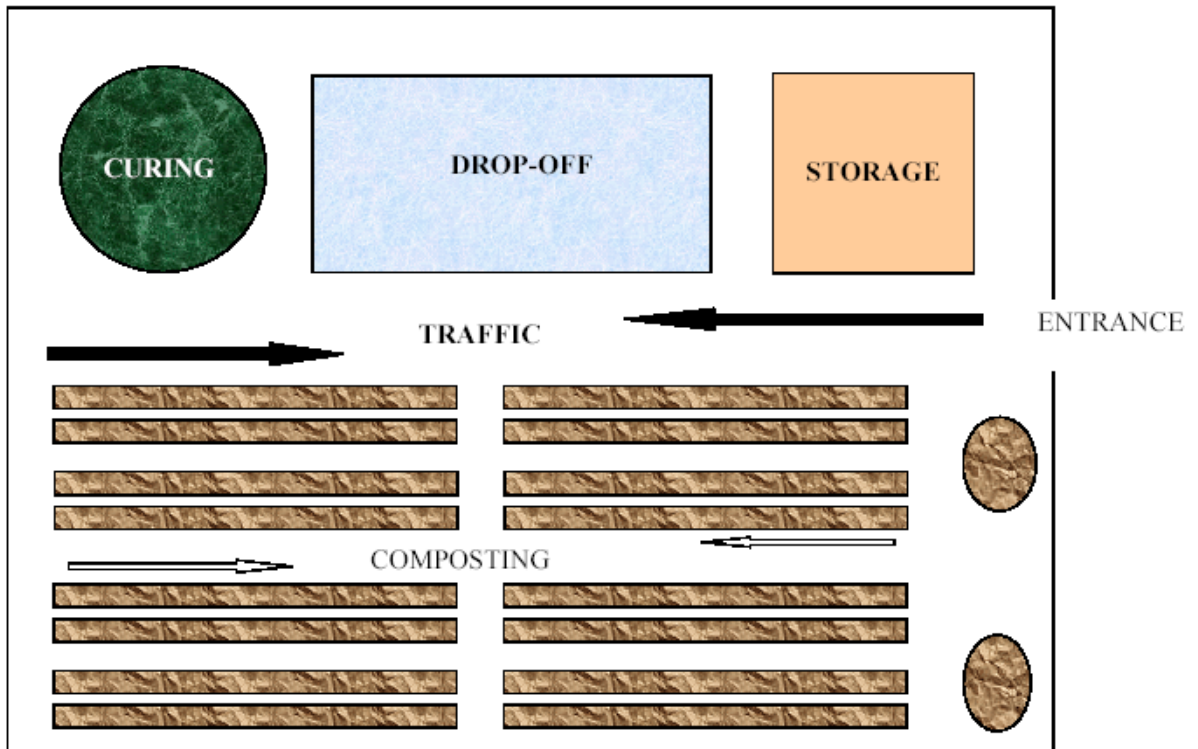


# SWANA RECYCLING TECHNICAL ASSISTANCE STUDY

## GUIDANCE FOR YARD WASTE COLLECTION SERVICES AND YARD WASTE SITE SELECTION

Prepared for:

**CENTER TOWNSHIP  
BUTLER COUNTY, PENNSYLVANIA**



Conceptual Layout  
Yard Waste Composting Facility

**GANNETT FLEMING, INC.**



**HARRISBURG, PENNSYLVANIA**

**July 2003**

**SWANA RECYCLING  
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Figure 3: Leaf Composting Process

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Figure 5: Schematic of Leaf Process Operation

**APPENDICES** \_\_\_\_\_

Appendices A: Title 25, PA Code – Recycling Regulations, Excerpts from Chapters 271 and 272

Appendices B: Title 25, PA Code - Section 281.202, Compost Site Specifications

**SWANA RECYCLING  
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AND  
YARD WASTE SITE SELECTION**

**1.0 INTRODUCTION**

Through the partnership with the Solid Waste Authority of North America (SWANA), the Pennsylvania State Association of Township Supervisors, and the Pennsylvania Department of Environmental Protection (PADEP), Center Township, Butler County, PA was awarded \$6,000 in technical assistance to be provided by Gannett Fleming, Inc.

The Township is in the process of determining its role in establishing a curbside yard waste collection program and a corresponding composting site. The Township is requesting general guidance assistance from Gannett Fleming (GF) on securing curbside yard waste collection services for the Township. Additionally, the Township is requesting assistance in estimating the required size of a yard waste compost site. The compost site should have sufficient capacity to adequately meet the needs of the new curbside yard waste collection program.

**1.1 Scope of Work**

GF worked with Center Township to develop the following four tasks for the yard waste collection and composting project.

- Task #1** GF staff will work with Center Township to gather pertinent background information from the Township, and if necessary, from surrounding municipalities. Specific Township needs and/or problems associated with this project will be identified.
- Task #2** GF will provide general guidance and review alternatives for securing yard waste collection services for the Township.
- Task #3** GF will estimate the area (acres) needed for a composting site to meet Township needs.
- Task #4** GF will provide Center Township with a summary report that will include findings, technical guidance, and recommendations.

**2.0 BACKGROUND**

Center Township is home to approximately 8,500 residents and is located in Butler County in western Pennsylvania (see Figure 1). Due to the 2000 Census count and the

Municipal Waste Planning, Recycling and Waste Reduction Act of 1988 (Act 101), population and population density requirements, Center Township is now mandated under Act 101 to provide a curbside recycling program for its residents. Currently, Center Township residents privately subscribe for waste collection and/or recycling collection services through one of three local haulers that operate within the Township. The Township has relatively little experience in implementing a curbside recycling or curbside trash collection program.

### 3.0 EXISTING WASTE COLLECTION SERVICES

#### 3.1 Private Haulers

Currently BFI and Waste Management are the two primary haulers that provide waste collection and/or recycling services to the majority of Center Township residents. All private haulers operating in the Township are required to be licensed by Butler County.

Residents are responsible for contracting with one of these haulers for collection services. In this type of collection system, often called “private subscription”, the hauler bills the individual resident directly. It should be noted that local cost experience from Pennsylvania municipalities has shown that multiple haulers competing in the same service area for residential customers often results in higher collection costs for the residents (as compared to the cost per resident for municipally contracted collection services).

#### 3.1.1 Cost for Municipal Waste Collection and Recycling Services

As shown in Table 1, BFI and Waste Management offer recycling services along with municipal waste collection services. The current pricing per household (dependent on the service/no. of bags selected by the resident) ranges from \$133 to \$216 per year. Yard waste collection services are not currently provided by Waste Management or BFI.

**Table 1: Household Pricing for Center Township Waste Collection and/or Recycling**

Hauler	Municipal Waste and Recycling (cost per month)	Billing Schedule	Yard Waste Collection	Annual Cost (approximate)
Waste Management	\$11.10 (one 30-gal bag per week)	Every 3 months	NO	\$133.20
	\$15.25 (up to ten 30-gal bags per week)	Every 3 months	NO	\$183.00
BFI	\$18.00	Monthly	NO	\$216.00

## 4.0 RECYCLING

Center Township provides its residents with 5-gallon plastic recyclables bins. The bins are placed at the curbside by residents to be collected by the private hauler selected by each household. Prior to becoming mandated by Act 101, the Township was never directly involved in administering a comprehensive recycling program. As a newly mandated municipality under Act 101, the Township must implement a curbside recycling program for residences, commercial, institutional and municipal establishments, and community events. Center Township is currently in the process of implementing a curbside or other comprehensive recycling program for recyclables, including yard waste. Specific excerpts from Title 25 of the PA Code pertaining to the implementation of a mandated recycling program have been provided in Appendix A.

The Township has developed an ordinance that requires Township residents to recycle the following recyclable materials (from the list of recyclable materials designated by Act 101):

- **Aluminum & Bi-metallic Cans**
- **Plastics**
- **Glass**
- **Leaf Waste**

## 5.0 YARD WASTE

Yard waste includes grass, leaves and tree and brush trimmings. Grass can be the biggest yard waste component by weight but is often encouraged to be kept out of the compost stream. Grass clippings may compact and restrict air flow throughout the pile and slow the composting process. Leaves are usually the biggest yard waste component by volume. Local yard waste generation varies dramatically based on yard size, percentage of the population in single-family housing, and various other related factors. Yard waste can be the largest component of municipal solid waste (MSW) during the summer and fall, with grass predominant in the summer and leaves predominant in the fall. In general, yard waste is one of the larger components of landfilled MSW by volume or weight.

### 5.1 Yard Waste Collection Services

The Township does not currently operate a curbside yard waste collection system or yard waste drop-off area and composting site. Based on information collected by the Township, it does not appear that yard waste is collected (from households) by any of the larger haulers operating in the Township. In some cases, residents set out yard waste along with their trash for collection, but yard waste is not collected as a separate material from residents in Center Township.

### **5.1.1 “Leaf Waste” Requirements as a Mandated Municipality**

As a mandated municipality, Center Township is required to provide for the collection of “leaf waste” for residents as described by Chapter 271 of the PA Code (refer to Appendix A for recycling regulations). “Leaf waste” is defined as leaves, garden residues, shrubbery and tree trimmings, and similar material, but not including grass clippings. Collection of other yard waste materials (e.g. grass clippings) is not required by the Act 101 recycling mandate, but clippings are sometimes accepted by mandated curbside recycling programs.

### **5.1.2 Decision Making and Yard Waste Collection**

The Township will need to determine if it is feasible to provide yard waste collection services with its own staff and equipment or to contract for curbside yard waste collection services. Yard waste collection pick-ups are often done seasonally. The Township will need to decide on the number of collection days made available for residents. The number of collection days (and specific service offered and materials collected) will affect the cost in either a municipally run or contracted yard waste collection system. Some residents may be unsatisfied if Township-operated or contracted services do not meet the needs (e.g. desired number of collection days) of the residents.

At least initially, it is recommended the Township contract for yard waste collection services over a trial period. A short-term contract (e.g. 2-3 years) with an option to renew each year, is a good approach. The Township can use the experience of contracted yard waste collection services to assess the real costs associated with providing yard waste collection services. After these costs are understood, the Township will be able to decide whether to continue contracted services or to implement a program that will be conducted with Township staff and equipment. General guidance related to competitive procurement of collection services is provided in Section 6.0.

A drop-off location is not an option for replacing curbside collection of “separated” materials in mandated communities, which includes “leaf waste” as defined by Act 101.

## **6.0 COMPETITIVE PROCUREMENT**

Contracting municipal waste collection services along with curbside recycling services is often a natural step in the process of implementing a mandated curbside recycling program. The Township will need to decide on the desired structure of the mandated recycling program and any corresponding waste collection services/system before bidding for these services.

If the Township elects to bid for recycling and/or waste collection services, the Township should develop specifications for the bid based on Act 101 requirements and the specific needs of the Township. It is highly recommended that a solicitor work with the Township during this

process. As the result of the competitive procurement process, the Township can then enter into contracts or agreements with the selected lowest responsible bidder(s). The award may be for one hauler or for more hauler(s) handling specific collection services (e.g. waste collection only, recyclables and/or yard waste collection, waste and recyclables collection). Typically, contracted container recyclables collection services are provided on a weekly basis. Yard waste collection services are typically seasonal, done on a weekly basis.

Contracted recycling services and/or waste collection services provide the Township with a fair amount of control over the collection system for recyclables and for refuse materials. The Township may elect to manage the billing for these services and have the hauler charge the municipality directly. In this scenario, the Township may attach a “system” or “administrative” fee for administering the billing service. Some PA municipalities also use the assessed fee to secure revenues to support the administration and operation of their leaf collection or compost program.

## 7.0 YARD WASTE SITE SELECTION

Regardless of whether Center Township contracts yard waste collection services or elects to purchase collection vehicles and/or other yard waste processing equipment, the Township will still need a site to receive and compost yard waste. At this time, the concept of operating a yard waste site is in the early stages, and the Township has not yet identified any potential site locations. As Center Township moves forward with identifying potential sites, the Township should consider the following yard waste composting facility site criteria:

### General Yard Waste Siting Criteria

- Remote from residential areas (recommended at least 300 foot buffer). Greater isolation distances and buffer zones desirable.
- Proximity to source of yard waste material. Minimize hauling distances.
- Sufficient size.
  - Approximately 3-5 acre site is recommended for 4,000 cy/yr of yard waste. 3,000 cy/acre maximum site loading.
  - Additional space allowance for expansion and/or alternate uses (e.g. recycling drop-off).
  - Windrow Layout: In order to minimize equipment maneuvering (e.g. number of passes), windrows are usually designed to maximize their length across the available site area (which reduces total number of rows).
- Ownership/ control of the site.
- Land – open/ vacant
  - Nearly level to moderate slopes
  - Favorable soils – deep, well-drained

- Drainage
  - No high water table (within 4 feet of surface)
  - No drainage problems
  - Outside of 100 year flood plain preferred
  
- Sensitive areas
  - No wetlands
  - No historic sites
  - No rare/endangered species
  - No restricted lands
  - No sensitive “receptors” nearby
  - No sinkhole areas (within 100 feet)
  - No nearby surface or groundwater supplies within ¼ mile (up gradient of site) or 300 feet (down gradient of site)
  
- Access
  - Easy access for vehicles and equipment into and throughout site
  - Control of access to unauthorized persons
  
- Utilities
  - Water supply is the most critical utility service and should be readily available
  - Power supply is desirable

The Municipal Waste Management regulations (Title 25 Pa Code, Section 281.202) specify the areas where general composting facilities are prohibited. This Section is included in Appendix B.

## 7.1 Estimated Yard Waste Generation

Center Township does not have access to historical data for Township yard waste generation because the Township has not previously operated a yard waste collection program. Yard waste generation rates for the Township have been estimated with consideration of the following: population, housing units, average yard size (as estimated by the Township), typical yard waste density and by yard waste generation experience/ data from other Pennsylvania municipalities. It is also noted that participation rates in the initial years of implementing a yard waste program are typically lower than for a mature yard waste program. The level of participation will significantly impact the total quantity of material generated each year. In addition, the amount of material to be composted may vary based on the types of yard waste materials accepted at the site (e.g. grass clippings, tree waste, etc.).

Generation of yard waste varies depending on the type of community (i.e. urban, suburban or rural). Typically, generation rates range from 100 to over 250 pounds per capita per year. The majority of Center Township residents reside in suburban areas with medium sized large sized lots (estimated by the Township to range from ¼ - ½ acres or larger). A rate of 200 pounds per capita was assumed for Center Township.



Based on a population of 8,500 persons and a generation rate of 200 pounds per capita per year, the Township could receive approximately 4,250 cubic yards of material per year. This estimate assumes 400 pounds per cubic yard for the bulk density of the mixed yard waste.

## 7.2 Site Sizing

The site sizing presented below assumes that a turned windrow system will be used. The Township has expressed an interest in a yard waste site that will benefit participating residents. The turned windrow system will accelerate composting through regular windrow turning with a loader or windrow turner, and will provide residents and the Township with a useable compost product.

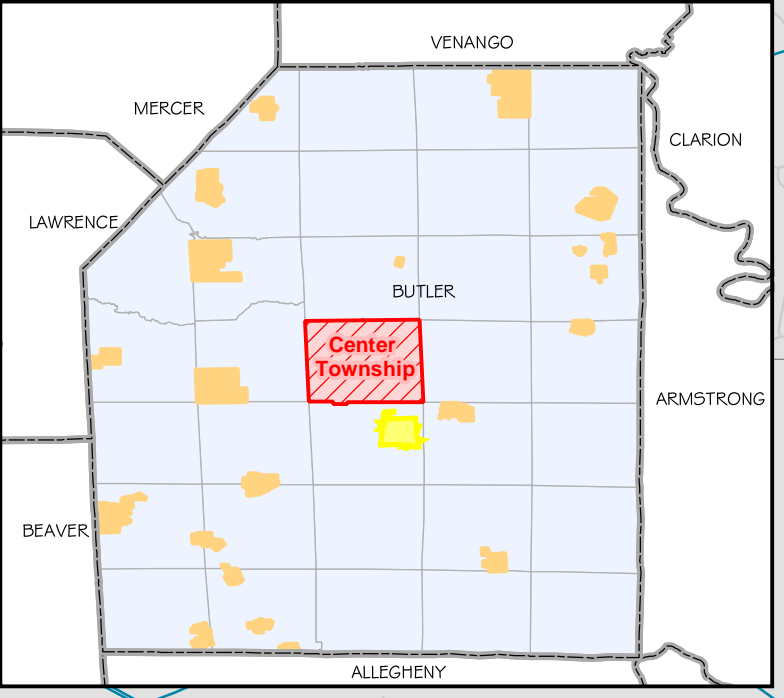
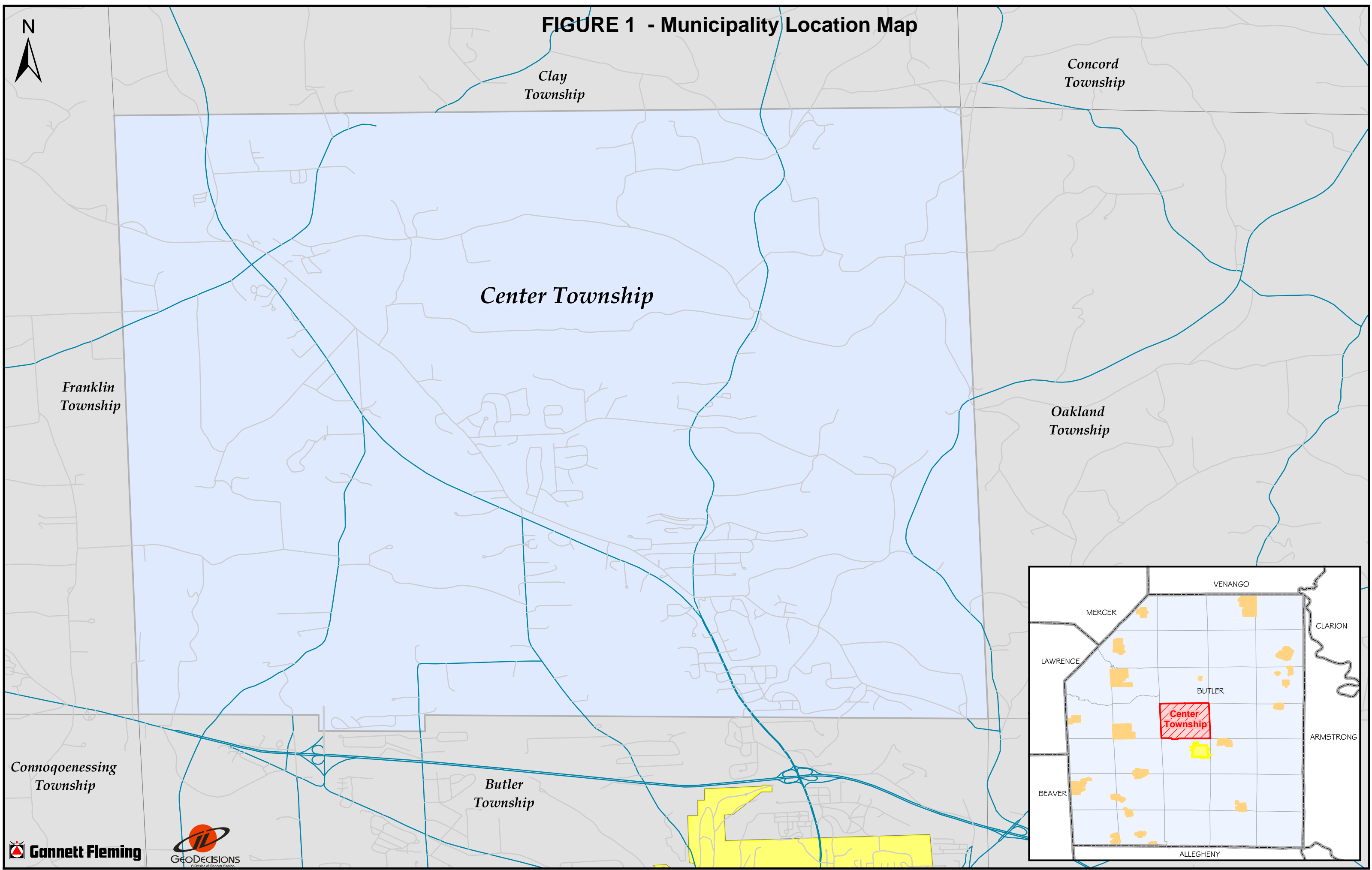
It is recommended the total yard waste receiving and compost area is at least 4.5 acres (not including a buffer area). A conceptual layout for the yard waste and composting site has been provided in Figure 2. 4.5 acres should be sufficient area to accommodate easy site access, easy receipt of yard waste, maneuverability of equipment, material and equipment storage, landscaping (e.g. fencing, trees, etc.), and would allow for some future expansion and/or uses. It is recommended that the site have a 300’ buffer area to any other use and a 1,000 – 1,500’ buffer to any residential use.

The windrow dimensions were assumed to be 12 feet wide, by 6 feet high, by 200 feet long. Using these pile dimensions, the Township would need approximately 16 windrows (@ 265 cubic yards each) to compost the estimated 4,250 cubic yards of material that may be generated by the Township annually. The Municipal Waste Regulations (Section 271) limit the amount of material to be composted on one (1) acre to be no more than 3,000 cubic yards.

Additional site area has been included because Center Township has indicated the proposed yard waste site may have several uses. The site may be open to the public as a drop-off site for unprocessed yard waste. Residents will be able to take away processed compost material and/or woodchips or other materials for their use. If the Township elects to purchase yard waste collection and or processing equipment for a Township operated system, the site will require some area to stage equipment. The Township has also indicated that the site may be used for future recycling drop-off or other similar events that could benefit residents.

Compost Facilities under 5 acres in size do not require a permit as long as certain guidelines are followed, in accordance with “permit-by-rule” Title 25, Chapter 271.103 of the PADEP regulations. Compost facilities between five and 15 acres in size may be allowed to operate under an existing PADEP General Permit (GP) for composting facilities, provided the proposed activities are consistent with the existing GP and approved by PADEP. PADEP requires the submittal of Form 27, “Acceptance of General Permit Conditions”, as part of this process. PADEP will make a “Determination of Applicability” based on the information provided by the applicant requesting approval to operate under the GP.

**FIGURE 1 - Municipality Location Map**



### **7.2.1 The Borough of Camp Hill**

As part of this study, the Borough of Camp Hill was contacted to gather information related to their yard waste collection operation and yard site. Camp Hill Borough's population and demographics are comparable to Center Township. Camp Hill is a suburban municipality with approximately 8,000 residents. The Borough has a mature yard waste collection program that has been in operation for over 10 years. In 2002, Camp Hill received 7,500 cubic yards of yard waste (limbs, brush, roots, stumps, bushes, etc.) including leaves at their yard waste collection and composting site.

Residents have a designated area to drop-off yard waste. Camp Hill provides curbside collection for leaves (on the same day as municipal waste collection) once per week from October through December. In a typical year this equates to about 10 leaf collections. Camp Hill Borough estimates the cubic yards for leaves based on 250 lbs per cubic yard for uncompacted leaves (the estimate for Center Township generation assumes 400 lbs per cubic yard for mixed yard waste).

Residents also drop-off woodwaste at the designated area, and in 2001 the Borough processed 6,500 cubic yards of woodwaste. Camp Hill shares the use of a tub grinder owned by Cumberland County through a shared equipment agreement.

Camp Hill's yard waste receiving area is 300' x 300' (approx. 2 acres). In addition the composting area is 725' x 125' (approx. 2 acres). The total yard waste receiving area and compost area is a little over 4 acres. The composting area of the site is currently sufficient to meet the Borough's needs, but the Borough is looking to expand the yard waste receiving area to 350' x 300'. The Borough would prefer the yard waste site area to be 400' x 400', but does not currently have the land/space available to expand to this size.

Camp Hill Borough's site is comparable to the recommended sizing provided for Center Township. Camp Hill currently operates a 4 acre site that will be expanded slightly to about 4.5 acres. The 4.5 acre site recommended for Center Township allows adequate space for beginning a new program that can be developed as the yard waste collection and receiving program grows. It will likely take several years or more to reach participation rates and total generation quantities that are comparable to Camp Hill's mature yard waste program.

### **7.3 Yard Waste Site Preparation and Operating Costs**

There will be costs associated with preparing and operating a turned windrow yard waste receiving and compost site. Site preparation costs may include, but not be limited to: clearing and grubbing, grading, excavating, windrow pad construction and processing area preparation, water lines, stormwater protection, local permitting, and access road construction and security (fencing and/or a gate). Equipment costs include the cost of a loader and/or windrow turner to

build and turn piles and to move materials around. Operating costs will include staff time to operate and maintain a loader/ windrow turner to turn windrows (typically 3 times per year between December and April). Some staff time may also be required for miscellaneous tasks (e.g. watering piles, site clean up, equipment maintenance, etc.).

The costs associated with preparing and operating the site are impacted by many factors. For example, a site selected in a cleared and level area with well-drained soils may greatly reduce site preparation costs. Operating costs may be minimized by sharing equipment and by using staff persons intermittently.

In some municipalities, static piles (rather than turned windrows) are used for composting in order to eliminate the operating costs associated with turning windrows.

## **8.0 TURNED WINDROW SYSTEM TECHNOLOGY**

Although there are three main types of composting systems (i.e. mechanical reactor, static windrows, and turned windrows), this report focuses on the turned windrow system because it is most suitable to the needs of Center Township (and most municipal yard waste operations). The turned windrow system is the conventional yard waste composting method. The term “turned” refers to the method of aeration used in this windrow system. The basic idea of the turned windrow system is to accelerate the compost process by building the compost pile/windrow, tearing it down, and rebuilding it. The turned windrow system is primarily for yard wastes. The following information deals with the operational requirements of the turned windrow method. Figure 3 through Figure 5 illustrate the compost process and turning

Key aspects of windrow construction and turning are described below and illustrated in Figures 3-5:

### **Construction**

Windrow construction should occur within one week, but preferably within 1-2 days of delivery of the yard wastes. If several different types of waste are to be composted together, they should be thoroughly mixed. Grass clippings are sometimes placed on top of an existing windrow pile and incorporated into the pile. PADEP guidelines require grass clippings to be incorporated in partially decomposed windrow piles within 24 hours of grass delivery, at a ratio of no less than 3 parts leaves to 1 part grass. Mixing of yard wastes can be performed using a front-end loader, but when mixing with grass clippings, which tend to mat together, use of a windrow turner is recommended.

Watering during the pile construction period is important. Water should be added to reach the desired moisture content (between 40 and 60 percent moisture for leaf composting).

The form and shape of the windrow affects several key conditions of the composting process. For instance, if the piles are too large, oxygen cannot reach the center. If the piles are too small they will not reach optimum temperatures. The ideal windrow size varies with the substrate and with seasons of the year. In general, windrows of autumn leaves can be constructed 6 to 8 feet tall and 12 to 18 feet wide at the base; these piles may be built to 8 to 10 feet tall in mid-winter months. Larger or smaller piles can create problems for leaf composting operations. Windrows of grass clippings with leaves may need to be smaller, often only 5 feet high and 10 feet wide (however, with a 3:1 minimum ratio of leaves to grass, reduction of the windrow pile size is probably not necessary).

Keep in mind that many factors influence the size and number of piles including; seasonal volumes, equipment limitations, frequency of turning (i.e. increased/ decreased composition), moisture content, type(s) of material, etc.

In some Pennsylvania counties, municipalities share the use of the windrow turners, grinders, and other yard waste equipment among neighboring municipalities (via agreements). The municipalities gain use of equipment that would otherwise be too expensive to purchase and diffuse the overall cost for the equipment owner by sharing the operating and maintenance cost responsibilities. Annual use costs per municipality are very reasonable. For sites using a Scat-type mechanical turner, a windrow pile size of 6 feet high by 18 feet wide is optimal.

When constructing the windrow, care should be taken not to drive on or compact the material. The material should be allowed to cascade down from the bucket of a front-end loader to form a loose pile. Space permitting, it is recommended windrows be constructed in pairs for later **combining** of piles (if a Scat turner is used, a 7-foot clearance between piles is necessary for equipment passage). Allow approximately 15 feet to 25 feet between sets of pairs (see Figure 2). Typically, the piles can be combined after 2-4 months from receiving yard waste and adding it to the windrows. The piles will have experienced significant size reduction during the 2-4 month period. Combining the piles will mix the yard waste, creating a larger single pile that will usually improve the overall composting process.

**Turning**

The main goals of turning the compost pile are to promote decomposition by moving material from the outside to the inside of the pile, and to “fluff” the material so it will be more porous, allowing air to move freely through the pile. Turning the piles increases the rate of decomposition by mixing of materials and exposing new surface areas.

Turning frequency should be based on temperature, since temperature reflects decomposition taking place in the pile. Whenever temperatures drop below 90EF or exceed 140EF, turning should be performed. If the compost is staying within the 90E to 140EF range by itself, turning can still help accelerate decomposition. Windrows may be turned within 1 to 2 weeks after initial windrow construction. Windrows composed entirely of leaves may only need

to be turned a few times a year, and should be left alone during winter months, as severe cold weather may decrease the decomposition rate. Windrows including grass clippings in the substrate will require more frequent turning to prevent odors caused by anaerobic conditions. However, if a 3:1 leaves: grass ratio is maintained, this should not be a major issue.

Should anaerobic conditions become apparent, turning the pile will temporarily add oxygen but will also create offensive odors. Before turning, try to identify the cause of the problem so remedial action can be taken as the pile is being turned. Turning of piles during breezy days with preferred prevailing wind directions will help dissipate offensive odors safely.

Although several types of equipment are available for turning windrows, front-end loaders may be the only equipment necessary for smaller composting facilities. When turning the piles with a front-end loader, let the compost cascade out of the bucket so that the materials drop through the air to keep it as loose as possible. As in initial construction, when turning/reconstructing the piles, care should be taken not to compact the material.

Windrows may only need to be turned 3-4 times between initial fall delivery (pile construction) and the middle of the next summer.

### **Curing**

After a period of 8-10 months, decomposition in the windrows has slowed substantially. At this time, the material can be moved from the windrow composting area and stacked 10-12 feet high in curing piles (height limited by the capabilities of the site's front-end loader equipment). The material will slowly continue to stabilize. Further turning of the pile should not be necessary at this time, as long as the material stacked is stable due to proper windrow decomposition.

### **Screening**

Often, finished yard waste compost is used as a mulch, soil amendment or conditioner, without further processing. To improve product quality, a mechanical screen or shredder may be used to size-reduce and/or size-separate various grades of material. This can improve demand and potential end-uses of the material.

### **Limitations**

There are two potential limitations associated with the turned windrow system. These are odors and pathogens. Odors can periodically be a part of the composting process, even with appropriate operating procedures. Proper site and operations management will minimize odor occurrences. Pathogens are generally applicable to operations that involve the processing of

wastewater sludges or residues from other animals, and should not be an issue in yard waste operations.

## 8.1 Monitoring Procedures

The key elements for successful composting include moisture content, oxygen, temperature, pH and substrate. These environmental factors work together to provide the desired extent and rate of decomposition. Frequent monitoring of the compost piles is important, as the pile characteristics are clues to the composting process. Good record-keeping practices allow the operator to study the monitoring results and better address problems and concerns. Standard monitoring parameters and record-keeping requirements are summarized below. At a minimum, the following parameters should be monitored:

**Moisture** - Water is essential to the survival of microorganisms. Excessive moisture, however, inhibits the flow of oxygen and anaerobic conditions start to develop. The optimal moisture content for leaf composting should be between 40 and 60 percent; this is about the consistency of a wrung-out sponge...the leaves should feel damp but with only a drop or two of water expelled when tightly squeezed. Leaves very often require water at the start of the composting process. As a rule of thumb, dry leaves initially need about 20 gallons of water for every cubic yard of leaves.

**Temperature** - As a key environmental factor affecting biological activity, the temperature should be monitored frequently; temperature readings should be taken at least two times per week along every 65 to 75 ft section of the pile. It is important to monitor temperatures and turn the compost when temperatures exceed 140EF to prevent problems. Turning the compost whenever temperatures get above or below the optimum range (90 - 140EF) will help produce a high quality compost in the shortest possible time. When the compost temperature drops below 70EF (21EC), the composting process is nearly complete.

**Appearance** - Visual inspection of the windrows should be conducted. Items of concern include ponding water and leachate discharges; pile reconstruction or turning may be necessary. When turning the piles, look to see whether the moisture content of the material looks uniform, or if portions are too wet or too dry; watering and/or mixing/turning methods may need to be modified. Look to see whether the decomposition looks uniform, or if portions look like they did when received while other portions look decomposed; again, watering and/or mixing/turning methods may need to be modified.

**pH** - Decomposition takes place most efficiently under neutral pH conditions, so the pH of the material should be monitored periodically. It is common for the pH to be low (down to 5.0) during the early stages of decomposition; then the pH begins to rise to near neutral conditions. By keeping the pile in an aerobic state, via proper turning methods, leaf composting operations

should not present a pH (acidic) problem. Testing for pH can be done on-site with a soil pH testing kit.

***Odor*** - Foul odors will develop under anaerobic conditions, and the rate of composting slows dramatically under anaerobic conditions. An adequate supply of oxygen is crucial to efficient composting. Should anaerobic conditions become apparent, turning the pile will temporarily add oxygen but will also intensify offensive odors. Before turning, try to identify the cause of the problem so remedial action can be taken as the pile is being turned. For instance, problems other than lack of oxygen may include windrows that are too large and failure to construct windrows soon enough (i.e., storing leaves).

## 8.2 Record-keeping

Good record-keeping provides the operator of composting operations with readily available site-specific data. Such data can be used to better manage site operations and to address problems which may arise. Records should be kept for all windrows constructed. Information to be collected should include, but is not limited to, the following:

### Initial Data (to be recorded upon pile construction)

- type and quantity of materials used as substrate
- method of size reduction
- method of mixing
- amount of water added and method of watering
- date of windrow construction
- size and shape of windrow

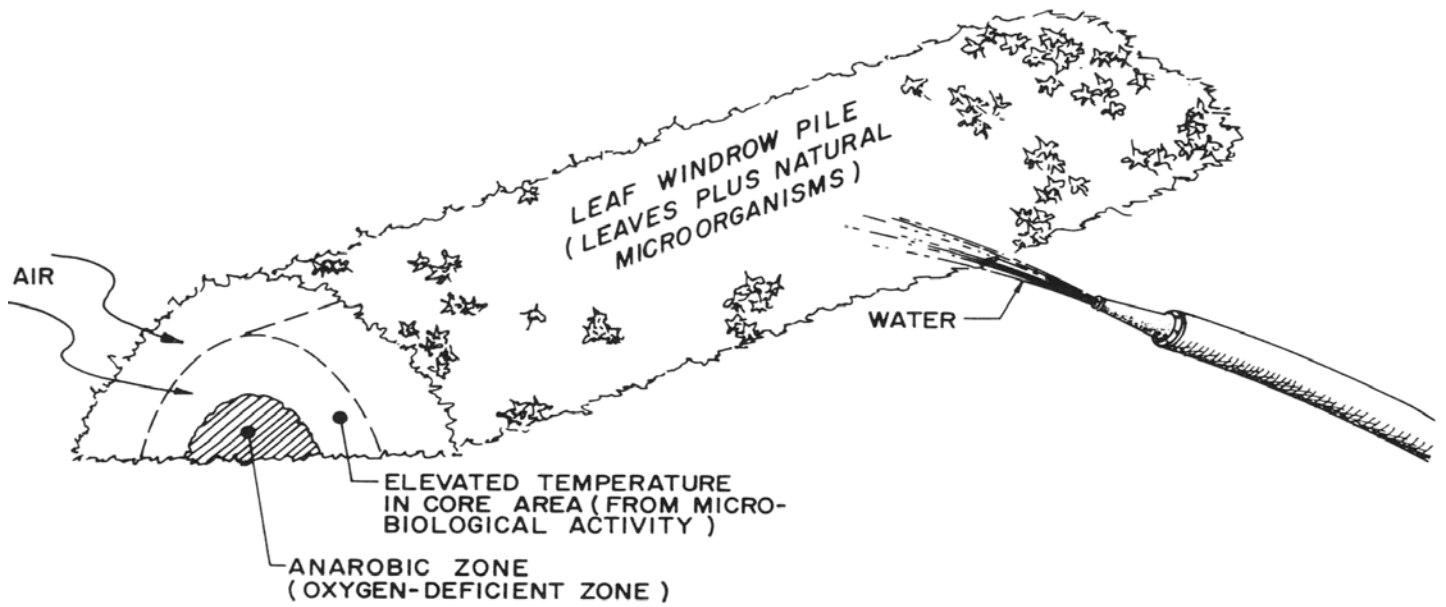
### Process Data (to be recorded periodically or during turning as recommended)

- temperature (3-6 foot long temperature probe)
- pH
- moisture content
- oxygen levels (if equipment is available)
- odor
- texture



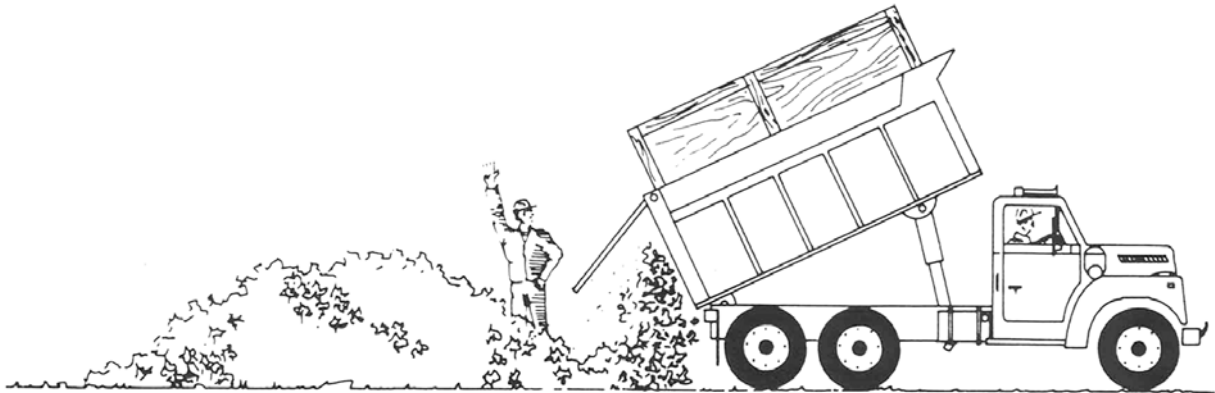
FIGURE 3

LEAF COMPOSTING PROCESS



# FIGURE 4

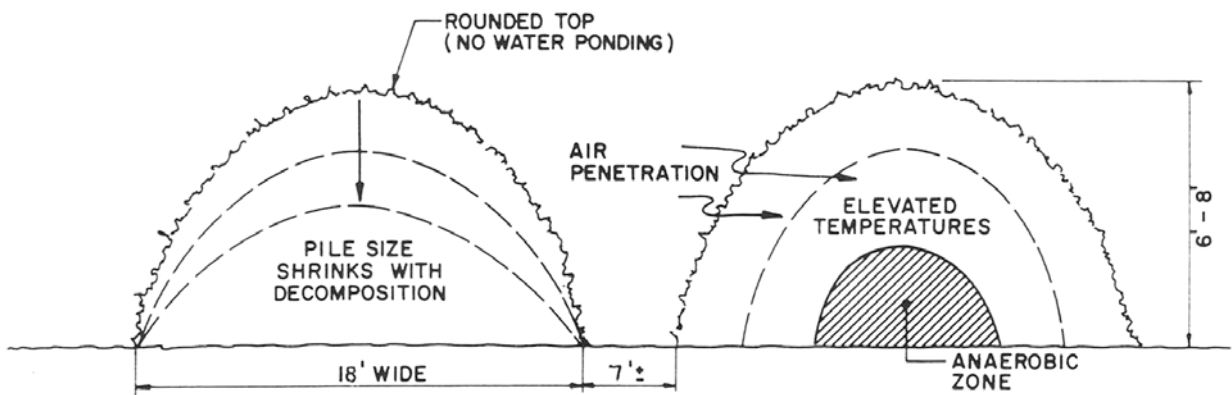
## COMPOST SITE PROCEDURES



STEP 1. LEAF DELIVERY



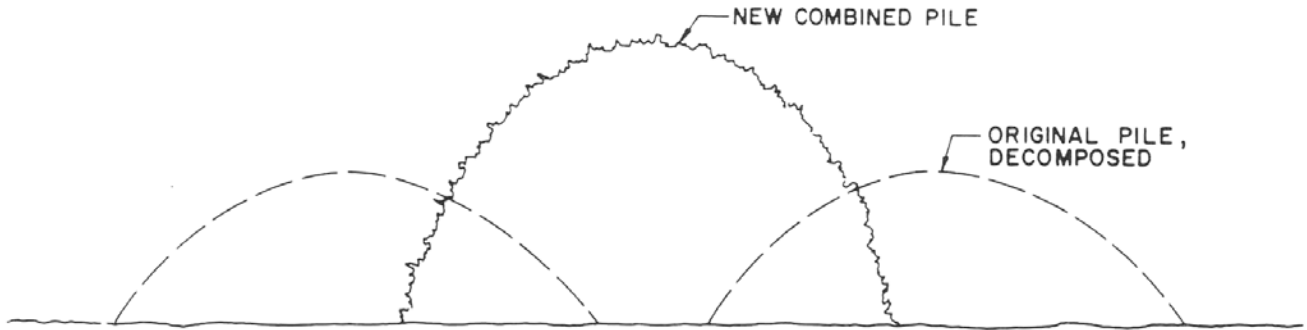
STEP 2. PILE CONSTRUCTION



STEP 3. COMPLETED PAIR OF WINDROW PILES

# FIGURE 4 (Continued)

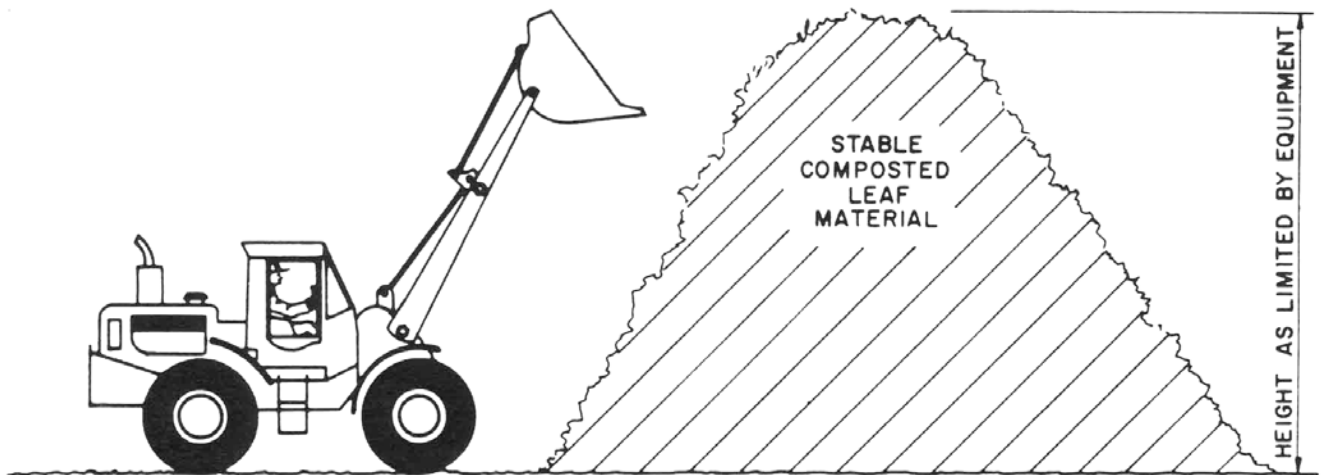
## SITE PROCEDURES-CONTINUED



STEP 4. COMBINING PILES

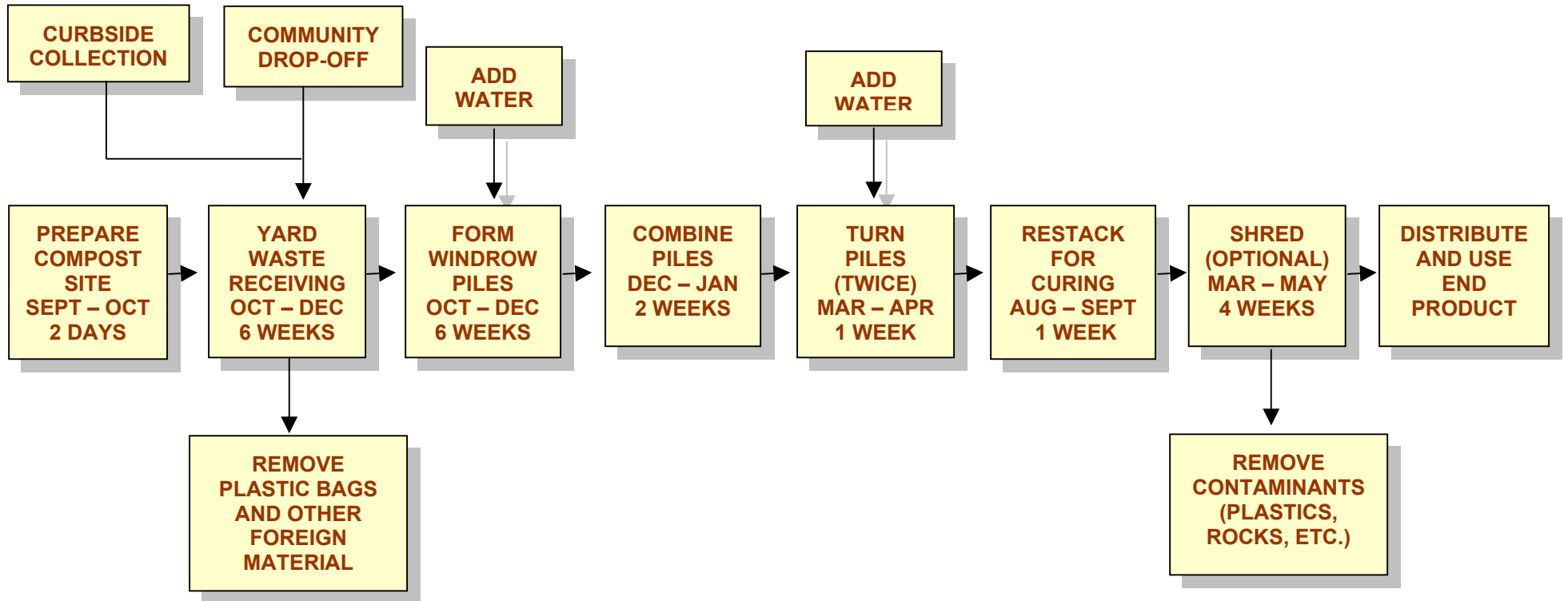


STEP 5. TURNING PILE IN PLACE



STEP 6. COMBINE AND RESTACK MATERIAL FOR FINAL CURING

**FIGURE 5  
SCHEMATIC OF LEAF  
PROCESS OPERATION  
LOW-LEVEL TECHNOLOGY (12-18 MONTH PROCESS)**



## 9.0 CONCLUSIONS AND RECOMMENDATIONS

As of the 2000 census, and based on Act 101's requirements for municipalities with minimum populations and population densities, Center Township has become a newly mandated recycling municipality. The Township has never administered a curbside trash collection and/or recyclables collection program. In accordance with their new recycling mandate, Center Township intends to implement an effective recycling and yard waste collection program.

As a mandated recycling community that is considering contracted waste collection services and/or recycling collection services for its residents, Center Township is currently faced with a variety of waste management and recycling decisions. Not all of these decisions were evaluated in this study, but it should be noted that these choices will impact the selected waste management system, the recycling and yard waste collection programs, and the approach to implementing each of these programs in Center Township.

The following conclusions and recommendations focus on the successful implementation of a yard waste collection program for Center Township.

### CONTRACTED WASTE AND RECYCLABLES COLLECTION SERVICES

- The Township should determine if it is favorable and feasible to contract municipal waste and/or recyclables collections services (which may include yard waste). Based on current residential monthly costs presented in this report, and from general municipal experience, it appears that at least some residents would experience improved monthly rates for collection services if the Township contracted these collection service(s) through one hauler. If the Township elects to move forward with contracting collection services, the Township should work closely with their solicitor to develop the specifications that will meet the needs of the Township and residents. The bid specifications should be consistent with Act 101 recycling requirements, if recyclables collection services are requested in the bid document.

### YARD WASTE COLLECTION SERVICES

- As agreed upon by the Township, it is suggested that the Township use a short-term contract for yard waste collection services OVER a trial period in order to gain a clear understanding of the costs associated with providing yard waste collection services. A short-term contract (e.g. 1-3 year), with an option to renew each year, is a good approach. Annual costs for the contracted services could be compared to the estimated costs for a proposed Township-operated yard waste collection program.

- If Center Township elects to contract waste collection and/or recyclables collection services, it is recommended that the Township include yard waste collection services as an option in the bid. Based on the responses and pricing, the Township would have the flexibility to include or reject contracted yard waste collection services for the Township residents. The Township may also elect to contract for yard waste collection services-only in a separate bid.

#### YARD WASTE COMPOSTING SITE SIZING

- It is recommended the site selected for yard waste receiving and composting be at least 4.5 acres in size (see Figure 2). 4.5 acres should allow sufficient area to accommodate easy site access, easy receipt of yard waste, maneuverability of equipment, material and equipment storage, landscaping (e.g. fencing, trees, etc.), and to allow for some future expansion and/or other uses (e.g. recycling drop-off event) as indicated by the Township. If it is economically feasible for the Township to get a site larger than 4.5 acres, the Township can operate a site up to 15 acres under an already approved General Permit provided the facility is designed and operated within the parameters of the General Permit.

#### YARD WASTE COMPOSTING SITE COSTS

- There will be costs associated with preparing, equipping and operating a turned windrow yard waste compost site. It is recommended that site preparation equipment and site operation costs are evaluated prior to moving forward with the development of a yard waste site. Refer to Section 7.3 for a brief overview of costs that may be associated with developing and operating a yard waste compost facility.

#### EDUCATION

- The Township should review (with the board and others) the regulations presented in this report related to the proper implementation of a mandated recycling program.
- The Township should educate Township residents and businesses on the new and ongoing responsibilities related to waste collection and recycling in the Township as a mandated community. This approach could include the development and/or use of educational newsletters, brochures, and other sources of media that are available.
- If the Township moves forward with the development of yard waste composting facility, the public should be informed well in advance of its opening. Ongoing education and public notices will be critical in keeping participation rates high for the yard waste program.

- Education efforts/costs could be added as a line item in the Township’s budget to ensure that education costs are documented, ongoing, and effective. In order to lower recycling education costs through shared resources, and for general guidance, the Township should request assistance (as it is necessary) from other Butler County municipalities and the Butler County Recycling Coordinator (or other County and municipal recycling coordinators). A host of recycling resources are also available on the PADEP website ([www.dep.state.pa.us](http://www.dep.state.pa.us)).

## FUNDING

- The Township should pursue state grant funding as necessary to help offset the costs of developing new or improving existing recycling and/or yard waste programs. Because grant funding is not guaranteed, the Township should not rely on grant funding as the support mechanism for recycling programs. If the Township continues forward with expanding recycling and yard waste programs, it is recommended the Township work with a solicitor to investigate the use of an administrative fee (or a related fee system) to support the administration and implementation of these programs.
- The competition for Act 101, Section 902 Implementation Grant funding is becoming more and more competitive each year. PADEP has had to prioritize who will get funding. Submit early, and schedule the required pre-application meeting as early as possible in order to improve your municipality’s chance at getting 902 Grant funding. PADEP offers at least one 902 grant round annually. The most recent grant round closed on June 26, 2003.
- The Township should apply for 902 grant funding for up to 90 percent reimbursement for costs associated with purchasing recycling equipment and recycling containers, and for recycling educational outreach.
- As the Township implements its curbside recycling program and investigates future yard waste and recycling programs, the Township could apply (through the County) for Act 101, Section 901 Planning Grant funding for 80 percent of approved costs for conducting related studies, surveys, investigations, and research and analysis.