June 12, 2008

R·W·BECK

Ms. Mary Justh
Secretary/Treasurer
Middlesex Township
350 N. Middlesex Rd, Suite 1
Carlisle, PA 17013

Subject**: SWANA Technical Assistance Project**

Dear Mary:

This letter report summarizes R. W. Beck's evaluation of a shared leaf/yard waste composting program for Middlesex Township and North Middleton Township. The objective of the evaluation was to investigate the feasibility of siting a yard waste management facility on a site owned by and located in Middlesex Township. Both townships believe they could benefit from such an arrangement as it would enable them to satisfy residents' need for yard waste management services. Yard waste collection is the most popular service provided by North Middleton Township, according to a Township representative contacted for this project. Currently North Middleton Township, with just over 10,000 residents, is mandated by Pennsylvania Act 101 to recycle "leaf waste" which is defined in Act 101 as "leaves, garden residue, shrubbery and tree trimmings, and similar materials, but not including grass clippings." Middlesex Township is not currently classified as an Act 101-mandated municipality, but Township officials believe that the 2010 census will put them over the population threshold of 10,000, therefore they will then be required to recycle "leaf waste" as well. A shared approach would also allow the Townships to utilize Cumberland County's yard waste processing equipment loan program, which will be a more cost-effective solution than spending their own resources on processing equipment.

This evaluation was performed as part of the Recycling Technical Assistance program sponsored by the Pennsylvania Department of Environmental Protection (DEP) and the Solid Waste Association of North America (SWANA).

The report is divided into the following sections:

- Background on the current yard waste management infrastructure in North Middleton and Middlesex Townships and volumes of yard waste estimated to be collected;
- Identification and discussion of Commonwealth of Pennsylvania permitting implications for the type of compost facility envisioned by the Townships;
- Presentation of planning-level design and cost estimates;
- Estimate of annual operating and capital costs; and
- Recommendations.

Current Yard Waste Management Infrastructure in Middlesex and North Middleton Townships

General Information

Middlesex and North Middleton Townships are located in Cumberland County in southcentral Pennsylvania. According to 2004 estimates, the county's 11 boroughs and 22 townships are home to 221,397 people. The Cumberland Valley stretches for 42 miles from the Borough of Shippensburg on the west to the banks of the Susquehanna River on the east. Three major highways converge in Cumberland County – the Pennsylvania Turnpike (I-76), I-83, and I-81. Cumberland County is located in close proximity to Harrisburg, Hershey, Gettysburg and Lancaster, and two hours from Philadelphia, Washington D.C. and Baltimore.

Twelve of Cumberland County's 33 municipalities are Act 101-mandated recycling communities. Recycling is mandatory for communities with a population of 10,000 or greater, or communities that have a population of 5,000 or greater with a population density of at least 300 people per square mile. With 10,197 residents, North Middleton Township is just over the threshold; Middlesex Township, with 6,669 residents, is well under the threshold currently, but Township officials anticipate that the next Census will show a population increase that will, by 2010, make recycling mandatory. Mandated recycling municipalities are required to also provide for the collection from residents of "leaf waste." As described above, PA Code defines "leaf waste" as including leaves as well as other yard wastes such as garden residues, shrubbery, tree trimmings and other similar materials up to four inches in diameter, but excluding grass clippings.

Current Yard Waste Management Programs

North Middleton Township

North Middleton Township collects brush and woody waste from residents weekly during the months of March, April, May and September. A special collection of Christmas trees is done over one week in January. The brush is chipped on-route. Bagged leaves are collected from residents weekly in November and December. Brush and leaves are both piled on the site of a former landfill that is being reclaimed. Approximately three truckloads per day of chipped brush are collected during the brush collection season, with September being a particularly busy month. An estimated 60 truckloads of chipped brush are collected over the season, along with approximately two truckloads of chipped Christmas trees, for a total of about 62 13-cubic yard truckloads of chipped wood. North Middleton Township officials estimate that between 10,000 and 17,000 bags of leaves are collected in a year, depending on the weather. At the processing site, bags of leaves are opened manually. If the quantity of leaf waste generated is particularly significant in a given year, or the collection schedule is disrupted by harsh weather, bags of leaves can sit for quite a while, making the de-bagging process unpleasant.

North Middleton Township also has an agreement with Carlisle Borough to allow North Middleton residents to drop off yard waste at the Borough's site for processing. A fee is paid to the Borough for this service. The Borough, however, could cease allowing this if they found their site to be overburdened.

Middlesex Township

Currently Middlesex Township has no yard waste collection or processing services available to their residents. The Township desires to jointly develop the yard waste composting facility with North Middleton Township even though they are not currently a mandated recycling community in order to provide a service to their residents. The Township does not plan on collecting any brush or wood waste from individual households, but would instead encourage them to use the yard waste site as a drop-off. Township officials are considering requesting a proposal from York Waste, a local trash and recycling collection provider, to collect bagged leaves curbside twice per year in the fall season.

Table 1 summarizes the annual yard waste generation for Middlesex and North Middleton Townships. The estimates were provided by the Cumberland County Solid Waste Authority from its 2005 Act 101 Summary Report.

Table 1
Estimated Annual Yard Waste Generation

Jurisdiction	Population	Materials Available						
		Leaves		Wood		Total		
		Tons	Cubic Yards	Tons	Cubic Yards	Tons	Cubic Yards	Avg. Pounds Per Capita
N. Middleton Twp.	10,197	388	2,217	340 (214 chipped 126 loose)	856 chipped 775 loose	728	3,848	143
Middlesex Twp.	6,669	254	1,451	222	1,366	476	2,817	143
TOTAL:	16,866	642	3,668	562	2,997	1,204	6,665	**143**

Source: 2007 Cumberland County report to PA DEP for Middlesex Twp. Cubic yardage is estimated by R. W. Beck, based on conversion factors described below.
* Amount chipped is delivered by municipal collection trucks; amount loose is projected to be delivered by residents, see Page 9 for discussion

The estimations in Table 1 utilized conversion factors of 350 pounds per cubic yard for leaves, 325 pounds per cubic yard for loose brush and wood (the average between 250 pounds per cy

for yard waste and 400 pounds per cy for wood), and 500 pounds per cubic yard for chipped brush/wood. These density figures are used for all calculations in this report, unless otherwise stated.

It should be noted that the estimations in Table 1 indicate tonnage that is potentially available for recovery. It may be the case that 100 percent of recoverable yard waste in the Townships is not actually captured. Capture rate is impacted by factors that are difficult to predict, such as:

- Convenience of site to residents;
- Other alternatives to residents (e.g., composting on site); and
- Use of private landscaping companies (who may have access to other composting options).

Middlesex and North Middleton Townships have the advantage of being eligible to participate in Cumberland County's yard waste processing equipment loan program. A description of Cumberland County's yard waste composting efforts and the County's equipment loan program are presented below.

Cumberland County Recycling System

General Background

Cumberland County's solid waste management system is overseen by the Cumberland County Recycling and Solid Waste Authority. The Authority is a fully-chartered Authority under the Pennsylvania Municipal Authorities Act. As such, it may own land and develop solid waste facilities. Currently, however, the Authority functions mostly in an advisory capacity to the Cumberland County Commissioners. The Authority consists of seven voting board members, three staff members, a consulting engineer, and a solicitor. Additionally, in accordance with Act 101, a Solid Waste Advisory Committee is appointed by the County Commissioners to offer input and guidance in the development and maintenance of the County Waste Management Plan, as required. The membership of this committee includes representatives from citizen organizations, municipalities, industry, and private solid waste businesses operating in the County.

The mission of the Cumberland County Recycling and Solid Waste Authority is to:

- Provide for the long-term disposal capacity for Cumberland County's municipal waste in an environmentally sound and cost-effective manner;
- Reduce waste generation;
- Increase recycling; and
- Provide County residents with proper management options for certain items that are generally considered inappropriate for municipal solid waste disposal facilities.

The Authority also maintains working relationships with all of the municipalities in the County and offers them a broad array of assistance. The Act 101-mandated municipalities consult with the Authority on a regular basis for information and advice relating to their recycling programs. The Authority also makes a conscientious effort to keep the municipalities informed of the resources available to them, including Act 101 recycling grants, technical assistance grants, organizations such as Professional Recyclers of Pennsylvania (PROP), and the recycling programs offered through the Authority. The Cumberland County Recycling and Solid Waste Authority also offers assistance with the development of recycling and burning ordinances and with the completion of grant applications.

In the past, beginning in 1992, programs and initiatives of the Authority were funded by a County Administrative Fee of $2.50 on every ton of Cumberland County generated municipal waste. This fee was collected by disposal facilities that accept Cumberland County waste. The legality of administrative fees has been challenged in Pennsylvania, however, and due to court rulings, the County has not been receiving administrative fees since early 2007. They do receive some funds through a contract with a waste-to-energy facility in Harrisburg, but this is not enough to sustain the Authority. The Authority has enough reserve funding to operate for approximately three years. There is also a bill pending, HB 934, which would allow counties and authorities in Pennsylvania to charge a fee on solid waste disposal to fund recycling programs.

Approximately 83 percent of Cumberland County residents, representing 18 of 33 municipalities, have access to curbside recycling through contracted municipal collection. Twelve of these municipalities are Act 101-mandated communities. Mandated municipalities are required to also provide for the collection from residents of "leaf waste." As defined by Chapter 271 of the Pennsylvania Municipal Code, leaf waste includes other yard wastes such as garden residues, shrubbery, tree trimmings and other similar materials.

Seventeen percent of Cumberland County's population resides in the 15 rural municipalities in the western portion of the County, without access to municipally-provided curbside collection of recyclables and refuse. Trash and recycling collection in these rural areas is by subscription service arranged directly by households with private haulers. The Authority sponsors two drop-off centers where residents can deliver the following recyclable materials:

- Aluminum cans,
- Steel cans,
- Clear, green, and brown glass,
- #1 and #2 plastics bottles,
- Corrugated cardboard,
- Newspapers,
- Magazines, and

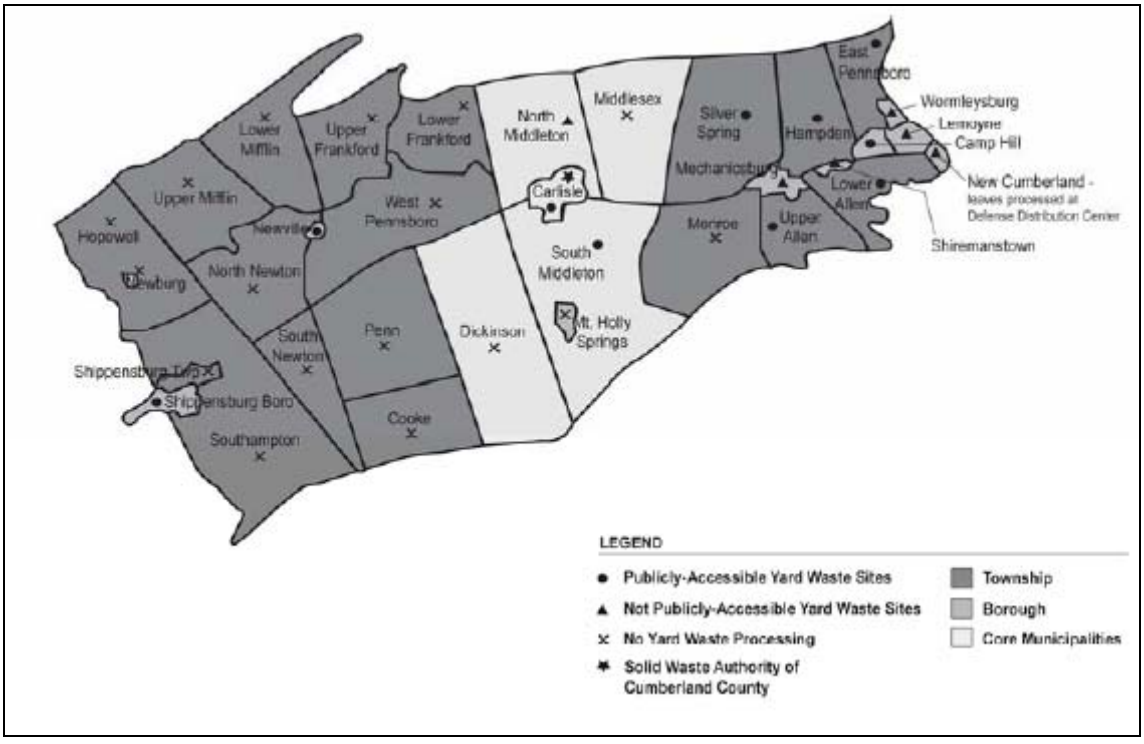
- Office paper.

Cumberland County Yard Waste Management System

Background

Sixteen Cumberland County municipalities provide some level of collection and processing for yard waste, 10 of which have processing sites accessible to the public. The eastern portion of the County has a well-established infrastructure for yard waste processing consisting of either operating or planned yard waste facilities. All of the yard waste processing facilities in the County are publicly owned and operated. Figure 1 shows a map of Cumberland County with the locations of the yard waste sites identified.

Figure 1
Cumberland County Yard Waste Sites



Approximately half of the municipalities in Cumberland County have developed programs to collect and process yard waste; however, these operations are diverse in terms of their degree of complexity, manner of operation, and level of service offered. All municipal yard waste programs offer public access for material drop-off except for Lemoyne Borough,

Mechanicsburg Borough, New Cumberland Borough, North Middleton Township, Shiremanstown Borough, and Wormleysburg Borough.

North Middleton Township collects leaves and chips brush on-route, piling both materials on a municipal site for passive decomposition. Currently Middlesex Township and Dickinson Township have no yard waste processing services available to their residents.

The Cumberland County Yard Waste Equipment Program

The Cumberland County Recycling and Solid Waste Authority established a program to loan yard waste processing equipment to municipalities in 1994, through DEP recycling grant funds. The County saw this as a way to help municipalities process yard waste cost-effectively. The County first purchased a tub grinder and two windrow turners in 1994 to assist the five municipalities participating in the loan program. As more municipalities expressed interest in the program, an additional grinder, a screener and a top dresser were purchased and added to the program. The County also provides operator training, equipment maintenance and replacement parts, scheduling, and transportation.

An annual fee is charged to the participating municipalities for unlimited use of the equipment to help defray expenses. The equipment and corresponding fees are presented in Table 2.

Table 2
Cumberland County Yard Waste Processing Equipment

Equipment	Manufacturer/Model	Purpose	Annual Fee
Horizontal Brush Grinder	Vermeer HD 525	Grind brush and tree trimmings into wood chips and mulch	$2,500 (Includes both grinders)
Tub Grinder	Olathe867 TG 10-foot Morbark 3800 Wood Hog (new in April 2008)	Grind brush and tree trimmings into wood chips and mulch	
Windrow Turners (2)	SCAT 482B, each with 20-ton trailer (these are 14 years old and may be replaced soon)	Turn leaf windrows to facilitate composting. Pull behind tractor, hook up to PTO	$750
Trommel Screen	Retech 620 Prospector	Screen mature compost for beneficial use; can mix in soil	$850
Top Dresser	Millcreek 75 TD	Spread compost. Pull behind tractor, hook up to PTO	$100

Shared Yard Waste Processing Facility

Background

In 2006 Cumberland County completed a study to investigate the feasibility of implementing a regional composting program for yard waste that could economically serve the needs of residents in the following communities:

- Carlisle Borough,
- North Middleton Township,
- South Middleton Township,
- Dickinson Township, and
- Middlesex Township.

The County envisioned that a regional yard waste facility could eventually serve as the primary yard waste processing site for the entire County, although municipalities would still have the option to operate their own sites and use the County's yard waste processing equipment on loan, for a fee. The study made a favorable recommendation to the County to establish a regional processing site using DEP grant funding. However, due to local considerations related to land acquisition, this site has not been established. Both Middlesex and North Middleton Townships were potential participants in this new site. Now that it will most likely not be built in the foreseeable future, the two Townships have decided to collaborate on developing a smaller site that they could jointly establish and share.

Description of the Potential Facility

Middlesex Township owns a tract of land that is potentially suitable for a yard waste composting facility. The site under consideration is part of a larger, 117-acre tract of land that includes the Middlesex Township parks and recreation facility. The park features sports fields, walking trails, and other recreational opportunities to residents. It is approximately two miles from the Middlesex Township administrative office. Much of the 117 acres is undeveloped wooded land. The 4.5-acre portion that could potentially become the yard waste processing facility is located in the southwestern corner of the park and is clear of vegetation. The land slopes gradually up from Beagle Club Road, then drops down to the north and culminates in a steep, wooded drop-off to a small run-off branch. The Townships would like to situate the site so that residents to the south and east do not see the site from their property.

Yard Waste Processing Site Design Considerations

Capacity

In developing a composting site, distinct areas must be planned to accommodate the following activities:

- Feedstock storage;
- Grinding/size reduction/mixing;
- Composting;
- Curing;
- Screening; and
- Final product storage.

In addition, space must be allocated to:

- Equipment storage, maintenance and fueling;
- Office space;
- Public access (for both material drop-off and pick-up); and
- Buffers for safety and environmental protection.

As shown in Table 1, the joint facility's initial estimated annual volume is 6,804 cubic yards of material, including both leaf waste and brush trimmings. County staff indicates that a desired size and shape for composting windrows is 18 feet wide by 6 feet tall to accommodate the available windrow turning equipment. If windrows were constructed 200 feet long and parallel to the slope of the site, a total of 17 windrows would be needed to accommodate all of the material. To accommodate these windrows, aisles between them for the turner to access them, maneuvering room at each end of each windrow, and aisles on each side of the line of windrows, a total of three and a half acres would be required to accommodate the windrows alone. The curing pad and finished material storage would each require approximately one-half acre. The total composting area required would then be 4.5 acres.

The joint composting site will be open for public drop-off, but since North Middleton Township, the larger municipality, provides scheduled yard waste collection it is reasonable to assume that the large majority of the leaves and brush will be delivered to the site by the municipalities and a smaller quantity of yard waste, which would be delivered more sporadically, will originate be delivered directly from residents. It is difficult to predict what this volume might be. While South Middleton Township reports that the vast majority of its brush and yard waste originates from residents through their drop-off site, their curbside brush collection system only began in 2006. Residents are therefore in the habit of dropping off this

material, while in North Middleton Township they have grown accustomed to curbside pickup over a number of years. It is considered unlikely that a majority of residents would abandon the convenience of curbside pick-up for a trip to the drop-off center. However, North Middleton Township officials acknowledge that material cut into small lengths, such as tree limbs, present safety issues for the grinders on-route and they would prefer that such material be dropped off by residents for processing in a larger tub grinder.

According to North Middleton Township officials, approximately 66 truckloads annually of chipped brush are collected from Township households. This includes three truckloads per day during the weekly collection in March, April, May and September, plus three truckloads of Christmas trees in January. The trucks have a 13-cubic yard capacity, for a total approximate collection of 858 cubic yards of brush annually. The current collection is about 63 percent of the estimated available material generation shown in Table 1. If the generation estimates are correct, the remaining 37 percent of material would be delivered to the site by residents. So, while it is not entirely possible to predict the amount of material to be delivered by the public, it is reasonable to assume that residents will deliver approximately one-third of the volume, while municipal collection vehicles will deliver approximately 2/3 of the brushy material.

The situation is similar for leaves. North Middleton Township reports collecting between 10,000 and 17,000 bags of leaves annually. It takes approximately six 35-gallon capacity trash or leaf bags to equal one cubic yard. Therefore, North Middleton Township is collecting between 1,667 and 2,833 cubic yards of leaves per year. The median volume of 2,250 cubic yards is actually slightly higher than the 2,217 cubic yards of generation estimated in Table 1. If Middlesex Township decides to contract with York Waste for leaf collection, this would most likely occur only two times per year, and only in the fall months. However, York Waste would likely find it much more cost-effective to deliver leaves to the new site, as opposed to another location. Also, this would further support the assumption that most of the material of both types could be expected to originate from municipal collection during specified times of the year.

If Middlesex Township develops a yard waste collection program that is not at least monthly, then, per Act 101, they must allow residents to deliver yard waste (both leaves and brush) to the compost site. The Township has 6,669 residents. Using the County average of 2.41 persons per household (2000 U.S. Census), it can be estimated that the Township has 2,767 households. If 75 percent of households used the site, and it was open approximately seven months per year (April through October), then assuming each household used the site two times during that seven-month period, an average of 591 cars per month, or 137 cars per week could be expected to use the site, on average, from Middlesex Township. North Middleton Township would also allow residents to drop off their materials at the site. Since North Middleton Township provides more frequent collection services, it is estimated that roughly 37 percent of its estimated 4,231 households would use the site as a drop-off. This would translate to approximately 447 cars per month, or 104 cars per week, on average, if each participating household delivered yard waste two times during the seven-month (approximately 30 weeks)

period. The Townships should ensure that vehicle counts are maintained, as part of their routine record-keeping.

Seasonality

The issue of volume and capacity is mitigated to an even greater degree by seasonality. Most small yard waste composting operations in temperate climates deal with the issue of seasonality – specifically, brush and leaves arrive at the site during different months. The seasonality of different materials is summarized in Table 3.

Table 3
Yard Waste Seasonality

Month	Material Volume			Source	
	Brush	Leaves	Xmas Trees	Municipal	Drop-off
January	Low	Low	High	√	√
February	Low	Low	Low		√
March	Medium	Low	None	√	√
April	Medium	None	None	√	√
May	Medium/High	None	None	√	√
June	Medium	None	None		√
July	Low	None	None		√
August	Low	None	None		√
September	High	Low	None	√	√
October	Medium	Medium	None		√
November	Medium	High	None	√	√
December	Medium	High	Low	√	√

As Table 3 illustrates, leaf generation is high only two months of the year, and during those months brush generation is only medium. Brush generation is high during two months of the year, when leaf generation is low or non-existent. The municipalities collect brush and leaves during different months. Therefore, accumulations of brush can be expected in March, April, May, September, and January (Christmas trees), while accumulations of leaves can be expected

in November and December. Compost program managers have to decide the best way to manage these materials given the sporadic nature of their generation and delivery.

There are basically three options for managing the seasonal nature of material deliveries that will be discussed below.

1. **Save the leaves until March, when larger volumes of brush begin to arrive, and build the windrows for composting during March, April and May –** This approach involves keeping leaves, either in bags or de-bagged, in piles for several months. The benefit to this approach is that waiting for the brush to arrive and mixing it with the leaves can result in better compost. The brush contributes nitrogen, which speeds up composting. Typically leaves have a carbon:nitrogen (C:N) ratio of 54:1 while typical brush trimmings have a C:N ratio of about 35:1. In addition, the chipped brush mixed with leaves can absorb moisture and contribute porosity to the pile or windrow, allowing air to penetrate. Wet leaves tend to retain moisture, so piles can become very wet. When wet leaf piles decompose without oxygen (anaerobically), odors can result. A drawback of keeping leaves until brush arrives in sufficient quantities is that the piles of leaves may become wet and anaerobic during the waiting time. Additionally, during winter months piles of wet leaves may freeze, making management more difficult when March arrives and brush is available.

2. **Save the brush until November, when larger volumes of leaves begin to arrive, and build the windrows for composting during November, December and January** – Accumulating brush may not be as problematic as accumulating leaves, since chipped brush tends to not absorb water in the same way as leaves. However, stockpiles of chipped brush and tree trimmings, if left for several months, lose much of their nitrogen and, therefore, their value to the compost. If the weather becomes hot and dry, brush piles may pose a fire hazard as they can spontaneously combust. If windrows are constructed in the winter months, cold weather, rain, snow and ice may interfere with the process. The actual biological process of composting requires temperatures inside compost windrows to reach 135 to 140 degrees F, so in winter months in Pennsylvania the composting process for windrows built in the winter may not start until the warmer spring weather arrives.

3. **Assign different management options to the two material types for the large volume months – make brush into mulch and compost leaves – and compost them together during smaller volume months** – This approach is a "just-in-time" management approach that takes into consideration the need to manage materials as they arrive, as well as recognizing that each material can be managed separately and still produce quality products. During months of high brush and chipped wood generation, this material would be stockpiled for use as a mulch product without composting. This would occur during March, April, May, September and January. During months of high leaf generation, incoming leaves would be arranged into windrows and the composting

process started without waiting for significant quantities of brush to mix with the leaves. This would occur during the months of November and December. While the leaves were composting over the 30-60 days necessary, smaller incoming amounts of both chipped brush and leaves could be incorporated or started as new windrows. During the remainder of the year, the decision to build windrows or to stockpile chips for mulch would be made on-site depending on the actual volumes arriving during particular months.

Each of the three options outlined above has its benefits and drawbacks, but for the situation facing Middlesex and North Middleton Townships, option three would seem to be the best choice due to the greater flexibility inherent in this approach. Compost windrows constructed from leaves alone can result in excellent compost. If the windrows are regularly turned for aeration and watered as necessary to maintain optimal temperatures, the windrows can accommodate varying amounts of wood chips as the delivery dictates. The facility operator will gain experience over time that will allow the site to operate optimally, producing quality compost in a timely manner and offering mulch as well.

Permitting Issues

Regardless of the composting method or materials management techniques used, the Middlesex/North Middleton Township composting site will need an operating permit from the Pennsylvania Department of Environmental Protection (DEP).

Four types of permits that apply to municipal or county organics composting facilities are provided by the DEP. The type of permit required depends primarily on the size of the compost operation site, as well as the types of materials (food or non-food) to be composted. The four types of permits are summarized below.

- Agricultural land application of leaf waste on areas less then five acres in size:
  - May operate under "Permit by Rule," as authorized by Pennsylvania Municipal Solid Waste Regulations (Title 25, Chapters 271, 281 and 285).
  - DEP Publication # 254-5403-100, "Guidelines for Yard Waste Composting Facilities," addresses specific siting and operational criteria that must be met.
- Yard waste compost operations less than five acres in size:
  - May operate under "Permit by Rule," as authorized by Pennsylvania Municipal Solid Waste Regulations (Title 25, Chapters 271, 281 and 285).
  - DEP Publication # 254-5403-100, "Guidelines for Yard Waste Composting Facilities," addresses specific siting and operational criteria that must be met.
  - These Guidelines limit the amount of yard waste, including leaves, that can be processed or stockpiled at any site to 3,000 cubic yards per acre.

- Compost operations more than five, but less than 15 acres:
  - May operate under existing Pennsylvania "General Permit" WMGM-017 for beneficial use of a waste material, as long as the operations comply with the provisions of this permit.
  - Allows addition of food wastes and other nitrogenous feedstocks.
  - DEP issues a "Determination of Applicability" once the applicant demonstrates compliance with the permit terms.
- Compost operations over 15 acres:
  - Must apply for an individual permit.
  - The permitting process is rigorous and involves bonding, insurance requirements, and public hearings. It can be costly to the municipality. The timeframe for an individual permit is nine months.

The actual operating site for the Middlesex/North Middleton composting facility will be approximately 4.5 acres in size. Therefore this site could qualify for the Permit By Rule.

The application process would determine that the chosen site and proposed activities were consistent with the existing Permit by Rule Guidelines and approved by the DEP. The permit application forms are attached as an Appendix to this report.

Site Characteristics and Guidelines

The DEP's "Guidelines for Yard Waste Compost Facilities" outlines a set of criteria to be used in identifying and evaluating a site. This document should be reviewed carefully as part of the site selection process to understand in detail the DEP requirements. The list below summarizes the criteria contained in the Guidelines:

- Site:
  - Remote from residential areas (300-foot buffer recommended); and
  - Close proximity to yard waste, to reduce transportation costs and impacts.
- Land:
  - Sufficient size (1 acre per 3,000 cubic yards of yard waste);
  - Level to moderately sloping land;
  - Good drainage and no high water table;
  - Not within 100 feet of a perennial stream or within 300 feet of a water source; and
  - Outside of floodplain.
- Sensitive Areas:

- No wetlands;
- No historic sites;
- No rare/endangered species;
- No restricted lands;
- No public well heads;
- No sensitive "receptors" nearby (schools, churches); and
- No sinkholes within 100 feet.

- Access:
  - Easy access for vehicles, equipment, and the public; and
  - Control of access to unauthorized persons.
- Utilities:
  - Water and power supplies available; and
  - Stormwater control measures implemented.

An evaluation of any potential site should be undertaken using the complete Guidelines document prior to any lease or purchase negotiations. However, preliminary discussions with Township officials and a visit to the site did not reveal any issues that would result in non-compliance with these guidelines. The only possible issue is that at the bottom of the wooded slope on the north end of the parcel, a small branch of water was observed. This branch is believed to be a run-off catchment only, and not a perennial stream, but this should be verified prior to permit application. The branch is at the very northern corner of the property, and actual composting activity would occur further south where the site is wider. A stormwater retaining basin should be located at that end of the property to catch any rainwater or run-off that results from storm events.

Facility Ownership

A discussion of facility ownership must include both the ownership of the actual land and the ownership of the facility itself, including equipment. The site under consideration is owned by Middlesex Township, which is willing to allow North Middleton Township to share it for composting purposes in order to minimize costs. In order to keep things simple, ownership of any fixed assets such as fencing, gates, buildings and roads remain with Middlesex Township. Some communities might choose to charge a fair rent or monthly fee to the community that does not own the site, however in this case, the Townships have agreed that there will be no money exchanged for site development or for the fact that the site is on Middlesex Township property. The only monetary exchange they envision for this project is potentially some

payback for labor at the site, if one Township agrees to staff the site, for example. It is anticipated that DEP grant funding will be requested to construct the site.

Processing Equipment

Since the County owns several pieces of yard waste processing equipment, those costs do not have to be factored in to site development (see Table 2). Other equipment owned by the municipalities may also be useful at the regional processing site. Middlesex Township recently acquired a front-end wheel loader that they intend to transport to the composting site to use when needed. Middlesex Township and North Middleton Township would make an arrangement to share costs, most likely with Middlesex Township billing North Middleton Township for its usage at an agreed-up rate. Additionally, North Middleton Township owns a Case wheel loader and several dump trucks. This equipment, along with the equipment available from Cumberland County, should enable the Townships to execute all the functions necessary in managing a yard waste site. These municipalities may be willing to allow their equipment to be used at a regional yard waste facility, pending review of liability and other issues. Table 4 summarizes the equipment owned by the municipalities.

Table 4
Municipal Equipment Potentially Available for Regional Yard Waste Site

Municipality	Description of Equipment	Percent of Time Currently Used for Yard Waste Activities	Age of Equipment
Middlesex Twp.	Front – End Loader (wheel loader)	None	New
N. Middleton Twp.	Wood Chipper	165 hours per year	Model Year 1989
	1-Ton Dump Truck	247 hours per year	Model Year 1997
	Medium Duty Dump Truck, single axle	170 hours per year	Model Year 1985
	Heavy Duty Dump Truck, tandem axle	63 hours per year	Model Year 2002
	Pick-up Truck	127 hours per year	Model Year 1989
	Case Wheel Loader	31 hours per year	Model Year 1999

Conceptual Operational Description

To guide the municipalities in evaluating the use of their potential composting site, a conceptual operational description is presented here.

Leaf Composting

In windrow composting, leaves are laid down in elongated piles, kept moist by watering, if necessary, and agitated and aerated by turning with either a loader or a windrow turner. Windrow composting is a proven, low-technology method currently in use by many Pennsylvania municipalities including several others in Cumberland County.

Generally new windrows are constructed to spec with a front-end loader using a one cubic-yard scoop. As each width is laid down, the layers are watered as needed (generally 15 to 25 gallons per scoop). Watering each layer allows the moisture to be absorbed, as opposed to waiting until the pile is constructed before watering it, which results in run-off. Newly completed windrows are left for seven days, and then turned. The piles should be turned so that the material at the outer edges of the old pile is placed in the center of the new pile. Another 10 to 14 days after the first turning, windrows are ready to be turned again. At this point, decomposition has reduced the size of the windrows by about 1/3 of their original volume, so that two piles may be combined into one. Turning and mixing is important to allow uniform moisture distribution and to aerate and agitate the material. Water should be added if the pile has dried out. After the first two turnings the piles should be monitored and turned on a schedule that promotes active composting. The DEP Guidelines direct that windrow piles must be turned at least once every three months.

Tasks associated with windrow composting systems include building the windrows, turning them as needed, and keeping track of the age of windrows and the progress of the composting process. The length of windrows will vary with material quantity, but the width and height should be constructed to specific dimensions to optimize the composting process. Pile widths of 12 to 14 feet are recommended, with heights of six to eight feet. The dimensions of Cumberland County's windrow turners suggest that a height of six feet and a width of 18 feet are optimal in this case. The County's windrow turners need two passes, one on either side, to completely turn the windrows, necessitating aisles between windrows that can accommodate the width of a wheel loader. With these dimensions, one linear foot of windrow contains approximately two cubic yards of leaves.

The quantity of leaves estimated to be composted at the site, as illustrated in Table 1, would be 3,668 cubic yards.

Using this information for design purposes, the area needed for active windrow composting can be calculated:

- Nine windrows would be constructed, each approximately 150 feet long and 7 feet in height;
- Aisles between windrows in a pair would measure 12 feet to accommodate the width of a wheel loader with a safety buffer; and
- Thirty feet would be reserved at either end for equipment access.

The area needed for windrow placement is 54,180 or approximately 1.2 acres. These windrow rows would allow for the placement of 3,150 cubic yards of leaves, which should be adequate,

as the volume of the leaf waste reduces by 20 percent in size in a relatively short period of time, and some compost will be moved to curing piles periodically, as described below.

Once the windrow composting process is finished the compost is placed into curing piles to cool and biologically stabilize. Curing is an important step, since compost that is still actively decomposing can harm plants. Curing and stabilization is a critical step in creating a quality product.

For this municipal site, the volume of leaves in the curing pile would be in piles of about 36 feet wide and 65 feet in length. If the piles were about seven feet high, this would accommodate about 1,617 cubic yards. Assuming for planning purposes that the curing piles were arranged in piles the same height of the windrows, but twice as wide because they would not need to be turned, then the space needed for the curing piles would be 16,400 square feet, including maneuvering room on either end of and between the piles.

After curing the finished compost would be stockpiled for pick-up by users. Due to a reduction in the amount accumulated by gradual pick-up, half the amount of space would be needed for finished material. For curing and finished product stockpiling, then, the total area needed would be about another .6 acres.

The total area for leaf composting windrows, curing piles, and finished product storage would then be about 1.8 acres.

Although theoretically leaves may be stored and composted on a dirt or grass surface, and DEP has no prohibition against this, it is not an ideal surface. During dry conditions, the site may become very dusty, and during times of rain and snow, the surface may become rutted, muddy, and frozen. This makes efficient material processing difficult and is detrimental to the equipment. Therefore, it is advisable to have a hard surfaced area, either concrete or asphalt, for the 2.5-acre leaf composting zone. These estimations make some conservative assumptions, such as:

- The compost piles are relatively triangular in shape, thus a formula of ½ x b x h was used to estimate the area, whereas in actuality the shape of the piles may be more extended, allowing for additional volume; and
- A height of 7 feet was assumed, whereas actual heights may be up to eight feet.

Therefore, the assumptions may have some slight room for expansion. In addition, the finished compost piles and curing compost piles may be extended in length slightly, as there is no need to turn a windrow-turner around them. It is advisable, however, to maintain passing space between the finished compost piles and the road, if at all possible, to allow for vehicles to turn.

Wood Waste Mulching

The wood waste delivered to the site would be ground, but not composted, and stockpiled for use as mulch by the municipalities, residents, and potential other "customers." Some wood

chips, however, might be incorporated into the compost as needed, as a bulking agent. Yard trimmings and brush delivered to the site by North Middleton Township would be already chipped, and this would likely account for the majority of the material delivered. Loose material would be delivered by North Middleton Township residents who choose to use the drop-off site instead of curbside service, who desire to cut their tree limbs and trimmings into smaller size pieces than the municipal shredders can manage safely, or have brush to drop-off during the months that municipal collection is not offered. Loose brush could also be delivered by Middlesex Township residents who choose to use the site, though it is difficult to predict how many residents would actually use the site.

Without prior experience it is difficult to accurately project how much material will be dropped off by residents. For planning purposes in this report, it is assumed that the generation estimates in Table 1 are accurate – meaning that there is 100 percent recovery of the wood waste generated in the Townships. Therefore, it is assumed that about 856 cubic yards annually, representing approximately 63 percent of the total brush available in North Middleton Township, will arrive chipped, and about 775 cubic yards annually, or 37 percent by weight, will originate from residential drop-off and will be loose. An additional 1,336 cubic yards of loose wood waste, or about 222 tons, is expected to be available from Middlesex Township.

Planning for the site must include a space for storage of incoming chipped wood waste, incoming loose wood waste, and chipped waste processed on-site. The chipped material can be delivered into one pile, and the grinder, which is expected to be delivered to the site and used twice per year, can be configured to deposit its chips onto that same pile. The entire volume of wood waste will not arrive at once, but will be spread out over an approximate seven-month period. For planning purposes, it is assumed that up to half of the loose brush/wood will remain onsite in an unground state at any point in time.

After grinding, the brush delivered loose to the site will be reduced in volume significantly. At any point in time, therefore, if all of the wood waste potentially generated in both Townships were delivered to the site, there should be enough space for 1,071 cubic yards of material that is chipped on site (being reduced to 700 cubic yards), and an additional 857 cubic yards for material that is chipped en route. This is 1,557 cubic yards, total, of chipped wood. This material would be accommodated by piles that are estimated to be rounded in shape (therefore a formula of 2/3 x base x height x length was used to estimate their volume). This storage would be accommodated by three piles that are 175 feet in length, 18 feet in width, and 6.5 feet in height, for a volume of 5035cubic yards per pile, or 1,517 cubic yards total. In reality, the site will accommodate incoming loose wood piles of approximately 150 feet in length, 18 feet in width, and assumed to be 6.5 feet in height. Such piles will accommodate an estimated 83 percent of the wood that could potentially be delivered to the site, and half of the loose wood that would be chipped on site.

It is estimated that the 2,141 cubic yards of brush that could potentially be delivered loose to the site each year will, at most, result in 1,070 cubic yards of unchipped material at any point in

time. This material can be placed in piles near the incoming bagged leaves. If this material were placed in piles of approximately 18 feet in width by 100 feet in length, and six feet in height, there could be up to four such piles on site at any given time. In reality, however, there is room for three piles that are 18 feet in width and 100 feet in length, and assumed to be six feet in height. These piles are estimated to be able to accommodate up to 78 percent of the loose wood waste that is generated in the two Townships, assuming only up to half of that wood would be loose at any point in time.

Approximately 2 acres is required, therefore, for incoming wood waste storage, processing space, and chipped wood storage.

Based on piles of the stated dimensions plus buffers and access space, when roadway, buffer space at the end of the piles, and maneuvering space between piles is taken into consideration, the processing space required is approximately 4.5 acres for both leaf and wood processing. The 4.5-acre site will be fenced in with 8-foot fencing. Although permit-by-rule facilities are not required to be fenced in, but must have access restricted via a gate, the Townships would like the fence to deter illegal dumping.

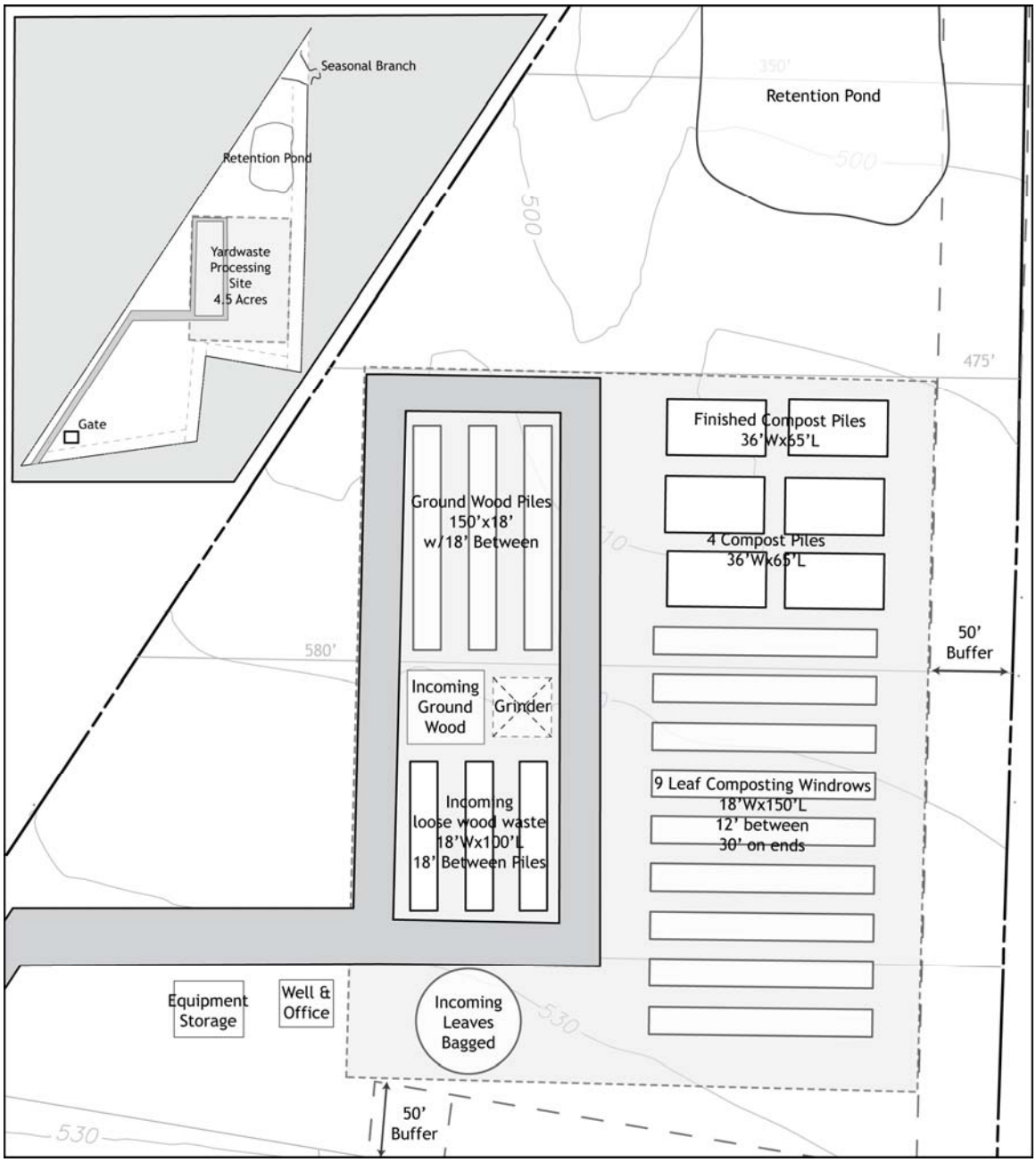
In order to maximize the use of the paved site, the storage shed/office should be located outside of the paved site, but close to the entrance, for monitoring purposes. Similarly, we suggest that traffic flow into the site in a circular pattern, with traffic going in one direction, in order to avoid traffic mishaps. In the site drawing where "grinder" is indicated is where residents could pick up ground wood waste, as the grinder will only be on the site approximately three times per year, and it is recommended that the site be closed to traffic during those times.

If space is constrained at any point in time, a DEP representative indicates that the Townships could potentially store wood that is chipped en route in a different location, as it could be considered a separate program. It would be beneficial, however, for this material to be stored in close proximity to the site, and near or along the road, for easy access for residents. The Townships have already discussed the fact that if space became overly constrained, North Middleton Township would revert to its own processing site, and Middlesex Township would assist them in developing that site. This should be spelled out in the inter-municipal agreement between the two Townships.

Conceptual Site Design and Description

A sketch of a potential site design, based on the expected volume, site guidelines, and acreage discussed, is provided in Figure 2.

Figure 2
Conceptual Design for Yard Waste Processing Site



Municipal trucks, private contractors' vehicles, and the general public's vehicles would enter the access road and continue along the road, turning right toward the site. They will pass the storage building on the right, and enter the site. They will come directly to the leaf drop-off area, as well as the loose wood storage area. It is envisioned that loose wood could be deposited in the far-right pile, and workers would continuously move wood to a pile further left, as needed, until grinding was done. It is possible that if loose wood space became limited, the Townships could use North Middleton's tow-behind chipper to reduce the volume of some wood waste, thereby freeing up space. Similarly, wood can be compacted to some degree with the loaders, while it is being moved to piles further from the road. It is suggested that the Townships consider using jersey barriers with a walls on three sides, in order to containerize the wood chips being delivered. As vehicles travel north on the road, they will approach the finished compost area and ground wood area. As described above, residents could pick up wood at the "grinder" area, and finished compost could be collected just off the road next to the finished compost pile. While the Townships might wish to adapt the conceptual drawing to some degree, it is suggested that access to all drop-off and pick-up areas be close to the road, in order to minimize residents' traveling into the processing area. It is likely that grinding (using one of the County's large grinders) will only occur on site two times a year or so. If possible, the Townships should try to time grinding and screening activities for a time when traffic to the site is expected to be low. Similarly sized yard waste processing operations, for example, tend to borrow the County's grinder for a week each quarter, and two processors grind wood for a week (eight-hour days). Similarly, leaf compost can become hard and dry, and often yard waste facilities will also have two operators use the County's trommel screen for a week or so to screen the compost to the desired consistency.

Cost Estimates and Cost Sharing Options

Site Development

The 4.5-acre site in Middlesex Township identified as the potential site for the joint composting operation is completely undeveloped, so the municipalities would be starting without any infrastructure in creating the facility. However, the site has significant favorable characteristics that make it ideal for development into a composting facility. It is almost entirely grass, with no trees to be removed. The site has a gentle slope in both directions, with its highest point toward the front of the site on the south side where the road access is. Therefore it should be relatively straightforward to screen the facility from sight by the road, while grading it just past the slope to contain the active processing and composting areas. The municipalities intend to apply for a Section 902 Recycling Development and Implementation Grant to cover the site development costs. The grant match is likely to be partially offset using in-kind Township contributions that are used to develop the site, including the paving and grading. The in-kind contributions are not expected to result in one Township making a payment to the other. Operating costs, however, and any remaining site development costs would be shared based on

an arrangement between the municipalities. Table 5 presents a summary of potential site development costs, and factors in the possible contribution of a DEP recycling grant.

Table 5
Cost Estimates for Site Development

Item	Total Cost	Cost to Project Participants (10%) Assuming DEP Grants Available	Cost to DEP (90%) Assuming DEP Grants Available
*Asphalt Hard Surface for 4.5 Acres	$391,270	$39,127	$352,143
*Access Road, 25-feet wide, 1200 feet long	$79,326	$7,933	$71,393
*Electricity to Site	$3,500	$350	$3,150
Facility Signage	$2,000	$200	$1,800
Well and Pump	$5,000	$500	$4,500
8' Fence for Composting Area, Including Motorized Gate	$60,000	$6,000	$54,000
4' Fence for Pond (1200 feet)	$24,000	$2,400	$21,600
Diesel Fuel Tank	$1,600	$160	$1,440
Sprinklers	$1,000	$100	$900
Building for Operator and Well Pump	$4,000	$400	$3,600
Building for Equipment	$50,000	$5,000	$45,000
Subtotal	$621,696	$62,170	$559,526

*Includes some in-kind costs

In-Kind Services

The Townships have the skill and equipment on staff that could provide some of the services needed to construct the site. In particular, labor and equipment for excavation, installing drainage, installing the stone base, and seeding and mulching, can be done with Township staff. The Pennsylvania DEP allows in-kind services to be applied against the 10 percent matching portion (assuming the applicant is successful in securing a Section 902 grant). Table 6 describes the in-kind services to be provided.

Table 6
Summary of In-Kind Services Anticipated for Yard Waste Site Development

	North Middleton Township		Middlesex Township	
Service	Labor(1)	Equipment(2)	Labor(1)	Equipment(2)
Excavation	$864	$1,216(2)		
Drainage	$648		$324	$336(3)
Stone Base	$648	$912	$972	$1,368
Paving	$864	$1,216	$1,296	$1,824
Seeding/Mulching	$540		$540	
Subtotal	$3,564	$2,128	$3,132	$3,192
Total per Twp.	$5,692		$6,324	
GRAND TOTAL	$12,016			

(1) All labor is $27 per hour.
(2) All equipment (trucks) are valued at $38 per hour, unless otherwise indicated.
(3) Truck is used at $28 per hour.

Operations

Facility labor and other operational costs are anticipated to be shared between the municipal partners of Middlesex Township and North Middleton Township. Operational and management tasks include, but are not necessarily limited to, the following:

- Gatekeeping and site logistics;
- Receiving and stockpiling raw materials from both the general public and participating municipalities;
- Building, turning, watering (as needed) and monitoring leaf compost windrows;
- Chipping and piling brush;
- Supervising the distribution and loading of finished compost and mulch into private vehicles and large trucks from municipalities and, potentially, landscape contractors;
- Fueling and basic maintenance of equipment;
- Ordering and managing fuel and other supplies;
- Record-keeping.

Several options are possible for sharing the labor and resources necessary for site management. For example, responsibility for site-specific tasks, such as gate keeping and record-keeping, could be done by Middlesex Township as site owner, while tasks related to processing could be

managed by North Middleton Township, which has personnel already experienced in processing wood chips and de-bagging and stockpiling leaves. The "special" processing jobs, such as grinding on-site using the County's grinder, and screening material, should be done by two laborers at once, for work efficiency and safety reasons. The management arrangement determined by the jurisdictions should be recorded in written form to prevent misunderstandings. This record can be in the form of a memorandum of understanding, or, more formally, in an inter-municipal agreement. This type of document is enforceable as a contract between jurisdictions. The two Townships have successfully entered inter-municipal agreements with each other in the past.

Labor

Operating cost estimates are based on the following parameters:

- The facility is assumed to be open to the public approximately 30 weeks per year. The season would be April 1 through October 17 (29 weeks) plus some time after Christmas. Hours during which the facility is open to the public would be:
  - Tuesdays, 7:00 am – 3:30 pm
  - Thursdays, 3:00 pm – 8:00 pm
  - Saturdays, 8:00 am – 12:00 pm
- In addition, the facility would accept Christmas trees after the holiday season. In estimating employment costs below, an extra week of operations was included to account for this time.
- The facility is expected to be staffed during all operating hours by a part-time employee earning $7.50 per hour (minimum wage in PA is $5.85 per hour, but will increase to $6.55 on July 24, 2008);
- The equipment operator(s) is/are expected to be a municipal employee(s), earning $16.00 per hour, with benefits assumed to cost 1/3 of his/their hourly salary;
- The number of processing and material handling hours per week will vary depending upon the generation of leaves and brush. Some tasks will be conducted only in the fall and early winter, while others will not be performed in the winter months. The average hours per week over the course of the 30-week season are presented in Table 7. It is important to note that some weeks more than the average hours will be spent and some weeks less. These tasks could complement winter-specific tasks, such as snow and ice removal. Costs included in Table 7 assume that processors will be highly utilized (e.g., productive). Therefore, to the extent that they are not, labor costs will increase.
- There will be some "off-season" processing needs, particularly when the leaf season runs later than usual. Middlesex Township hopes that they will have volunteers do the

processing during this off season. However, to the extent that volunteers can not be found to provide this service, labor costs may increase.

Table 7
Estimated Annual Labor Cost for Windrow Composting Systems

Task	Average Hours per Week – In Season	Hours per Year	Estimated Cost Per Year
1. Gate keeping and general oversight (1)	17.3	520	$3,900
2. Stockpile raw material	5.7	170	$3,618
3. Build windrows	5.3	160	$3,405
4. Turn windrows	12	0.4	$255
5. Monitor windrows	1.2	36	$766
6. Grind brush	5.3	160	$3,405
7. Screen Compost	5.3	160	$3.405
8. Stockpile finished material	2.7	80	$1,702
9. Misc. material handling and maintenance tasks	15	450	$9,576
Total Estimated Annual Labor Cost			$30,032

(1) Assumes approximately 29 weeks per year (April 1 – October 17) and 12 additional hours after Christmas to allow for the delivery of Christmas Trees. Off-season processing labor is not included in the Table, and is expected to be on an as-needed basis using volunteers, at least initially.

Note that in scheduling facility operation, the Townships should consider having materials processing, particularly screening and grinding, occur when the site is not open to the public. Separating when drop-off/delivery of materials occur vs. processing can help ensure safety of the public, as it is often difficult to ensure that people will avoid operating machinery.

It is also suggested that the gatekeeper and/or material processor monitor incoming loads delivered by residents, to the best of their ability, to ensure that materials are not contaminated. Educating the public about the importance of keeping yard waste free of contaminants is important, as contaminants can:

1) Pose a threat of severe injury or even death to material operators;
2) Degrade the quality of the compost; and
3) Damage processing machinery.

Total Annual Operating Costs

Total annual operating costs are summarized in Table 8. It should be noted that these costs assume that the processing equipment currently being utilized will remain in usable condition.

Fuel costs assume that the average fuel consumption for the various pieces of equipment is 15 gallons per hour, and that diesel fuel costs $4.50 per gallon. The total yearly equipment operating hours are 1,200.

Table 8
Estimated Annual Operating Expenses
for Regional Yard Waste Facility

Expense	Cost
Gatekeeper	$3,900
Processor(s)	$26,132
Subtotal Labor	$30,032
Fuel	$81,000
Equipment Maintenance	$5,000
Utilities	$1,000
Miscellaneous Expenses	$2,500
Equipment Rental (County Program) (1)	$4,100
Total Operating Costs	$123,632

(1) Assumes rental of grinders, trommel screen, and windrow tuner.

Table 9 show the total annual costs for the site, both assuming the Townships are successful in obtaining a DEP grant, and assuming they are not successful in achieving a grant. The annual costs assume an annual interest rate of 6.5 percent, and a ten-year amortization period. As mentioned above, the PA DEP will allow successful Act 101, Section 902 grant applicants to offset their 10 percent match with the value of in-kind services. This means the annual capital costs are reduced to $6,977, thereby reducing the total annual cost to $130,608.

Table 9
Estimated Annual Costs of Regional Yard Waste Facility,
Including Capital Costs

Assumptions	Annual Operating Costs	Annual Capital Costs without In-Kind Adjustment	Total Annual Costs	Capital Costs with In-Kind Adjustment	Total Adjusted Annual Costs
Ten Year Amortization – No Grants	$123,632	$86,481	$210,113	NA	NA
Ten Year Amortization – 90% of Site Improvement Paid for with Grant	$123,632	$8,648	$132,280	$6,977	$130,608

Cost Sharing Options

The capital costs of establishing a regional yard waste facility are high, but it is possible that the municipal partners could utilize DEP 902 recycling grant funding for the majority of the capital expense. It has been determined that in-kind contributions to the building of the facility, such as paving or fencing, can be counted as part of the 10 percent match required by DEP. The municipal partners are fortunate in that the County owns compost processing equipment and offers its use to municipalities for a reasonable fee.

However, the annual operating costs are also significant for a yard waste processing facility, particularly the costs of labor and fuel. A number of options exist for equitable cost-sharing between Middlesex and North Middleton Townships. Two of the most equitable are:

1) The municipalities pay a share of operating costs based on the number of visits from their community, including both the public and municipal trucks; and
2) The municipalities pay a share of operating costs based on the number of households (or single-family households) in their jurisdiction;

Assigning a share of operating costs to all participating municipalities in the County based on the number of single-family households in the jurisdiction seems the most equitable for the following reasons:

- Such a system provides an incentive for municipalities to encourage their residents to use the facility rather than disposing of or burning their yard waste;
- Such a system encourages the municipality to provide collection of yard waste;
- Having municipalities contribute based on the number of visits from their jurisdiction imposes a disincentive to encourage promotion of the facility, and thus a disincentive to reduce waste disposed;

- Assigning costs based on number of visits requires a system to keep track of individual visits and credit them to the proper municipality, which may increase costs;
- Calculating the contribution based on single-family households recognizes that multi-family households are normally serviced by private landscapers.

If annual costs were allocated to each of the Townships based on the number of households, then the estimated annual costs per Township would be as shown in Table 10. Additional adjustments might be made to offset labor hours from each Township dedicated to the site.

Table 10
Example of Possible Cost Allocation Between Townships

	TOTAL	North Middleton Township	Middlesex Township
Estimated Number of Households per Township	6,998	4,231	2,767
Estimated Percent of Population in Township	100%	60.46%	39.54%
Estimated Annual Costs	$130,608	$78,364	$51,644
Avg. Annual Cost per Household	$18.66	$18.66	$18.66
Avg. Monthly Cost per Household	$1.56	$1.56	$1.56

Private landscape contractors may inquire about using the facility also. Currently very little is known about the amount of yard waste managed by private landscape contractors, and where and how it is processed. It is suggested that if the Townships consider allowing the use of the site by private contractors, they do so for a fee. The cost of their usage of the site capacity must also be factored into any cost-sharing formula, in a way that encourages them to use the site but not overwhelm its capacity. Also, it is suggested that the site become comfortable with its operations, and certain that all residents are aware of the program, before considering allowing private landscapers to use the site. Furthermore, the Townships should consider charging residents for the finished materials. This would ensure that compost and mulch are seen as "commodities," and would also help offset some of the facility's operating costs. Other Mechanicsburg Borough and Silver Spring Township, for example, have a joint facility located in Mechanicsburg, where residents are charged $10 per loader bucket for each type of material. These revenues cover their operator and equipment costs.

Conclusions and Recommendations

A regional yard waste processing facility would benefit both Middlesex and North Middleton Townships. It would provide for North Middleton Township a site on which to organize its material deliveries, process yard waste, allow residents to pick up processed compost or mulch for their own use, provide residents an option for recycling leaves and yard trimmings during months when municipal pick-up did not occur, and encourage residents to drop-off undersized brush or trimmings. For Middlesex Township, it would enable the municipality to offer its residents a recycling option for yard waste that they currently do not have, allow the Township to negotiate for household leaf pick-up with a hauler and delivery to a specific, municipally managed site, and enable the Township to get ahead of its expected status as a mandated recycling community by the 2010 census on the basis of expected population growth. Based on the analysis in this report, R.W. Beck makes the following recommendations to Middlesex and North Middleton Townships.

1. Plan for a shared yard waste facility that could manage the yard waste processing needs for both municipal collection and residential drop-off on the 4.5-acre tract of land being considered adjacent to the municipal park. Consider how the site would be expanded, potentially, in the future, if the site were outgrown. Although the estimates in this report are considered to be conservative, many Townships develop sites that they eventually outgrow over time, due to increased popularity of the service. The Townships might consider, for example, expanding operations to the southwest of the 4.5-acre site.
2. Ensure that the site will be in compliance with PA DEP's Permit by Rule for yard waste processing facilities. Guidelines for such facilities can be found at the following web site:

http://www.pacode.com/secure/data/025/chapter271/s271.103.html

3. Apply for a PA DEP Section 902 Recycling Development and Implementation grant to obtain the capital costs for site improvements, counting municipal contributions as a portion of the required 10 percent cost match.
4. Use Cumberland County's equipment loan program to process the material
5. Develop an operations and cost-sharing plan, to include responsibility for staffing and associated tasks on-site shared between the two municipal partners.
6. Specific operational suggestions include:
    a. The Townships might consider purchasing cement highway-type barricades, which can be moved as needed, and can provide a surface that can be used to push materials against with the loaders, facilitating the storing and transporting of incoming and finished material.
    b. The Townships should ensure that part of the processing duties includes pulling visible contaminants from the incoming material streams to the greatest extent

possible. As mentioned above, contaminants not only degrade the quality of the finished material, but can also pose a risk to both equipment and equipment operator.

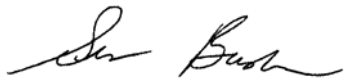
c. Prohibit the acceptance of plastic bags at the site. Plastic bags can be harmful to equipment, contribute significant to litter, and can compromise the quality of the compost. Instead, request that materials be delivered loose or in Kraft (brown paper) bags.

d. Consider selling compost and mulch by the loader bucket. Not only does selling the product, rather than giving it away, stress to residents that compost and mulch are commodities, but it also will help the Townships recover some of their operating costs. Mechanicsburg Borough and Silver Spring Township, for example, charge residents $10.00 per bucket for each material type (mulch and leaf compost).

We hope these findings are useful to you, and we appreciate the opportunity to work with Middlesex and North Middleton Townships on this project. Please contact me at (508) 935-1807 should you have any questions.

Very truly yours,

R.W. BECK, INC.



Susan Bush

Environmental Consultant