676	1,967	745	871
CESQGs	1	4	0	0	0
Off-Site Collection Event Participants	0	0	0	585	1,282
Total Number of Participants	837	680	1,967	1,330	2,153

When the number of Broome County participants plus the off-site event participants is divided by the number of occupied housing units in the County, the participation rate is calculated to be, on average, 0.84 to 2.66 percent, as shown in Table 7-6.

Table 7-6
Electronics Collection Program – Participation Rates
Broome County

	2004	2005	2006	2007	2008
Broome County Participants	836	676	1,967	745	871
Off-Site Collection Event Participants	0	0	0	585	1,282
Total Participation	836	676	1,967	1,330	2,153
Number of Occupied Housing Units – Broome County	80,800	80,800	80,800	80,800	80,800
Participation Rate	1.03%	0.84%	2.43%	1.65%	2.66%

7.4.3 Quantities of E-Waste Collected/Managed

The total quantities of used electronics collected at the County's permanent Facility and at the off-site collection events are shown in Table 7-7. The tons collected have steadily increased each year.

Table 7-7
Quantities of Used Electronics Collected per Year (in Tons)
Broome County

	2004	2005	2006	2007	2008
Broome County	45.92	53.98	55.95	55.32	65.03
CESQGs	0.16	1.07	0	0	0
Off-Site Collection Events	0	0	0	34.77	69.50
Total Tons	46.08	55.05	55.95	90.09	134.53

The overall amount of used electronics in the waste stream is difficult to estimate. The EPA commissioned two reports that took different approaches to analyzing the amount of electronics in the waste stream – one relied on market research data on sales of electronics and one relied on government statistics on sales of electronics.¹⁸

By looking at waste characterization studies conducted between 1998 and 2004, the EPA estimated that the average pounds of consumer electronic discards (e.g., computer-related electronics and CRTs) per person, per year was 9.4.¹⁹ (That number is likely to be higher now due to more people purchasing electronic equipment and more equipment becoming obsolete faster than in past years. Also, the EPA estimate does not include cell phones.)

Applying the EPA estimate of 9.4 pounds per capita per year to the U.S. Census Bureau's 2008 population estimate for Broome County of 195,018, the result is approximately 917 tons of e-waste discarded per year. In 2008, 135 tons of e-waste was collected, as shown in Table 7-7, or approximately 15 percent of the e-waste stream.

When the tons of e-waste collected from the County were converted to pounds, the average number of pounds collected per participant ranged from 57 to 160 pounds as shown in Table 7-8. This appears to be in the range of other programs researched by R. W. Beck including:

- Buck's County, Pennsylvania – 108 pounds per participant (2008)
- Iowa – 81 pounds per participant (2006)
- Kansas – 92 pounds per participant (2007)
- Wisconsin – 65 pounds per participant (2008)

¹⁸ Source: EPA website, Statistics on the Management of Used and End-of-Life Electronics.
<http://www.epa.gov/epawaste/conserve/materials/ecycling/manage.htm>

¹⁹ Source: "Electronics Waste Management in the United States - Approach 1," EPA, July 2008.
<http://www.epa.gov/epawaste/conserve/materials/ecycling/docs/app-1.pdf>

Table 7-8
Used Electronics Collected - Pounds per Participant per Year
Broome County

	2004	2005	2006	2007	2008
Total Tons	45.92	53.98	55.95	55.32	65.03
Total Pounds	91,840	107,960	111,900	180,180	269,060
Number of Participants	836	676	1,967	1,330	2,153
Pounds per Participant	110	160	57	135	125

7.4.4 Scope of Services Offered

The County's collection program for used electronics is fairly comprehensive. However, as the quantities of e-waste continues to grow, it may become more critical that the County offer more collection events or increased days/hours for accepting e-waste at the HHW Facility. If the state of New York eventually bans e-waste from landfills, the County will need to expand the collection program. It is likely that more producer take-back programs will emerge, so it is recommended the County monitor this issue in order to provide its residents with the most current information.

7.5 Capital and Operating Expenses

Any expansion considerations that require large capital expenditures would most likely need to be presented to the County Legislature for approval. The capital and operating expenses related to expanding the County's current HHW and/or electronics recycling program would be dependent on what, if any, options or recommendations the County chooses to implement.

Depending on how the County chooses to expand the programs, there may be capital and operating costs to consider. Capital expenditures could include, but not be limited to:

- Purchasing, leasing or constructing a satellite collection site;
- Purchasing or leasing a mobile collection vehicle;
- Purchase of rolling stock equipment; and/or
- Retrofitting or renovating the current HHW Facility to accommodate a product reuse room.

Expanding the County's current HHW and/or electronics recycling program may require additional staff or contracted labor to collect, manage, and process additional volumes of materials in preparation for their ultimate disposal or transportation to a processing or disposal site. (The County currently has one full-time Solid and Hazardous Waste Facility Technician.) Also, any type of expansion would require increased staff time to develop, coordinate and implement expanded public information, outreach, and marketing programs, as well as additional data tracking,

program management, etc. (The County currently has one full-time Materials Recovery Manager.) Any additional staff or staff time would result in an increase in operating expenses.

7.6 Evaluation of Public/Private Ownership and Operation Options

Public-private partnerships provide an option for municipalities to consider when expanding their HHW and/or electronics recycling program. Typically, such partnerships would utilize the financing advantages of the public sector entity (i.e., lower cost of capital) and the operational expertise of the private sector.

The public/private approach might be considered for an electronics collection and recycling program or if the County ever chose to NOT be involved in the operations side of the HHW collection program.

An approach to a public/private partnership is to distribute a Request for Interest (RFI) to hazardous waste management companies with capabilities and interest in providing collection, processing, packaging and/or transportation services for HHW and/or used electronics. If the County considered this option, staff time would be needed to develop and distribute an RFI to companies with capabilities and interest in providing the services of an expanded HHW and/or electronics recycling program.

The approach could include an incentive in which the County provides the land for use at a minimal cost and then contracts with a private firm to operate the collection/processing facility. One example of a successful HHW program partnership is provided below.

7.6.1 Dakota County, Minnesota

Forming a public-private partnership may provide a means to decrease program costs and increase flexibility. An example of a successful public-private partnership is Dakota County, Minnesota. Part of the Minneapolis/Saint Paul metropolitan area, the County is largely suburban in nature, with a 2008 population estimate of 392,755 (and approx. 153,326 households). The County held its first HHW collection event in 1985 and by 1987, the County was sponsoring multiple (three to four) collection events per year. In 1991, Dakota County implemented a permanent collection system at two sites in the County, together with occasional off-site collection events. In 1996, the County chose to consolidate operations and issued a Request for Proposals (RFP) for HHW management services. The RFP stated that the vendor would be responsible for siting, constructing, operating and staffing a permanent HHW collection facility. The RFP excluded HHW material recycling/disposal services.

Gopher Resources, a local private lead smelting and plastics recycling company, contracted with the County to provide HHW services. Services included operation, maintenance and management of the County's Eco-Site (HHW facility). The private contractor pre-sorts delivered materials into general categories, bulks liquids, and selects usable materials to be placed in the reuse center.

Located near the County's population center, the permanent HHW facility is approximately 3,000 square feet. It has a product reuse area, which allows residents to choose HHW materials for their use, free of charge. The HHW facility is housed in the same building as the plastics recycling company and adjacent to the lead smelting facility. As part of this partnership, the County provides all of the movable fixtures within the facility, including waste processing equipment, shelving, drum dolly, drum scale, and office equipment and oversight of facility activities. The HHW facility is staffed by Gopher Resources employees and includes one primary manager, two technicians, and up to twelve additional trained part-time staff.

In addition to offering HHW services at the permanent collection facility, the County hosts four collection events per year in order to increase customer convenience by decreasing distance to HHW services. The collection events are held in cooperation with cities, who are responsible for advertising the event, locating a temporary collection event site, and providing labor for the day-long event. At the conclusion of each collection event, County staff transport materials to the permanent collection facility.

7.7 HHW and E-Waste Recycling Education

The County provides information on HHW and electronics disposal and recycling options on its website, has developed an "HHW and Electronics Recycling" brochure, and publishes print ads announcing electronics collection events. In addition, the County's Division of Solid Waste Management office and the HHW Facility field calls throughout the year regarding proper disposal options for HHW and used electronics.

Recommendations to expand on education efforts include:

- Send an annual letter to small businesses in the County that explains the basics of the County's CESQG program, including what materials are accepted in the program, what the costs are for disposal, and how to prepare the items for delivery to the HHW Facility. Work with the local Chamber of Commerce to obtain contact information for small businesses. Because this could be a large mailing, the County could consider sending letters to one-fourth or one-third of the businesses one year and send the remaining letters in subsequent years and continue with the rotation.
- Expand/re-arrange the HHW and e-waste information section of the County's website. Currently on the Solid Waste Management home page, there are three options: Recycling, Landfill, and Hazardous Waste & Electronics. There is some HHW-related information on the side bar of the webpage that is not on the Hazardous Waste main page. It is recommended that the HHW-related brochures (e.g., Paint Tips & Disposal; Compact Fluorescent Bulb Disposal & Handling; Mercury in the Home; and Cleaning Mercury Spills) be moved from the "Brochures" section of the side bar to the Hazardous Waste & Electronics page.

Also, the Recycling web page lists "battery only drop-off sites." The County may want to consider adding this information to the Hazardous Waste page and

expand it by providing retail locations that accept other materials such as used motor oil, automotive batteries, rechargeable batteries, electronics, cell phones, etc.

Lastly, there is other information on the side that may get more attention if placed on the main Hazardous Waste page including:

- Transport of HHW;
- Alternative Products; and
- FAQ for residents.
- Provide a description of environmental and health hazards of improper use and disposal of HHW products on the County's website.
- Continue to partner with the County's Environmental Management Council (EMC) for dissemination of public education and outreach information. The EMC is the County's citizen advisory board for local environmental matters. Each year the EMC budgets for staff support, technical assistance, planning, and research and development assistance to the County's Solid Waste Management Division.²⁰ As part of the Department of Planning and Economic Development, the EMC conducts reviews of land-use proposals as part of the 239 land use laws. Currently during a review, if the EMC staff notice hazardous materials are generated as part of a businesses' operations, they will inform the business of proper disposal options and inform them of the County's CESQG program.
- Continue to partner with Cornell Cooperative Extension (CCE) for direct educational outreach. Currently, CCE includes hazardous waste information in its recycling outreach for the County. Keep CCE informed of any new e-waste legislation or take-back programs that might develop in the future.
- Consider distributing promotional items such as pens, magnets, calendars, etc. to promote the County's HHW and electronics recycling programs. These inexpensive marketing tools have the potential for the County's message to be seen over and over again.

7.8 Revenue Options

HHW and residential e-waste recycling programs are typically not revenue-generating programs for cities and counties. More often, they are justified expenses to ensure these hazardous materials are managed properly and kept from harming the environment. Generally, these programs are funded out of a municipality's general fund. CESQG programs however, should be structured to generate enough revenue to cover the capital and operating costs of managing the hazardous waste from the small business sector. It is recommended the County continue to charge CESQGs for the management of hazardous materials and charge small businesses for the collection and recycling of used electronics.

²⁰ For 2009, the EMC's proposed budget to assist the Solid Waste Management Division was slightly less than \$10,000, a portion of which is allocated for planning and technical assistance.

The number of businesses that have participated in the County's CESQG program over the last five years is low, as shown in Table 7-3. It is recommended the County make a concerted effort to increase the awareness of the CESQG program in an attempt to increase the number of CESQGs using the Facility.

7.9 Addressing Stakeholder Concerns

The stakeholders most impacted by changes to the County's HHW and electronics recycling programs would be the local haulers if the County decided to implement curbside collection of used oil, antifreeze, and/or used electronics.

As mentioned previously, the County would need to research this option and conduct work sessions with local licensed haulers to discuss the implications of offering expanded collection services and gauge the interest of haulers in providing curbside collection service of these materials.

If the County chose to expand its HHW collection program to include a satellite facility or a mobile collection unit, the residents of certain cities, towns and villages within the County should benefit greatly from this service. If the satellite facility or mobile collection unit was a joint venture between a municipality and the County, any concerns related to financing, staffing and operations would need to be resolved before such a project could move forward.

7.10 Implementation Requirements

In order to expand the current HHW and/or electronics recycling program, County staff would need to evaluate each expansion option as it relates to:

- Federal and State rules and regulations;
- Local permitting;
- Storage issues;
- Handling of materials;
- Staffing requirements;
- Health and Safety issues;
- Capital expenditures and operating costs; and
- Other program-specific considerations.

7.11 Benefits and Drawbacks

Implementing an expanded HHW and/or electronics recycling program has benefits as well as drawbacks, as outlined below.

7.11.1 Benefits

The benefits to the County may include, but not be limited to, the following:

- A potential increase in HHW and e-waste collection participation from both residents and businesses;
- A potential increase in the quantities of materials collected;
- A potential decrease in the amount of HHW and e-waste disposed at the Broome County Landfill, thus increasing the life of the Landfill and reducing liability exposure to the County;
- Avoided disposal costs if consumer electronic take-back programs were promoted so less e-waste would come through the County's program;
- Environmental benefits from diverting materials from being improperly disposed, by offering more convenient disposal and recycling options for HHW and e-waste; and
- Overall increased health & safety of the communities located within the County.

7.11.2 Drawbacks

The drawbacks to implementing an expanded HHW and/or electronics recycling program would most likely be financial. Most program additions or enhancements would require the County to increase funding for additional staff and expenses.

By increasing the quantities of HHW and electronics collected, the County would incur increased collection, processing, transportation, disposal and recycling fees. However, any fees incurred are likely to be less expensive collectively when compared to the cost of landfill disposal on a per ton basis or per cubic yard of air space, or when compared to remediation costs due to a hazardous waste spill or incident.

As stated in previous issue papers, when considering the “cost” of recycling or diversion programs there are both “economic” considerations and “non-economic” considerations. Under economic considerations, the County must compare the cost of recycling programs with the cost of landfill disposal, including transportation costs and long term disposal obligations after the landfill is closed (post-closure obligations). For “non-economic” considerations there are factors such as environmental sustainability, carbon footprint, public desire for and participation in recycling, and New York State Rules and Regulations. These factors should all be considered as the County formulates its integrated solid waste management planning efforts.

7.12 Resources

Provided below is a list of program information supporting R. W. Beck's analysis which may assist the County.

- Product Stewardship Institute
<http://www.productstewardship.us/>
- U.S. Environmental Protection Agency, eCycling website:
<http://www.epa.gov/epawaste/conserve/materials/ecycling/index.htm>
- U.S. EPA's Plug-In To eCycling program:
<http://www.epa.gov/epawaste/conserve/materials/ecycling/donate.htm#local>

7.12.1 HHW Curbside Collection Programs

- City of Denver, Colorado – HHW Curbside Collection Program
<http://www.denvergov.org/rechhw/CollectionProgram/tabid/425374/Default.aspx>
- City of Laguna Beach, California – HHW and Electronics Curbside Collection Program
<http://www.lagunabeachcity.net/government/departments/publicworks/services/hazwaste.htm>
- Sarasota County, Florida – Curbside Collection of Used Motor Oil and Electronics
<http://www.co.sarasota.fl.us/EnvironmentalServices/SolidWaste/MotorOil.asp>
<http://www.co.sarasota.fl.us/EnvironmentalServices/SolidWaste/Electronics.asp>

7.12.2 Product Re-Use Programs

- Kansas City, Missouri
<http://www.kcmo.org/water.nsf/web/swapshop>
- City of Fargo, North Dakota
<http://www.cityoffargo.com/Residential/CityServices/Householdhazardouswaste/Productreuseroom/>
- Hennepin County, Minnesota
<http://www.co.hennepin.mn.us/portal/site/HCInternet/menuitem.3f94db53874f9b6f68ce1e10b1466498/?vgnextoid=d4d8bbf4099fc010VgnVCM1000000f094689RCRD>
- Sarasota County, Florida
ReUzIt Shop:
<http://www.co.sarasota.fl.us/EnvironmentalServices/SolidWaste/HazardousWaste/ReUzitShop.asp>
Recycled Paint:
<http://www.co.sarasota.fl.us/EnvironmentalServices/SolidWaste/HazardousWaste/RecycledPaint.asp>

7.12.3 Electronics Curbside Collection Programs

- Town of Cary, North Carolina
<http://www.townofcary.org/depts/pwdept/recycling/computers.htm>
- City of Centerville, Minnesota
http://www.centervillemn.com/index.asp?Type=B_BASIC&SEC={B9958A9F-F7B1-41C4-BEE0-31E5E48841C3}
- Cleveland Heights, Ohio
http://www.clevelandheights.com/citydept_works_refuse_recycling.asp
- Contra Costa County, California
<http://www.wastediversion.org/specialcleanups.htm#reuse>
- San Mateo County, California
http://www.recycleworks.org/cgi-bin/bin/user/details_company_aq.pl?id_company=213&id_subcategory=54&ActualType=where
- Sarasota County, Florida
<http://www.co.sarasota.fl.us/EnvironmentalServices/SolidWaste/Electronics.asp>
- City of Solon, Ohio
<http://www.solonohio.org/PublicWorks/serviceInfo.html#recycle>

8.1 Overview

Zero waste is a comprehensive approach to waste management with the ultimate goal of eliminating all types of waste including solid and hazardous waste and any emissions to the air, soil and water. It is a management philosophy applicable to the next generation of solid waste management systems. It includes “recycling,” but goes beyond recycling by taking a “whole system” approach to the vast flow of resources and waste through human society. The philosophy behind the zero waste movement is that all wastes generated are potential residual resources.

Nationwide, waste generation per person continues to increase each year, making it difficult to increase diversion rates. Recycling alone will not increase diversion significantly. As a result, the concept of zero waste is gaining in popularity in an attempt to maximize recycling, minimize waste generation, reduce consumption, and ensure that products are made to be reused, repaired, or recycled back into nature or the marketplace.¹

Zero waste is just one part of a growing environmental movement that also includes product stewardship, sustainability and green building, as described below.

8.1.1 Product Stewardship

Product stewardship is a product-centered approach to environmental protection. It calls on everyone involved in the product life cycle – manufacturers, retailers and consumers – to share responsibility for reducing the environmental impact of products at the end of their useful life. Manufacturers are encouraged to design products that require less harmful materials and that are made from recycled material. In addition, manufacturers are asked to design products that are more durable and that can be reused and recycled. Retailers and consumers are asked to take an active role in the proper disposal or recycling of the products.

8.1.2 Sustainability

Sustainability provides for current needs without sacrificing the needs of future generations. Sustainable practices require that we evaluate how today’s decisions will affect the environment, economy and society in the future. Sustainability acknowledges that everything depends on healthy functioning societies, economies

¹ Source: GrassRoots Recycling Network.

and ecosystems. Some key sustainability principles include reducing our reliance on non-renewable energy sources and limited raw materials as well as reducing waste, reusing materials and goods, and recycling.

8.1.3 Green Building

Green or sustainable building is the practice of creating healthier and more resource-efficient models of building construction, renovation, operation, maintenance and demolition. Research and experience demonstrate that when buildings are designed and operated with their life cycle impacts in mind, they can provide environmental, economic and social benefits. Elements of green building include: energy efficiency and renewable energy; water stewardship; environmentally preferred building materials and specifications; waste reduction; indoor environment; and smart growth and sustainable development.

One of the more recognizable organizations promoting green building is the U.S. Green Building Council (USGBC) with its Leadership in Energy and Environmental Design (LEED) program. LEED is a certification system that measures how well a building performs related to energy savings, water efficiency, carbon dioxide emissions reduction, indoor environmental quality and stewardship of resources.²

Other green building organizations include Green Globes, BRE Environmental Assessment Method (BREEAM), and the World Green Building Council. Links to these organizations are provided in Section 8.13 of this paper.

Another effort in the environmental movement not described here is environmentally preferable purchasing (EPP), a topic on which R. W. Beck provided detailed information to Broome County (County) in Issue Paper #1 – EPP and Recycled-Content Procurement Policies.

8.2 Life Cycle Analysis

Zero waste strategies consider the entire life-cycle of products, processes and systems in the context of a comprehensive systems understanding of our interactions with nature and search for inefficiencies at all stages. With this understanding, wastes can be prevented through designs based on full life-cycle thinking.³

Life cycle analysis or assessment (LCA) as applied to municipal solid waste (MSW) management systems is a technique for assessing the environmental inputs and outputs associated with production, use and end-of-life management for products. Household, business and institutional consumption of products results in discards of unused or consumed materials. These discards, including construction and demolition (C&D) debris, compose the MSW stream.

The diagram in Figure 8-1 portrays basic environmental flows in terms of energy and material inputs and energy and pollution outputs (to air, water and land). The typical

² Source: USGBC website. <http://www.usgbc.org/Default.aspx>

³ Source: Zero Waste Alliance.

product's life cycle involves extracting raw materials from nature's ecosystems, refining those virgin resources into industrial feedstocks, manufacturing the product from these feedstock, using the product, discarding the product at the end of its useful life, and/or disposing of the product discards by reuse, recycling, recovery or disposal.

The resource extraction, refining and product manufacturing phases together are often termed the “upstream phase” of the product life cycle. The feedback loops in the diagram indicate how reuse and recycling short circuit the upstream phase, thereby conserving energy and reducing releases of waste and pollutants in the production of goods and services. Most of the environmental value for recycling and composting comes from pollution reductions in the manufacture of new products made possible by the replacement of virgin raw materials with recycled materials and the replacement of synthetic petroleum-based fertilizers with compost, typically measured in reduction of greenhouse gas emissions.

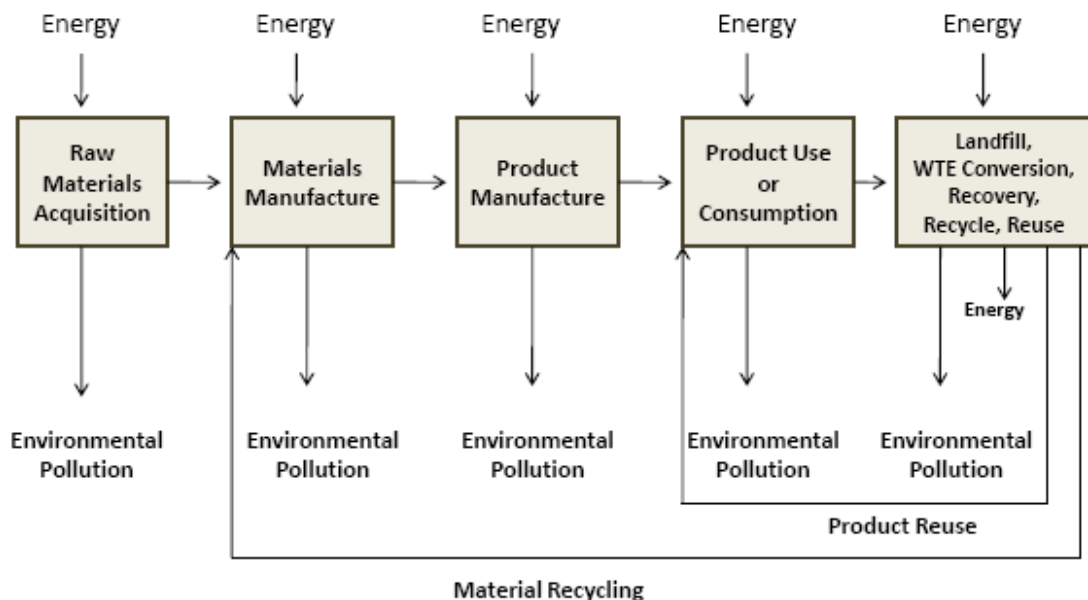


Figure 8-1. Schematic Depiction of the Phases in a Product's Life Cycle

To estimate environmental emissions of waste management methods, a number of environmental life cycle inventory and assessment models have been created. They include, but are not limited to:

- U.S. Environmental Protection Agency's (EPA) waste reduction model (WARM) life cycle inventory spreadsheet calculator for greenhouse gas (GHG) emissions;⁴
- EPA's MSW Decision Support Tool and database;⁵

⁴ Source: EPA. http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html

⁵ Source: EPA and Research Triangle Institute.
http://www.epa.gov/ord/NRMRL/scienceforum/thorneloe_s.htm

- Carnegie Mellon University Green Design Institute's Economic Input-Output Life Cycle Assessment model;⁶
- National Institute of Standards and Technology's BEES model;⁷ and
- EPA's TRACI model.⁸

The models enable the user to express the quantity of pollutant releases in terms of a single indicator quantity for other categories of environmental damage. Each category encompasses a particular type of potential environmental impact. The impact categories used in an LCA may include, among others:

- Global warming
- Acidification
- Eutrophication
- Human health impacts (for example, air pollutants, cancer and non-cancer illness)
- Ecosystem toxicity
- Ozone depletion
- Smog formation
- Habitat alteration
- Resource depletion
- Water consumption

If the County were to implement a zero waste plan, one of the first tasks would be to determine the environmental impacts of the County's current solid waste system using a life cycle assessment model. This baseline could then be used as a comparison in the future to determine the effects of zero waste activities.

One of the easier models to use is the U.S. EPA's WARM model. The WARM model is designed to estimate GHG emission reductions from several different waste management practices. The model is based on unique assumptions tailored for 34 different material types. Inputs to the model include the scenarios to be compared (e.g., the amount of each material type and the method used to manage it including recycling, landfilling, composting or combustion), the average shipping distance of recyclable materials to market, and whether or not the landfill has a landfill gas collection and control system.

To determine the "tons landfilled" for each material type to be input into the model, the County could either conduct a waste characterization of the Broome County Landfill or, as an alternative, estimate the tons of each material type landfilled by

<http://www.rti.org/page.cfm?objectid=D73EE9A3-C4B1-4E28-B47E8764292D2EF4>

⁶ Source: Carnegie Mellon University. <http://www.eiolca.net>

⁷ Source: Building and Fire Research Laboratory.

<http://www.bfrl.nist.gov/oae/software/bees/model.html>

⁸ Source: EPA. <http://www.epa.gov/nrmrl/std/sab/traci/>

applying waste characterization study results from another community to the Landfill's annual tonnage.

As part of the County's Local Solid Waste Management Plan update, R. W. Beck assessed the County's waste stream for future diversion potential. R. W. Beck identified recent waste characterization studies completed for communities with demographics and solid waste management systems similar to those of Broome County. Together, the County and R. W. Beck selected the 2005 composition results for Cedar Rapids/Linn County, Iowa from the Iowa Statewide Waste Characterization Study as an appropriate comparison. Table 8-1 lists the estimated quantities of material in Broome County's MSW that were calculated by applying the County's 2007 MSW landfill tonnage (148,904 tons)⁹ to the composition results from the Cedar Rapids/Linn County waste characterization. These estimates, along with additional Landfill tonnage data for materials other than MSW, could then be input into the WARM or other life cycle assessment model to estimate environmental emissions of the County's solid waste management methods.

Table 8-1
Cedar Rapids/Linn County, Iowa MSW Composition Percentages Applied to
Broome County 2007 MSW Landfill Tonnage

Material Group	Material	CR - Linn Co Avg Percent Comp.	Broome County 2007 Tons
Paper	Compostable Paper	7.10%	10,541.23
Paper	High Grade Office	1.60%	2,372.95
Paper	Magazines	1.00%	1,506.76
Paper	Mixed Recyclable Paper	5.30%	7,904.36
Paper	Newsprint	2.40%	3,545.83
Paper	Non-Recyclable Paper	4.30%	6,432.42
Paper	OCC and Kraft Bags	3.50%	5,154.69
Total Paper		25.20%	37,458.25

⁹ Source: Landfill Tonnage by Material from "Broome County Executive Summary, Division of Solid Waste Management, As of December 31, 2007 – Final." The tons include General MSW plus Municipal MSW from Cleanup Events.

Table 8-1
Cedar Rapids/Linn County, Iowa MSW Composition Percentages Applied to
Broome County 2007 MSW Landfill Tonnage

Material Group	Material	CR - Linn Co Avg Percent Comp.	Broome County 2007 Tons
Plastics	# 1 PET Deposit Beverage Containers	0.30%	400.12
Plastics	# 1 PET Beverage Containers	0.50%	701.58
Plastics	# 2 HDPE Containers	0.90%	1,324.20
Plastics	Film/Wrap/Bags	6.30%	9,348.47
Plastics	Other # 1 PET Containers	0.20%	331.23
Plastics	Other Plastic Containers	0.40%	649.61
Plastics	Other Plastic Products	6.50%	9,642.45
Total Plastics		15.00%	22,397.67
Metals	Aluminum Beverage Containers	0.10%	112.54
Metals	Aluminum Deposit Beverage Containers	0.10%	202.13
Metals	Ferrous Food and Beverage Containers	1.70%	2,570.05
Metals	Other Aluminum Containers	0.10%	120.04
Metals	Other Ferrous Metals	3.50%	5,271.84
Metals	Other Non-Ferrous Scrap	0.50%	688.41
Total Metals		6.00%	8,965.00
Glass	Blue Glass	0.00%	71.18
Glass	Brown Glass	0.00%	57.32
Glass	Clear Glass	0.80%	1,201.60
Glass	Glass Deposit Containers	0.30%	426.87
Glass	Green Glass	0.10%	174.48
Glass	Other Mixed Cullet	1.00%	1,531.48
Total Glass		2.30%	3,462.94
Yard Waste	Pumpkins	0.70%	1,088.10
Yard Waste	Yard Waste	0.90%	1,290.44
Total Yard Waste		1.60%	2,378.54
Total Food Waste		12.40%	18,477.15

Table 8-1
Cedar Rapids/Linn County, Iowa MSW Composition Percentages Applied to
Broome County 2007 MSW Landfill Tonnage

Material Group	Material	CR - Linn Co Avg Percent Comp.	Broome County 2007 Tons
Wood	Non-Treated	4.20%	6,267.79
Wood	Treated	6.10%	9,085.01
Total Wood		10.30%	15,352.79
Total Demolition / Renovation / Construction Debris		8.90%	13,184.54
Durables	Cell phones and Chargers	0.00%	14.13
Durables	Central Processing Units/Peripherals	0.20%	236.4
Durables	Computer Monitors/TV'S	0.20%	294.99
Durables	Electrical and Household Appliances	1.10%	1,615.07
Durables	Other Durables	2.80%	4,188.96
Total Durables		4.30%	6,349.55
Total Textiles And Leathers		3.30%	4,884.38
Total Diapers		2.50%	3,773.16
Total Rubber		0.20%	330.18
HHW	Automotive Products	0.00%	23.88
HHW	Household Cleaners	0.00%	30.03
HHW	Lead Acid Batteries	0.00%	-
HHW	Mercury Containing Products	0.00%	5.25
HHW	Other Batteries	0.30%	465.23
HHW	Other HHW	0.20%	262.79
HHW	Paints and Solvent	0.00%	27.91
HHW	Pesticides, Herbicides, Fungicides	0.00%	-
Total HHW		0.50%	815.09
Total Sharps		0.00%	5.93
Total Other Organic		1.20%	1,786.88
Total Other Inorganic		2.80%	4,137.14
Total Fines/Super Mix		2.10%	3,121.05
Total Other		1.40%	2,023.77
		100.00%	148,904

The per-ton estimates of GHG emissions for various solid waste management methods, per the WARM model, are shown in Table 8-2. The materials which provide the greatest benefit when recycled (per ton) include aluminum cans, copper wire, and carpet. GHG emissions are reported as metric tons of carbon equivalent (MTCE). A negative value indicates an emission reduction; a positive value indicates an emission increase.

Table 8-2
Per-Ton Estimates of GHG Emissions for Alternative Management Scenarios

Material	Source Reduced (MTCE)	Recycled (MTCE)	Landfilled (MTCE)	Combusted (MTCE)	Composted (MTCE)
Aluminum Cans	(2.26)	(3.73)	0.01	0.02	NA
Steel Cans	(0.87)	(0.49)	0.01	(0.42)	NA
Copper Wire	(2.02)	(1.36)	0.01	0.02	NA
Glass	(0.16)	(0.08)	0.01	0.01	NA
HDPE	(0.49)	(0.38)	0.01	0.25	NA
LDPE	(0.62)	(0.47)	0.01	0.25	NA
PET	(0.58)	(0.42)	0.01	0.29	NA
Corrugated Cardboard	(1.53)	(0.85)	0.09	(0.18)	NA
Magazines/Third-class mail	(2.36)	(0.84)	(0.09)	(0.13)	NA
Newspaper	(1.33)	(0.76)	(0.24)	(0.20)	NA
Office Paper	(2.18)	(0.78)	0.48	(0.17)	NA
Phonebooks	(1.73)	(0.73)	(0.24)	(0.20)	NA
Dimensional Lumber	(0.55)	(0.67)	(0.14)	(0.21)	NA
Food Scraps	NA	NA	0.19	(0.05)	(0.05)
Yard Trimmings	NA	NA	(0.09)	(0.06)	(0.05)
Grass	NA	NA	0.04	(0.06)	(0.05)
Leaves	NA	NA	(0.16)	(0.06)	(0.05)
Branches	NA	NA	(0.14)	(0.06)	(0.05)
Carpet	(1.10)	(1.97)	0.01	0.10	NA
Personal Computers	(15.26)	(0.62)	0.01	(0.06)	NA
Concrete	NA	(0.00)	0.01	NA	NA
Fly Ash	NA	(0.24)	0.01	NA	NA
Tires	(1.09)	(0.50)	0.01	0.02	NA

With the implementation of a zero waste plan, the quantities of waste being landfilled would be reduced, resulting in less GHG emissions, which in turn reduces the impact of regional climate change.

8.3 Diversion Strategies

Diversion strategies to achieve the next incremental level of diversion for a municipality require targeting select sectors and materials. Strategies to enhance waste prevention and diversion can be classified into the following four categories:

1. **Regulatory** – includes actions such as adopting extended producer responsibility mandates (i.e., producer-funded take-back programs), instituting bans on certain types of materials, charging user-fees on disposable items, or mandating recycling at construction sites.
2. **Policy** – includes changing the rate structure for refuse collection, implementing environmentally preferable purchasing guidelines to emphasize recycled or reused materials in government projects, or adding materials that may be integrated into the traditional recycling and organics waste collection service.
3. **Programmatic** – includes education, market development, or implementing changes in the actual collection of materials, including the frequency of collection and the size and type of containers used by residents and business.
4. **Contractual** – includes structuring solid waste service contracts to compensate contractors, vendors, and suppliers based on performance objectives that are aligned with the community's waste reduction or product stewardship goals.

In order to achieve higher waste diversion, it is important to focus efforts in areas with the greatest diversion potential and strong cost/benefit potential.

8.4 Application of Diversion Strategies

The diversion strategies listed above can be applied to a local government's various solid waste, recycling, and waste reduction programs. Some example applications are provided below for the County to consider.

8.4.1 Single-Family Residential Programs

Enhancements to curbside recycling and refuse collection programs can be used to optimize diversion and manage costs. Variables that can be modified include rate structures, collection frequencies, container sizes, and items collected.

Some Broome County communities have volume-based garbage collection also referred to as "pay-as-you-throw" (PAYT) while other communities set limits on the amount of garbage that can be set out for collection. The municipalities offer an array of refuse collection methods (i.e., bags and cans), however no County-wide, uniform PAYT approach is currently in place. In the City of Binghamton, for example, residents purchase special plastic bags for refuse collection. The cost of the bag pays for the collection and disposal of the waste. Other communities such as the Town of Union and Johnson City have a flat fee that allows residents to set out a maximum of 6 items or containers per week. In Vestal and Endicott, residents pay based on the number of cans set out.

Even though the County does not oversee the collection of garbage throughout the County, it is possible to implement a uniform PAYT program through hauler licenses. For example, the City of Sioux Falls, South Dakota has a subscription-based hauling system in which residents choose their own garbage hauler. As a requirement of the annual hauler license, each hauler must submit their variable rate pricing schedule to the City.

Per the City Ordinance, “All licensed garbage haulers shall file, as a part of their application for a business license, a general statement of their use rate structures and billing systems consistent with the City’s comprehensive plan of solid waste reduction and recycling program which shall include the following elements:

1. A rate to reward people who reduce their level of solid waste collection service based either upon volume or weight.
2. A rate to provide customers with adequate options and incentives to reduce their weekly level of solid waste collection service and the amount of solid waste collected as a result of their participation in waste reduction and recycling programs.
3. A rate that includes the combined cost of solid waste, using the above elements, and recycling collection services.”¹⁰

In an attempt to provide a larger financial incentive to recycle and reduce quantities of garbage set out for collection, some municipalities in the U.S. have implemented a more aggressive pricing schedule (i.e., with greater increments between service levels) to encourage more recycling. For example, in Seattle, Washington, residents may choose their own subscription levels for garbage collection service. (The fees include recycling service.) The City of Seattle offers a "micro-can" level of service. The micro-can is a 12-gallon container at a price of \$14.05 per month compared to a 96-gallon cart for \$66.90 per month. This represents a significant financial incentive to encourage diversion and waste prevention.

One measure of Seattle’s success using a variable can rate to reduce waste generation is that in 2008, 62 percent of the City’s residents were one-can (32-gallon) customers, 25 percent were mini-can (20-gallon) customers, and 5 percent subscribed to the micro-can (12-gallon) service. Only 8 percent subscribe to 2 or more cans of service. These percentages contrast with the situation prior to the introduction of variable rates, when 60 percent of single-family customers subscribed to one can and 39 percent subscribed to two or more cans.

The City of Austin, Texas has one of the most mature variable rate programs in the country. The program is designed as an economic incentive to increase diversion. Billing occurs monthly and residents have the choice of three cart sizes. The 2008 base rate of \$8.75 per month includes unlimited curbside recycling and yard debris collection. Cart sizes and prices are \$4.75 for 30 gallons, \$10.00 for 60 gallons, and \$16.50 for 90 gallons, and the cart exchange fee is waived for customers seeking smaller cart sizes.

¹⁰ Source: Revised Ordinances of Sioux Falls, South Dakota, Chapter 18, Article IV. Commercial Haulers, Sec. 18-59. Solid Waste Collection Rates.
<http://www.siuoxfalls.org/Council/Cityclerk/ordinances>

The City of Minneapolis offers a unique program to attempt to reward those who recycle. Residents are billed a flat monthly fee of \$24.00 for solid waste services that includes collection of refuse, recyclable materials, yard waste, and bulky materials. They offer a large cart for a \$4.00 per month disposal fee and a small cart for \$2.00 per month. If the resident participates in the recycling program, they receive a \$7 per-month credit on their bill. In other words, the resident receives a recycling rebate.

A relatively new approach to recycling incentives is the RecycleBank™ program which offers rewards to residents based on the quantities of materials set out for recycling. Each recycling container has an identification tag that is scanned and recorded by the collection truck each time the address is serviced. The amount of materials recycled is converted to RecycleBank Points, which can be redeemed for gift cards and/or coupons to local retailers.

The incentives in the RecycleBank program are derived from two sources – donations of discounts and gift certificates by local businesses (in exchange for advertisement) and the City's payment to RecycleBank to participate in the program. The City of Minneapolis' \$7 per-month credit is budgeted as part of an expense that the City pays to operate the program. In essence, the user fees pay the rebate to those who choose to participate in the recycling program, which is appropriate, as the cost of recycling collection and processing (when markets are strong) is typically less costly than the collection and disposal of garbage. Recycling program user fees should be assessed periodically as participation changes.

The success of enhancing residential diversion hinges on both convenience and adequate financial incentives. Collection services offered must be comprehensive and convenient. Residents need to be adequately rewarded in order for the residential programs to maximize diversion.

8.4.2 Multifamily Residential Programs

Most communities find the implementation of effective multifamily programs to be a challenge. Multifamily recycling and refuse collection tend to be regulated the same as the commercial sector, but the waste generated is more like the residential sector.

Part of the challenge in the multifamily sector, is that there is little direct link between recycling goals or requirements and the behavior of individual tenants. Tenants have little to no control over the location, capacity or convenience of the recycling system at their residence. Property managers and owners have no control over the actual recycling and disposal behavior of the tenants. Overcoming multifamily recycling barriers requires tenant education as well as oversight of property managers and owners. Details of multifamily recycling issues and overcoming barriers are addressed in Issue Paper #2 - Commercial and Multifamily Recycling.

An example of a successful multifamily recycling program can be found in Portland, Oregon. A City ordinance was passed in 2005 requiring standardized recycling systems at every multifamily property. Glass is collected in one container and all other recyclables (paper, metal, plastic) are commingled in a second container. A consistent and predictable collection system at the multifamily properties makes

recycling education for tenants more effective. While all properties must be in compliance, City staff has assisted about one half of the complexes in converting to this standard. All properties are expected to be in compliance by 2010.

Other requirements for Portland's multifamily properties include:

- Multifamily property owners are required to provide a recycling system for tenant use at each property;
- The collection system for recyclable materials must be as convenient as that provided for garbage; and
- Property managers are required to provide tenants with recycling education materials within 30 days of move-in, and on an annual basis.

8.4.3 Commercial Sector Programs

In most communities, the commercial sector generally has a moderate recycling or waste diversion rate, while generating the greatest portion of disposed waste. Disposed commercial waste includes significant volumes of recyclable materials, including glass, metal, paper and cardboard, wood, food, plastics, and yard debris. Details of commercial, industrial, and institutional recycling issues and overcoming barriers are addressed in Issue Paper #2 - Commercial and Multifamily Recycling.

The City of Seattle offers a commercial diversion incentive by offering businesses that generate low volumes of waste (i.e., less than 90 gallons per week) a less expensive, residential-type collection service, including recycling.

The City of Portland, Oregon provides for commercial collection of recyclable materials through permitted private contractors. The City has adopted a goal of diverting 75 percent of the commercial waste stream by 2015. A key to this program is that waste haulers providing service within the City must also collect specifically listed recyclables, report collection volumes to the City, and pay a tip fee surcharge for disposal (no fee is imposed on recyclables). In addition, Portland has a mandatory food waste recycling requirement for the City's largest food-producing businesses. Also, all building projects in Portland with a permit value of \$50,000 or more are required to separate and recycle the following construction and demolition (C&D) materials from the job site:

- Rubble (concrete/asphalt);
- Land clearing debris;
- Corrugated cardboard;
- Metals; and
- Wood.

One additional commercial diversion strategy implemented by the City of Portland, is a ban of polystyrene foam containers. Since 1990, the City has prohibited restaurants,

grocery stores and other retail vendors from using polystyrene foam containers for prepared food.¹¹

Many corporate businesses have adopted a zero waste policy. One example is Subaru's Indiana automotive manufacturing plant in Lafayette, Indiana which attained "zero landfill" status in 2004 and has remained that way ever since.¹² In 2006, the plant recycled 97 percent of its materials including steel, plastic, wood, paper and glass. The remaining three percent was sent to a waste-to-energy incinerator where steam is produced to heat some of Indianapolis' downtown buildings.

8.4.4 C&D Debris Programs

As discussed in detail in Issue Paper #3 – C&D Debris Recycling, common recyclable C&D materials include wood, drywall, metals, masonry (brick, concrete, etc.), carpet, roofing debris, rocks, soil, paper, cardboard, and land clearing debris.

There are typically two primary methods of improving C&D diversion. The first is facility-based, and involves improving customer access to drop-off facilities and support for the development of mixed C&D recycling facilities in a region. This could also include take-back programs for used building materials and the expansion of salvage and re-use stores and materials exchange programs.

The second primary method for enhancing C&D diversion is based on directing generator behavior, which can be done with the use of rate incentives, building permit requirements, and market development. This could include such methods as:

- Adopting rate incentives that make disposal of mixed C&D waste more expensive than recycling;
- Mandating submittal of a recycling plan for all building projects over a certain dollar value;
- Mandating that C&D waste be delivered only to a licensed recycler;
- Setting a C&D diversion rate goal;
- Developing and promoting pilot projects that show the benefit of de-constructing and recycling as compared to demolition; and/or
- Developing markets for building products made with recyclable materials.

8.4.5 Food Waste Programs

Several communities throughout the country are beginning to collect residential food waste in the same container as curbside yard waste. This is possible in places where processing facilities receiving the materials are permitted to accept both food and yard waste. In addition, a few pilot programs have been implemented around the U.S.

¹¹ Source: City of Portland website.

<http://www.portlandonline.com/osd/index.cfm?a=109474&c=41472>

¹² Source: Subaru website. http://subarudrive.com/Sum05_SubaruDifference.htm

collecting residential food waste and non-recyclable materials separately from yard waste. The cost effectiveness of such an approach is still being evaluated.

Currently, there are no facilities in the County that actively compost food waste or co-compost food and yard waste. Nevertheless the following examples of food waste diversion programs are provided for the County to consider, as food waste diversion opportunities may arise in the future and will be discussed as part of the alternative technology evaluation.

In Seattle, post-consumer commercial food, such as cafeteria waste contaminated with takeout containers, paper plates, cups, etc. is diverted and processed by co-composting it with yard waste. A key to success with post-consumer food waste is that the containers and cutlery must be compostable. Many products advertise that they are “biodegradable,” although whether a material that claims to be biodegradable can *actually* be composted is dependent on the receiving facility and its processes. Therefore a material testing and approval program, such as the one managed by Cedar Grove Composting¹³, the private company that processes Seattle’s post-consumer cafeteria waste, is suggested before biodegradable items are accepted in the food waste program.

The St. Paul, Minnesota Independent School District recently implemented a large-scale, post-consumer food waste composting program. This district has more than 42,000 students and 80 different schools. In the 2007/08 school year, 52 schools within the district implemented a food-for-livestock program. Each of these sites has trained its students and staff to source-separate their food waste in the cafeterias. The food waste is then cooked per Minnesota Animal Health Standards and fed to pigs. The program is estimated to reduce the volume of commercial waste requiring disposal by nearly 30 percent. This has resulted in cost savings to the district because of reduced MSW collection costs realized through a resource management program.

Pre-consumer commercial food waste, such as trimmings produced by restaurants and grocery stores, is compatible with a source-separated collection and processing program because it tends to be produced in higher volumes and is less likely to be contaminated with packaging.

Grocery stores have a financial incentive to reduce their waste stream because not only is trash service expensive, but trash takes up valuable space. Some stores have contracts for organics collection service, while others backhaul compostable materials to a distribution center where it is directed to a composting facility. Examples include Safeway¹⁴ and Whole Foods.¹⁵ Whole Foods even markets its own bags of finished compost in some of its stores.

Large-scale food waste diversion, whether collected with yard waste or as a separate commodity, is relatively new in the U.S. As such, compost facilities are becoming better at managing the material, and energy recovery technologies such as anaerobic digestion, are being considered by the public and private sectors alike. (Anaerobic

¹³ Source: Cedar Grove Composting website. <http://www.cedar-grove.com/services/compost.asp>

¹⁴ Source: Safeway website. <http://www.safeway.com/IFL/Grocery/CSR-Recycling>

¹⁵ Source: BioCycle, November 2004. <http://www.jgpress.com/archives/free/000309.html>

digestion will be discussed in more detail in the Evaluation of Alternative Technologies section of the County's Local Solid Waste Management Plan update.) As collection and processing capacity develop over time, it is expected that communities will begin to consider mandatory diversion and/or disposal bans for food waste.

8.4.6 Mandatory Recycling Ordinances/Disposal Bans

Regulatory options that include mandatory recycling ordinances and disposal bans have the potential to increase diversion at little cost to the local government. (Most costs incurred are related to enforcement of the ordinances/bans.) However, reliable management options must be available upon implementing such an approach.

Mandatory recycling ordinances typically require generators to separate a defined list of materials for recycling, or to recycle a certain percentage or number of the materials they generate. Enforcement of mandatory recycling ordinances is typically directed at the generator.

Disposal bans prohibit disposal of certain materials and/or limit solid waste loads to a maximum percentage of banned materials. Enforcement of disposal bans is usually directed at collectors, but can focus on generators and/or disposal facilities such as landfills and transfer stations. In 1989, the County banned leaf and yard waste from the Landfill. Effective December 1990, newspaper, kraft paper, corrugated cardboard, office paper, metals, glass, recyclable plastic, tires and batteries were banned from the Landfill.

Based upon experiences in other communities, it is observed that the most successful disposal bans have certain essential features in common including:

- Reasonably available alternatives to disposal exist and are relatively convenient for the generator;
- The disposal ban and alternatives to disposal are widely publicized;
- Support is built among stakeholders such as haulers, businesses, and residents; and
- A phase-in or grace period is used to introduce the program and allow a collection and processing infrastructure to develop or mature before strict enforcement is implemented.

In general, bans that are enacted without provision for enforcement, or with weak enforcement, are not effective.

In 2003 Portland Metro (Oregon) commissioned a study to determine the impact that mandatory recycling ordinances and disposal bans aimed at the commercial sector have on markets for recycled paper. The study investigated the impact of mandatory recycling and disposal bans on the quantity, quality, and price of recycled paper in five North American communities. The study found that these policies increased the amount of commercial fiber recovered, and that they had limited impact on fiber quality or price. Since most programs were adopted concurrently with other

enhancements to recycling programs and measurement methodology, the study did not attempt to isolate any specific impact on diversion rates.

The study also identified a number of factors that should be considered in terms of how they might impact government, collectors, processors and end-users when mandatory recycling or disposal bans are under consideration. A few are listed here as examples:

Government

- Outreach efforts need to include broad-based activities for the entire commercial sector, as well as sector-specific programs aimed at large-volume sources (e.g., packing and shipping, office buildings, etc.) and “problem” sources (e.g., food service and multi-tenant).
- Recycling collection costs and logistical problems for small generators tend to be prohibitive. Moreover, it is difficult for small generators to achieve savings from reduced trash service to offset their recycling costs. The jurisdiction should work to identify viable strategies such as shared bins, commercial rates that include the cost of recycling services, distributing and sharing costs among larger and smaller generators, drop-off sites, etc. that help reduce the economic burden for small- and medium-sized enterprises.
- Enforcement is essential. It must be integrated with outreach activities and not simply punitive.

Collectors

- Mandatory recycling ordinances and disposal bans increase the “demand” for recycling services and thus tend to increase competition among collection service providers. Traditional waste collection companies have more incentive to offer recycling services and compete against established commercial fiber recycling companies.

Processors

- Processors have experienced some increase in contamination after implementation of mandatory recycling ordinances and disposal bans, but not beyond what they can handle. Processors continue to be able to readily meet market specifications for the paper grades they produce.

End Users

- End users are generally “insulated” from local program issues. They draw supply from many sources, and local processors must deal with problem loads. Those contacted could not identify specific quality problems due to the mandatory recycling ordinances and/or disposal bans implemented by the five jurisdictions in this study.

A list of example ordinances and disposal bans is provided in Section 8.12 – Resources.

8.5 Diversion Potential

Most U.S. communities claim to have a diversion rate in the 40 to 50 percent range. The City of San Francisco, California announced in May of 2009 that the City had achieved a 72 percent recycling rate for 2007, up from 70 percent the year before.¹⁶ The City has a goal of 75 percent landfill diversion by 2010 and zero waste by 2020 and is making strides to achieving those goals. A mandatory C&D debris recovery ordinance was passed in 2006 and plays a large role in the City's high recycling rate. It is important to note, however, that comparing diversion and recycling rates among communities is challenging due to the manner in which different communities define and measure recycling and waste reduction, as well as the MSW stream.

A number of diversion programs could be considered by Broome County to enhance diversion beyond its current rate. These programs may include a mix of targeted programs focusing on specific materials (i.e., food waste) and/or specific sectors (i.e., commercial sector). Strategies for consideration include regulatory (i.e., disposal bans), policy changes (i.e., upgraded pay-as-you-throw), and programmatic (i.e., larger container sizes).

Tables 8-3 through 8-8 provide strategies for the County to consider for each sector (single family, multi-family, commercial, etc.) as well as strategies for increasing food waste diversion and strategies related to disposal bans and producer responsibility. R. W. Beck recommends that the County use these strategies as a guide to develop official waste diversion or zero waste goals. Each strategy could be ranked by diversion potential, as determined by the County.

One means of ranking diversion potential was developed by Skumatz Economic Research Associates, Inc. (SERA) for Metro Vancouver's (British Columbia) solid waste management system in 2007. SERA's diversion code ranking is provided in Table 8-3 below.

Table 8-3
Diversion Range Codes¹

Diversion Value	Diversion Description	Diversion Code
Very High	Over 5.0%	VH
High	Up to 5.0%	H
Medium	Up to 2.0%	M
Low	Up to 1.0%	L
Very Low	Up to 0.3%	VL
Super Very Low	Up to 0.06%	SVL

¹ Source: Skumatz Economic Research Associates, Inc.

¹⁶ Source: City & County of San Francisco website.
<http://sfgov.org/site/frame.asp?u=http://www.sfenvironment.org>

The ranking should be based upon a qualitative estimate of diversion potential, ease of implementation, and estimated cost to implement.

8.5.1 Single-Family Residential Waste Diversion Strategies

Table 8-4
Single-Family Residential Diversion Strategies

Implement a residential food waste disposal ban
Add food waste to yard waste collection
Increase illegal dumping fines
Implement curbside collection of C&D waste (by appointment)
Implement performance-based contracting for solid waste service contracts
Implement curbside collection of electronic waste (by appointment)
Implement county-wide volume-based rate structures for residential garbage
Implement bulky item recycling collection (by appointment)
Enhance waste screening at the Landfill for exclusion of banned recyclables
Adopt a compostable plastic bag mandate for yard waste and organics collection
Add dry cell batteries to existing curbside recycling program
Offer a thermometer exchange to replace mercury-containing fever thermometers with digital thermometers
Develop a pesticide container recycling program
Enforce Landfill ban of recyclable materials
Add additional materials to curbside recycling program
Require all haulers to leave education tags for customers who set out improperly prepared items and/or contamination

8.5.2 Multifamily Residential Waste Diversion Strategies

Table 8-5
Multifamily Residential Diversion Strategies

Establish mandatory recycling requirement for all multifamily buildings
Monitor multifamily properties to verify that adequate recycling is provided and is as convenient as garbage disposal
Expand residential food and yard waste collection to multifamily properties
Implement bulky item recycling collection (by appointment)
Adopt minimum requirements for space for recycling containers at new multifamily developments
Increase recycling education to multifamily residents
Provide apartment-sized recycling totes or bags to multifamily dwelling units

8.5.3 Commercial Waste Diversion Strategies

Table 8-6
Commercial Diversion Strategies

Establish an overall mandatory recycling requirement for businesses to achieve by a prescribed date/year
Expand inspection & enforcement program
Conduct/expand commercial and institutional waste audits
Require commercial haulers to offer recycling service of certain materials
Offer residential garbage rates to businesses who generate <90 gallons/week
Implement weight-based commercial garbage rates (incorporates disincentive to dispose organics)
Establish a commercial food waste collection and composting program
Establish mandatory food scrap diversion in commercial waste
Promote reusable transport packaging
Develop a pesticide container recycling program
Work with local businesses to promote green purchasing and business practices

8.5.4 Food Waste Diversion Strategies

Table 8-7
Food Waste Diversion Strategies

Increase availability of commercial food waste collection and composting
Implement a commercial food waste disposal ban
Implement a residential food waste disposal ban
Implement commercial weight-based garbage rates (incorporates disincentive to dispose organics)
Enhance residential curbside organics collection to include all food waste
Implement multifamily collection of food waste
Adopt a permit requirement that states restaurants must have food waste collection space
Provide technical assistance to commercial kitchens
Establish new mandatory food scrap diversion in commercial waste
Establish a commercial food scrap collection program with subsidized tip fee
Investigate/potentially implement an anaerobic digestion program for organics processing, possible biofuels production

8.5.5 C&D Debris Diversion Strategies

Table 8-8
C&D Debris Diversion Strategies

Incentivize development of private mixed C&D debris recycling facility
Require C&D waste pre-processing for commingled material
Ban PVC plastic packaging
Implement a disposal ban on all (or specific types of) C&D waste
Increase illegal dumping fines
Create a larger difference between disposal tip fee and fee to deliver source-separated C&D waste
Promote salvage and reuse swap sites
Encourage market development for C&D materials
Research feasibility of a take-back program for carpet
Building & demolition permit to include a C&D reuse and recycling fee deposit
Take-back program for used building materials at home product centers
Residential collection of C&D waste (by appointment)
Pre-approved certification of C&D recycling compliant facilities
Pilot deconstruction and salvage projects
Mandatory waste diversion plan for projects over a specified size
Mandatory C&D recycling of 75 percent (example) including development of notification, education and verification of compliance
Recycle 75 percent of construction, remodeling and demolition (CR&D) waste at projects with a permit value over \$50,000 (numbers are provided as an example)

8.5.6 Producer Responsibility, Disposal Bans and Disposal Fee Strategies

Table 8-9
Extended Producer Responsibility, Disposal Bans, Retail, and Advance Disposal Fee Programs

Ban PVC plastic packaging
Implement a commercial food waste disposal ban
Implement a residential food waste disposal ban
Establish a take-back program for product packaging by retail sellers
Charge a fee on incandescent bulbs to fund fluorescent bulb recycling
Enforce disposal ban for recyclables in commercial waste
Establish a take-back program for used building materials at home product centers

Table 8-9
Extended Producer Responsibility, Disposal Bans, Retail, and Advance Disposal
Fee Programs

Establish a take-back program for carpet
Establish a take-back program for electronic waste
Enhance waste screening at landfill for exclusion of banned recyclables
Encourage/mandate the use of reusable transport packaging
Implement a compostable plastic bag mandate for yard waste and organics collection
Establish a product ban for polystyrene to-go containers and single-serve foodservice
Implement a take-back program for foam packaging – negotiate with the Association of Foam Packaging Recyclers
Implement a packaging tax
Establish/encourage an eco-labeling program in retail stores
Encourage/mandate retailers to charge an advance disposal fee (ADF) on disposable shopping bags (or alternatively, provide a per-bag discount for shoppers who bring their own reusable bags)
Implement a phased ban on plastics in food takeout containers and utensils/shift to compostable disposables
Enforce Landfill ban of recyclable materials

To achieve significant increases in diversion, the County would need to embark on systematic incremental planning that includes commitments from stakeholders to implement specified waste diversion strategies, as well as commitment on the part of local government to provide adequate enforcement.

8.6 Steps in Developing Diversion Projections

To determine the current and future waste diversion projections for Broome County, R. W. Beck recommends the following steps:

- Identify the current MSW and C&D composition by quantity and material types (preliminary estimates are included in Appendix A);
- Gather data on current diversion quantities by material type;
- Calculate current waste generation by summing the material quantities disposed with quantities diverted;
- Identify additional waste diversion programs by material type that are planned for implementation or could be implemented in the future;
- Divide the future planning period into five-year increments for further analysis;
- Calculate waste diversion for MSW, C&D and combined sectors for each of the five-year increments to develop waste diversion projections both in the aggregate and by material type;

- Apply a waste generation growth rate to the existing generation rate based on existing per-capita waste generation rates and agreed-upon population growth rates; and
- Project waste generation, disposal, and diversion quantities for the planning period.

8.7 Education Tactics

Educating stakeholders (in this case, government officials; MSW, C&D, and recyclable materials haulers, processors, and end-users; businesses; multifamily building owners/managers; the general public; etc.) about a zero waste approach to waste management is critical in order to obtain key stakeholder feedback and support. Developing a zero waste policy and getting it adopted, would most likely take at least a year. Once adopted, multiple education tactics should be implemented in order to educate the stakeholders in the County.

Education and outreach tools should be developed to focus on particular types of waste (such as food waste and C&D debris) as well as particular sectors (single-family, multifamily, commercial). Disseminating education might be done through:

- Website/Intranet/Internet (which can be used to convey various types of information as well as provide access to some of the other tools listed below);
- List serve;
- Email bulletin;
- Conferences/seminars/workshops to inform various sector representatives or specific waste collectors and processors of the zero waste plan;
- Fact sheets (e.g., detailing requirements of the policy, alternatives to disposal, commodity-specific fact sheets, etc.); and
- Technical assistance to businesses (e.g., waste audits).

It is suggested that, to the extent possible, all education and outreach materials be offered electronically in order to minimize waste and expenses.

Also, it will be critical for the County to educate all stakeholders about the County's zero waste plan and provide periodic updates regarding the progress made with regard to the policy, so that the County's dedication to reducing waste and minimizing health and environmental impacts is conveyed.

8.8 Capital and Operating Expenses

The capital and operating expenses to implement a zero waste plan would be dependent on the breadth of the program, but would most likely be sizable, because a policy change such as this would be far-reaching and affect most sectors within the County. A zero waste plan would require dedicated staff time for policy development, increased education efforts (including designing and distributing education pieces,

website development, site visits and audits, additional data tracking, etc.), and policy enforcement. The extent of the capital expenditures would depend on the level of involvement from the County. Zero waste programs not only require policy, regulatory, and contractual changes be made, but also programmatic changes. If the County took a hands-on approach to making changes to its waste diversion programs (e.g., expanded its C&D program, expanded its composting program to include food waste, or subsidized the purchase of containers for volume-based collection, etc.), the capital expenses could be great. However, if most program changes were implemented by the private sector, the County would have less capital expenditures. Regardless of the approach, a large capital expenditure for a zero waste campaign would be the ongoing promotional and education pieces.

A successful zero waste program would inevitably reduce the amount of waste requiring disposal, thus reducing the revenue from tipping fees received at the Landfill and possibly reducing Landfill operating expenses.

While developing and implementing policies are most likely activities that are part of existing staff time, a zero waste policy would most likely require additional time and labor because of its scope and ongoing need for monitoring and enforcement. Many municipalities have dedicated staff to specifically implement and maintain a zero waste program. These programs, as described in this issue paper, are multi-faceted and take many years to fully implement. Section 8.9 provides a basic outline of the implementation requirements, however the extent of the requirements is something that would be determined by the County.

8.9 Implementation Requirements

If the County were to move forward with researching the zero waste concept, it may consider forming a task force or a “team” of stakeholders to consider the practicability and implications of such a plan. The steps required to implement a zero waste plan might include, but not be limited to:

- Research other communities that have implemented a zero waste plan to ensure all stages of the process are included;
- Determine Broome County’s current diversion rate;
- Develop a diversion plan including a list of sectors and materials to target for diversion;
- Develop diversion projections for the near future and for the long-term (e.g., twenty years);
- Set goals and target dates for future waste diversion;
- Inform stakeholders of intent to develop a zero waste policy;
- Solicit stakeholder input;
- Identify goals of the policy;
- Develop the policy;

- Inform stakeholders of the policy;
- Present/adopt the policy;
- Develop policy tools;
- Educate stakeholders about policy tools;
- Evaluate the effectiveness of the policy and supporting programs (ongoing basis); and
- Enforce the policy (ongoing basis).

Based upon R. W. Beck's review of waste diversion rates in several communities with successful recycling programs, we note that reaching diversion targets greater than 50 percent requires a strong commitment by the local government, participating municipalities, waste haulers, processors, and end-users, manufacturers, producers and retailers, and by the residents and businesses which generate waste.

One barrier to increasing diversion can be the lack of uniformity in program services and requirements throughout the County. The variety of recycling services offered can make it more difficult to assess the impact of program enhancements or to provide consistent technical assistance to businesses and residents.

The adoption of certain minimum standards for recycling services could serve to standardize expectations in both urban and rural areas. Standardizing service levels could reduce costs as jurisdictions could share technical assistance, education, and promotional materials and programs.

It should be noted that recycling alone will not increase diversion significantly. Nationwide, waste generation per person continues to increase each year. As a result, the proportion of waste being diverted has remained stagnant in many communities, while the volume of waste requiring disposal continues to grow.

8.10 Addressing Stakeholder Concerns

The implementation of a zero waste plan would most likely impact every sector of Broome County. Stakeholders would include, but not be limited to, government officials; MSW, C&D, and recyclable materials haulers, processors and end-users; residents; business owners and managers; multifamily building owners and managers; product manufacturers, producers and retailers; and the Landfill Citizen Advisory Committee.

As mentioned in Section 8.9 – Implementation Requirements, the County may want to consider establishing a task force to discuss the concept of zero waste, determine diversion strategies, and consider the policy language and implications. One role of the task force would be to address concerns which may include, but not be limited to:

- Resistance from residential, commercial, C&D and food waste stakeholders to mandatory bans of specific materials;
- Concerns from cities, towns and villages regarding potential increase in duties to monitor recycling ordinances and/or disposal bans;

- Concerns from contractors, developers, and business owners regarding perceived cost increases to comply with disposal bans (i.e., the need to provide multiple containers or dumpsters to divert multiple materials);
- Concerns from product manufacturers and retailers regarding take-back programs; and
- Concerns from haulers required to collect and haul an increased number of source-separated materials.

8.11 Benefits and Drawbacks

Implementing a zero waste plan has benefits as well as drawbacks, as outlined below.

8.11.1 Benefits

The benefits of a zero waste plan to the County may include, but not be limited to, the following:

- A reduction in MSW quantities landfilled resulting in GHG emissions reduction.
- Disposal bans and recycling ordinances increase the quantities of materials recycled and diverted from disposal.
- Packaging bans and incentives to buy in bulk can lead to increased waste diversion, thus increasing the life of the Landfill.
- Products and services that use fewer resources (such as water and energy) save natural resources.
- Expanded materials processing and markets create new business opportunities.
- EPP programs increase the demand for recycled materials to be used as feedstock for recycled-content products.
- When held accountable for the materials they produce, manufacturers have an incentive to create less waste. Promotes designs that consider the entire product life cycle.
- An overall increase in awareness of recycling and environmental-related issues and a potential move towards increased sustainability.
- A reduction in hazardous waste, toxic emissions, and energy waste.

8.11.2 Drawbacks

The drawbacks to implementing a zero waste plan would most likely be financial. Increased staff time and resources would be needed to develop a zero waste plan and policies; track the County's diversion rate; increase outreach, education and technical assistance efforts; and enforce the policies, bans and ordinances.

In addition, it may be difficult to obtain support from community leaders and stakeholders regarding the zero waste concept.

As stated in previous issue papers, when considering the “cost” of recycling and waste diversion programs there are both “economic” considerations and “non-economic” considerations. Under economic considerations, the County must take into account the reduction in revenue from tipping fees received at the Landfill as a result of a successful zero waste program. Also, the cost of a zero waste program should be compared with the cost of landfill disposal, including transportation costs and long-term disposal obligations after the landfill is closed (post-closure obligations). For “non-economic” considerations there are factors such as environmental sustainability, carbon footprint, public desire for and participation in recycling and waste diversion, and New York State Rules and Regulations. These factors should all be considered as the County formulates its integrated solid waste management planning efforts.

8.12 Resources

Provided below is a list of program information supporting R. W. Beck’s analysis which may assist the County.

- City of Austin, Texas – Zero Waste Plan
<http://www.ci.austin.tx.us/sws/0waste.htm>
- GrassRoots Recycling Network
<http://www.grn.org/zerowaste/>
- Metro Portland study “Impact of Mandatory Recycling Ordinances and Disposal Bans on Commercial Fiber Recycling,” by Moore & Associates.
<http://www.oregonmetro.gov/index.cfm/go/by.web/id=19318>
- City of Oakland, California – Zero Waste Resolution and Strategic Plan
<http://www.zerowasteoakland.com/Page749.aspx>
- Product Stewardship Institute
<http://www.productstewardship.us/index.cfm>
- RecycleBank
<https://www.recyclebank.com/>
- San Francisco, California – Zero Waste Legislation and Initiatives
<http://sfgov.org/site/frame.asp?u=http://www.sfenvironment.org>
- Zero Waste Alliance
<http://www.zerowaste.org/>
- Zero Waste International Alliance
<http://www.zwia.org/index.html>

Green Building Resources

- BREEAM
<http://www.breeam.org/>
- Green Globes
<http://www.greenglobes.com/>
- U.S. Green Building Council
<http://www.usgbc.org/Default.aspx>
- World Green Building Council
<http://www.worldgbc.org/home>

Examples of Recycling Ordinances and Disposal Bans

- City of Cambridge, Massachusetts
<http://www.cambridgema.gov/TheWorks/departments/recycle/ordinance.html>
- Central Vermont Solid Waste Management District
<http://www.cvswmd.org/wp/cvswmd-to-amend-surcharge-ordinance/>
- City of Durham, North Carolina
<http://www.ci.durham.nc.us/departments/solid/pdf/ordinance.pdf>
- City of Gainesville, Florida
<http://www.cityofgainesville.org/GOVERNMENT/CityDepartmentsNZ/Recycling/MandatoryCommercialRecycling/tabid/488/Default.aspx>
- Lee County, Florida
http://www3.leegov.com/solidwaste/uploads/Final_Scanned_Ordinance.pdf
- Linn County, Iowa – Corrugated Cardboard Recycling Ordinance, Chapter 35
http://www.linncounty.org/content.asp?Page_Id=836&Dept_Id=6
- Nova Scotia, Canada
<http://www.gov.ns.ca/nse/waste/regulations.asp>
- City of Portland, Oregon
<http://www.portlandonline.com/osd/index.cfm?c=47899&>
- San Francisco, California
http://www.sfenvironment.org/downloads/library/mandatory_pdf.pdf
- Solid Waste Association of North America (SWANA) Technical Policy on Solid Waste Disposal Bans
<http://www.swanacal-leg.org/downloads/T-32%20Policy%20on%20Solid%20Waste%20Disposal%20Bans.pdf>

Appendix A

MSW and C&D Debris Estimates by Material Type

Broome County

As part of Broome County's Local Solid Waste Management Plan update, R. W. Beck assessed the County's waste stream for future diversion potential. R. W. Beck identified recent waste characterization studies completed for communities with demographics and solid waste management systems similar to those of Broome County. Together, the County and R. W. Beck selected the 2005 composition results for Cedar Rapids/Linn County, Iowa from the Iowa Statewide Waste Characterization Study as an appropriate comparison. Table A-1 below lists the estimated quantities of material in Broome County's waste stream that were calculated by applying the County's 2007 MSW landfill tonnage (148,904 tons)¹ to the MSW composition results from Cedar Rapids/Linn County.

Table A-1 Cedar Rapids/Linn County MSW Composition Percentages Applied to Broome County 2007 MSW Landfill Tonnage			
Material Group	Material	CR - Linn Co Avg Percent Comp.	Broome County 2007 Tons
Paper	Compostable Paper	7.1%	10,541
Paper	High Grade Office	1.6%	2,373
Paper	Magazines	1.0%	1,507
Paper	Mixed Recyclable Paper	5.3%	7,904
Paper	Newsprint	2.4%	3,546
Paper	Non-Recyclable Paper	4.3%	6,432
Paper	OCC and Kraft Bags	3.5%	5,155
Total Paper		25.2%	37,458
Plastics	# 1 PET Deposit Beverage Containers	0.3%	400
Plastics	# 1 PET Beverage Containers	0.5%	702
Plastics	# 2 HDPE Containers	0.9%	1,324
Plastics	Film/Wrap/Bags	6.3%	9,348
Plastics	Other # 1 PET Containers	0.2%	331

¹ Source: Landfill Tonnage by Material from "Broome County Executive Summary, Division of Solid Waste Management, As of December 31, 2007 – Final." The tons include General MSW plus Municipal MSW from Cleanup Events.

Table A-1 Cedar Rapids/Linn County MSW Composition Percentages Applied to Broome County 2007 MSW Landfill Tonnage			
Material Group	Material	CR - Linn Co Avg Percent Comp.	Broome County 2007 Tons
Plastics	Other Plastic Containers	0.4%	650
Plastics	Other Plastic Products	6.5%	9,642
Total Plastics		15.0%	22,398
Metals	Aluminum Beverage Containers	0.1%	113
Metals	Aluminum Deposit Beverage Containers	0.1%	202
Metals	Ferrous Food and Beverage Containers	1.7%	2,570
Metals	Other Aluminum Containers	0.1%	120
Metals	Other Ferrous Metals	3.5%	5,272
Metals	Other Non-Ferrous Scrap	0.5%	688
Total Metals		6.0%	8,965
Glass	Blue Glass	0.0%	71
Glass	Brown Glass	0.0%	57
Glass	Clear Glass	0.8%	1,202
Glass	Glass Deposit Containers	0.3%	427
Glass	Green Glass	0.1%	174
Glass	Other Mixed Cullet	1.0%	1,531
Total Glass		2.3%	3,463
Yard Waste	Pumpkins	0.7%	1,088
Yard Waste	Yard Waste	0.9%	1,290
Total Yard Waste		1.6%	2,379
Food Waste	Food Waste	12.4%	18,477
Total Food Waste		12.4%	18,477
Wood	Non-Treated	4.2%	6,268
Wood	Treated	6.1%	9,085
Total Wood		10.3%	15,353
Demolition/ Renovation/ Construction Debris	C&D Debris (Excluding Wood)	8.9%	13,185
Total Demolition/Renovation/Construction Debris		8.9%	13,185
Durables	Cell phones and Chargers	0.0%	14
Durables	Central Processing Units/Peripherals	0.2%	236

Table A-1 Cedar Rapids/Linn County MSW Composition Percentages Applied to Broome County 2007 MSW Landfill Tonnage			
Material Group	Material	CR - Linn Co Avg Percent Comp.	Broome County 2007 Tons
Durables	Computer Monitors/TV'S	0.2%	295
Durables	Electrical and Household Appliances	1.1%	1,615
Durables	Other Durables	2.8%	4,189
Total Durables		4.3%	6,350
Textiles And Leathers	Textiles and Leathers	3.3%	4,884
Total Textiles And Leathers		3.3%	4,884
Diapers	Diapers	2.5%	3,773
Total Diapers		2.5%	3,773
Rubber	Rubber	0.2%	330
Total Rubber		0.2%	330
HHW	Automotive Products	0.0%	24
HHW	Household Cleaners	0.0%	30
HHW	Lead Acid Batteries	0.0%	-
HHW	Mercury Containing Products	0.0%	5
HHW	Other Batteries	0.3%	465
HHW	Other HHW	0.2%	263
HHW	Paints and Solvent	0.0%	28
HHW	Pesticides, Herbicides, Fungicides	0.0%	-
Total HHW		0.5%	815
Sharps	Sharps	0.0%	6
Total Sharps		0.0%	6
Other Organic	Other Organic	1.2%	1,787
Total Other Organic		1.2%	1,787
Other Inorganic	Other Inorganic	2.8%	4,137
Total Other Inorganic		2.8%	4,137
Fines/Super Mix	Fines/Super Mix	2.1%	3,121
Total Fines/Super Mix		2.1%	3,121
Other	Other	1.4%	2,024
Total Other		1.4%	2,024
		100.0%	148,904

Note: Totals may not sum due to rounding.

As stated in Issue Paper #3 – Construction & Demolition Debris Recycling, the County does not require C&D debris to be separated from MSW when brought to the Landfill. The Landfill does track the tonnage of mixed C&D debris that comes in as dedicated loads from area contractors. In 2007, the Landfill accepted approximately 22,400 tons of dedicated C&D debris. (The Landfill also received C&D mixed with MSW, however the quantities are unknown because the loads were recorded as MSW tons.) For planning purposes, R. W. Beck applied the C&D percentages from the 2008 Bartow County, Georgia visual C&D waste characterization study to Broome County's 2007 C&D debris tonnage, as shown in Table A-2 below.

Table A-2 Estimate of C&D Tonnage, by Material Type Accepted at the Broome County Landfill		
Tier 1 Materials	Projected Tonnage	Percent of Total
Non-Treated Wood	6,642	29.60%
Treated Wood	3,613	16.10%
Asphalt Shingles	3,052	13.60%
Pressboard and other sheet lumber	1,503	6.70%
Gypsum Board	1,257	5.60%
<i>Tier 1 Materials Sub-total</i>	<i>16,066</i>	<i>71.60%</i>
Tier 2 Materials	Projected Tonnage	Percent of Total
Yard Waste	808	3.60%
Ferrous Metal	740	3.30%
Carpet	516	2.30%
Non-Reinforced Concrete	494	2.20%
MSW	471	2.10%
OCC	449	2.00%
Rubber	314	1.40%
Other Masonry	292	1.30%
Soil	247	1.10%
Glass	247	1.10%
Plastic - Other Plastic Products	224	1.00%
Brick	224	1.00%
Reinforced Concrete	157	0.70%
Expanded Polystyrene	157	0.70%
Textile	135	0.60%
Durables - Electrical Appliances, Computer, TV's	112	0.50%

Table A-2 Estimate of C&D Tonnage, by Material Type Accepted at the Broome County Landfill		
Tier 1 Materials	Projected Tonnage	Percent of Total
Office Paper	112	0.50%
Tile	112	0.50%
PVC	112	0.50%
Other Paper	90	0.40%
Crushable Inerts	67	0.30%
Asphaltic Concrete	67	0.30%
Linoleum	45	0.20%
Plastic Film/Wrap/Bags	45	0.20%
Other Inerts	22	0.10%
Insulation	22	0.10%
Tires	22	0.10%
Non-Ferrous Metal	22	0.10%
Newspaper	0	0.00%
Aluminum	0	0.00%
Wood Packaging	0	0.00%
Phonebooks	0	0.00%
Food Waste	0	0.00%
Brush	0	0.00%
Dirt/Fines	0	0.00%
Drywall/Sheetrock	0	0.00%
HHW	0	0.00%
Magazines	0	0.00%
Other Non - C&D (please Specify)	0	0.00%
Other C&D	0	0.00%
Rock	0	0.00%
<i>Tier 2 Materials Sub-total</i>	6,328	28.20%
Total	22,394	99.80%

Note: Totals may not sum due to rounding.

9.1 Overview

Broome County (County) currently provides several options for residents and businesses in the County to divert organics (yard waste, food scraps, wood waste) from the waste stream including:

- Large-Scale Composting – Yard waste (including leaves, brush, grass clippings and tree limbs) was banned from the Broome County Landfill (Landfill) in 1989. The County has a designated area at the Landfill for composting these materials. Finished compost is offered to County residents, while supplies last. In addition to the Landfill, yard waste may also be delivered to Boland's Top Soil in Conklin or Robinson Hill Nursery in Johnson City for proper disposal/composting. Most garbage haulers in the County offer curbside collection of yard waste as either part of their regular collection service or for an additional fee. The Village of Endicott operates a yard waste compost facility that serves Endicott, the Town of Union and the Town of Vestal.
- Backyard Composting – The County encourages backyard composting and offers a fact sheet and basic information on the County's Solid Waste web page. The County also contracts with Cornell Cooperative Extension (CCE) for direct educational outreach and CCE has a composting education program that includes home composting. Together the County and CCE promote backyard composting through workshops, classroom programs, bin sales and ad campaigns.
- Grasscycling – The County encourages residents to leave grass clippings on the lawn instead of bagging them, as a waste reduction measure. The County has a Grasscycling brochure posted on the Solid Waste web page and encourages residents to call CCE for more information.
- Food Donation – The County encourages donation of non-perishable food items to local food pantries and lists several locations that accept food donations in its Recycling/Reuse Guide located on the Solid Waste web page.

This issue paper will address options for expanding the current programs as well as alternative options for the County to consider in an attempt to increase organics diversion in Broome County.

9.2 Diversion Options

9.2.1 Large-Scale Composting

Currently the County actively composts yard waste using the windrow method at the Landfill. In an effort to increase diversion, the County could consider composting additional materials such as biosolids (the nutrient-rich organic materials resulting from the treatment of sewage sludge) and/or food waste.

9.2.1.1 Biosolids Composting

Currently the County accepts biosolids that are delivered to the Landfill and the material is buried. The disposal of biosolids is a County-wide issue and diversion options for biosolids will be discussed in more detail in the evaluation of alternative technologies section of the County's Local Solid Waste Management Plan update.

9.2.1.2 Food Waste Composting

Commercial/industrial/institutional (CII) food waste (typically generated from grocery stores, hotels, restaurants, and institutions such as universities, hospitals and prisons) is an ideal feedstock for composting. The material usually consists of pre-consumer food waste such as raw fruit and vegetable peelings and meat waste,¹ as well as post-consumer waste such as leftovers. In addition, certain types of paper (including non-recyclable waxed corrugated cardboard, paper towels, paper plates, etc.), can also be diverted from the garbage and composted.

Residential food waste is also an ideal feedstock for composting, however, it is logistically more difficult to collect than CII food waste. The collection of food waste is discussed in Section 9.2.4 of this issue paper.

The downstream diversion of food waste will be discussed as part of the municipal solid waste (MSW) composting options in the alternative technologies evaluation section of the County's Local Solid Waste Management Plan update.

9.2.2 Backyard Composting

Currently the County encourages backyard composting and contracts with Cornell Cooperative Extension (CCE) for direct educational outreach. CCE distributes a quarterly composting newsletter and has a Home Composting Demonstration Site for members of the community to visit that features commercial and homemade compost bins. Also, the County sells backyard compost bins (at cost) year round at the Landfill.

In an effort to increase backyard composting, the County and CCE could consider offering more workshops throughout the year and increase the advertising for compost bin sales. In addition, the County could consider expanding the Backyard Composting information on the Solid Waste website to include more information such as

¹ Typically fats, meats, and bones are acceptable in large-scale, properly managed composting systems.

troubleshooting, health and safety, preventing animal nuisances, pH and temperature control, etc. Links to other organization's backyard composting websites are provided in Section 9.10 - Resources.

9.2.3 Small-Scale Vermicomposting

Vermicomposting (composting with worms) is an easy way to divert food waste from the garbage by turning food scraps into a rich soil amendment. It can be done indoors, requires little space, and is odorless, if maintained correctly. Vermicomposting typically utilizes redworms, also called "red wigglers," because the species thrive in small, confined spaces and they tolerate a wide range of conditions. CCE usually offers a worm composting workshop for Broome County residents every year. Attendees receive a worm container, bedding and starter worms all free of charge. In addition, CCE also holds an annual vermicomposting workshop specifically designed for school teachers.

One option the County may consider to increase worm composting, is to add a vermicomposting webpage to the County's Solid Waste website. The information could include how to start a worm composting bin, troubleshooting, and where to purchase redworms. In addition, the County could consider having a "worm sale" once a year. Vermicomposting can be an educational project for school children and could be incorporated into the County/CCE's waste reduction and recycling outreach efforts.

9.2.4 Food Waste Collection/Diversion

Nationwide, food waste accounts for an estimated 12.5 percent² of MSW. At a time when many recycling programs have hit a plateau, food waste is commonly the next segment of MSW to be tapped for diversion. Collecting food waste is often more challenging than collecting typical recyclable materials. Some of the hurdles to collecting food waste from both residential and CII generators include space considerations, the costs of collection containers and vehicles, and the distance to the composting/processing facility.

Currently, there are no large-scale facilities in the County that actively compost post-consumer food waste or co-compost food and yard waste. The State University of New York (SUNY) Binghamton campus composts some food waste in a static pile and transports some to Pennsylvania where it is co-composted with yard waste and manure. Frito-Lay in Kirkwood has a pre-consumer organic waste recycling program that produces livestock feed. Delaware County, east of Broome County, owns and operates an MSW co-composting facility near Walton, New York. Large-scale food waste or organics composting facilities are typically more economically viable in locations that have high tipping fees for MSW disposal (>\$50/ton), whose construction and/or operations are subsidized in some way, or where there are specific long-term economic considerations that lower the present worth cost over a 20-year

² Source: "MSW Generation, Recycling, and Disposal in the United States: Facts and Figures for 2007," U.S. EPA. <http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw07-fs.pdf>

planning period (e.g., landfill air space). Nevertheless the following information on food waste collection and diversion is provided for the County's reference, as food waste diversion opportunities may arise in the future.

9.2.4.1 Residential Collection

As mentioned in Issue Paper #8 – Zero Waste, several communities in the United States have implemented curbside collection of residential food waste and food-soiled paper (e.g., paper towels, napkins, paper plates, tissues, etc.) in the same container as yard waste. Links to some of these programs (including Seattle, WA; San Francisco, CA; Alameda County, CA; Cedar Rapids, IA; and Hutchinson, MN) are provided in Section 9.10 - Resources. The co-collection of food waste with yard waste is possible in places where processing facilities receiving the materials are permitted to accept both food and yard waste.

While some of the program examples are located in communities much larger than Broome County, it should be noted that two residential organics collection programs are operating on a smaller scale: Hutchinson, Minnesota, with a 2007 population estimate of 13,929 and Cedar Rapids, Iowa with a 2007 population estimate of 126,396.

Most residential food waste collection programs utilize lidded, wheeled carts and automated collection vehicles for the curbside collection of food and yard waste. Because the County does not operate or manage the collection of MSW, recyclable materials or yard waste in the County, the issue of purchasing or using carts for organics collection would have to be researched and discussed with the municipalities and private haulers who operate collection programs within the County. The issues would be similar to those discussed in Issue Paper #10 – Single-Stream Recycling Collection Methods, Bins vs. Carts and include, but not be limited to:

- Cost of carts;
- Compatibility with haulers' current collection vehicles;
- Cart maintenance; and
- Residents' lack of space to store carts.

In addition to the types of carts referenced in Issue Paper #10, many organics collection programs are using aerated carts such as SSI Schaefer's "Compostainer"³ or IPL's "Bio Cart."⁴

While the quantities of organic materials may increase with the use of wheeled carts, there is also the potential for an increase in contamination of "non-targeted" materials (items that are defined by the County as not acceptable) to be placed in the carts. Some residents may place garbage or recyclable materials in their organics cart if they are confused about the program, their trash container is full, or as a way to avoid purchasing specially-marked bags, such as those required for garbage collection in the City of Binghamton.

³ Source: SSI Schaefer website. <http://www.ssi-schaefer.ca/WR/WRproAP.html#wr2>

⁴ Source: IPL website. <http://www.ipl-plastics.com/Afficher.aspx?page=197&langue=en>

9.2.4.2 Commercial/Industrial/Institutional Collection

Implementing a food waste collection program with the CII sector can be easier than implementing a residential food waste collection program, because there are fewer generators so education tends to be more site-specific or one-on-one. Also, because of the larger quantities generated, a commercial business can often use a dumpster, a roll-off container, or a compactor for food waste which many haulers are capable of servicing using their current fleet of collection vehicles.

Pre-consumer commercial food waste, such as trimmings produced by restaurants and grocery stores, is ideal for composting because it tends to be produced in higher volumes and is less likely to be contaminated with packaging.

Grocery stores have a financial incentive to reduce their waste stream because not only is trash service expensive, but trash takes up valuable space. In some communities, stores have contracted for organics collection or they backhaul compostable materials to a distribution center where it is directed to a composting facility.

Some grocery store food discards may be packaged in plastic wrap, which does not decompose and can pose handling issues in a compost system and contamination issues if not screened out at the end of the process. To reduce the impact of plastic packaging, grocery stores should be educated to remove packaging prior to setting out material for collection, and the finished product should be screened to make sure no stray plastic bits remain. Fats, meats, and bones are acceptable in a large-scale composting system.

The Windham Solid Waste Management District (WSWMD) in southern Vermont accepts old corrugated cardboard (OCC) and non-recyclable paper in its commercial composting program for economic reasons. While they had preferred to recycle OCC back into paper products, it was not economical to dispatch a separate truck for OCC collection and a truck for organics collection in their rural service area.⁵

In Seattle, post-consumer commercial food, such as cafeteria waste contaminated with takeout containers, paper plates, cups, etc. is diverted and processed by co-composting it with yard waste. A key to success with post-consumer food waste is that the containers and cutlery must be compostable. Many products advertise that they are “biodegradable,” although whether a material that claims to be biodegradable can *actually* be composted is dependent on the receiving facility and its processes. Therefore a material testing and approval program, such as the one managed by Cedar Grove Composting⁶, the private company that processes Seattle’s post-consumer cafeteria waste, is suggested before biodegradable items are accepted in the food waste program.

The St. Paul, Minnesota Independent School District recently implemented a large-scale, post-consumer food waste composting program. This district has more than 42,000 students and 80 different schools. In the 2007/08 school year, 52 schools within the district implemented a food-for-livestock program. Each of these sites has

⁵ Source: “Public/Private Partnering Facilitates Organics Diversion,” by Robert Spencer, BioCycle June 2008. <http://www.jgpress.com/archives/free/001662.html>

⁶ Source: Cedar Grove Composting website. <http://www.cedar-grove.com/services/compost.asp>

trained its students and staff to source-separate their food waste in the cafeterias. The food waste is then cooked per Minnesota Animal Health Standards and fed to pigs. The program is estimated to reduce the volume of commercial waste requiring disposal by nearly 30 percent. This has resulted in cost savings to the district because of reduced MSW collection costs realized through a resource management program.

As collection and processing capacities develop over time, it is expected that more communities will consider mandatory diversion and/or disposal bans for food waste.

9.3 Rules and Regulations

The management of organics composting, including siting and permitting, is regulated at the state level with the exception of biosolids and animal manures. In New York, composting biosolids is regulated by both State and Federal regulations.

New York state requirements for facilities involved in composting of sewage sludge, food, yard and other solid wastes are subject to regulation under the Comprehensive Revisions and Enhancements to Title (6 NYCRR) Subpart 360-5: Composting Facilities⁷. The regulations apply to the construction and operation of composting and other organic waste processing facilities for mixed solid waste, source separated organic waste, biosolids, septage, yard waste and other solid waste. These requirements include general requirements, pollutant limits, operational standards, monitoring, record keeping and reporting. Permitted facilities in New York must submit an annual report pertaining to the above requirements.

Local regulations related to the collection of organics typically include hauler licenses/permit requirements and published ordinances.

9.4 Implementation Requirements

Currently the County actively composts yard waste (including leaves, brush, grass clippings and tree limbs) in windrows at the Landfill. In an attempt to increase organics diversion from the Landfill, the County would need to research and evaluate its diversion options. Composting food waste (with MSW) and biosolids will be discussed in the alternative technologies evaluation section of the County's Local Solid Waste Management Plan update.

Expanding backyard composting and small-scale vermicomposting could be done with increased staff effort. However, to implement a large-scale food waste diversion program (separate from an MSW composting program) would require the development of the infrastructure needed to collect and process the material. As stated previously, there are no facilities in the County that actively compost food waste or co-compost food and yard waste at this time. Whether a public or private facility is developed, the County would need to consider:

- Facility permitting;

⁷ Source: NYSDEC website. <http://www.dec.ny.gov/regs/4411.html>

- Acquisition of feedstock;
- Management/monitoring of composting operation;
- Health and Safety;
- Cost; and
- Other site-specific considerations.

In addition, the collection of the organic material would need to be evaluated for both the residential and commercial sectors and would include, but not be limited to:

- Collection container options and compatibility with haulers' current collection vehicles;
- Public Education; and
- Cost.

The County may want to consider implementing a pilot study to gather more data on the logistics and effects of an organics collection program.

Public/private ownership and operation of a food waste/organics composting facility may be an option for the County to consider. Typically, such partnerships would utilize the financing advantages of the public sector entity (i.e., lower cost of capital) and the operational expertise of the private sector. If the County considered this option, staff time would be needed to develop and distribute a Request for Information (RFI) to firms with capabilities and interest in providing the services of composting organic materials. The approach could include an incentive in which the County provides the land for use at a minimal cost and then contracts with a private firm to operate the processing facility.

Another option the County may consider researching is a food waste-to-livestock program. Such a program has not been implemented in New York State and would require approval from the state's Department of Agriculture and/or Department of Health.

The County may consider establishing an organics diversion working group or committee. The group could be charged with researching the various diversion options, identifying barriers to each option, and be asked to make specific recommendations to the County's solid waste management staff.

9.5 Education Tactics

The education requirements of implementing an expanded organics diversion program will depend on the diversion options that are ultimately chosen: backyard composting, vermicomposting, residential and/or commercial food waste collection, etc.

The County should continue to work with CCE to promote backyard composting, grasscycling, vermicomposting (for residents and schools), composting workshops, and compost bin sales.

The option that would require an increased level of public education would be a food waste collection and composting program. In order to receive feedstock that is appropriate for composting and free of contaminants, County staff would need to educate the generators of the food waste (i.e., residents, restaurants, institutions, grocery stores, etc.) as well as the collectors (haulers) of the food waste.

Educating residents would require a coordinated plan to disseminate public information before the program is to be implemented (direct mailings, coverage in community newspapers, local cable access programs, neighborhood advisory groups, etc.) as well as during implementation and throughout the life of the program (cart tags/notices). The City of San Francisco's contracted hauler uses photographs to educate customers what materials should be placed in what cart (garbage, recycling, compostables).⁸

One example regarding education and training grocery store employees to separate food waste for composting can be found in an article on Whole Foods Market stores⁹ that was previously provided to the County in Issue Paper #8 - Zero Waste.

The County currently provides technical assistance to businesses. This service may be in higher demand if the County implemented a food waste collection and composting program. Certain businesses may need a waste audit to determine if they generate enough food waste to participate in the program.

As with any program change, the County's website should be kept up-to-date with diversion program information. Many people have come to rely on their municipalities' website for solid waste-related instructions and it is a relatively low-cost means of providing information.

9.6 Capital and Operating Expenses

Implementing an expanded organics diversion program may incur considerable costs to the County. The extent of the capital and operating expenses depends on the option(s) considered by the County.

Dedicated staff time would be required to analyze each diversion option. If the County were to be involved in the development and operation of a food waste composting facility, the capital expenses would be great. Costs could include, but not be limited to: land acquisition, costs associated with designing and constructing the composting facility, equipment required to handle and process the organic feedstocks, labor required to operate the program, etc. However, if a food waste composting facility were to be developed by a private entity, the County could have less capital expenditures. Regardless of the approach, a large capital expenditure for a food waste collection and diversion campaign would be the ongoing promotional and education pieces. Additional staff time would be required to monitor the program and work with the private haulers on collection issues.

⁸ Source: "Food Waste Diversion Promoted on the Street," by Rhodes Yepsen, BioCycle March 2009. <http://www.jgpress.com/archives/free/001833.html>

⁹ Source: "Composting at the World's Largest Natural Foods Supermarket Chain," by Molly Farrell, BioCycle November 2004. <http://www.jgpress.com/archives/free/000309.html>

A successful organics diversion program would inevitably reduce the amount of waste requiring disposal, thus reducing the revenue from tipping fees received at the Landfill and possibly reducing Landfill operating expenses.

9.7 Diversion Potential

As part of Broome County's Local Solid Waste Management Plan update, R. W. Beck assessed the County's waste stream for future diversion potential. R. W. Beck identified recent waste characterization studies completed for communities with demographics and solid waste management systems similar to those of Broome County. Together, the County and R. W. Beck selected the 2005 composition results for Cedar Rapids/Linn County, Iowa from the Iowa Statewide Waste Characterization Study as an appropriate comparison. Table 9-1 lists the estimated quantities of organic material in Broome County's waste stream that were calculated by applying the County's 2007 MSW landfill tonnage (148,904 tons)¹⁰ to the organic composition portion of Cedar Rapids/Linn County's MSW.

For this analysis, it was assumed that certain paper grades such as newspaper, corrugated cardboard, magazines, high grade office paper and mixed recyclable paper (box board, junk mail, etc.) would be recycled through typical residential and commercial recycling programs, rather than composted.

Table 9-1
Cedar Rapids/Linn County MSW Composition Percentages Applied to
Broome County 2007 MSW Landfill Tonnage

Material Group	Material	CR - Linn Co Avg Percent Comp.	Broome County 2007 Tons
Paper	Compostable Paper	7.1%	10,541
Yard Waste	Pumpkins ¹	0.7%	1,088
Yard Waste	Yard Waste	0.9%	1,290
Food Waste	Food Waste	12.4%	18,477
Wood	Non-Treated	4.2%	6,268
Other Organic	Other Organic	1.2%	1,787
Total Tons			39,451

¹ The Iowa Statewide Waste Characterization sorting events were conducted between September and November of 2005 so "Pumpkins" was a separate material subset of Yard Waste.

From this analysis, it is estimated that the County may have more than 39,450 tons of organic material available in the MSW stream. In addition, the County accepted 2,121

¹⁰ Source: Landfill Tonnage by Material from "Broome County Executive Summary, Division of Solid Waste Management, As of December 31, 2007 – Final." The tons include General MSW plus Municipal MSW from Cleanup Events.

tons of yard waste for composting in 2007 and approximately 7,000 tons of sludge was accepted at the Landfill for disposal.¹¹

To determine the current and future organic waste quantities available to the County, R. W. Beck recommends the County survey large private industrial and commercial solid waste generators in an attempt to gather data including the tonnages generated and the tonnages recycled, composted or diverted for each organic material.

9.8 Addressing Stakeholder Concerns

Stakeholder concerns regarding an expanded organics diversion program will depend on the option(s) considered by the County. Concerns may include, but not be limited to:

- Resistance from residential and CII stakeholders to an organics collection program;
- Concerns from business owners regarding perceived increases in time and labor to divert multiple materials;
- Concerns from haulers and municipalities that currently operate their own collection programs being required to collect and haul an increased number of source-separated materials;
- Concern that the costs associated with implementing a residential curbside cart-based collection program for organics may be high; and
- Concerns related to siting and permitting issues for a food waste composting facility.

Depending on the approach taken by the County, one stakeholder group that could be concerned with a food waste composting facility (if it were located at the Landfill) would be the Landfill Citizen Advisory Committee (CAC). As a subgroup of the Environmental Management Council, the CAC acts as a liaison between the County and the communities adjacent to the Landfill and provides public input regarding the design, construction and operation of the Landfill. The County retains all power and responsibility for decisions at the Landfill but must consult with, solicit and consider the views of the CAC.

The County could schedule meetings with the CAC to first discuss the organics composting options that the County is considering and get feedback from the CAC, and then keep them updated as the County moves forward with studying the feasibility of certain options, perhaps ultimately choosing an option, going out for bids, etc.

As discussed in Section 9.4 – Implementation Requirements, the County may consider establishing an organics diversion working group or committee. This group could report to the CAC to keep them informed of the research of various organics diversion options and identification of barriers to each option.

¹¹ Source: Landfill Tonnage by Material from “Broome County Executive Summary, Division of Solid Waste Management, As of December 31, 2007 – Final.”

9.9 Benefits and Drawbacks

Implementing an expanded organics diversion program has benefits as well as drawbacks, as outlined below.

9.9.1 Benefits

Potential benefits of increased organics diversion include:

- A decrease in the amount of waste disposed at the Landfill, thus preserving airspace and extending the life of the Landfill;
- A decrease in some odor-causing wastes from the Landfill working face; and
- Benefits related to the increased use of finished compost, a by-product of organics diversion, (by residents, landscapers, the County, etc.) include a reduction in need for fertilizers, providing nutrients to deficient soils, prevention of soil erosion and nutrient run-off, and feedstock for land reclamation projects.

The benefits to implementing a residential curbside cart-based collection program for organics may include, but not be limited to, the following:

- Increased convenience to residents by switching to lidded, wheeled carts;
- Increased quantities of organic materials collected due to adding food waste to the diversion program in addition to yard waste;
- Improved residential neighborhood aesthetics by reducing the amount of yard waste litter caused by windy conditions as well as having uniform containers for every household;
- Protection of organic materials from excess moisture on rainy days, which can make materials and containers heavier when manually collected;
- An increase in productivity by the haulers because the collection crews would be able to service more households in one day than they are able to service using the current, manual collection method; and
- The potential to lower haulers' workers compensation claims because workers would be doing less lifting compared to the current manual collection of yard waste.

9.9.2 Drawbacks

Potential drawbacks of increased organics diversion include:

- An increase in capital and operating expenses;
- An increase in County staff time to research diversion options, determine available feedstocks, design a facility, proceed through a facility permitting process, work with haulers regarding collection issues, etc.; and
- Addressing concerns and potential resistance from haulers and residential and CII stakeholders to an organics collection program.

The drawbacks related to implementing a residential curbside cart-based collection program for organics may include, but not be limited to, the following:

- A potential for increased quantities of contaminants or non-targeted materials to be collected, however education and enforcement efforts can mitigate this risk;
- Implementing a cart-based collection system for organics may impose a financial burden on some haulers to purchase new, fully-automated collection vehicles or retrofit current vehicles with semi-automated cart tippers. These costs are not likely to be included in the hauler's current equipment budget;
- Implementing a cart-based system may impose a financial burden on the County if the County subsidizes the program in any way (e.g., by purchasing the carts);
- Some businesses may not have space for an organics collection container; and
- Some residents may resist the use of carts, citing lack of space to store the cart.

9.10 Resources

Provided below is a list of resources which may be beneficial to the County when researching organics diversion options.

Backyard Composting

- Cornell Waste Management Institute
<http://cwmi.css.cornell.edu/smallscalecomposting.htm>
- Maryland Cooperative Extension Home and Garden Information Center
<http://www.hgic.umd.edu/media/documents/BackyardCompostinghg35pfv.pdf>
- U.S. EPA – Backyard or Onsite Composting website.
<http://www.epa.gov/waste/conserve/rrr/composting/backyard.htm>
- University of Wisconsin Extension
<http://www4.uwm.edu/shwec/publications/cabinet/composting/CommonBackyardCompostingQA.pdf>

Small-Scale Vermicomposting

- Maryland Cooperative Extension Home and Garden Information Center
Indoor Redworm Composting
<http://www.hgic.umd.edu/media/documents/IndoorRedwormCompostingHG40pfv.pdf>
- New York Worms
<http://www.nyworms.com/vermicomposting.htm>

Curbside Collection of Food Waste

- Alameda County, California
<http://www.stopwaste.org/home/index.asp?page=528>

- BioCycle, “Diverting Food Residuals in Minnesota,” by Roberta Wirth, September 2005.
<http://www.jgpress.com/archives/free/000525.html#more>
- BioCycle, “Organics Cart and Container Trends,” by Nora Goldstein, October 2007.
<http://www.jgpress.com/archives/free/001469.html>
- City of Cedar Rapids, Iowa
<http://www.cedar-rapids.org/solidwaste/prepare.asp>
- City of Hutchinson, Minnesota – Curbside Organics Collection
<http://www.ci.hutchinson.mn.us/composting.html#curbside>
<http://www.ci.hutchinson.mn.us/pdf/organiccompostprog.pdf>
- King County, Washington
<http://your.kingcounty.gov/solidwaste/garbage-recycling/food-collection.asp>
- City of Olympia, Washington
<http://www.ci.olympia.wa.us/city-utilities/garbage-and-recycling/organics-and-yard-waste/organics-and-yard-waste-the-basics.aspx>
- Resource Recycling, “Getting Organics to the Curb,” by John Jaimez, May 2005.
- City of San Francisco, California
<http://www.sfrecycling.com/residential/composting.php?t=r>
- City of Seattle, Washington – Food & Yard Waste Collection
http://www.seattle.gov/util/Services/Yard/Yard_Waste_Collection/index.asp
- SWANA, “Curbside Collection of Residential Food Waste,” December 2008 (available free of charge to SWANA members).
<http://swanastore.stores.yahoo.net/cucoofrefowa.html>.

Food Waste-to-Livestock

- Hennepin County, Minnesota
<http://www.co.hennepin.mn.us/portal/site/HCInternet/menuitem.3f94db53874f9b6f68ce1e10b1466498/?vgnnextoid=f866b70a699fc010VgnVCM1000000f094689RCRD>
- North Carolina Division of Pollution Prevention and Environmental Assistance
http://www.p2pays.org/ref/20/19926/P2_Opportunity_Handbook/7_II_A_5.html
- University of Minnesota
<http://www.mntap.umn.edu/food/67-FeedingFood.htm>

Issue Paper #10

Single-Stream Recycling Collection Methods

Bins vs. Carts

10.1 Overview

Broome County (County) has a single-stream recycling program in which all recyclable materials (residential and commercial) are commingled together in preparation for collection. The County has a contract with Waste Management (WM) Recycle America for processing single-stream recyclable materials, however, haulers and municipalities are not mandated to use this materials recovery facility (MRF). Some private haulers continue to collect recyclable materials using the dual-stream method in which fiber (newspaper, cardboard, office paper, magazines, etc.) and containers (plastic, glass, aluminum and tin) are separated into two streams. The materials are then delivered to a dual-stream MRF rather than WM Recycle America's MRF.

Currently there are five recyclable materials processors in the region:

1. WM Recycle America in Binghamton, NY. This facility accepts recyclable materials commingled (single-stream) and transfers the materials to its materials recovery facility (MRF) in Liverpool, NY where the loads are sorted, processed and marketed.
2. Broome Recycling, Inc. in Binghamton, NY. This facility is owned and operated by Bert Adams Disposal and Taylor Garbage Service. The facility accepts recyclable materials in two streams (fiber and containers) and processes/markets the material at its Binghamton location.
3. A&W Recycling in Chenango Bridge, NY. This facility accepts materials in two streams (fiber and containers) and processes/markets the material at its Chenango Bridge location.
4. Taylor Garbage & Recycling in Owego, NY (Tioga County). This facility accepts recyclable materials in two streams (fiber and containers) and processes/markets the material at its Owego location.
5. Empire Recycling Corporation in Johnson City. This facility is a branch of Empire Recycling's main facility in Utica. They accept scrap paper and shredded paper, exclusively from commercial accounts. The materials are baled and marketed to end users from the Johnson City location.

The residential recyclable materials collected in the County are delivered to either WM Recycle America, Broome Recycling, Inc. or A&W Recycling. Commercial recyclables are taken to any of the five facilities.

From the Recyclable Materials Characterization Study completed in December of 2008 by R. W. Beck, it was determined that approximately 65 percent of the curbside recyclable materials collected in Broome County is delivered to WM Recycle America's transfer station in Binghamton, and an estimated 35 percent is delivered to Broome Recycling and A&W Recycling facilities combined. (Taylor and Empire did not report any recycling tonnages to the County in 2007.)

The focus of this issue paper is the collection method of recyclable materials and the potential to increase diversion. The County is interested in the possible use of lidded, wheeled carts (carts) for residential recyclable materials collection County-wide, and the potential impact this policy change would have on the recyclable materials stream and on the haulers who collect recyclable materials. This paper will address the potential benefits and drawbacks of using carts for recycling collection throughout the County.

10.2 Collection Options

Since approximately 1992 the County has been providing curbside recycling bins to municipalities and private haulers at no charge. Each year the County purchases the bins and receives a 50 percent reimbursement of the cost through the New York State Department of Environmental Conservation's (NYSDEC) Municipal Waste Reduction and Recycling (MWR&R) program.¹ In recent years the County has purchased between 8,000 and 10,000 18-gallon bins annually. The reason for ordering such a high number of bins is due to the number of requests for replacement bins. Because there are many college students living in the County, it seems that bins tend to "disappear" each year.

All of the haulers in the County currently collect residential recyclable materials using the curbside bins. Commercial recycling is collected using a variety of collection methods including dumpsters, wheeled carts and some of the smaller businesses use the 18-gallon curbside bins.

This issue paper will focus on the collection of *residential* recyclable materials. There are three methods typically used for the collection of residential recyclable materials:

- **Manual, using curbside bins** - Collection drivers and/or laborers manually empty the curbside bins, typically into a rear-load or side-load collection vehicle. This method works for both single-stream and dual-stream collection.
- **Semi-automated, using carts** - Collection drivers and/or laborers manually wheel the carts to a collection vehicle that has been fitted with lifters or cart tippers. The tipper automatically empties the contents of the cart into the collection vehicle. This method is typically used for single-stream collection, however some municipalities and haulers offer dual-stream recycling collection

¹ Source: NYSDEC website. <http://www.dec.ny.gov/pubs/4776.html>

(or dual-commodity collection for garbage/recyclables or organics/recyclables) using split carts and split-body collection vehicles. See Section 10.9 - Resources for examples.

- **Fully-automated, using carts** - Collection drivers use a vehicle with an automated arm to empty the carts, without having to exit the cab of the collection vehicle. This method is typically used for single-stream collection.

Another automated or semi-automated option that has been implemented in some communities is to provide residents with two carts and offer fiber collection one week and containers the following week.

The County is interested in using carts for collection to not only increase diversion, but also to reduce the number of curbside bins required to be purchased each year. A brief overview of wheeled carts is provided below.

10.2.1 Carts

Carts are a very important component of an automated or semi-automated collection system. Once carts are purchased and distributed, it is extremely difficult and costly to re-think the decision, so choosing the right cart from the start is crucial to customer satisfaction and system effectiveness.

10.2.1.1 Cart Construction

There are three ways in which plastic carts for automated or semi-automated collection are constructed: Blow molding, injection molding, and rotational molding. Blow molding was the initial technology utilized for constructing carts, rotational molding followed, and the latest technology is injection molding. Carts are made of linear high-density polyethylene (HDPE), crosslinked HDPE (which is stronger than linear HDPE but can not be recycled), or medium-density polyethylene (MDPE), which is more flexible than HDPE but may be weaker. There are advantages and disadvantages to each of these processes, which are outlined in Table 10-1.

Table 10-1
Cart Construction - Advantages and Disadvantages

	Blow Molded	Rotationally Molded	Injection Molded
Advantages	▪ Strong and tough ▪ Can use recycled content, including HDPE from curbside collection programs ▪ Can be recycled at end of life ▪ Least costly method	▪ Produces a zero stress product ▪ Smooth textured surface with no weld lines ▪ More material deposited in bottom corners – helps protect cart from wear ▪ Can use a wide variety of tough plastic materials –e.g. MDPE, which is more flexible than HDPE, and cross-linked HDPE, one of the highest quality resin on the market ▪ Can use recycled materials ▪ Linear HDPE and MDPE can be recycled at end of life ▪ Results in round-shaped containers, which work well with automated arms. ▪ Exterior of containers has textured surface to prevent slippage	▪ Allows for complicated designs ▪ Consistent wall thickness ▪ Consistent weight ▪ More reinforcement can be built into cart where needed ▪ Features can be molded-in, less hardware needed, less need to drill holes and “stress” the container ▪ HDPE can be recycled at end of life ▪ Can vary wall thickness strategically throughout the same part
Disadvantages	▪ Have to drill holes to add hardware – introducing potential areas of weakness	▪ Crosslinked HDPE can not be recycled ▪ Wall thickness is inconsistent ▪ More difficult to incorporate molded- in features ▪ Slower production process than other methods – generally results in a more expensive product ▪ Thinner walls generally result in a lighter cart with less wind resistance	▪ Have a weak area at sprue, where plastic flows into mold ▪ Material is more rigid, less flexible than rotationally molded ▪ Exterior surface is more “slick” – more prone to slippage with automated arms ▪ Have “molded-in stress” from high-pressure process

Carts are designed and tested for use in all climates and are designed to resist cracking, especially in cold temperatures. Per one cart representative, the blow-molding process produces a product that offers the best stress crack resistance of any molding process, especially in an outdoor environment of temperature extremes. However, vendors of both rotationally molded and injection molded carts also claimed those carts perform very well in colder climates. Two cities that experience extremely

cold temperatures in the winter - Bismarck, North Dakota and Akron, Ohio – both utilize rotationally molded carts.²

There are several major companies that produce carts for automated or semi-automated collection. A list of potential vendors is included in Appendix A.

10.2.1.2 Cart Warranties

Most of the major cart manufacturing companies offer 10-year, non-prorated full replacement warranties. Most manufacturers, therefore, will replace or repair a cart if it cracks or breaks from normal use. No cart manufacturer will replace or repair a cart if it fails due to abuse or misuse. It is important to clarify the warranty with the cart vendor during the procurement process. It is also important to read the “fine print” in the warranties. Although nearly all manufacturers claim to have a 10-year non-prorated full replacement warranty, some of the warranties may be worded to provide the company with a “loophole” for claims.

10.2.1.3 Cart Maintenance Programs

Many of the major cart manufacturers offer cart maintenance programs. Typically this service is outsourced to a third party. Rates for this service are generally based on a monthly per-cart fee.

10.2.1.4 Using Carts on Rural Recycling Routes

Servicing rural households can be a challenge for haulers collecting recyclable materials (as well as refuse). Rural collection issues typically include:

- Low-density housing, which can result in long distances between stops and lengthens the time spent on the route;
- Long distances to processing facilities;
- Material generation may be low, resulting in inefficiencies and decreased economies of scale;
- Logistical problems for residents in getting materials to the road, especially if they have long driveways; and
- Uneven terrain for container/cart placement.

Despite the challenges, some communities have been successful in implementing curbside recycling using wheeled carts in rural areas.

In 2008 Rice County, Minnesota³ switched from source-separated recycling collection to single-stream recycling using carts. The county spent \$800,000 to provide a 65-gallon wheeled recycling cart to every household in the county, including those in the rural areas. The largest complaint the county received was from rural residents who did not subscribe or contract for refuse collection but wanted a recycling cart. The

² Source: “Of Warranties, Service, and Resins,” MSW Management, May-June 2007.
<http://www.mswmanagement.com/may-june-2007/warranties-service-resins.aspx>

³ 2008 Population estimate: 62,390; number of owner-occupied housing units: 16,800.

county made it mandatory that a household subscribe for garbage collection in order to receive a recycling cart. (An additional benefit to residents signing up for refuse and recycling collection is the potential to decrease the amount of backyard burning of refuse.) The county reported that the residential recycling tonnage increased from 2,200 tons per year to 5,500 tons per year after the cart-based collection program was implemented.

Frederick County, Maryland switched to single-stream recycling using carts in March of 2009. To address some rural collection issues, the county offered suggestions on its website:

“Residents living in rural areas or on sloping sites are encouraged to use their carts in a manner that will prevent recyclable materials from becoming litter in the landscape. Try not to overfill the cart as doing so keeps the lid from closing all the way; excess recyclables may be placed next to the cart in another open container and larger carts are available upon request. The cart should be set on a hard level surface if possible. A brick or stone may be used to weight the lid.”⁴

For residents with long driveways, getting the carts to the road can be a challenge. The Regional District of Central Okanagan in British Columbia, Canada allows residents to permanently keep their carts where their driveway meets the road and deliver their garbage, recycling and yard waste to the carts on collection day.⁵

In 2007, the Warren County (Ohio) Solid Waste Management District was awarded a grant of \$100,000 from the Ohio Department of Natural Resources (DNR) to purchase curbside recycling carts for use in targeted rural areas. CSI Waste Services of Cincinnati provided a match of \$116,000 which resulted in 3,000 65-gallon carts to be purchased for approximately \$72 each. The recycling rate before the pilot began was estimated to be 6.6 percent and after the pilot program it had increased to over 30 percent, based on tons recycled.

Recycling service in rural Warren County is subscription-based and CSI Waste Services gained more customers when the cart-based service became available. Eventually the other haulers began offering the same level of service in an effort to compete, which may have resulted in increased tonnages of recycling to be collected.⁶

In order to maximize payloads, most rural recycling is collected every-other-week, rather than weekly.

⁴ Source: Frederick County, MD website: <http://www.co.frederick.md.us/index.aspx?NID=3574>

⁵ Source: Regional District of Central Okanagan website: <http://www.regionaldistrict.com/docs/waste/AutomatedPgm/Information%20for%20Rural%20Residents.pdf>

⁶ Source: Telephone conversations with Warren County Solid Waste Management District staff; Ohio DNR staff; and CSI Waste Services staff.

10.3 Diversion Potential

Typically when municipalities switch from curbside bins to carts for recyclable materials collection, it is in conjunction with a change in set-out methods from dual-stream to single-stream recycling. Because the County already adopted single-stream recycling in 2002, it is difficult to predict how the use of carts would impact the quantities of residential materials collected. Because the capacity of the carts (typically 65 or 95-gallon) is larger than the County's current 18-gallon bin, it is likely the volumes of material set out for collection would increase. It is not uncommon for residents to place recyclable materials in with their garbage if their recycling bin is full. The larger capacity carts may alleviate this problem. In addition, many consider the wheeled carts to be more convenient to use so there is the potential for some non-recyclers to begin recycling or for inconsistent recyclers to start recycling on a regular basis.

While the quantities of recyclable materials may increase with the use of wheeled carts, there is also the potential for an increase in contamination of "non-targeted" materials (items that are defined by the County as not acceptable) to be placed in the carts. Some residents may place garbage in their recycling cart if their trash container is full or as a way to avoid purchasing specially-marked bags, such as those required for garbage collection in the City of Binghamton.

In the case studies provided below in Section 10.4, two pilot programs are highlighted in which curbside bins were replaced with carts. Both studies resulted in increased tonnages of recyclable materials. Clark County, Washington's tons increased an average of 29 percent for weekly and 16 percent for every-other-week collection. The City of Roseville, Minnesota noticed a 28 to 32 percent increase in tons collected from households on routes with cart collection. It should be noted that in these two examples, the collection container (cart) and the collection method (single-stream) were both new to residents, whereas in Broome County, the commingling of the recyclables would not be new to the residents, so the results may not be as significant.

10.4 Case Studies

For this issue paper, two pilot studies are referenced - Roseville, Minnesota and Clark County, Washington.

10.4.1 City of Roseville, Minnesota

With assistance from R. W. Beck, the City of Roseville, Minnesota⁷ conducted a pilot study in 2004 to help refine its curbside recycling program to capture more recyclable materials. The pilot study analyzed the impacts that various collection methods have on the quantity and quality of residential recyclable materials collected curbside, as well as impacts on customer participation. At the time of the pilot study, the City of Roseville had dual-stream recycling collection, using 18-

⁷ The City of Roseville is an inner ring suburb of St. Paul with a population of about 34,000.

gallon curbside bins, collected every other week. The city conducted five pilot routes, two of which utilized single-stream collection using 64-gallon wheeled carts. (The two routes differed in demographics; one route was a newer area, considered more affluent.) The other pilot routes were variations on the city's dual-stream collection program and included increased frequency (from every-other-week to weekly); additional education; and larger bin capacity (from 18 to 22-gallon bins).

The pilot program studied several performance measures including material composition, tonnages of material collected, set-out and participation rates, and customer attitudes.

Although Broome County's situation is different because the County has already implemented single-stream recycling, the Roseville study is referenced here to illustrate that the County may encounter 1) increased quantities collected; 2) increased contamination or quantities of "non-targeted" materials; and 3) increased participation.

10.4.2 Clark County, Washington

Clark County, Washington was interested in boosting recycling tonnages and participation in the County's recycling program. Some cities had shown interest in moving to a cart-based system in an effort to reduce litter caused by windy conditions and open curbside recycling bins. The County's contract for transfer and disposal provided an opportunity to upgrade the current processing system to accommodate a change in the collection method.

At the time of the pilot study, recyclable materials were collected weekly using three stackable curbside bins. The recyclable materials were to be sorted into three material groups: 1) containers (plastic, glass, aluminum and tin)⁸; 2) newspapers; and 3) mixed paper. The pilot study consisted of eight routes: five routes with 65-gallon carts collected weekly and three routes with 95-gallon carts collected every-other-week. The residents were asked to place glass in a separate bin and all other recyclable materials in the wheeled cart.

10.4.3 Quantities Collected

In the Roseville study, the net pounds collected (not including non-targeted materials) per household on the single-stream (SS) routes increased an average of 7 to 8 pounds (28 to 32 percent) when compared to quantities collected before the pilot study, as shown in Table 10-2.

⁸ It should be noted that Washington does not have a "bottle bill" or legislation similar to New York's Returnable Container Act, so the quantities and types of recyclable containers collected at the curb in Clark County would most likely be different than the quantities and types collected in Broome County.

Table 10-2
Comparison of Net¹ Pounds per HH Collected Per Route **Before** and **During** the Pilot
City of Roseville, MN

	Routes “Before” Pilot – All Dual-Stream			Routes “During” Pilot			
	Net Average (without non-targeted materials) ²			Net Average (without non-targeted materials) ²			
	Mean (Avg. Lbs Collected per HH per Route)	Lower Range	Upper Range	Mean (Avg. Lbs Collected per HH per Route)	Lower Range	Upper Range	Statistically Significant Difference
Mon. – Primary SS	21.33	19.70	22.96	28.16	25.83	30.49	✓
Mon. – Contrast SS	26.87	25.72	28.03	34.39	32.19	36.59	✓
Wed. – Addt’l Educ	21.73	15.84	27.63	25.30	22.62	27.99	
Thurs. – Larger Bins	20.03	17.82	22.23	26.87	23.29	30.46	✓
Fri. – Control	24.14	19.19	29.10	26.86	20.60	33.11	

¹ Average total pounds after non-targeted materials were subtracted.

² The range was calculated by subtracting the difference in pounds collected with and without non-targeted materials from the gross pounds collected per household.

In Clark County, the quantity of recyclable materials collected from the pilot routes with the 65-gallon carts collected weekly increased an average of 29.2 percent compared to the baseline average (before the pilot study). The quantity of materials collected from the routes with the 95-gallon carts collected every-other-week increased an average of 16.2 percent.

10.4.4 Non-Targeted Materials Collected

In the City of Roseville’s pilot study, the average quantity of non-targeted materials collected during the single-stream pilot routes was higher than during the dual-stream pilot routes (8.5 percent versus 3.4 percent of the total tons collected), as shown in Table 10-3.

Table 10-3
Comparison of Material Compositions by Weight¹
Single-Stream and Dual-Stream Routes
City of Roseville, MN²

Material Category	Average Weight (Pounds) September & October 2004	
	Single-Stream (Monday)	Dual-Stream (Wed – Friday) ³
Paper	9,246	5,652
Metals	309	655
Glass	654	1,838
Plastic	647	916
Non-targeted Materials	1,013	315
Total	11,867	9,375

¹ The weights were estimated by applying the median percentages from the sorting events to the average of the pilot route truck tonnages.

² It should be noted that Minnesota does not have a “bottle bill” or legislation similar to New York’s Returnable Container Act, so the quantities of recyclable containers collected at the curb in Roseville are most likely higher than what would be collected in Broome County.

³ The weights from Tuesday’s routes were excluded from the comparison because they represent weekly collection, whereas the Wednesday, Thursday and Friday routes provided more comparable data as they were collected bi-weekly.

In the pilot program conducted for Clark County, Washington, contamination was observed in over 38 percent of the carts and in 15 percent of the glass bins. The contaminants that were found most frequently were plastic film (including plastic bags), found in almost 19 percent of the setouts. When comparing contamination quantities of Clark County’s baseline program and the pilot routes, contamination rose from 1.6 to 2.9 pounds per household per month. However, the total contamination by weight (4 percent) was not considered significant.

In the City of Portland, Oregon, the quantities of contaminants increased when carts were distributed in 2008.⁹

10.4.5 Participation Rates

The results of the participation data collected by the City of Roseville for the bi-weekly pilot routes are shown in Table 10-4. Participation was defined as a household that set out recyclable materials at least once during the six collection events during the term of the pilot study.

⁹ Source: The Oregonian – OregonLive.com website.

http://www.oregonlive.com/news/index.ssf/2008/10/portlands_new_recycling_bins_g.html

Table 10-4
Comparison of Participation Rates Before and During the Pilot
(Bi-Weekly Routes)
City of Roseville, MN

	Primary Single- Stream	Contrast Single- Stream	Add'l Education	Larger Bin Capacity	Control
Participation Before	85.3%	91.8%	79.6%	78.5%	85.8%
Participation During	94.3%	96.7%	89.5%	93.3%	89.3%
Percentage Change	9.0%	4.9%	9.9%	14.8%	3.5%

All routes had increases in participation, including the single-stream routes with carts (9 percent and 5 percent), however the pilot route with the largest increase in participation was the Larger Bin Capacity route (14.8 percent).

In Clark County, two routes were observed for participation. On an every-other-week route, participation decreased by 2.5 percent compared to a 3 percent increase in participation on a weekly route. The volumes collected on both routes increased (4.6 percent on the every-other-week route and 28.6 percent on the weekly route).

10.4.6 Pilot Study Results

The City of Roseville chose to stay with dual-stream recycling. Although the recommendation was to switch to larger curbside bins, the City stayed with 18-gallon bins due to cost issues. The results of Roseville's pilot study are included in Appendix B of this paper.

In April 2009, Clark County converted to a cart-based recycling collection system with a separate bin for glass. The link to Clark County's pilot program final report is provided in Section 10.9 - Resources.

10.5 Capital and Operating Expenses

If the County were to convert to wheeled carts for single-stream recycling collection, the largest expense would be the purchase of the wheeled carts. Carts are a significant financial investment. At an average price of \$55 to \$60 per cart, the investment required for Broome County could be between \$2.9 and \$3.2 million for an estimated 54,000¹⁰ carts. Usually the cost is amortized over the life of the carts which can range anywhere from 10 to 20 years. A portion of the carts may be eligible for fifty percent reimbursement through the NYSDEC's Municipal Waste Reduction and Recycling

¹⁰ Number of owner-occupied housing units in Broome County per the U.S. Census Bureau, 2005-2007 estimate.

program. Some municipalities place a recycling fee on the residents' property tax statement to offset a portion of the expenses related to the recycling program.

Some cart manufacturers will lease carts. Typically the lease fee is in the \$0.72 - \$1.75 per cart per month range, based on a five-year lease and may include a maintenance program. The lower end of the range includes no assembly or maintenance. The upper end of the range includes assembly and maintenance programs. Some municipalities have found this to be a more cost-effective means of procuring and maintaining their carts. Another option may be for the County to lease carts from WM Recycle America.

The County would also incur operating expenses related to staff time to plan the conversion, procure the carts, draft and distribute public education/instructions, etc. The cost to deliver the carts to residents could be an expense of the hauler or the County. In some cases, municipal or county crews deliver the carts, in other cases the hauler(s) is contracted to deliver the carts.

In addition to the County's expenses, the haulers would also incur expenses related to a switch to a cart-based recycling collection system. New collection vehicles may need to be purchased or current trucks may need to be retrofitted with cart tippers. Some of these costs may be offset by increased productivity. Automated collection typically results in less time on the road collecting recyclables. Fully-automated collection requires only one staff person per vehicle, so hauling companies may be able to reduce the amount of staff required on recycling routes, either by reducing the number of staff on a vehicle or including more households on each route, therefore potentially requiring fewer vehicles. In addition, many municipalities switch from weekly to every-other-week collection when they convert to a cart-based system for recycling, thus reducing staff and collection time even more. One financial benefit to fully-automated or semi-automated collection is the potential to reduce on-the-job injuries and workers' compensation claims. Many communities that implement automated collection report that their workers' compensation claims and insurance costs have resulted in significant cost savings.

10.6 Addressing Stakeholder Concerns

Implementing a cart-based recycling collection program would impact several sectors of Broome County. Stakeholders may include, but not be limited to, government officials, municipalities, recyclable materials haulers, and residents.

As mentioned in Section 10.7 – Implementation Requirements, the County may want to consider establishing a task force to discuss the implications of converting from bins to carts for recycling collection. The task force could address concerns raised by private haulers and municipalities that currently operate their own recycling collection programs, as these two groups would be most affected by such a conversion. The County should expect resistance from haulers to the changes required to retrofit existing collection vehicles or the need to purchase new collection vehicles in order to service the carts.

10.7 Implementation Requirements

If the County were to move forward with researching the option of using carts for single-stream collection, it may consider forming a task force to consider the implications of such a conversion. The steps required to implement cart-based recycling collection might include, but not be limited to:

- Research cart options and discuss cart design with haulers because it is imperative that their equipment works effectively with the carts.
- Determine the size cart that would be offered, and whether residents could opt to have a different sized cart, and how this would be conveyed (many communities, for example, send a post card or post a notice informing residents they can opt for a larger or smaller cart in advance; otherwise, they receive the default size).
- Determine the number of carts required and obtain quotes from several cart manufacturers. Research how carts are shipped – whether lids are already attached, whether wheels snap in place, etc. This will have an impact on assembly and distribution costs.
- Research cart maintenance options.
- Research leasing and grant/funding opportunities available to the County for procuring carts.
- Solicit feedback from haulers and municipalities that would be affected by the change.
- Consider implementing a pilot study to gather more data on the logistics and effects of a cart-based recycling collection program (possibly in the City of Binghamton where special trash bags are required for refuse collection, to see if cart-based recycling collection results in excessive increases in contamination of recyclables, as well as to see if carts result in increased participation/tonnages in recycling program).
- Determine level of effort required of County staff to implement a change to a cart-based recycling system (planning, procurement, distribution, possible maintenance, public education, customer service calls, etc.).

10.8 Benefits and Drawbacks

Implementing a cart-based collection system for recyclable materials has benefits as well as drawbacks, as outlined below.

10.8.1 Benefits

The benefits to the County and its residents may include, but not be limited to, the following:

- A potential for increased quantities of recyclable materials collected due to increased participation as well as larger container capacity.

- A potential decrease in the amount of MSW disposed at the Broome County Landfill, thus increasing the life of the Landfill.
- Improved residential neighborhood aesthetics by reducing the amount of litter caused by windy conditions (in which the recyclable materials get blown out of the curbside bins) or by animals getting into the recyclable materials.
- Increased convenience to residents.

Benefits related to changing the collection method to a fully-automated or a semi-automated system may include:

- An increase in productivity because the collection crews would be able to service more households in one day than they are able to service using the current, manual collection method. One 65 or 95-gallon cart collected every other week is generally large enough for the quantities of recyclable materials generated per household in two weeks.
- The potential to lower workers' compensation claims because workers would be doing less lifting compared to manual collection of recyclable materials.
- Reduction in fuel costs and truck emissions (and as a result, a reduction in greenhouse gas impacts), if collection frequency changed from weekly to every-other-week.
- Protection of recyclable materials from moisture, which results in improved sorting capabilities, particularly with paper.
- Potential to collect recyclable materials every-other-week, which can result in significant cost savings to the hauler(s) and potentially to the residents if the hauler passes those savings on.

10.8.2 Drawbacks

The drawbacks related to a cart-based collection system for recyclable materials may include, but not be limited to, the following

- A potential for increased quantities of contaminants or non-targeted materials to be collected with the acceptable recyclables, however education and enforcement efforts can mitigate this risk.
- Implementing a cart-based collection system may impose a financial burden on some haulers to purchase new, fully-automated collection vehicles or retrofit current vehicles with semi-automated cart tippers. These costs are not likely to be included in the hauler's current equipment budget.
- Implementing a cart-based system may impose a financial burden on the County if the County subsidizes the program in any way (e.g., by purchasing the carts).
- Depending on the automated collection method, the number of collection staff may be reduced, resulting in lay-offs or employee displacement. If a fully-automated system (in which a mechanical arm picks up and empties the carts) is chosen, only one equipment operator may be required per truck. If a semi-

automated system (in which cart tippers are used) is put into place, two person crews would be required so one person could drive the truck while the other brings the carts to the truck to be emptied. When converting to automated collection, many hauling companies and municipalities are able to reduce staff through attrition or by transferring staff to other departments.

- Some residents may resist the use of carts, citing lack of space to store the cart.

10.9 Resources

Provided below is a list of program information supporting R. W. Beck's analysis which may assist the County.

- Town of Cary, North Carolina
<http://www.townofcary.org/news/news2009/curbsiderecycling.htm>
- Clark County, Washington - Curbside Recycling Pilot Program
<http://www.cityofvancouver.us/solidwaste.asp?menuid=10465&submenuID=10531&itemID=62148>
- City of Gaithersburg, Maryland
http://www.gaithersburgmd.gov/poi/default.asp?POI_ID=309&TOC=307;309;&id=3915
- Village of Howard, Wisconsin
<http://jasmith17.wordpress.com/2009/06/07/single-stream-recycling-new-bins/>
- Saint Louis County, Missouri – Guidelines for New Recycling Carts
<http://www.stlouisco.com/doh/waste/Get%20Rolling%20Recycling%20Cart%20Welcome%20Booklet.pdf>

Split Carts and Trucks

- City of Davis, California
<http://cityofdavis.org/pw/recycle/garbage.cfm>
- City of San Jose, California
<http://www.sjrecycles.org/residents/truck.asp>
- Split-body trucks for organics collection
<http://www.jgpress.com/archives/free/001797.html>

Carts

- MSW Management, "Buying Carts and Containers: Do Your Homework," by Penelope Grenoble O'Malley, July-August 2001.
<http://www.mswmanagement.com/july-august-2001/buying-carts--containers.aspx>
- MSW Management, "Waste Bins: Don't Judge a Cart by Its Cover," by DeWitt Smith, September-October 2007.
<http://www.mswmanagement.com/september-october-2007/waste-bins-cart.aspx>

Rural Curbside Recycling

- Cansporter
<http://cansporter.com/>
- Resource Recycling, “Heading for the Hills: Rural Curbside Recycling,” by Tom Watson, November 1991.
<http://www.p2pays.org/ref/06/05444.pdf>
- Waste Age, “Country Roads,” by Russ Short, February 2008.
http://wasteage.com/Collections_And_Transfer/waste_country_roads/

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PUBLIC WORKS

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(607) 725-2310

March 30, 2010

Mrs. Debra Smith
Broome County
Materials Recovery Manager

RE: Comments Draft Report

I have reviewed the Draft report of the Broome County Solid Waste Management Plan. It is my understanding that Broome County must prepare a local solid waste management plan for a period of ten years under the New York State Code of Rules and Regulations, Subpart 360 under the current NYCRR requirements.

I have read carefully the Strategies to increase diversion according to Appendix B of the Broome County SWMP. I'm primarily concerned with Broome County and its elected officials concerning themselves with Collection Districts. Issue Paper #6.

Collection Districts states that Broome County is exploring the idea of establishing private collection districts and what factors may contribute to the decision of these collection districts. How many districts will be established, where the boundaries may lie, and most importantly who will be the providers to collect trash in these marked districts.

There are six major waste haulers excluding the municipalities in the Broome County area. Waste Management, Taylor Garbage, XYZ, Jenks, Joes Disposal and My Company Bert Adams Disposal. I cannot speak for them, but I have worked very hard to build my customer base. I alone have been in business 30 years, starting my business with one garbage truck and building my family business into what it is today with over sixty local employees and more than fifty trucks. I have spent several million dollars acquiring my business by purchasing other haulers territory and customers. I find it very aggravating that I have spent my hard earned money to acquire my customer base and it could possibly be divided up and taken away. Will Broome County reimburse me for all my hard earned money spent on my customer base? With this said I do not understand why Broome County would find it economically feasible to divide its County into collection Districts?

If indeed Broome County were to divide into Collection Districts they would pose the risk of losing County sales tax. The Broome County budget is already out of balance and in need of financial overhaul! What is next? Will Broome County then try to decide

what fuel companies delivering propane to residents are allowed to service certain "districts"? Or will they tell local car dealerships they can only sell certain cars to people living within their "districts"? With this being said, why would Broome County want to divide into Collection Districts? Has there ever been an issue with any of these six private haulers not providing outstanding service to any area located in Broome County? And lastly, why would Broome County find it any of their concern to worry about the private garbage haulers and their business territory? They should primarily be concerned with their municipalities and how they conduct their business. I don't come down to your office and tell you what "restaurant" to order your lunch from and further more if it is within the permitted "district"!

My private refuse business should not be a concern of Broome County and its elected officials!

Another Issue I would like to comment on is Issue Paper # 10, Single-Stream Recycling Collection Methods. I understand in a perfect world we would like to minimize waste and of course divert trash going to the landfill. I understand Broome Counties efforts to do this and as a private garbage hauler I support these efforts. Recycling has become a part of all of our lives and I am proud to be part of the campaign. However, I feel single stream recycling is not efficient and cost effective. I single handily witnessed the single stream-recycling program and feel there are many loopholes in this system. The whole point of recycling is to process used materials into new products to prevent waste of potentially useful materials in hopes of preserving our fresh raw materials. When we have our customers and citizens commingling all the recyclables into one bin this can pose several problems. It has been my experience that they think of the bin as a "catch all" for all goods. Whether it is trash or recyclable they just throw it in. How can we try to divert recyclables going to the landfill when indeed the commingled recyclables are ending up in the landfill because of the contaminated trash in it? Now this is a problem!

If we were to increase the bin size and switch over to carts this would give residents the option to not put it out weekly and would then lead to more contaminants getting into the "cart". When the hauler goes to pick up the recycling and place all the goods in one unit to be recycled, there are contaminants in the bin that will slow down the sorting process. This creates an inefficient and costly problem. The machinery used to sort the single stream recyclables is very expensive to maintain and service when it is broken. There have been numerous times when this machinery has worn or is not working properly due to contaminated material. Increasing the bin size will only contribute to the contamination. Lastly the "cart" system would also slow down the picking process and increase the amount of work hours employees are putting in on a daily basis.

Nonetheless, with this in mind how are we going to justify the purchase of carts when in fact we are still be educated on using the old bins?

Secondly according to section 10.2 Collection Options it states that there has been an increase in regular 18-gallon bin purchases due to the number of college students living in the area, the bins "disappear"? I have five children and I know that a recycle bin would be the last thing they would want to take or steal. I find it very hard to believe that these young educated adults would do the same.

The cart method would require the municipalities and private haulers to purchase carts and trucks with lifters to service the customers. This will impose a huge financial burden on both Broome County and the private garbage haulers. Who will be paying for this new cart method and its costly burden?

How will the financial burden that will be put on the private garbage haulers be compensated? Why is the dual stream recycling program so bad?

I look forward to hearing from you regarding all my concerns as a private garbage hauler conducting business in Broome County. If you have any questions regarding my comments and concerns please feel free to call me (607) 725-2310.

Thank you,

A handwritten signature in cursive script, appearing to read "Bert Adams", followed by a horizontal line.

Bert Adams

President

Bert Adams Disposal

Cc: Daniel Schofield Deputy Commissioner

Patrick Brennan: Deputy County Executive for Physical Services

Broome County Division of Solid Waste Management

Barbara J. Fiala, Broome County Executive • Daniel A. Schofield, Deputy Commissioner



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April 1, 2010

Bert Adams
Bert Adams Disposal
PO Box 549
Chenango Bridge, NY 13745

RE: Comment to Draft SWMP

Mr. Adams,

This correspondence is in response to your recent comments regarding the Broome County Solid Waste Management Plan.

Concern: Collection Districts (Issue Paper #6)

- 1) *How many districts will be established, where the boundaries may lie, and most importantly who will be the providers to collect trash in these marked districts.*

If the County was to ever pursue collection districts it would require in depth analysis to determine the number of districts and boundaries as noted in section 6.2.1 and section 6.2.2 of the Collection District Issue Paper #6. The process of selecting the hauler for each district would also require further analysis as discussed in section 6.3.

- 2) *With that said I don not understand why Broome County would find it economically feasible to divide its County into collection Districts?*

Collection Districts were included in the original SWMP and were included again in the SWMP update as there are environmental/economic benefits that can potentially be realized such as reducing redundant vehicular traffic resulting in potential decreased road maintenance and improving air quality, provides for route efficiency, provides a uniform collection program for garbage & recycling often increasing recycling participation and minimizes illegal dumping. The County, however, understands that Collection districts also can have drawbacks. More details of the benefits and drawbacks are outlined in section 6.9.1 and 6.9.2 of the Issue Paper.

Concern: Single Stream Recycling Collection Methods (Issue Paper #10)

- 1) *How can we try to divert recyclables going to the landfill when indeed the commingled recyclables are ending up in the landfill because of the contaminated trash in it?*

The County instituted single stream recycling in 2002 and since that time has not experienced any high residue rates from the material being collected. The current contractor processing the County's single stream materials also has not had any issues with the quality of materials being marketed from its facility. As with any program, whether single stream or dual stream educational outreach is a key component and there will always be some contamination. While the County conducts education, over the years we have reached out to area haulers to assist with reinforcing proper recycling, by not collecting recyclables that are contaminated (as trash) and to notify the resident of what is incorrect so the behavior can be corrected.

Single stream processing equipment does require a financial investment, however utilizes a largely automated process that decreases the staffing required through use of updated technology. All materials recovery facilities (MRF) experience downtime and routine equipment repairs.

2) Increasing the bin size will only contribute to contamination.

Educational outreach is the key to limiting contamination of materials. Increased bin size has the potential to increase the quantity of recyclables currently being captured. The County routinely receives comments for residents requesting larger containers as many households have 2-4 bins for recyclables. In some cases the limited space results in materials being disposed of rather than recycled properly.

3) Lastly the "cart" system would also slow down the picking process and increase the amount of work hours employees are putting in on a daily basis.

A cart system has the potential to increase productivity especially if it is a semi or fully-automated system. Collection crews would be able to service more households per day, there is a potential to lower worker's compensation claims, reduction in fuel costs and truck emissions (if frequency of collection is changed) and recyclables would be better protected from moisture. One cart would be picked up as opposed to 2-4 bins per household. In addition a semi or fully automated collection could reduce the number of staff to one or two workers per truck.

4) Nonetheless, with this in mind how are we going to justify the purchase of carts when in fact we are still be educated on using the old bins?

The container whether a bin or a cart will still entail the same materials being placed in it which again goes back to continued educational outreach. The County if it was to pursue a cart system would apply for a grant from the Department of Environmental Conservation that would cover 50% of the cost of the carts.

5) Secondly according to section 10.2 Collection Options it states that there has been an increase in regular 18 gallon bin purchase due to the number of college students living in the area, the bins "disappear"?

The County has experienced an increase in the number of bins being replaced. It is very common that students residing off campus utilize the bins for alternative uses such as packing boxes, storage containers, etc. Routinely bins are replaced at student rental locations as they have been removed from the site. An increase of bins have also resulted from mishandling of the bins by collection crews which often throw the containers back to the residents house after emptying them.

6) The cart method would require the municipalities and private haulers to purchase carts and trucks with lifters to service customers. This will impose a huge financial burden on both Broome County and the private garbage haulers. Who will be paying for this new cart method and its costly burden?

The County is aware that one of the drawbacks of the cart system would be the increased financial burden it can place on the haulers. In some cases a hauler would need to purchase new trucks or could retro-fit an existing truck with cart tippers. This is one of the drawbacks to a cart system, however there are also benefits to it as well as described in section 10.8. of Issue Paper #10.

7) Why is the dual stream recycling program so bad?

The County does not view the dual stream program as "bad". The County pursued single stream recycling because it had benefits over a dual stream program that the County felt was beneficial to the residents and the area haulers. Single stream made the task of recycling easier for residents and resulted in positive feedback from people because they did not have to separate their materials and people often stated they started recycling more because it was easier. Some of the area haulers were

able to realize the collection efficiencies of single stream by utilizing packers to collect materials therefore maximizing the capacity of the truck and decreasing the number of trips to the MRF. In addition, workers did not have to lift bins overhead decreasing the likelihood of injury and worker compensation claims. Single stream technology has improved greatly and can adequately separate materials to meet specifications. The marketing of materials has not been impacted because it comes from a single stream facility.

In closing, the goal of the County when drafting this update was to look at all of the possible options. In doing so, the County fully realizes not all of those options are feasible or implementable in our community. The County now and in the near future is not going to pursue Collection Districts or a cart based system or mandate single stream recycling as we do not believe it is currently in the best interest of the County as a whole. This does not mean that those concepts do not have merit. These two noted changes would be major program changes which would not be pursued without extensive discussions with stakeholders such as yourself.

Again the Issue Papers presented in the Draft SWMP are to provide the County with background on various programs, technologies and methods being utilized by other programs that may be beneficial to the County. While reviewing the Issue Papers the County knew that some of the suggested program changes would not be actively pursued any further. The Department of Environmental Conservation is in the process of updating the state plan as well. The State's plan "Beyond Waste" is a ten year plan focusing on a 15% increase in recycling over a two year period. While the County does not feel that is obtainable we must make efforts to increase our diversion. One of the ways the County feels we can accomplish this is to further explore organics composting. Again, as the County continues to increase diversion and investigate program options, area haulers will be included in the process as a valuable asset of knowledge and experience to the solid waste program. The Division prides itself of offering state-of-the-art solid waste management for our residents and look forward to continuing to enhance our program.

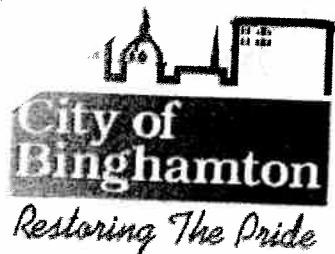
Thank you for your time.

Sincerely,



Debra Smith
Materials Recovery Manager

Cc: Daniel Schofield, Deputy Commissioner of DSWM
Patrick Brennan, Deputy County Executive

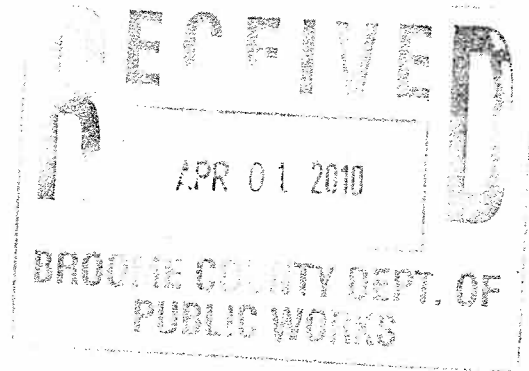


Office of the Mayor

Matthew T. Ryan

April 1, 2010

Debra Smith, Materials Recovery Manager
Broome County Division of Solid Waste Management
Broome County Office Building
60 Hawley St
Binghamton, NY 13902



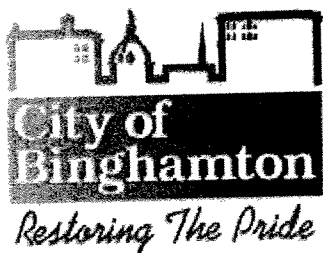
Re: Comments on the Broome County Draft Solid Waste Management Plan Update

I am writing to provide my comments on the Broome County Draft Solid Waste Management Plan Update.

First, I would like to thank Broome County, its leadership and staff, for its efforts to promote recycling and to discourage unnecessarily landfilling reusable materials, which reduces the need to extract increasingly limited natural resources. Such efforts have resulted in a County recycling rate that significantly surpasses the national average. Broome County's Division of Solid Waste staff should be seen as environmental stewards on the frontline protecting our natural resources and applauded for their hard work and dedication.

While I have a number of questions and comments to provide on this draft Solid Waste Management Plan (SWMP) Update, I would like to share that I was greatly impressed by the in-depth review of the many potential opportunities for increasing waste diversion and I was pleased to see that the Division of Solid Waste has selected the following items for immediate consideration: 1) Commercial, Industrial, Institutional and Multifamily Recycling, 2) Household Hazardous Waste and Electronics Recycling, 3) Construction and Demolition Debris Recycling, and 4) Organics Recycling. The City's Commission on Sanitation and Commission on Smart Growth and Sustainable Development—both of which I and the City Council launched in 2008 to address pressing issues of municipal finance—felt similarly that these items should be targeted to promote financial and environmental sustainability in our region. The commissions also concluded that the City's efforts would be much more successful with the support of Broome County. The City would like to partner with the County to achieve our mutual goals and to help our region develop as a model for other communities across the region, the nation and worldwide.

Ultimately, the goal of our county and our country should be to achieve zero waste. We should strive to achieve the efficiencies of a sustainable, healthy ecosystem, in which all materials are resources



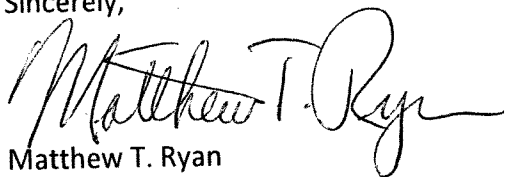
Office of the Mayor

Matthew T. Ryan

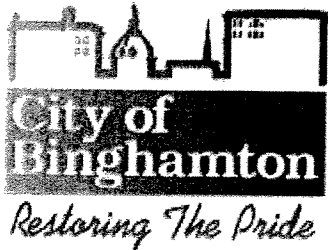
and never waste. The recommendations outlined in this update will help us take significant strides toward this ultimate goal.

Again, I would like to applaud Broome County for its leadership in promoting recycling and in reducing waste in our community. Thank you for your consideration of my comments on the SWMP update, and I look forward to future discussions on this important issue.

Sincerely,



Matthew T. Ryan



Office of the Mayor

Matthew T. Ryan

City of Binghamton Comments on the Broome County Draft Solid Waste Management Plan Update

Lifespan of the Current Landfill

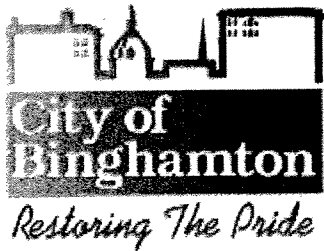
While the draft SWMP Update is intended only to plan for the next 20 years, one cannot help but think about the importance of planning for an even longer term when considering that the landfill is projected to have little more than 40 years of operation remaining. Inevitably, Broome County will have to develop a new landfill within the lifetime of many of its current residents. There is no discussion in the SWMP of the costs or challenges of building a new landfill. In addition, the SWMP Update does not address whether the proposed diversion measures may lengthen the life of the landfill and produce savings for residents. These issues should be addressed in the final version of the SWMP.

Household Hazardous Waste and Electronics Recycling

Increasing the proper disposal and recycling of Household Hazardous Waste (HHW) and electronic waste (e-waste) is essential to safeguarding public health and maintaining the integrity of our environment. However, the benefits to our community should not come at a cost to others. It is widely recognized that third world countries are becoming dumping grounds for our e-waste. An estimated 80% of the electronics collected in the United States for recycling are exported to developing countries for processing by low-wage laborers and prisoners who are not afforded the same protections as workers in developed countries. In the absence of international and national regulations to address this issue, non-governmental organizations have stepped up to the plate creating e-Stewards (<http://www.e-stewards.org>), a third party audited and accredited certification program for responsible electronics recyclers. Eco-International, the Vestal based company which receives Broome County's e-waste, has not received e-Stewards certification. The City recommends that the County encourage Eco-International to do so, or to contract with another New York State business that is e-Stewards certified.

Promoting Commercial, Industrial, Institutional & Multifamily Recycling

The City recognizes the difficulty of promoting recycling in these sectors, and would be interested in working with the County on this issue. The City would be willing to test out new regulations, such as requiring standardized recycling standards at all multifamily properties, as is done in Portland, or updating its zoning to require adequate outside space be designated for the placement of recycling collection containers when a new commercial, industrial, institutional establishment or multifamily housing developer applies for a building permit.



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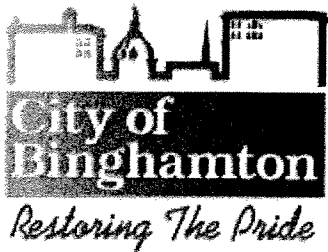
Matthew T. Ryan

Construction and Demolition Debris Recycling

The issue of construction and demolition (C&D) debris recycling has been discussed at length within the City's Commission on Smart Growth and Sustainable Development, which developed a number of recommendations on the subject in its final report.¹ The City has begun working on implementing the recommendations from this Commission, including promoting deconstruction by providing Restore NY funding for a pilot deconstruction project and working to support the development of a private C&D recycling facility at the former Stowe Manufacturing site in the Brandywine corridor. I was surprised to find that the SWMP update made no mention of these current initiatives, or of how the County might support them. If the County were to ban C&D material from the landfill, or simply increase tipping fees for these materials, a C&D recycling facility could be developed by Cgreen, LLC, a local development group, and be up and running within a year. Instead of recommending that the County support a private project that is ready to go now, the SWMP suggests a 5-10 year timeframe for developing a County-owned C&D sorting facility at the landfill, which would result in a massive amount of C&D tonnage (likely over 220,000 tons) ending up in the landfill unnecessarily due to the delay in development.

Building a regional, sustainable waste system that aims to achieve zero waste requires strong partnership between private and public sectors. Just as the SWMP references opportunities for partnership with the private sector in regards to organics diversion, we should also consider the advantages of a privately-run C&D facility. Though I understand that the loss of C&D debris would result in a loss of revenue for Broome County in tipping fees, which in part helps to support its recycling efforts, I am concerned that a County-operated C&D recycling facility would not provide the same benefits that are possible under a privately-owned venture. Private C&D facilities can integrate resale stores, workforce training opportunities, and spinoff businesses. A private facility, as has been proposed by Cgreen, could be centrally located and provide added convenience to workforce trainees and consumers. A publicly-run facility at the landfill greatly compromises convenience, and may make a resale store and workforce training less viable. Further, early results of the Brandywine Corridor BOA identified green industry as a prime sector to fill this corridor. A C&D facility at the former Stowe site would comply with the recommended uses and long-term vision articulated in the Brandywine BOA public visioning sessions and the market analysis of the consultant hired by the County to develop the Brandywine BOA Nomination Study, and would provide an excellent focus around which to attract more green industry and professional firms.

¹ The report by the Commission on Sustainable Development and Smart Growth is available at:
<http://www.cityofbinghamton.com/Library/pages/Commissions/FINAL%20REPORT%20Commission%20on%20Sustainable%20Development%20and%20Smart%20Growth.pdf>.



Office of the Mayor

Matthew T. Ryan

Returning to the issue of lost revenue being a disincentive to supporting the creation of a privately owned C&D recycling facility, the draft SWMP update did not address the potential cost savings that would be achieved by reducing the amount of waste sent to the landfill annually by having a privately owned C&D recycling facility. A true analysis needs to take into account the savings to taxpayers by diverting waste and extending the life of the landfill. Waiting ten years to build a publicly run facility may actually cost taxpayers when a viable private enterprise could be fully operational by the end of this year.

I hope that the final SWMP update will address the many questions and concerns I have outlined on this issue.

Organics Diversion

The City's Commission on Sanitation explored the concept collecting food wastes and developing a City-run composting facility that would process both yard and food wastes. The Commission concluded that such an initiative would be more cost effective on a larger scale.² The City is very interested in supporting the County's efforts to make it possible to collect household and institutional food waste and compost the materials at a municipal facility. In the draft SWMP update, it was mentioned that the scale of the County's composting operations might be limited in part by the amount of available bulking feedstock, i.e. leaves and other yard waste. The City does not bring its yard waste to the County for composting but rather contracts with Boland's for yard waste composting. If the County were to need additional bulking feedstock, the City could make its yard waste available. The City generates an estimated approximately 11,200 cubic yards or 5,800 tons of yard waste per year.

Single-Stream Recycling Collections Methods: Bins vs. Carts

The City's Commission on Sanitation has discussed the idea of switching to a roll cart system for recycling collection, but concluded that it would be too costly for the City alone to adopt. However, research has indicated that such a collection system would likely improve our recycling rate. The City would likely be supportive of switching to a cart collection system and would like to be involved in discussions exploring the implementation of such a program.

² The final report of the Commission on Sanitation is forthcoming, and its midterm report is available at: <http://www.cityofbinghamton.com/Library/pages/Commissions/Commission%20on%20Sanitation%20-%20Midterm%20Report.pdf>.

Broome County Division of Solid Waste Management

Barbara J. Fiala, Broome County Executive • Daniel A. Schofield, Deputy Commissioner



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April 13, 2010

Matthew Ryan, Mayor
City of Binghamton
Government Plaza
Binghamton, NY 13901

RE: Comment to Draft SWMP

Mayor Ryan,

This correspondence is in response to your recent comments regarding the Broome County Solid Waste Management Plan.

Concern: Lifespan of the Current Landfill

1. The draft plan covers a 20 year period; however most plans cover only a 10 year period. The Department of Environmental Conservation does not support plans longer than 20 years as the solid waste industry changes rapidly and new technologies are consistently developed. At this time the draft SWMP does not address building a new landfill and evaluating costs associated with such a project as it is too soon to make a definitive program determination. This does not mean the County is not looking forward to future waste disposal needs. One of the main focuses of the draft SWMP is waste diversion strategies. Logically, anything that can be kept out of the landfill will have a direct impact on extending the life of the landfill; however the extent that each of the upstream diversion activities can be implemented will affect the quantity of material diverted which is not quantifiable at this time.

Concern: Household Hazardous Waste and Electronics Recycling

1. The County is aware of the e-steward program; however the program which is operated by BAN (Basal Action Network) incorporates ISO 14001 for environment, ISO 18001 for health and safety, SA 8000 for social accountability which are all standards that can be used. While it demonstrates due diligence by a company to invest time and money into the process it does not insure the company will indeed follow Federal or State regulations/laws as set forth and the program does not conduct enforcement of such regulations/laws nor does it nullify the possibility of material being exported. In addition, it is one of three programs that have developed standards pertaining to e-waste recycling. The County as part of its procurement process places requirements and requires certifications regarding the final destination of all electronic components. The County is aware of the environmental impacts and concerns of e-waste not being handled properly and works diligently to ensure County material is properly managed.

Concern: Promoting Commercial, Industrial, Intuitional & Multifamily Recycling

1. The County appreciates the City's willingness to work together to further recycling efforts in these sectors.

Concern: Construction and Demolition Debris Recycling

1. *If the County were to ban C&D material from the landfill, or simply increase tipping fees for these materials, a C&D recycling facility could be developed by Cgreen, LLC, a local development group, and be up and running within a year. Instead of recommending that the County support a private project that is ready to go now, the SWMP suggests a 5-10 year timeframe for developing a County-owned C&D sorting facility at the landfill, which would*

result in a massive amount of C&D tonnage (likely 220,000) ending up in the landfill unnecessarily due to the delay in development.

The County in the past has reviewed area business proposals for developing a facility and the economics needed to financially make a facility equitable and tonnages needed did not appear to present itself. Currently, much of the C&D in the area is not being received at the Broome County Landfill, but being exported to other landfills with lower tip fees than the \$40/ton Broome County charges. An increase in tip fees would most likely result in additional material being exported. For the County to implement a ban on C&D material without an established viable operating facility located in the County would be irresponsible and a poor solid waste management decision. To implement a ban the County must be able to provide an alternative to all of our residents to handle their C&D material that is both convenient and economically feasible. A poorly implemented ban could cause a rise in illegal dumping and burning.

2. *Returning to the issue of lost revenue being a disincentive to supporting the creation of a privately owned C&D recycling facility, the draft SWMP update did not address the potential cost savings that would be achieved by reducing the amount of waste sent to the landfill annually by having a privately owned C&D recycling facility. A true analysis needs to take into account the savings to taxpayers by diverting waste and extending the life of the landfill. Waiting ten years to build a publically run facility may actually cost taxpayers when a viable private enterprise could be fully operational by the end of this year.*

The county is an established enterprise fund (financed through landfill tip fees) and was instituted with the county's acceptance that recycling and waste diversion activities would divert material from the landfill resulting in revenue being diverted. While C&D recycling would result in a loss of revenue the county is not shunning its support of C&D recycling. If a private enterprise chooses to pursue a facility the County is not opposed to it and not preventing any private enterprise from doing so. The landfill currently accepts approximately 40,000 tons of C&D material a year which has not shown to be quantities high enough to support a full C&D recycling facility alone. To provide a consistent quantity of material to make a facility viable a facility would need to receive a majority of their material from feedstock's outside of what the County Landfill receives.

Concern: Organics Diversion

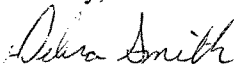
1. The County appreciates the City's support of any future organics diversion efforts.

Concern: Single-Stream Recycling Collection Methods: Bins vs. Carts

1. Any steps the County may take regarding a change in bin size or carts would require further discussion and input from all area haulers.

The overall focus of the SWMP is to strive to increase recycling and waste reduction to provide a more sustainable county and to extend landfill capacity. The County will continue to work towards diverting material from the landfill through continued program improvements. Thank you for your time and comments on the draft SWMP.

Sincerely,



Debra Smith
Materials Recovery Manager

Cc: Daniel Schofield, Deputy Commissioner of DSWM
Patrick Brennan, Deputy County Executive

Step 1. Planning Unit and Plan Period Selection

Please, select from the drop-down list the name of your planning unit and the planning period of your LSWMP. Be aware that a LSWMP must be developed for a 10-year period, and that your selection will be replicated on each one of the following tabs.

Planning Unit	Broome County
Planning Period	2019-2028

Step 2. Waste Generation Rate

In order to project how the amount of waste generated in the planning unit will change over time, data regarding the current amount of waste generated by the planning unit is needed. This can be the total tons of waste generated by the planning unit in the current year (Tons/yr), or this can be the estimated daily quantity of waste generated per person in the planning unit (lb/person/day). If both the total annual generation and the estimated generation rate per person are unknown, the state average for MSW generation rate can be used along with the planning unit's population to estimate the total amount of waste generated in the planning unit.

For this step, select one of the options that describes the known information about the planning unit. Enter the waste generated in Tons (MSW disposed & Recycled Materials) or the waste generation rate in lb/person/day in the purple cell. If no data on the waste generated in the planning unit is available, choose the corresponding option from the list. The calculator will estimate the total amount of waste generated based on the state's average generation rate and the planning unit's population.

Broome County

The amount of waste generated (by all residents, institutions, etc.) in the planning unit will be based on what is known. If the MSW generation amount and the generation rate are unknown, the state average for MSW generation rate will be used.

☒ I know the amount of MSW generated (Tons/year):

Enter tons disposed here:

163,828.00

☐ The planning unit Average MSW Generation Rate (lb/person/day) is:

☐ The amount of MSW Generated and the planning unit Average MSW Generation Rate are unknown.

Enter tons diverted here:

210,912.00

Step 3. Planning Unit Population - Projections & Municipal Solid Waste (MSW) - Projections

This tab will provide you with population projections and MSW generation projections for the planning period you had previously selected. It is recognized that Municipal Solid Waste (MSW) generation is reliant on population changes, hence, it is necessary to project both and identify their correlation.

In the first **purple cell** enter the total tons of MSW that was disposed in the year immediately before your plan period starts. For example: If the plan period is 2016-2026, the MSW disposed data should be from 2015.

Population Projection:

Calculations are determined by a linear regression based on the latest census population data and an annual growth rate percentage specific to the planning unit. If it is anticipated that the population is going to decrease overtime, the minus sign (-) will be used.

MSW Generation Projection:

The MSW generation rate (Lb/person/day) calculated on the previous tab from the Waste Generation Rate will serve as a start point for the planning period. On the calculator, three options are considered to anticipate the MSW generation over time, and one must be selected according to the goals of the planning unit:

First Option:

MSW generation rate does not change. Consequently, MSW generation fluctuates with the population of the planning unit. If the population increases, waste generation will rise as well, and vice versa. By selecting this option, the planning unit is in “**status quo**”, meaning that is not making any improvements, and consequently is getting far from reaching the State’s goal by 2030.

Second Option:

MSW generation amount remains the same, regardless of whether or not the planning unit's population changes.

Third Option:

As a result of successfully implementing the Local Solid Waste Management Plan, MSW generation will be reduced by an annual factor of ...

An Annual Factor of Reduction (%) should be calculated, defined, and selected by the planning unit. This factor will be the numerical representation of one of the planning unit's goals for the planning period. Once calculated, the Annual Factor of Reduction can be chosen from the drop down list provided.

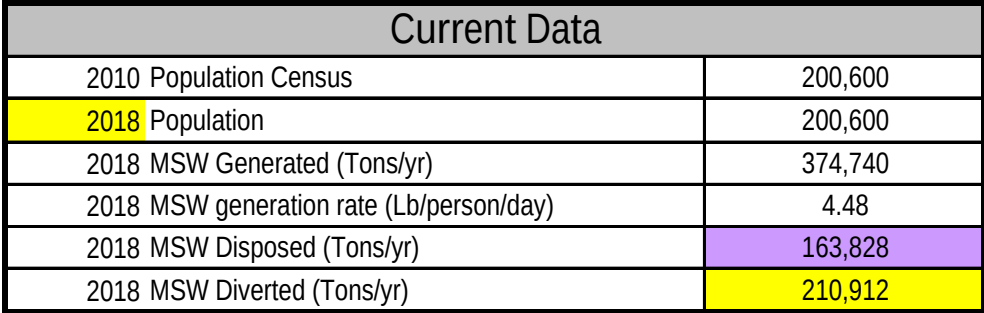
Note:

- The graphic will display the Population and MSW Generation projections over the selected planning period. It has been designed to visualize the contrast of the final outcomes, based on the selections of each planning unit

Broome County	2019-2028

Broome County	2019-2028

Current Data	
2010 Population Census	200,600
2018 Population	200,600
2018 MSW Generated (Tons/yr)	374,740
2018 MSW generation rate (Lb/person/day)	4.48
2018 MSW Disposed (Tons/yr)	163,828
2018 MSW Diverted (Tons/yr)	210,912



Annual rate of population growth (%)	0.00%

[illegible]

Forecasting future conditions... What do you expect to happen to the MSW generation rate over the next 10 year period plan?

- ☐ MSW generation rate does not change. Consequently, MSW generation fluctuates with the population of the planning unit, if the population increases, waste generation will rise as well, and vice versa.
- ☐ MSW generation amount remains the same, regardless of whether or not the planning unit's population fluctuates.
- ☒ As a result of successfully implementing the Local Solid Waste Management Plan, MSW generation will be reduced by an annual factor of ...

This option is required, as per 363-2.7(b)(2).

Reduction Factor (per year)	1.0%

MSW Generation Projection										
2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
10.22	10.12	10.02	9.91	9.82	9.72	9.62	9.52	9.43	9.33	9.24
374,094	370,353	366,649	362,983	359,353	355,759	352,202	348,680	345,193	341,741	338,324

MSW generation rate (Lb/person/day)	10.22

(Lb/person/day)

Tons/yr

Step 4. Municipal Solid Waste (MSW) Detailed Composition Analysis

The next step is to Identify the Materials Composition of the Waste Stream based on population density, and demographic characteristics of the Planning Unit.

This tab will provide the PU with a more detailed estimate of the materials present in the waste stream, which could be crucial when prioritizing the initiatives and programs of the LSWMP.

The population density distribution has been calculated based on the 2010 Census data and will be auto populated when a planning unit is selected. The following parameters were used:

- Rural: <325 persons/mi²
- Suburban: >325 and $<5,000$ persons/mi²
- Urban: $>5,000$ persons/mi²

Under Density Population Distribution, the user has the option to modify the percentage values for the Sector (*Residential and Commercial/Institutional*) based on land use and specific characteristics of each planning unit. For example: A rural population in Westchester County could be 64% Residential and 36% Commercial / Institutional, while in Wyoming County might be 50% Residential and 50% Commercial / Institutional.

The results are presented on the last right column under MSW Materials Composition. Be aware of color changes on the cells, whenever a category represents over 15% of the total waste generation, the cell will turn red to easily identify key categories of the waste stream. It will also facilitate the selection of initiatives, programs, and infrastructure for the solid waste management system.

Note: If no data exists, use the pre-populated information in the worksheet.

This page is a more specific

Broome County										2019-2028		
Density Population Distribution	Rural			Suburban			Urban			MSW Materials Composition (%)		
	28.50%			68.42%			3.08%					
	Residential	Comm/Inst.	Combined	Residential	Comm/Inst.	Combined	Residential	Comm/Inst.	Combined			
	58.00%	42.00%	100.00%	55.00%	45.00%	100.00%	58.00%	42.00%	100.00%			
Material	Newspaper		5.20%	1.90%	3.81%	5.00%	1.90%	3.61%	6.60%	2.00%	4.67%	3.70%
	Corrugated Cardboard		6.60%	13.90%	9.67%	6.60%	13.90%	9.89%	6.90%	13.70%	9.76%	9.82%
	Other Recyclable Paper	Paperboard	3.20%	1.10%	2.32%	3.30%	1.00%	2.27%	3.60%	0.90%	2.47%	2.29%
		Office Paper	0.80%	3.80%	2.06%	0.90%	4.20%	2.39%	1.10%	5.80%	3.07%	2.31%
		Junk Mail	3.00%	0.70%	2.03%	3.20%	0.70%	2.08%	3.50%	0.70%	2.32%	2.07%
		Other Commercial Printing	1.70%	2.30%	1.95%	1.70%	2.40%	2.02%	2.30%	2.60%	2.43%	2.01%
		Magazines	1.10%	0.90%	1.02%	1.00%	0.80%	0.91%	1.10%	1.00%	1.06%	0.94%
		Books	0.50%	0.30%	0.42%	0.50%	0.30%	0.41%	0.60%	0.40%	0.52%	0.41%
		Paper Bags	0.50%	0.20%	0.37%	0.50%	0.20%	0.37%	0.60%	0.20%	0.43%	0.37%
		Phone Books	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%	0.20%	0.26%	0.30%
	Poly-Coated	0.20%	0.30%	0.24%	0.20%	0.20%	0.20%	0.30%	0.20%	0.26%	0.21%	
	Other Recyclable Paper (Total)		11.30%	9.90%	10.71%	11.60%	10.10%	10.93%	13.40%	12.00%	12.81%	10.92%
	Other Compostable Paper		6.80%	6.80%	6.80%	6.40%	6.40%	6.40%	6.80%	6.80%	6.80%	6.53%
	Total Paper		29.90%	32.50%	30.99%	29.60%	32.30%	30.82%	33.70%	34.50%	34.04%	30.96%
	Ferrous/Aluminum Containers	Ferrous Containers	1.90%	1.00%	1.52%	1.20%	0.70%	0.98%	1.40%	0.70%	1.11%	1.13%
		Aluminum Containers	0.70%	0.40%	0.57%	0.60%	0.30%	0.47%	0.50%	0.40%	0.46%	0.50%
	Ferrous/Aluminum Containers (Total)		2.60%	1.40%	2.10%	1.80%	1.00%	1.44%	1.90%	1.10%	1.56%	1.63%
	Other Ferrous Metals		5.20%	5.40%	5.28%	5.00%	5.80%	5.36%	3.30%	3.70%	3.47%	5.28%
	Other Non-Ferrous Metals	Other aluminum	0.20%	0.30%	0.24%	0.20%	0.30%	0.25%	0.20%	0.30%	0.24%	0.24%
		Automotive batteries	0.80%	0.50%	0.67%	0.70%	0.40%	0.57%	0.20%	0.20%	0.20%	0.58%
		Other non-aluminum	0.50%	0.30%	0.42%	0.30%	0.40%	0.35%	0.40%	0.20%	0.32%	0.36%
	Other Non-Ferrous Metals (Total)		1.50%	1.10%	1.33%	1.20%	1.10%	1.16%	0.80%	0.70%	0.76%	1.19%
	Total Metals		9.30%	7.90%	8.71%	8.00%	7.90%	7.96%	6.00%	5.50%	5.79%	8.10%
	PET Containers		1.10%	0.80%	0.97%	0.90%	0.80%	0.86%	1.20%	1.00%	1.12%	0.90%
	HDPE Containers		1.10%	0.60%	0.89%	0.90%	0.70%	0.81%	1.00%	0.70%	0.87%	0.83%
	Other Plastic (3-7) Containers		0.20%	0.10%	0.16%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.19%
	Film Plastic		5.70%	5.90%	5.78%	5.50%	5.80%	5.64%	5.80%	5.80%	5.80%	5.68%
	Other Plastic	Durables	3.10%	3.20%	3.14%	3.00%	3.20%	3.09%	3.20%	3.30%	3.24%	3.11%
		Non-Durables	1.60%	1.80%	1.68%	1.60%	1.80%	1.69%	1.80%	1.90%	1.84%	1.69%
		Packaging	1.40%	1.10%	1.27%	1.40%	1.10%	1.27%	1.50%	1.10%	1.33%	1.27%
	Other Plastic (Total)		6.10%	6.10%	6.10%	6.00%	6.10%	6.05%	6.50%	6.30%	6.42%	6.07%
	Total Plastics		14.20%	13.50%	13.91%	13.50%	13.60%	13.55%	14.70%	14.00%	14.41%	13.67%
	Glass Bottles, Jars and Containers		4.10%	3.80%	3.97%	3.90%	3.80%	3.86%	4.30%	3.80%	4.09%	3.90%
	Other Glass (Flat glass, dishware, light bulbs, etc.)		0.50%	0.40%	0.46%	0.30%	0.40%	0.35%	0.40%	0.40%	0.40%	0.38%
	Total Glass		4.60%	4.20%	4.43%	4.20%	4.20%	4.20%	4.70%	4.20%	4.49%	4.28%
	Food Scraps		12.70%	13.30%	12.95%	12.90%	15.50%	14.07%	17.20%	25.20%	20.56%	13.95%
	Leaves and Grass / Pruning and Trimmings		3.10%	1.10%	2.26%	11.30%	9.10%	10.31%	4.20%	1.50%	3.07%	7.79%
	Total Organics		15.80%	14.40%	15.21%	24.20%	24.60%	24.38%	21.40%	26.70%	23.63%	21.74%
	Clothing Footwear, Towels, Sheets		4.60%	3.00%	3.93%	4.40%	3.20%	3.86%	4.80%	2.50%	3.83%	3.88%
	Carpet		1.40%	1.30%	1.36%	1.70%	1.40%	1.57%	1.70%	0.90%	1.36%	1.50%
Total Textiles		6.00%	4.30%	5.29%	6.10%	4.60%	5.43%	6.50%	3.40%	5.20%	5.38%	
Total Wood (Pallets, crates, adulterated and non-adulterated wood)		4.10%	9.00%	6.16%	2.90%	4.10%	3.44%	2.00%	3.50%	2.63%	4.19%	
DIY - Construction & Renovation Materials		8.00%	7.60%	7.83%	3.80%	2.70%	3.31%	4.40%	3.80%	4.15%	4.62%	
Diapers		1.90%	1.10%	1.56%	2.10%	1.20%	1.70%	2.30%	1.10%	1.80%	1.66%	
Electronics		1.30%	1.40%	1.34%	1.60%	1.70%	1.65%	1.30%	1.30%	1.30%	1.55%	
Tires		1.80%	1.80%	1.80%	1.70%	1.40%	1.57%	0.50%	0.40%	0.46%	1.60%	
HHW		0.60%	0.00%	0.35%	0.60%	0.00%	0.33%	0.50%	0.00%	0.29%	0.33%	
Soils and Fines		0.60%	0.60%	0.60%	0.10%	0.20%	0.15%	0.10%	0.10%	0.10%	0.27%	
Other Composite Materials - Durable and/or Inert		1.90%	1.70%	1.82%	1.60%	1.50%	1.56%	1.90%	1.50%	1.73%	1.63%	
Total Miscellaneous		16.10%	14.20%	15.30%	11.50%	8.70%	10.24%	11.00%	8.20%	9.82%	11.67%	
Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	

Step 5. Municipal Solid Waste (MSW) Detailed Composition Analysis

On this tab, the composition of the municipal waste stream will be estimated based on the amount of material generated in the planning unit and the state average of the different waste materials. A pie chart will be generated to clearly show the composition of the waste stream and to identify key categories of the waste stream for the planning unit.

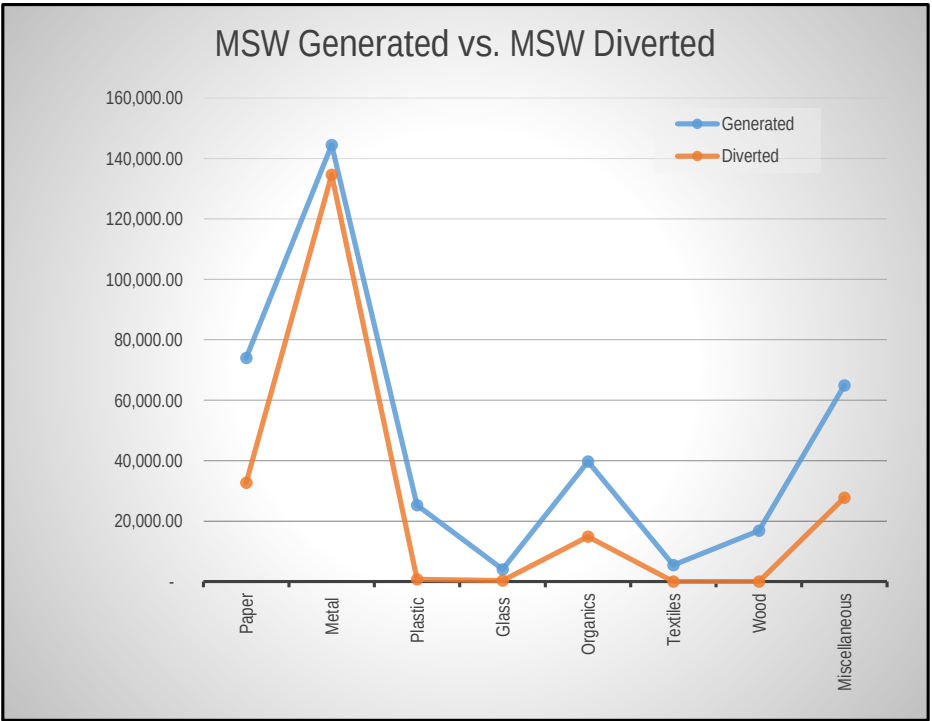
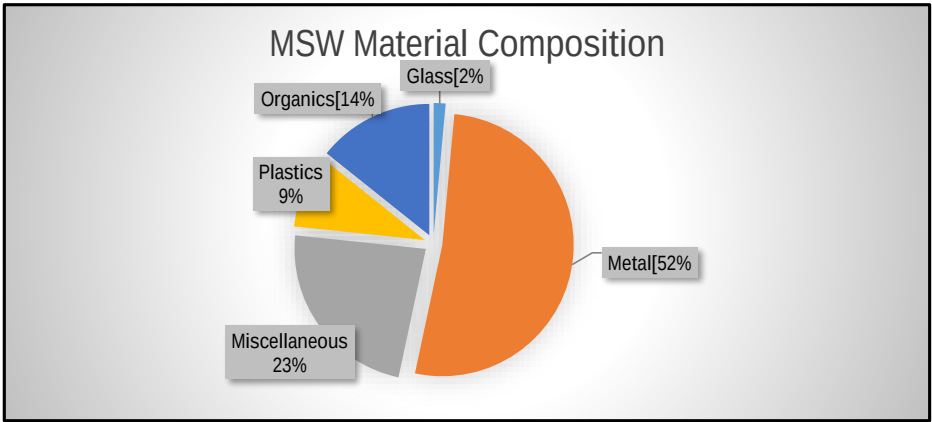
The total tons of MSW diverted per year will be auto populated based on previous data inputs, while the amount tons diverted for each material by category should be populated by the user. Purple cells should be used for amounts of diverted waste by type of material, and a totaled number by category (e.g. paper, metal) should be put in the green cells. After inputting the data, a graphic will be generated to show the MSW generation and diversion streams in Tons.

Make sure that the total amounts at the bottom of the page are consistent with the data you already put into the calculator. If the cell is highlighted in red, you should revise the amounts of diverted waste by category.

Broome County

2019-2028

		2018		
		MSW Materials Composition (%)	MSW Generated (Tons)	MSW Diverted (Tons)
Material		100.0%	#VALUE!	#VALUE!
Paper	Total Paper	19.7%	73,983	32,698.00
Metal	Total Metals	38.6%	144,479	134,649.00
Plastic	Total Plastics	6.7%	25,261	687.00
Glass	Total Glass	1.1%	4,061	293.00
Organics	Food Scraps & other	6.7%	24,995	2,714.00
	Leaves and Grass / Pruning and Trimmings	3.9%	14,758	12,137.00
	Total Organics	10.6%	39,753	14,851.00
Textiles	Total Textiles	1.4%	5,406	0.00
Wood	Total Wood (Pallets, crates, adulterated and non-adulterated wood)	4.5%	16,874	0.00
Miscellaneous	Misc.	0.0%	14,417	0.00
	Commingled containers	3.3%	12,202	12,202.00
	Electronics	2.0%	7,316	272.00
	Tires	0.4%	1,431	1,103.00
	HHW	0.9%	3,340	2,521.00
	Soils and Fines	4.7%	17,796	3,215.00
	Other Composite Materials - Durable and/or inert	2.2%	8,421	8,421.00
	Total Miscellaneous	17.3%	64,923	27,734.00
Total		100.0%	374,740	210,912.00



Glass 1.08%

Metal 38.55%

Miscellane 17.32%

Plastics 6.74%

Organics 10.61%

	Generated	Diverted
Paper	73,983.00	32698.00
Metal	144,479.00	134649.00
Plastic	25,261.00	687.00
Glass	4,061.00	293.00
Organics	39,753.00	14851.00
Textiles	5,406.00	0.00
Wood	16,874.00	0.00
Miscellane	64,923.00	27734.00

Step 6. Municipal Solid Waste (MSW) Diversion Projections

This tab will be used to create goals for the amount of material the planning unit will divert for each year of the planning period. These goals will be entered as percentages, based on how much of the material generated will be diverted for recycling or beneficial use.

The diversion goal percentages will be entered in the purple cells for each material and each year of the planning period.

Broome County

2019-2028

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Projected MSW Generation (Tons/yr)	374,094	370,353	366,649	362,983	359,353	355,759	352,202	348,680	345,193	341,741
MSW Diverted (Tons/yr)	23,459	23,459	23,459	23,460	23,460	23,460	23,460	23,460	23,460	23,460

		2018				2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
		MSW Materials Composition (%)	MSW Generated (Tons)	MSW Diverted (Tons)	% MSW Diverted	% MSW Diverted	% MSW Diverted	% MSW Diverted	% MSW Diverted	% MSW Diverted	% MSW Diverted	% MSW Diverted	% MSW Diverted	% MSW Diverted	% MSW Diverted
Material		100.0%	374,740	210,912	56.3%	6.3%	6.3%	6.4%	6.5%	6.5%	6.6%	6.7%	6.7%	6.8%	6.9%
	Total Paper	19.7%	73,983	32,698	44.2%	45.2%	46.2%	47.2%	48.2%	49.2%	50.2%	51.2%	52.2%	53.2%	54.2%
	Total Metals	38.6%	144,479	134,649	93.2%	94.2%	95.2%	96.2%	97.2%	98.2%	99.2%	100.0%	100.0%	100.0%	100.0%
	Total Plastics	6.7%	25,261	687	2.7%	3.7%	4.7%	5.7%	6.7%	7.7%	8.7%	9.7%	10.7%	11.7%	12.7%
	Total Glass	1.1%	4,061	293	7.2%	8.2%	9.2%	10.2%	11.2%	12.2%	13.2%	14.2%	15.2%	16.2%	17.2%
Organics	Food Scraps & other	6.7%	24,995	2,714	10.9%	11.9%	12.9%	13.9%	14.9%	15.9%	16.9%	17.9%	18.9%	19.9%	20.9%
	Leaves and Grass / Pruning and Trimmings	3.9%	14,758	12,137	82.2%	83.2%	84.2%	85.2%	86.2%	87.2%	88.2%	89.2%	90.2%	91.2%	92.2%
	Total Organics	10.6%	39,753	14,851	37.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%

Fill in these

Textiles	Total Textiles	1.4%	5,406	0	0.0%	1.0%	2.0%	3.0%	4.0%	5.0%	6.0%	7.0%	8.0%	9.0%	10.0%
Wood	Total Wood (Pallets, crates, adulterated and non-adulterated wood)	4.5%	16,874	0	0.0%	1.0%	2.0%	3.0%	4.0%	5.0%	6.0%	7.0%	8.0%	9.0%	10.0%
Miscellaneous	Misc.	0.0%	0	0	#DIV/0!										
	Commingled containers	3.3%	12,202	12,202	100.0%										
	Electronics	2.0%	7,316	272	3.7%	4.7%	5.7%	6.7%	7.7%	8.7%	9.7%	10.7%	11.7%	12.7%	13.7%
	Tires	0.4%	1,431	1,103	77.1%	78.1%	79.1%	80.1%	81.1%	82.1%	83.1%	84.1%	85.1%	86.1%	87.1%
	HHW	0.9%	3,340	2,521	75.5%	76.5%	77.5%	78.5%	79.5%	80.5%	81.5%	82.5%	83.5%	84.5%	85.5%
	Soils and Fines	4.7%	17,796	3,215	18.1%	19.1%	20.1%	21.1%	22.1%	23.1%	24.1%	25.1%	26.1%	27.1%	28.1%
	Other Composite Materials - Durable and/or inert	2.2%	8,421	8,421	100.0%										
	Total Miscellaneous	17.3%	64,923	27,734	42.7%	14.7%	14.7%	14.8%	14.9%	14.9%	15.0%	15.0%	15.1%	15.1%	15.2%

Step 7. Municipal Solid Waste (MSW) Generation and Diversion - Detailed Projections

The final result of the Population and Municipal Composition Calculator is presented on the last tab. This tab contains data for the current year regarding waste generated and waste diverted from disposal. This tab also shows the projected waste diversion percentages, and the amount of waste in tons these percentages will divert for recycling. Total amounts of waste diverted will be calculated for each material and each year of the planning period.

Broome County

2019-2028

				2018				2019			2020			2021			2022			2023			2024			2025			2026			2027			2028		
				MSW Materials Composition (%)	MSW Generated (Tons)	MSW Diverted (Tons)	% MSW Diverted	MSW generated (Tons)	MSW Diverted	% MSW Diverted	MSW generated (Tons)	MSW Diverted	% MSW Diverted	MSW generated (Tons)	MSW Diverted	% MSW Diverted	MSW generated (Tons)	MSW Diverted	% MSW Diverted	MSW generated (Tons)	MSW Diverted	% MSW Diverted	MSW generated (Tons)	MSW Diverted	% MSW Diverted	MSW generated (Tons)	MSW Diverted	% MSW Diverted	MSW generated (Tons)	MSW Diverted	% MSW Diverted	MSW generated (Tons)	MSW Diverted	% MSW Diverted			
	Material		100.00%	374,740	210,912	56.3%	374,094	23,459	6.3%	370,353	24,744	7%	366,649	26,001	7.1%	362,983	27,231	7.5%	359,353	27,378	7.6%	355,759	29,609	8.3%	352,202	30,758	8.7%	348,680	31,881	9.1%	345,193	32,979	9.6%	341,741	34,051	10.0%	
		Total Paper	19.74%	73,983	32,698	44.2%	73,855	0	0.0%	73,117	0	0%	72,386	0	0.0%	71,662	0	0.0%	70,945	0	0.0%	70,236	0	0.0%	69,533	0	0.0%	68,838	0	0.0%	68,150	0	0.0%	67,468	0	0.0%	
	Total Metals	38.55%	144,479	134,649	93.2%	144,230	0	0.0%	142,787	0	0%	141,360	0	0.0%	139,946	0	0.0%	138,547	0	0.0%	137,161	0	0.0%	135,789	0	0.0%	134,432	0	0.0%	133,087	0	0.0%	131,756	0	0.0%		
	Total Plastics	6.74%	25,261	687	2.7%	25,217	512	2.0%	24,965	1,013	4%	24,716	1,504	6.1%	24,468	1,985	8.1%	24,224	1,402	5.8%	23,982	2,919	12.2%	23,742	3,371	14.2%	23,504	3,814	16.2%	23,269	4,248	18.3%	23,037	4,673	20.3%		
	Total Glass	1.08%	4,061	293	7.2%	4,054	160	3.9%	4,013	317	8%	3,973	470	11.8%	3,934	621	15.8%	3,894	768	19.7%	3,855	913	23.7%	3,817	1,054	27.6%	3,779	1,192	31.6%	3,741	1,328	35.5%	3,703	1,461	39.4%		
Tex	Food Scraps & other	6.67%	24,995	2,714	10.9%	24,952	2,959	11.9%	24,702	3,176	13%	24,455	3,389	13.9%	24,211	3,597	14.9%	23,969	3,801	15.9%	23,729	4,000	16.9%	23,492	4,195	17.9%	23,257	4,386	18.9%	23,024	4,572	19.9%	22,794	4,754	20.9%		
	Leaves and Grass / Pruning and Trimmings	3.94%	14,758	12,137	82.2%	14,733	12,263	83.2%	14,585	12,287	84%	14,439	12,308	85.2%	14,295	12,328	86.2%	14,152	12,346	87.2%	14,011	12,363	88.2%	13,870	12,378	89.2%	13,732	12,391	90.2%	13,594	12,404	91.2%	13,458	12,414	92.2%		
	Total Organics	10.61%	39,753	14,851	37.4%	39,684	15,222	38.4%	39,288	15,463	39%	38,895	15,697	40.4%	38,506	15,925	41.4%	38,121	16,147	42.4%	37,739	16,363	43.4%	37,362	16,573	44.4%	36,988	16,777	45.4%	36,619	16,976	46.4%	36,252	17,168	47.4%		
Wood	Total Textiles	1.44%	5,406	0	0.0%	5,397	0	0.0%	5,343	0	0%	5,289	0	0.0%	5,236	0	0.0%	5,184	0	0.0%	5,132	0	0.0%	5,081	0	0.0%	5,030	0	0.0%	4,980	0	0.0%	4,930	0	0.0%		
	Total Wood (Pallets, crates, adulterated and non-adulterated)	4.50%	16,874	0	0.0%	16,845	168	1.0%	16,676	334	2%	16,510	495	3.0%	16,345	654	4.0%	16,181	809	5.0%	16,019	961	6.0%	15,859	1,110	7.0%	15,701	1,256	8.0%	15,544	1,399	9.0%	15,388	1,539	10.0%		
Miscellaneous	Misc.	0.00%	0	0	#DIV/0!	0	0	0.0%	0	0	0%	0	0	0.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%		
	Commingled containers	3.26%	12,202	12,202	100.0%	12,181	0	0.0%	12,059	0	0%	11,939	0	0.0%	11,819	0	0.0%	11,701	0	0.0%	11,584	0	0.0%	11,468	0	0.0%	11,353	0	0.0%	11,240	0	0.0%	11,128	0	0.0%		
	Electronics	1.95%	7,316	272	3.7%	7,303	345	4.7%	7,230	413	6%	7,158	481	6.7%	7,086	547	7.7%	7,016	612	8.7%	6,945	675	9.7%	6,876	737	10.7%	6,807	798	11.7%	6,739	857	12.7%	6,672	915	13.7%		
	Tires	0.38%	1,431	1,103	77.1%	1,429	1,115	78.1%	1,414	1,118	79%	1,400	1,121	80.1%	1,386	1,124	81.1%	1,372	1,126	82.1%	1,359	1,129	83.1%	1,345	1,131	84.1%	1,331	1,133	85.1%	1,318	1,135	86.1%	1,305	1,136	87.1%		
	HHW	0.89%	3,340	2,521	75.5%	3,334	2,550	76.5%	3,301	2,558	77%	3,268	2,565	78.5%	3,235	2,571	79.5%	3,203	2,578	80.5%	3,171	2,584	81.5%	3,139	2,589	82.5%	3,108	2,594	83.5%	3,077	2,599	84.5%	3,046	2,604	85.5%		
	Soils and Fines	4.75%	17,796	3,215	18.1%	17,765	3,387	19.1%	17,588	3,529	20%	17,412	3,668	21.1%	17,238	3,804	22.1%	17,065	3,936	23.1%	16,895	4,066	24.1%	16,726	4,192	25.1%	16,558	4,316	26.1%	16,393	4,437	27.1%	16,229	4,555	28.1%		
	Other Composite Materials - Durable and/or inert	2.25%	8,421	8,421	100.0%	8,406	0	0.0%	8,322	0	0%	8,239	0	0.0%	8,157	0	0.0%	8,075	0	0.0%	7,994	0	0.0%	7,915	0	0.0%	7,835	0	0.0%	7,757	0	0.0%	7,679	0	0.0%		
	Total Miscellaneous	17.32%	64,923	27,734	42.7%	50,419	7,397	14.7%	49,915	7,618	15%	49,416	7,835	15.9%	48,921	8,046	16.4%	48,432	8,252	17.0%	47,948	8,453	17.6%	47,468	8,649	18.2%	46,994	8,841	18.8%	46,524	9,028	19.4%	46,059	9,210	20.0%		

				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Population				200,600	200,600	200,600	200,600	200,600	200,600	200,600	200,600	200,600	200,600	200,600
MSW Generated (tons)				374,740.00	374,094	370,353	366,649	362,983	359,353	355,759	352,202	348,680	345,193	341,741
Per Capita MSW Generated (lbs/person/year)				3,736	3,730	3,692	3,656	3,619	3,583	3,547	3,511	3,476	3,442	3,407
MSW Diverted (tons)				210,912.00	23,459	24,744	26,001	27,231	27,378	29,609	30,758	31,881	32,979	34,051
Per Capita MSW Diverted (lbs/person/year)				2,103	234	247	259	271	273	295	307	318	329	339
MSW Disposed (tons)				163,828.00	350,634	345,608	340,648	335,752	331,974	326,151	321,444	316,799	312,214	307,690
Per Capita MSW Disposed (lbs/person/year)				1,633	3,496	3,446	3,396	3,347	3,310	3,252	3,205	3,159	3,113	3,068
Per Capita MSW Disposed (lbs/person/day)				4.48	9.58	9.44	9.30	9.17	9.07	8.91	8.78	8.65	8.53	8.40