



Nestor Resources, Inc.

Nestor Resources, Inc.
208 Kozy Corner Road
Valencia, PA 16059

Phone: 724-898-3489

Fax: 724-898-3592

E-mail: info@nestorresources.com

Internet: www.nestorresources.com

**Recycling Technical Assistance
Project #443
Westmoreland County**

**Feasibility of expanding
yard waste collection
throughout the county**

September 15, 2008



Nestor Resources, Inc.

Table of Contents

INTRODUCTION..... 5

BACKGROUND..... 5

PROJECT SCOPE OF WORK 6

SUMMARY OF RECOMMENDATIONS 7

CURRENT YARD WASTE MANAGEMENT PRACTICES 9

EXISTING MUNICIPAL SITES 9

Table 1 – Westmoreland County Existing Leaf Waste Collection Programs 10

Figure 1 – Proximity of Composting Services to Westmoreland County Municipalities 11

EXISTING PRIVATE SECTOR OPERATIONS..... 13

YARD WASTE GENERATION..... 15

Table 2 Potential Available Annual Tons of Yard Waste in Existing Service Areas* 15

COLLECTION AND DELIVERY 16

EQUIPMENT OPTIONS 17

Vacuum Systems..... 17

Front Loader Systems 17

Direct Loading 17

Table 3 Loose Yard Waste Collection Methods..... 18

Leaf-loader 19

Mechanical Claw 19

Bag and/or Container Collection..... 19

Bulk Collection..... 19

Table 4 Bagged Yard Waste Collection Methods 20

Table 5 Contained Yard Waste Collection Methods..... 21

Table 6 Bulk Yard Waste Collection Methods..... 22

Drop-off Sites..... 22

COLLECTION RECOMMENDATIONS FOR WESTMORELAND MUNICIPALITIES 23

CHARACTERISTICS AND NEEDS OF URBAN AND OLDER COMMUNITIES 23

CHARACTERISTICS AND NEEDS OF SUBURBAN COMMUNITIES 24

CHARACTERISTICS AND NEEDS OF RURAL AREAS 25

MIXED DEMOGRAPHIC MUNICIPALITIES 25

MAXIMIZING PROCESSING OPPORTUNITIES 25

MUNICIPAL COOPERATIVES 25

MOBILE UNITS 26

ON FARM APPLICATIONS..... 26

CENTRALIZED FACILITIES 26

CONCLUSIONS 27

APPENDIX A 29

PENNSYLVANIA’S ACT 101 LEAF WASTE COLLECTION REQUIREMENTS 29



Nestor Resources, Inc.

Introduction

The Recycling Technical Assistance Program is sponsored in partnership by the Pennsylvania Department of Environmental Protection (DEP) through the Solid Waste Association of North America (SWANA), the Pennsylvania State Association of Township Supervisors (PSATS) and the Department of Community and Economic Development (DCED) Governor's Center for Local Government Services. Qualifying municipalities wishing to enhance their recycling, composting, and waste reduction programs are provided with professional support to assist them achieve their goals and objectives.

Westmoreland Cleanways, on behalf of Westmoreland County, requested technical assistance to evaluate the availability of yard waste collection and composting opportunities for its municipalities. Additionally, Westmoreland Cleanways desired to determine the volume of material that could be captured in targeted areas if these services were expanded. Finally, Westmoreland Cleanways planned to share this information with private sector participants to incentivize investment in composting facilities.

As the consultant selected to manage the project, Nestor Resources, Inc. is pleased to submit to Westmoreland Cleanways and Westmoreland County our findings and recommendations. This report includes background data, resources and references, as well as explanations and justifications for the consultant's suggestions.

Background

Based on land area, Westmoreland County is the eighth largest county in the Commonwealth. Its size provides opportunities for residential growth and industrial development, while still maintaining a rural landscape of working farms, nature preserves and other conservation areas. A series of 72 municipalities, consisting of townships, boroughs, cities, and towns, represent local government in Westmoreland County.

The municipalities are demographically diverse. Some have less than 200 residents, while others exceed 40,000. Long-standing communities struggle to survive with decreasing and aging populations on fixed incomes. New residential developments populated by young affluent families are increasing in areas that were once primarily rural. Expectations differ for the types and level of municipal services that should be provided. Therefore, there is no consistent approach to waste management throughout the County. The greatest disparities likely can be found in the manner in which leaf and yard waste is managed.

In general, there is a slight difference between leaf waste and yard waste. The Municipal Waste Planning, Recycling, and Waste Reduction Act of 1988, Act

101, defines leaf waste as “Leaves, garden residues, shrubbery and tree trimmings, and similar material, but not including grass clippings.” Yard waste on the other hand does include grass clippings as well as all of the materials found in leaf waste.

Act 101, mandates that municipalities with populations of 10,000 or more and those with populations of 5,000 or more with a population density of greater than 300 people per square mile meet certain requirements for recycling and leaf waste management. These communities must implement mandatory residential curbside collection programs for recyclables and leaf waste and ensure that commercial, institutional, and government establishments manage recyclables and leaf waste accordingly.

In Westmoreland County, 21 municipalities are subject to these mandates. Of the remaining communities, most have no leaf waste program. Eleven provide those services voluntarily. For the most part, leaves, and not the full spectrum of leaf waste, are collected at specified times in the fall for composting in both the mandated and voluntary programs. During the remainder of the year leaves, brush and tree trimmings still find their way to the landfill. This falls short of compliance with the provisions of Act 101. In brief, the mandated communities are required to offer curbside collection of leaf waste once per month. Alternatively, these communities may collect at the curb twice per year, once in the spring and once in the fall, if a convenient drop-off site for leaf waste is available to residents during the remainder of the year. A more detailed explanation of the leaf waste collection requirements can be found in Appendix A.

There are no mandates to collect yard waste at this time. However, many municipalities find that residents prefer the inclusion of grass clippings in their collection programs. This is particularly true in suburban plans with groomed lawns and/or those municipalities where homeowner’s collection costs increase or decrease depending on the amount of waste they dispose. In the pending proposed revisions to the municipal waste regulations, a disposal ban of yard waste is currently being considered. Therefore, this study examines the broader issue of yard waste.

Project Scope of Work

Task #1: Nestor Resources, Inc. met with the Executive Director of Westmoreland Cleanways to discuss the current collection practices for yard waste; the existence of municipal collection contracts; and history of joint municipal efforts in other endeavors. In addition, the consultant made observations with the Executive Director to establish an awareness of limitations and constraints that may have impact on collection methodologies, equipment and, transport to processing facilities. Meetings also were held with operators of private sector composting facilities to discuss their current and future potential to accept the volume of yard waste anticipated.

Task #2: Utilizing actual demographics of Westmoreland County communities, data from national, state and regional programs, and local land use information, Nestor Resources, Inc. projected the volume/weight of yard waste expected to be generated in targeted regions of the county. The consultant provided options for the appropriate method and frequency of collection in each targeted area. The use of existing facilities as well as the need to develop new outlets to service specific clustered areas was considered.

Task #3: Nestor Resources, Inc. prepared and submitted to the Pennsylvania Department of Environmental Protection (PADEP) for review and comment, a draft project report, which summarized the consultant's findings and recommendations. Based on the PADEP's input, the consultant revised and finalized the report. Both Westmoreland Cleanways and the Department were provided with the report in electronic format. In addition, a hard copy of the document was provided to the Westmoreland Cleanways.

Summary of Recommendations

The following is a summary of the consultant's findings and suggestions for Westmoreland County:

- Service areas for Westmoreland County's existing facilities include 66% of the population, which in turn generates 70% of the yard waste that could potentially be available for collection and processing in the County.
- Grass clippings are estimated to be 54% of the total yard waste generated and gathered for disposal in the County overall.
- The existing facilities do not currently receive the full volume of yard waste that could result from a disposal ban. Based on field observations of the sites, most have space and labor constraints, making them ill prepared to receive greater quantities or expand services to contiguous municipalities. Operational modifications would be necessary in order to utilize these permitted sites to their fullest potential.
- The Waste Management Valley Landfill Compost Site is the one conveniently located site likely to have the capabilities to handle nearly all of the yard waste generated in the County. It is the only facility that currently accepts grass clippings in significant volumes.
- Small municipal sites could continue to provide a feasible outlet for many materials if mobile units were used for periodic shredding and grinding to reduce the volume.

- In mixed demographic neighborhoods, on-farm applications could provide the additional capacity needed in Westmoreland County should yard waste be banned from landfill disposal. General permits are available from PADEP for this purpose.
- Since collection of yard waste can be the most expensive component of any program, great care must be taken in determining the best method for local conditions. Volume reduction, distance, service frequency and minimal handling must be considered.
- Before brush and trimmings can be mixed with loads of leaves or grass, it is important to know whether the processing facility has the necessary equipment for chipping, grinding and screening. When this is not an option, Westmoreland communities should collect this material separately to be processed into a mulch product. Equipment should be shared among municipalities to reduce costs.
- Field data indicate that bag and/or container collection can be the most cost-effective method for yard waste systems if debagging is not required. This is the recommended method of collection in suburban areas of Westmoreland County.
- Vacuum and leaf loader methods of collection will likely be more productive in Westmoreland's urban areas and mature communities where the volume of leaves makes bagging prohibitive.
- Bag and/or container systems combined with drop-off sites provide a good combination of services in mixed demographic municipalities. Collection frequencies can be lesser in the more rural areas than in the more dense housing developments.
- Yard waste collection at the curb in Westmoreland's rural communities is virtually unnecessary, except in times of extreme disaster debris situations. Drop-off sites can be useful for those homeowners that generate more material than they can manage independently on their own property.
- Regardless of the method of collection, Westmoreland County communities should use a packer vehicle, shredder unit or compaction unit if the ultimate destination is a central or remote composting facility. Transporting loose material is only advisable when a compost site is located in close proximity.
- Throughout the years, municipalities in Westmoreland County have purchased collection and processing equipment made possible through Act 101 Section 902 Equipment and Implementation Grants. Westmoreland Cleanways should conduct an inventory of this grant-funded equipment to determine the overall processing capabilities in the County. Once the types and locations of equipment are known, Westmoreland Cleanways could help municipalities establish the cooperative sharing of these resources.

Current Yard Waste Management Practices

Communities in Westmoreland County handle the collection of yard waste in different fashions. Little or no consistency in the type or frequency of service prevails among the municipalities. Neither population nor geographic size seems to be a determining factor in service offerings. A mixture of curbside, drop-off and a combination of both types of programs can be found. In some areas, municipal public works employees, most often road crews, are enlisted to collect material, chip and grind material and maintain local compost sites. Private vendors may provide collection services in other areas as part of municipal waste collection contracts. In these scenarios, material is most often taken to a centralized private facility.

Table 1 shows a list of municipalities in Westmoreland County that offer some type of yard waste program. It indicates the population of each municipality and those that are mandated by Act 101 to provide curbside collection of leaf waste. The table provides the general overall source of waste collection and shows the destination of the material, whether to a local municipal or private site. Where the information was available, the reported types and weight of material collected are shown. Many of the municipalities that did not report individually were included in a collective tonnage report from one of the private facilities. Overall, the facility reported receipt of 1500 tons of yard waste. Because the weights cannot be attributed to any specific community, they are not shown here.

Figure 1 shows the location of all sites in the County and the approximate area from which they receive material. As part of the scope of work for the project, Nestor Resources, Inc. and the Westmoreland County Recycling Coordinator, visited numerous compost facilities and spoke with municipal officials regarding yard waste collection practices. A description of the sites and a summary of those observations follow.

Existing Municipal Sites

Five facilities operated by local governments were observed during the development of this report. These included:

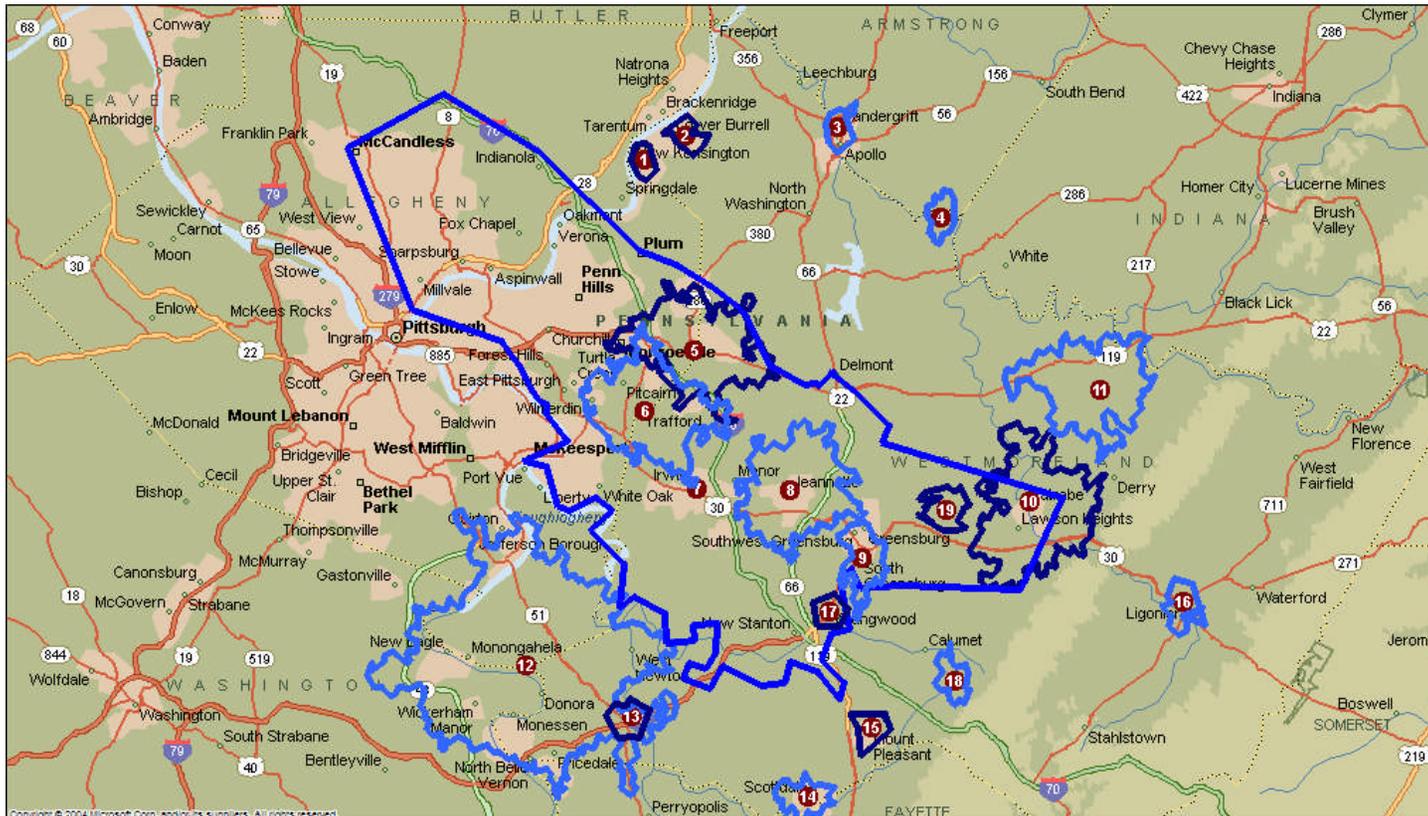
- Mount Pleasant Township
- Mount Pleasant Borough
- Unity Township
- City of Latrobe
- Youngwood Borough

Table 1 – Westmoreland County Existing Leaf Waste Collection Programs

Westmoreland County Municipalities with Existing Leaf Waste Collection Programs							
Municipality	Population	Act 101 Mandates	Collection System	Compost Site	Type and Tons Reported		
	2000 Census	Y/N	Contract Municipal Employees Private Subscription	Municipal Commercial	Leaves Only	Leaf Waste	Yard Waste
Arnold, City of	5,667	Y	Municipal	Commercial			
Avonmore Borough	820	N	Contract	Municipal			
Derry Borough	2,991	N	Private	Municipal	66		
Derry Township	14,726	Y	Private	Commercial	.74		
Greensburg, City of	15,889	Y	Contract	Commercial			525
Hempfield Township	40,721	Y	Contract	Commercial		127.4	
Irwin, Borough of	4,366	N	Contract	Commercial			
Jeannette, City of	10,654	Y	Municipal	Commercial			
Latrobe, City of	8,994	Y	Contract	Municipal		65.9	
Ligonier Borough	1,695	N	Private	Municipal			
Lower Burrell, City of	12,608	Y	Private	Municipal		45.5	
Madison Borough	510	N	Private	Commercial			
Monessen	8,669	Y	Contract	Commercial			
Mount Pleasant Borough	4,728	N	Contract	Municipal			
Mount Pleasant Township	11,153	Y	Private	Municipal		5	
Murrysville, Municipality of	18,872	Y	Contract	Commercial	123		
New Kensington, City of	14,701	Y	Contract	Municipal			275
New Stanton Borough	1,906	N	Contract	Commercial			
North Belle Vernon Borough	2,107	N	Contract	Municipal		70	
North Huntingdon Township	29,123	Y	Contract	Commercial	14		
Penn Township	19,591	Y	Contract	Commercial		423	
Rostraver Township	11,634	Y	Contract	Municipal			
Scottdale Borough	4,772	Y	Contract	Municipal	17 loads		
Southwest Greensburg Borough	2,398	N	Municipal	Commercial			
Trafford Borough	3,205	N	Contract	Municipal	71.2		
Unity Township	21,137	Y	Private	Municipal			
Vandergrift Borough	5,455	Y	Municipal	Municipal			
Youngwood Borough	4,138	N	Contract	Municipal		164	

Information provided by Westmoreland Cleanways and local municipalities

Figure 1 – Proximity of Composting Services to Westmoreland County Municipalities



SITE LOCATIONS

1. New Kensington
2. Lower Burrell
3. Vandergrift
4. Avonmore
5. J.A. Rutter
6. Trafford
7. WM Valley Landfill
8. Jeanette
9. A.P. Radomski
10. Latrobe Transfer
11. Derry Township
12. Monongahela (Washington County)
13. Rostraver Township
14. Scottdale
15. Mount Pleasant
16. Ligonier
17. Youngwood
18. Mount Pleasant Twp.
19. Unity Township

-  Current Service Area Leaves Only Site
-  Current Service Area Leaf Waste Site
-  Current Service Area All Inclusive Yard Waste Site

While each facility and operation had its own characteristics and methods of operation, there were commonalities found in all of them. These facilities were designed initially to serve the needs of the local community. The relatively low material volume received provides a manageable scenario for most local governments. The smaller sites can be maintained during downtime of existing road crews or other municipal labor forces, rather than have employees dedicated specifically to this operation. Therefore, space and labor constraints currently exist that are prohibitive to the expansion of services to contiguous municipalities.



Compost Pile in Mount Pleasant Township

Brush Pile in Unity Township



Another obstacle to accepting additional material is that, for the most part, many of these sites are not compost facilities in the purest sense of the term. Static piles, many with leaves and large pieces of brush combined, are left to decompose naturally with no active management. In some cases, road debris and other contaminants can be seen in the piles. Operational modifications would be necessary in order to utilize these permitted sites to their fullest potential. The photos of the sites in Unity and in Mount Pleasant Townships illustrate the conditions often found at small local sites in the County.

At some sites, material is chipped, shredded or put through a grinder for use as mulch. Mount Pleasant Borough has a designated receiving area for residents to drop-off material. Later Township crews process the material for use by residents and on Township properties.

Receiving and Processing Leaf Waste in Mount Pleasant Borough



TECHNICAL ASSISTANCE PROGRAM



WESTMORELAND COUNTY YARD WASTE COLLECTION

One site did demonstrate an active composting process. It also showed the resulting distribution of and use of the product. The Latrobe Transfer Station accepts both leaves and brush. Leaves are composted on site. Compost is used on site and throughout the town in decorative flowerbeds. The brush is hauled to Waste Management's Valley Landfill for processing. It should be noted that, unlike its counterparts in other Westmoreland communities, this facility has full-time employees available on site to facilitate the composting process. That likely makes the difference in the resulting product.



Compost from Latrobe Transfer Station is used in the town's flowerbeds



Existing Private Sector Operations

At least three private sector companies receive and process material from Westmoreland County yard waste collection programs. These include Waste Management Valley Landfill Compost Site located in Irwin, A.P. Radomski Composting located in Greensburg, and J.A. Rutter Landscape Supplies located in Murrysville. The operations differ in the amount of material received, and the manner in which the end product is produced and marketed.

Both Radomski and Rutter produce compost that is sold commercially for soil additives and amendments. Because these operations produce a commercial product, they are more selective on the composition of the inbound yard waste. Therefore, the material delivered from select local municipalities consists primarily of leaves, although Radomski does accept brush.

Waste Management receives the bulk of the yard waste collected in the County, including leaf waste, brush and grass clippings. It also serves a much broader geographic area that covers multiple surrounding counties. Traditionally, the

Former Yard Waste Piles at Valley Landfill



composting area, located on inactive portions of the landfill, comprised of six relatively static piles. Material in these piles decomposed naturally with minimal handling by the operators. The site did not produce a commercially marketable material. Rather, material was utilized in landfill operations as alternative daily cover and as a soil amendment for intermediate cover.

Recently, Waste Management implemented a corporate initiative to reduce the volume of material disposed at its landfills. This internal policy coupled with a potential statewide disposal ban on yard waste, translated locally into the need for better management of the yard waste received at the Valley Landfill site. It also spurred local interest in expanding the company’s collection service area in an attempt to divert even greater quantities of yard waste from the landfill to the composting operation.

Recently, Waste Management implemented a corporate initiative to

Screening the finished product

With the expectation of greater quantities of better quality compost material, the company looked for new outlets other than landfill cover. Therefore, Valley Landfill is considering plans to renew the concept of “community gardens” in Westmoreland County by making plots available to residents on farmland the company owns adjacent to the landfill.



Compost will be provided to gardeners who will be encouraged to donate a portion of their crops to the local food bank. Another outlet may be for the company to distribute compost material to the communities, which deliver yard waste to the Valley site.

Community Gardens may sprout from Landfill's Compost

Yard Waste Generation

The Pennsylvania State Solid Waste Advisory Committee is in the process of determining the feasibility of banning certain materials from disposal. High on that list of potential waste streams is yard waste. It has always been important for Westmoreland County to be aware of the current volume of material received at local compost sites. However, it is now even more essential to determine the volume that could result if yard waste was banned from local landfills.

Table 2 presents the existing composting sites within the county. It shows the municipalities within the approximate area served by each facility. Additionally, it illustrates the potential quantity of material that might be generated within each service area and thus available for processing at each location. The quantities shown are based on typical generation rates for yard waste disposed considering

Table 2 Potential Available Annual Tons of Yard Waste in Existing Service Areas*

Site	Areas Served	Grass	Other	Total
New Kensington	New Kensington	396.2	305.0	701.2
Lower Burrell	Lower Burrell	319.5	250.2	569.7
Vandergrift	Vandergrift	147.0	113.2	260.2
Avonmore	Avonmore	11.6	11.1	22.7
J.A. Rutter	Murrysville	452.1	359.8	812.0
Trafford	Trafford	86.4	66.5	152.9
WM Valley Landfill	Murrysville, Export, Delmont, Penn Township, Penn Borough, Manor, Jeanette, Adamsburg, Hempfield, Arona, Madison, New Stanton, Youngwood, Greensburg, South Greensburg, Southwest Greensburg, Unity, Youngstown, New Alexandria	3486.3	3131.6	6617.8
Jeanette	Jeanette	287.1	221.1	508.2
A.P. Radomski	Greensburg, South Greensburg	312.5	629.6	942.1
Latrobe Transfer	Latrobe	242.4	186.6	429.0
Derry Township	Derry Township	315.9	260.0	575.9
Monongahela	North Belle Vernon, Monessen, West Newton	373.5	287.6	661.1
Rostraver Township	Rostraver Township	254.8	208.4	463.1
Scottdale	Scottdale	128.6	99.0	227.6
Mount Pleasant	Mount Pleasant Borough	127.4	98.1	225.5
Ligonier	Ligonier Borough	45.7	35.2	80.9
Unity	Unity Township	488.0	392.7	880.7

*Service areas may overlap and therefore municipalities may be listed more than once.

the demographics of the areas served by each site. The calculations are based on the population figures for Westmoreland County according to the U.S. Census 2000. The quantities of yard waste disposed are based on the data for the Southwest Region from the Statewide Waste Composition Study conducted by R.W. Beck. This source was used because it accounts for the different disposal rates by rural, suburban and urban sources. The average disposal rate of 85.4

lbs/person/year agrees closely with the national average figure of 82 lbs/person/year estimated by Franklin Associates in *Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2006*.

Both grass and other yard waste quantities are shown, although most of the facilities accept only leaves. For estimating purposes, "other" yard waste can be assumed to be 50% leaves and 50% brush and other debris. Note that some duplication exists due to overlapping coverage between Waste Management's Valley Landfill and other sites.

Analysis of the data shows that the service areas for the existing facilities include 66% of the population and include 70% of the yard waste generated and potentially collected for disposal/processing in the County. Currently, as noted above most of the facilities do not accept all types of yard waste. In particular, grass clippings are estimated to be 54% of the total, but the only facility, which accepts grass in significant volumes, is the Waste Management Valley Landfill Compost Site. This facility potentially serves about 40% of the population and 42% of the yard waste generated and disposed in the county. The Latrobe Transfer Station acknowledges that some grass filters into its system, but estimates that it is less than 5% of the total volume.

Table 1 shows the reported quantities of material currently received at the existing compost sites in Westmoreland County. A comparison of those figures to the expected available material shown in Table 2 demonstrates that a considerable volume of yard waste generated in the County is still disposed in landfills. The comparisons between Table 1 and Table 2, indicates that most of the existing facilities do not realize the full potential volume of yard waste that could result from a disposal ban. Based on field observations, most of the sites are ill prepared to receive greater quantities. The Latrobe Transfer Station has some additional property that might allow for the expansion of its compost area. Additionally it already has the capabilities of transferring material to a central processing site. However, one site likely has the capabilities to handle nearly all of the yard waste generated. That is the Waste Management Valley Landfill Compost Site.

Collection and Delivery

Since collection of yard waste can be the most expensive component of any program, great care must be taken in determining the best method for local conditions. Logistics and demographics play an important role in determining how yard waste is managed in each community. The age and design of a community; the distance to a processing facility; the types and number of trees and other plantings; the expectations of the residents; and budgetary constraints will all influence the methodology selected.

Equipment options

Leaves can be collected by vacuum, mechanical claw, front-end loader, sweeper, and depending on the volume, in bags. Tables 3 thru 6 show various methods of collection along with their advantages and disadvantages. The tables also provide photos of the equipment. A brief description of each method follows.

Vacuum Systems

For leaves raked into the street or along the curb, vacuum systems are an appropriate choice. A crew consisting of a driver and two rakers is typically required for this type of collection. This system works best when collecting dry leaves. Operational problems due to clogging are common when crews encounter wet leaves and/or grass clipping. Intake hoses up to 18 inches in diameter are used to collect material. Units are available that can be towed behind a truck, into which the leaves are blown. Additionally, some units are self-powered, many with compaction capabilities, others with internal shredding capabilities, and capacities up to 32 cubic yards per load. Because self-powered units sit idle much of the year, justifying the higher cost can be difficult, particularly for a smaller community. The portable or tow-behind units are less expensive and can be used with multi purpose vehicles.

Front Loader Systems

Several methods of collecting yard waste raked in loose piles to the street or curb can be utilized with a front-end loader. Each method has its own unique features that add or detract from their operational and cost effectiveness.

Direct Loading

Some communities scrape yard waste that has been raked to the street with a front-end loader and place it in a dump truck or roll-off container. While equipment costs are relatively low because many towns already have loaders on hand for other purposes, transportation costs tend to be expensive. Therefore, this system would work best where the compost facility is in close proximity. Since loose rather than compacted material is contained in a vehicle, two or more trucks are often necessary to reduce the collection and loading time. This arrangement allows additional trucks to be loaded while the first truck transports the waste to the compost facility. The process can be more labor intensive than other systems, as it requires one loader operator, two rakers, and two or more truck drivers. Only 90% of the material is typically recovered and could result in additional passes.

Table 3 Loose Yard Waste Collection Methods

	Benefits	Disadvantages
 <p>Curbside Vacuum</p>	<p>Flexible mounting options available</p> <p>Avoid problems encountered with in-street piling</p>	<p>Collection crew must rake leaves toward vacuum hose</p> <p>Undesirable material remains in piles</p> <p>Blowing leaves in streets</p> <p>Wet leaves clog storm drains</p>
 <p>On Street Vacuum</p>	<p>Several mounting options available</p> <p>Most convenient method where on-street parking is prohibited</p>	<p>Repeated collection and possibly raking necessary when cars are parked on street</p> <p>Poses a hazard to children that play in leaves</p> <p>Undesirable material remains in piles</p> <p>Ineffective when material is excessively wet or frozen</p> <p>Blowing leaves in streets</p> <p>Wet leaves clog storm drains</p>
 <p>Front Loader with Leaf Loader</p>	<p>Capable of minimal shredding and compaction with moist leaves,</p> <p>Can continue to operate with use of multiple trucks</p>	<p>Poses a hazard to children that play in leaves</p> <p>Undesirable material remains in piles</p> <p>Collection crew must rake leaves;</p> <p>Difficulty with wet and frozen material</p>
 <p>Front Loader with Mechanical Claw</p>	<p>Effective with wet and/or slightly frozen leaves;</p> <p>90% capture rate</p> <p>Efficiency can be increased if street sweeper conducts final clean-up</p> <p>Can continue to operate with use of multiple trucks</p>	<p>Poses a hazard to children that play in leaves</p> <p>Undesirable material remains in piles</p> <p>Transportation costs are expensive</p> <p>Requires additional raking</p> <p>inefficient with dry leaves</p>

Leaf-loader

This type of equipment sweeps yard waste off the street and into the truck. The material is ground or chopped as it is collected to reduce the volume. Some units are attached to front end loaders as shown in Table 3. There are units that can be towed behind a dump or packer truck. As the truck becomes full, it is detached and another truck is connected.

Mechanical Claw

In this system, a front-end loader is equipped with a claw or pincer that loads into a transport vehicle. This piece of equipment can pick up virtually all types of yard waste placed in loose piles at the curb, including wet material. Although the system still requires three crewmembers, one raker and two drivers, speed and convenience make it more cost effective to operate. A distinct disadvantage is a capture rate that averages only 90 percent. Thus, additional passes could be required.

The use of a dump truck, roll-off container, or a packer truck to transport material has direct impact on costs. The use of a packer truck is advisable when distance is a concern because it reduces the volume of the leaves collected as well as trips to the composting site.

Bag and/or Container Collection

There are three types of bags that can be used in yard waste collection/composting systems: compostable, degradable, and plastic. Containers are made for manual, semi-automated and fully automated collection. Table 4 and 5 illustrate the variety of containment and equipment capabilities. Field data indicate that bag and/or container collection can be the most cost-effective method for yard waste systems if debagging is not required. Collection crews are limited to one or two laborers and a driver. It should be noted however, that at some point in the process, labor is required to handle the bags unless they are compostable. Degradable Kraft bags, rather than degradable plastic are [referred by compost site operators.

Bulk Collection

In addition to leaves and grass clippings, municipalities are confronted with managing woody materials such as brush, tree trimmings and prunings. Because woody chips do not decompose as readily as leaves, they must be screened from finished compost and reintroduced to new piles. Before brush and trimmings can be mixed with loads of leaves or grass, it is important to know whether the processing facility has the necessary equipment for chipping, grinding and

Table 4 Bagged Yard Waste Collection Methods

	Benefits	Disadvantages
 <p>Manual Compostable Bags</p>	<ul style="list-style-type: none"> Keeps leaves out of street Collection less dependent on weather low-cost collection no specialized equipment required instructions can be imprinted on bags 	<ul style="list-style-type: none"> High bag cost Open top bags can spill Time and cost for distribution of special bags Bag deterioration when wet
 <p>Manual Plastic Bags</p>	<ul style="list-style-type: none"> Keeps leaves out of street Prevents blowing leaves Collection less dependent on weather Low collection costs 	<ul style="list-style-type: none"> Cost of bags Time required for debagging at compost site Plastic must be screened out of finished compost
 <p>Manual Unbagged at Curb</p>	<ul style="list-style-type: none"> Keeps leaves out of street and prevents blowing leaves Any bag can be used/reused 	<ul style="list-style-type: none"> Time required for debagging at curb Slightly higher collection costs Possible blowing of plastic bags after debagging

Table 5 Contained Yard Waste Collection Methods

	Benefits	Disadvantages
 <p>Manual Contained</p>	<ul style="list-style-type: none"> Controls blowing leaves Can use any rigid container Low costs for containers 	<ul style="list-style-type: none"> Easy to overload Can cause back injuries
 <p>Semi Automated Contained</p>	<ul style="list-style-type: none"> Controls blowing leaves Convenient to wheel to curb Reduces back injuries Controlled volume per pickup Long-term cost less than bags Fast and efficient collection 	<ul style="list-style-type: none"> High up front cost for containers but can be supplemented with compostable bags Could face inadequate capacity for seasonal fluctuations
 <p>Fully Automated Contained</p>	<ul style="list-style-type: none"> Controls blowing leaves Convenient to wheel to curb Reduces back injuries Long-term cost less than bags Fast and efficient collection Controlled volume per pickup, 	<ul style="list-style-type: none"> High up front cost for containers Fully automated vehicles may not be appropriate in all terrains Could face inadequate capacity for seasonal fluctuations

screening. When this is not an option, many communities collect this material separately to be processed into a mulch product.

Spring and fall present the largest volume of woody waste; however, homeowners will continue to generate lesser quantities throughout the summer. Some communities will also collect Christmas trees for chipping and mulch production. Collecting bulk woody waste at the curb can be labor intensive and costly. To control transportation costs, many communities chip or shred the material at the curb. This serves to reduce the volume of material that must be transported. It also provides a ready to use product for the community.

However, the process is time consuming and money saved on transportation can easily be spent on labor costs. Operational issues arise because many mobile units tend to choke and stall. Dust and debris can also be a safety concern.

Table 6 Bulk Yard Waste Collection Methods

	Benefits	Disadvantages
 <p>Manual Bundled</p>	<p>Low equipment costs</p>	<p>Labor intensive</p> <p>Potentially high transportation costs</p>
 <p>Grapple Loader</p>	<p>Reduces back injuries</p> <p>Ability to handle larger sized bulk material</p>	<p>High transportation costs</p> <p>Poor maneuverability along rural roadways</p>
 <p>Manual Chip at Curb</p>	<p>Size/volume reduction</p> <p>Reduces transportation costs</p> <p>Ready to use material</p>	<p>Time consuming at curb</p> <p>Dust and debris can pose safety issues</p>

Drop-off Sites

A cost effective alternative to curbside collection of yard waste is to provide a spot where residents can deliver material in their own vehicles. This is particularly effective for bulk materials, brush and twigs. It is also common for communities to provide such sites for leaves and other forms of yard waste. The sites can be manned or unmanned. In high



volume areas, permanent sites may be open daily. In other areas, drop-off collections are held once per month in designated locations. Whichever type of operation a municipality chooses, the sites, which are supervised, tend to experience less contamination.

Drop-off sites can be relatively low-tech. Many towns simply provide a roll-off or hook lift container, which is then transported to a processing facility. Some communities build concrete bunkers. These serve to contain material, which is loaded loose; is chipped or shredded and loaded into a transport vehicle; or is chipped for on site use or distribution.



Container Drop-off Site with Accessible Ramp

These serve to contain material, which is loaded loose; is chipped or shredded and loaded into a transport vehicle; or is chipped for on site use or distribution.

mandated municipalities However, when drop-off sites are offered in conjunction with a curbside program, the Department allows less frequent collections. In fact, communities can reduce collections to twice per year if volumes warrant and maintain a drop-off site for materials in the months between collections. For curbside and drop-off leaf waste collection in mandated communities, guidelines that are more detailed are provided in Appendix A.

Act 101 requires curbside collection of leaf waste once per month in



Yard Waste Collected in Concrete Bunkers

Collection Recommendations for Westmoreland Municipalities

Westmoreland County communities that provide separate collections during the fall for leaf pickup typically base the timing of that service on labor availability and the cost of collection. Mandated communities also have to budget for a monthly collection throughout the year. Alternatively, they can weigh the monthly costs against one spring and one fall collection combined with the expense of maintaining a drop-off site. Many communities encourage backyard composting as well as the practice of leaving grass clippings on the lawn to help reduce yard-waste collection and processing costs.

Characteristics and Needs of Urban and Older Communities

Well-established neighborhoods are prone to have mature landscaping. Planting strips contain trees and other decorative vegetation. These are normally owned

and maintained by the municipality. Therefore, management of the material produced is typically considered the responsibility of the municipality rather than that of the homeowner. While lot sizes may be smaller, and thus grass clippings not a major issue, the volume of leaves produced can be significant. This can present a burden on any collection system as the leaf waste is produced in large volumes in a relatively short span of time. Timing, density and material volume are the drivers in the selection of collection operations and equipment in these instances. Therefore, vacuum and leaf loader methods shown in Table 3 are most common. Bags can be used, but the volume of leaves can make the cost and effort to bag material prohibitive. Likewise, numerous containers would be needed to hold the volume of material available for collection.

Whichever method is selected, use of a packer vehicle, shredder unit or compaction unit is necessary if the ultimate destination is a central or remote composting facility. Transporting loose material is only advisable when a compost site located in close proximity. Separate bulk collection of brush and other woody waste would be required in these communities. As a lower cost alternative, this material could be handled strictly at a drop-off site where it could be turned into a mulch product or transported for processing.

Packer Truck Unloading Yard Waste



Characteristics and Needs of Suburban Communities

Newer planned residential developments and young suburban communities have larger lots but less mature plantings. Therefore, while leaf waste still exists, it is generated in lesser quantities than neighborhoods that have existed longer. In these municipalities, grass clippings pose a greater issue in yard waste management. Similar to leaf waste, seasonality contributes to the weight and volume of material. Other influencing factors include the use of lawn care services where watering and fertilization may enhance growth and promote the practice of bagging clippings. Due to the moisture content of grass clippings, vacuum systems and loaders are less effective. Therefore, bags and/or container systems are suggested for collection in these municipalities. Bulk waste could be co-collected when the receiving facility has the capabilities to have such material processed. Packer trucks make the most sense to control collection costs in this scenario. Drop-off sites could be provided for periods between collections, enabling the municipality to reduce frequency of service.

Characteristics and Needs of Rural Areas

Yard waste management in rural communities is less demanding for local government. More acreage per home provides opportunities and outlets for residents to manage the material that is generated on their properties. Brush and compost piles are common. Additionally, the sheer size of lawns makes it prohibitive to bag and dispose of grass clippings. Therefore, yard waste collection in rural communities is virtually unnecessary, except in times of extreme disaster debris situations. Drop-off sites can be useful for those homeowners that generate more material than they can manage independently.

Mixed Demographic Municipalities

The land area of Westmoreland County creates an environment of widely different neighborhoods. Because many of these communities are in varied developmental stages after having been rural for hundreds of years, the complexion of the landscape can change dramatically within a municipality. Tight clusters of planned residential development can be surrounded by miles of rural farmland, which suddenly transforms into strips of retail establishments. Bag and/or container systems combined with drop-off sites provide a good mixture of services in these areas. Collection frequencies can be lesser in the more rural areas than in the more dense housing developments. Bulk waste could be co-collected when the receiving facility has the capabilities to have such material processed. Packer vehicles are likely a necessity to compensate for the drive time between developments. Alternatively, collections can be targeted and controlled to specific areas in scheduled periods, allowing for transport in a dump truck or roll-off if a compost site is relatively local. Drop-off sites for bulk woody waste and for periods between collections of other material could also be made available.

Maximizing Processing Opportunities

Regardless of how Westmoreland County municipalities collect the yard waste generated by their residents and businesses, the material must ultimately be delivered to a composting or processing facility. Many sites already exist. However, nearly all of the municipal sites are not currently equipped or prepared to handle a greater influx of materials. Therefore, it is important to explore actions that could be taken to improve the current operations to determine their role in the future expansion of yard waste management in Westmoreland County.

Municipal Cooperatives

Throughout the years, municipalities in Westmoreland County have purchased collection and processing equipment made possible through Act 101 Section 902 Equipment and Implementation Grants. Westmoreland Cleanways should

conduct an inventory of this grant-funded equipment to determine the overall processing capabilities in the County. This could be done with the help of the PADEP Regional Planning and Recycling Coordinator. Once the types and locations of equipment are known, Westmoreland Cleanways could help municipalities establish the cooperative sharing of these resources. This could maximize the potential usefulness and value of each item as well as the return on dollars spent from the Recycling Fund. Lastly, knowing the availability of equipment could make it easier for smaller municipalities to collect and process material at the local level, thus reducing transport costs to remote locations.

Mobile Units

Small municipal sites could continue to provide a feasible outlet for many materials if mobile units were used for periodic shredding and grinding to reduce the volume. Westmoreland Cleanways could replicate a system used by the Cumberland County Recycling and Solid Waste Authority. The organization purchased processing equipment, which it in turn leases to municipalities. It also conducts operational safety training for the municipal employees that will use the equipment. Not only does this system prevent the duplication of equipment, it also provides a small source of revenue for the Authority. Alternatively, private sector operators often have units that can be mobilized to shred and process the material for on site use, or transported to a commercial compost facility. J.A. Rutter located in Westmoreland County and AgRecycle located in Cheswick, Allegheny County provide this service.

On Farm Applications

Westmoreland County still has areas rich with agricultural activities. On-farm utilization of yard wastes can benefit both agricultural and urban/suburban communities. Aside from the obvious savings resulting by the avoidance of building and operating a composting facility, other benefits present themselves. On farm applications allows farmers to utilize a valuable soil amendment, and mitigate certain animal waste disposal problems. They help communities by diverting the material and conserving valuable landfill space. In mixed demographic neighborhoods, farms could provide the additional capacity needed in Westmoreland County should yard waste be banned from landfill disposal.

Centralized Facilities

Probably the most convenient outlet for yard waste generated by the majority of Westmoreland County municipalities is the Waste Management Valley Landfill Compost Site. Not only does the facility have adequate capacity to handle the current flow of material, it has more than ample room for expansion. The facility already has established a broad service area. In fact, it reaches well beyond the borders of Westmoreland County. Materials are delivered by Waste Management hauling companies, third party haulers, landscapers and municipalities.

Conclusions

The ability to collect yard waste in municipalities throughout Westmoreland County and deliver it to a processing location that is both convenient and cost effective has high potential. In the event of a disposal ban for yard waste, the County could easily respond and assist its municipalities to implement programs appropriate for their locales. Resource sharing, and intermunicipal cooperation to maximize the capabilities of existing equipment and facilities will be necessary steps toward a successful program. The existence of a large, centrally located, private sector facility is an additional bonus.

The collection method, frequency of service, and transport vehicle will all affect the ultimate costs for each community. Care should be taken to tailor the collection program to the demographic make-up of each municipality. Combining the types and levels of curbside and drop-off services will ensure customer satisfaction, compliance and proper yard waste management for the least cost.

This report illustrates the feasible geographic collection reach and volumes of materials that could be delivered to existing facilities. It also provides ideas to make the best use of existing public and private sector resources to reduce future capital outlays and necessary to handle the potential flow of material. Lastly, it offers suggestions on the methods and types of collection equipment applicable to a variety of situations. Labor and operational costs differ from town to town and for different private sector operations based on productivity, availability of equipment, proximity of facility, and other influencing factors. Therefore, it was impossible to calculate costs for all or any one municipality. However, recommendations were made to increase productivity and to ensure the lowest costs for different scenarios.

Nestor Resources is confident that background information provided in the report, along with the visual collection equipment matrix, will assist Westmoreland County municipalities improve and expand their yard waste management programs. The findings will also help Westmoreland County and the municipalities make better use of local resources, justify equipment needs in future grant requests and demonstrate full compliance with Act 101.



Nestor Resources, Inc.

Appendix A

PENNSYLVANIA'S ACT 101 LEAF WASTE COLLECTION REQUIREMENTS

Act 101, Section 1501(c)(1)(ii) and (iii), requires persons in mandated municipalities to separate leaf waste from other municipal waste generated at residential, commercial, municipal and institutional establishments. "Leaf waste" is defined in the Act and its regulations as "Leaves, garden residues, shrubbery and tree trimmings, and similar material, but not including grass clippings." Source separated leaf waste, as with other recyclable material, is to be collected at least once per month as set forth in Act 101 Section 1501(c)(2) and (3) and processed at Pa. DEP-approved composting facilities.

Act 101 mandated municipalities with programs that collect leaves only in the fall are not in compliance with the Act. Mandated municipalities desiring to establish leaf waste collection programs in compliance with Act 101 must, as a minimum:

1. Require by ordinance that leaf waste consisting of leaves, garden residues, shrubbery and tree trimmings, and other similar material are targeted for collection from residences and commercial, municipal and institutional establishments; and
2. Establish a scheduled day, at least once per month, when leaf waste is collected from residences; or
3. Establish a scheduled day, not less than twice per year and preferably in the spring and fall, when leaf waste is collected from residences, and facilitate a drop-off location or other collection alternative approved by Pa. DEP that allows persons in the municipality to deposit leaf waste for the purposes of composting or mulching at least once per month. The leaf waste drop-off location may be located in a neighboring municipality or at a private sector establishment provided that an agreement is in place to utilize that location and the municipality keeps residents and commercial, municipal and institutional establishments informed of the option at least once every six months.
4. Ensure that commercial, institutional and municipal establishments generating leaf waste have collection service.
5. Municipalities are encouraged to manage source separated Christmas trees as leaf waste for processing at Pa. DEP-approved composting facilities.



Nestor Resources, Inc.