

**SWANA RECYCLING
TECHNICAL ASSISTANCE STUDY
FINAL REPORT
LEAF WASTE MANAGEMENT EVALUATION**



Prepared for:

**UPPER CHICHESTER TOWNSHIP
DELAWARE COUNTY, PENNSYLVANIA**

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HARRISBURG, PENNSYLVANIA

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Figure 1 – Location Map

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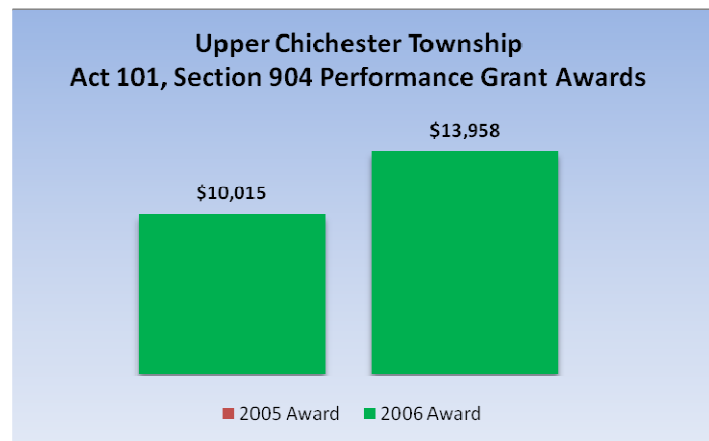
1.0 INTRODUCTION

Upper Chichester Township is located in Delaware County, Pennsylvania. The Township is interested in identifying cost effective alternatives for managing leaf waste generated in the Township and collected by municipal crews. 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), the Township was awarded \$7,500 in technical assistance to be provided by Gannett Fleming, Inc. (GF) to evaluate the existing leaf waste management program.

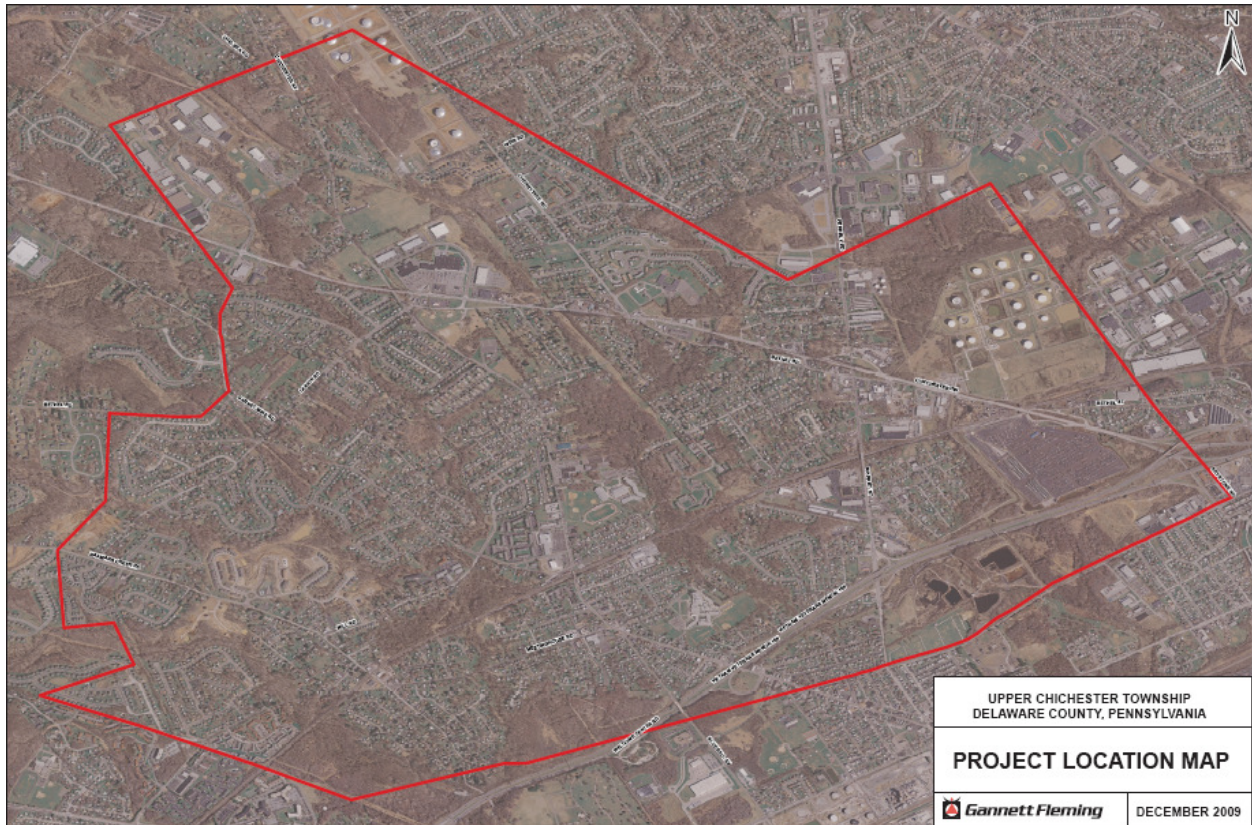
2.0 BACKGROUND

Acknowledging that organics, including leaf and yard wastes comprise a significant portion of the disposed waste stream, PADEP has increased its emphasis and enforcement on the proper management of leaf waste in recent years. Act 101 mandated communities, like Upper Chichester Township must provide curbside collection of “leaf waste” and assure that segregated leaf waste is taken to a PADEP-approved processor or compost facility. **Leaf waste**, as defined by Act 101, includes leaves, garden residues, shrubbery and tree trimmings, and similar material, but does not include grass clippings.

Mandated municipalities that do not comply with leaf waste collection and recycling requirements can be denied Act 101 Recycling Grants. Act 101, Section 902 grants offset 90 percent of the cost for purchasing items like recyclables or leaf waste collecting or processing equipment and containers, which can be vital in sustaining affordable program costs. Act 101, Section 904 Performance Grant awards are based on the total tons of eligible material recycled and reported to PADEP. Recent Performance Grant Awards for Upper Chichester Township are shown in the table to the right.



The Township population is 17,541 according to the 2008 U.S. Census Bureau estimates. This equates to approximately 6,800 households using an average household occupancy of 2.59 persons (U.S. Census Bureau, 2000). As shown in the **Location Map**, this suburban area has fairly dense housing developments and neighborhoods throughout the 6.7 square miles. Property lot sizes vary from small to large, and include a number of residential properties with over one (1) acre. Larger lots generate considerable volumes of leaves and yard wastes.



Although the focus of this study is to improve the leaf waste management program, organics management is just one part of an integrated municipal waste management system. The relationship between leaf waste management and other pieces of the municipally operated waste and recycling program are closely tied. These interrelationships are magnified with the assessment of waste disposal tipping fees by the Delaware County Solid Waste Authority (DCSWA) that began in 2009. In order to continue to deliver affordable waste management services, and to effectively provide other beneficial programs and meet municipal obligations, the Township will need to make adjustments to its waste management program.

3.0 PENNSYLVANIA ACT 101 LEAF WASTE REQUIREMENTS

Upper Chichester Township’s recycling ordinance, enacted in conformance with Act 101, Section 1501(c)(1)(ii) and (iii), requires residential, commercial, municipal and institutional establishments to separate leaf waste from other municipal waste generated. Commercial establishments must segregate leaf waste for collection or drop-off at a composting location. A supplemental drop-off location for leaf wastes can minimize, but not eliminate, the required number of residential curbside collections for leaf waste. Recycling education should be provided at least once every six months, including leaf waste information.

The following guidance information was prepared by PADEP in May, 2007 to help Act 101 mandated municipalities like Upper Chichester Township to understand and meet leaf waste requirements. The Township is required by law to implement a leaf waste management program consistent with the regulatory requirements. “Leaf waste” is defined in the Act 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 required to be collected at least once per month as set forth in Act 101 Section 1501(c)(2) and (3) and processed at PADEP-approved composting facilities. Municipalities that are mandated to comply with Act 101, which have programs that collect leaves only in the fall, are not in compliance with the Act. In order for municipalities that are mandated to comply with Act 101 to have a leaf waste collection program that meets the minimum requirements, the program must, at 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 PADEP that allows residents 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 PADEP-approved composting facilities.

4.0 EXISTING WASTE MANAGEMENT PROGRAM

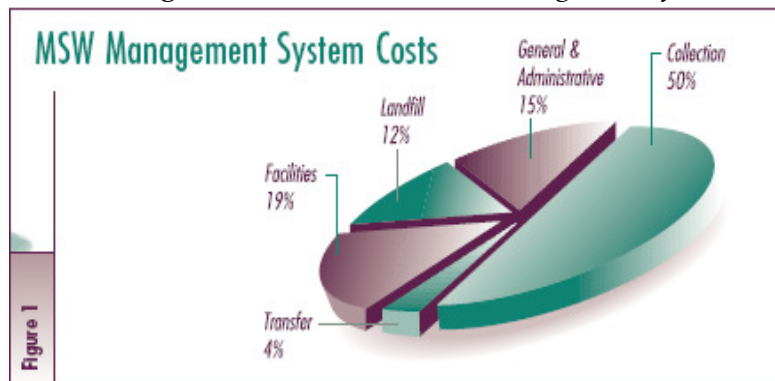
The Upper Chichester Public Works Department provides weekly residential municipal waste pick up and single-stream recyclables collection services to all residential establishments in the Township. After curbside collection, municipal waste is taken to the Delaware County Solid Waste Authority waste-to-energy facility. In the single-stream recycling program, the following recyclables are accepted combined in a single curbside container and collected by municipal crews:

- **Glass:** clear, green or brown glass food containers.
- **Cans:** aluminum and tin food & beverage.
- **Plastics:** #1 HDPE and #2 PET plastic.
- **Paper:** Old newspaper, paper bags, corrugated containers, magazines, catalogues and similar printed materials, and junk mail.

As of 2009, the DCSWA is no longer subsidized by County taxes. Residential tip fees assessed in conjunction with commercial tip fees cover the \$3.6 million annual budget plus some funding reserves. In 2010, the Township residential waste disposal tip fees will increase to \$23.45 per ton and commercial tip fees are \$63.00. The Township’s waste system is financially impacted by the direct relationship between the total tons disposed and the total cost of the Township’s municipal waste management program. Since tipping fees are new to the Township, the Township will have to plan for and recover this additional cost. The Township and its residents can manage or avoid costs by increasing the amount of material that is diverted from the Delaware County Solid Waste Authority processing facilities. In short, there is a financial incentive to recycle.

4.1 Distribution of Waste Management System Costs

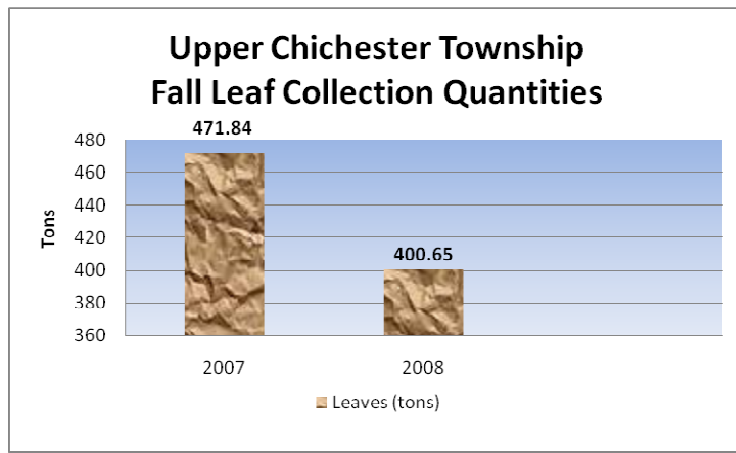
Because the Township wishes to improve program efficiencies and reduce costs, it is important to clearly understand the distribution of costs for its waste management program. The chart below from the EPA guidance document “*Getting More for Less, Improving Collection Efficiency*” shows that nearly 50 percent of costs for a typical municipally operated waste system are for collection. Consequently, improving the efficiencies of collection methods, equipment and labor utilization is a logical and controllable target.



Source: Integrated Municipal Solid Waste Management: Six Case Studies of System, Cost and Energy Use: Summary Report, SWANA, 1995, 50 pp, GR-G 2700.

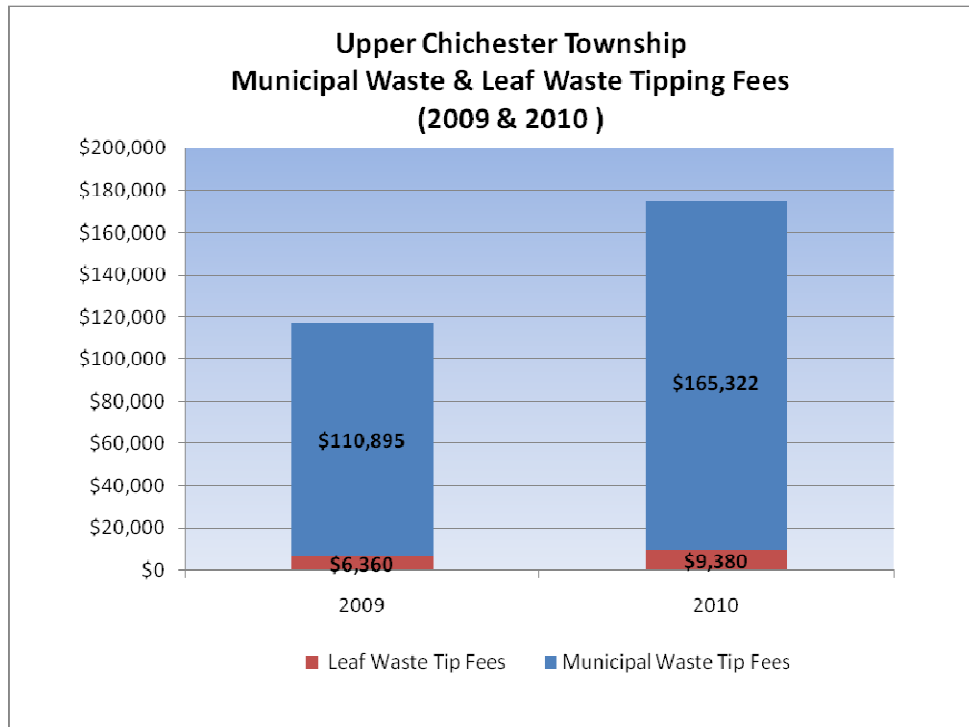
5.0 EXISTING LEAF WASTE MANAGEMENT PROGRAM

The Upper Chichester Public Works Department begins leaf waste collection starting in mid to late October. Residents are required to rake leaves to the curbside. In 2008, leaf waste collection crews began operating Monday through Friday on October 26th and finished the last collection in the week before Christmas. Collection routes are broken up into 8 zones and designated by letters A-H. Each household has two opportunities for scheduled curbside collections during the fall leaf collection schedule and approximately 90 percent of households participate. The portion of residents participating during the first collection is higher, both in terms of the number of households that set out leaves and the quantity of leaves per household. A third collection route is conducted but not provided as a scheduled pick up day for residents. This final route is used to clean up any remaining leaves that were missed or put out late at the curbside. As shown by the graph below, the Township collects over 400 tons of leaves annually and delivers the material to the Delaware County Solid Waste Authority.



After collection, leaves are delivered to the Delaware County Solid Waste Authority Transfer Station and leaf composting facility (referred to as Plant #1) located in Chester Township. The facility is less than 10 miles from the center of the Township. When delivering collected leaves to the processing facility, the crews stay on the vehicle for transport for unloading. On average, it takes 45 to 50 minutes to dump leaves, return and resume leaf collection or finish the day. Crews make 3-4 trips per day dumping leaves.

Although municipal waste and leaf waste data for 2009 was incomplete at the time of this study, it was possible to generate reasonable 2009 and 2010 tipping fee projections based on available and historical data (see the tipping fee chart below). It is estimated that the Township will recycle 400 tons of leaves in 2009, which will cost over \$6,000 in tipping fees at \$15.90 per ton. The Township also delivers approximately 7,000 tons of municipal waste to the Delaware County Solid Waste Authority waste to energy facility. In 2010, it is projected that the Township will collect and require processing of 400 tons of leaf waste to Plant #1 plus 7,050 tons of municipal waste to the waste-to-energy facility. At the 2010 rate of \$23.45 per ton for MSW disposal or organics processing, the total processing costs incurred by the Township will be about \$175,000, or roughly \$25 per household.



Leaf collection season is demanding on labor resources, requiring utilization of all 20 highway and sanitation staff during peak season. The bulk of annual leaf waste management costs are labor. On average, leaf waste operations include:

- 2 operating crews per day
- 3 staff per crew
- 5 operating days per week
- 9 weeks of leaf collection or about 39 collection days.

When rain and snow make leaves heavy, a collection crew of 3 to 4 persons is used to load a waste packer truck using a front-end loader.

5.1 Spring Collections of Leaves, Tree Trimmings, Garden Residues

In accordance with Act 101 of 1988, the Township offers one day in the spring for residents to set leaves, trimmings, garden residues and similar materials at the curbside for collection. Residents must call in for service and the cost is \$25. There is little interest or use of this service by residents.

5.2 Leaf Waste Collection Equipment

At the start of leaf collection season, the Township must configure it's leaf waste collection equipment using Township dump trucks, leaf boxes and leaf collectors. The Township owns a total of four leaf vacuum trucks but not all operate at one time. Three



dump trucks are fitted with ODB LCT650 belt driven “tow-behind” units like the one shown. Two were purchased in 2001 and another in 2006. The vacuums are fitted with curb nozzle attachments.

It is noted that Township dump trucks are used for salt spreading, plowing, and for other municipal purposes. Consequently, configuring equipment for leaf collection and converting it back for other activities requires a time and manpower investment and leads to delays in performing necessary and time-sensitive tasks.

6.0 LEAF WASTE MANAGEMENT ALTERNATIVES

Effectively managing leaf waste requires striking a balance between costs, labor resources and meeting the level of service needed or desired by Township residents. Due to the high costs associated with leaf collection, it should not be the intent of the Township to try and recover all the leaves, grass and brush generated in the Township. Several alternatives or program modifications are provided in the following subsections and are based on GF’s understanding of the existing program and other programs across the State. It is assumed the leaf waste collection program will continue to be managed by Township municipal crews in the foreseeable future. Optimizing the leaf waste management program will likely involve a phased implementation of a variety of program alternatives including modifications to equipment, new equipment, schedule adjustments, and changes to the service.

6.1 Leaf Waste Collection Equipment Changes and Retrofits

Gannett Fleming contacted ODB Company (ODB) regarding the ODB leaf vacuum equipment that is currently used by the Township. Based on discussions with the vendor, the curbside nozzle attachment utilized by the Township during leaf collection is not recommended. The curbside nozzle used is less efficient than other hose attachments that are available. The wide flat nozzle has less sucking power than other standard hose configurations and slows leaf recovery. ODB recommended the Township replace the nozzle system with the hose intake and boom assembly as shown below:

ODB COMPANY (N.E. Office)
41 Brookside Drive
Saratoga Springs, NY
Toll Free: 800-632-7989 (US Only)
Phone: 518-581-9375
Fax: 518-581-8267

Part Number	Description	Cost per unit	Notes
LCT650.1001 (Intake Hose Boom Ass’y)	10' x 16" diameter rubber including hydraulic boom	\$2,709.13	Cost shown does not include shipping or Township labor for conversion

Note: Ordering parts individually increases the cost for this assembly which is sold as a package.

Retrofitting at least two of the ODB leaf vacuums with the new suction assembly is a simple program modification that will increase the rate leaves are collected at the curbside using existing equipment.

Another fleet modification that can improve efficiency is to increase the vehicle holding capacity. Unfortunately, tow-behind configurations have fairly limited capacity. Leaf boxes are typically sized to fit in standard flat bed or dump body vehicles. Box capacities are usually less than 12 cubic yards, which is not much capacity when dealing with leaves. As the Township procures new leaf collection equipment in the future, it should try to increase the cubic yard carrying capacity of its fleet. Additional vehicle capacity specifically increases efficiency by:



- Servicing more households per route (or per vehicle or box)
- Reducing the total number of deliveries to the processor. This will increase worker productivity and overall collection efficiency by decreasing the time when crews are not actively engaged in leaf collection.

6.1.1 Self-contained One-man Leaf Waste Vacuum Truck

Self-contained leaf waste vacuum trucks have a proven track record of increasing leaf waste collection efficiency in municipal collection programs. The one-man operated leaf vacuum costs approximately \$135,000. Although the initial cost is higher than other leaf collection systems, this vehicle will save the Township money over time because it optimizes organics management in several ways:



- **Pre-season time savings** – Tow-behind leaf collection units require set up time to configure leaf boxes and vacuum motors with the dump trucks prior to beginning active curbside leaf waste collection. No set-up is required for self-contained leaf collection vehicles.
- **Emergency weather/lost time** – During snow events or even high wind events, the Township must disconnect tow-behind leaf waste equipment in order to add snow plows or otherwise configure the equipment to meet the emergency. This equipment is exclusive to leaf collection, leaving other trucks available for plowing and thus reducing or eliminating these delays.
- **25 percent faster leaf collection** according to ODB reports comparing the self-contained units to tow-behind collectors.
- **Overall labor productivity** – As the single operator, the driver rarely has to leave the vehicle and spends the bulk of the day collecting or dumping leaves.
- **Increased vehicle capacity** – As shown in the following table, a 25-cubic yard self-contained vehicle more than doubles the capacity of the typical tow-behind box and dramatically reduces the number of trips to the disposal site during the course of the collection season.

Leaf Waste Equipment Comparison			
Equipment	Cubic Yard Capacity	Annual Cubic Yards of Leaves ⁽¹⁾	Total Deliveries Required
ODB Boxes	14.0	2,285	163
ODB SCL800SM25	25	2,285	91

⁽¹⁾ The Township average of 400 tons converted using EPA's conversion of 350 lbs/cy for vacuumed leaves.

- **Reduces idle crews** – The Township crews consist of 3 persons. Transport, dumping and returning occurs at least 3 times each day, and takes 45 minutes per trip. No leaf collection occurs while the crew is in route. Three (3) trips at 45 minutes per trip with a 3-person crew is equivalent to 6.75 hours per day, or nearly an entire workday for one employee. Additional load capacity combined with use of a single operator creates a dramatic reduction in idle, unproductive staff time when compared with tow-behind configurations. Dumping a self-contained vehicle takes less time than tow-behind leaf boxes.
- **Flexibility/Chipping** – the specifications of this vehicle should include the feature to dually operate as a brush chipper.

GF has case study evidence from several municipalities that have added self-contained truck mounted leaf vacuum trucks to their fleet over the last two years. State College Borough and Lower Paxton Township have realized dramatic results:

- 35% reductions in labor costs
- Early route completion
- Avoided delays associated with configuring equipment. For Lower Paxton Township this was particularly beneficial during the early December snow storm in 2009. Because of early route completion due to the self-contained vacuum and because leaf collection could continue while other vehicles plowed snow, “countless hours and headaches were avoided.”
- Because fewer municipal employees are allocated to leaf collection, and because routes and the entire leaf collection service is completed in a shorter time frame, municipal staff are more effectively utilized on other municipal projects.

6.1.2 Self-contained One-man Leaf Waste Vacuum Truck

ODB Inc. offers a self-contained leaf collection system as illustrated in the photograph to the right (model SCL800TM25). The basic specification and options are included in the pricing document located in **Appendix B**. Operators of this dual axel system must have a Class A CDL license. The most commonly purchased size is 25 cubic yards, which increases efficiency over the lifetime of utilization primarily by reducing the number of trips for unloading (compared with smaller leaf boxes). The cost of the 25 cubic yard unit is approximately \$30,000. Particularly with access to Act 101, Section 902 Grant Funds for leaf collection equipment very questionable, the cost of this vehicle may be more palatable than the truck mounted version. Advantages of this system include:



- Improved collection efficiency. Servicing more households prior to dumping with significant reduction of overall unloads required during the season.
- Eliminates time and labor associated with assembly at leaf season start up and tear down of tow-behind configurations.
- Dumping is simple and immediate.
- Cleaner leaf collection because all leaves get directed into the box unlike tow behind units where leaves are often blown about because the seal is not complete.

6.2 Leaf Collection Schedules, Collection Methods & PAYT

It was beyond the scope of this study to complete a routing analysis. However, the time and labor associated with leaf collection is expensive and demanding on labor resources needed for other municipal activities. Some of the Township’s projects and ongoing responsibilities that demand staff resources include:

- Road maintenance
- Compliance with the street signs program including inventory and implementation over the next 2-3 years
- Playground upgrades
- Salt spreading
- Snow removal.

Based on GF’s understanding of the current program operation and costs, there are several leaf collection methods and schedule changes that should be evaluated and considered on an ongoing basis. These changes can be utilized to assure staff resources can be effectively allocated and prioritized across a variety of municipal tasks.

6.2.1 Hybrid Leaf Vacuum Service and Leaf Bag Collection

Consider implementation of a “hybrid Pay-As-You-Throw (PAYT)” program involving curbside vacuum service *and* curbside bag service as a way to strike a balance between escalating costs and the level of curbside service provided. PAYT refers to a system where residents/properties pay for the service based on the amount they dispose. This is a logical approach for organics since the level of generation and participation in leaf waste collection is highly variable. Arguably, property owners should be responsible for managing their property and some properties may place unfair cost burdens on others when they dispose large volumes of leaves and similar organics. The benefits of a PAYT leaf waste program can include:

- A financial incentive for residents to increase backyard composting or delivery to a compost facility to minimize excessive curbside handling of material, which adds costs across all Township residents.
- It is an equitable program; where the property owners who need and use curbside collections of leaves and yard wastes are responsible for paying a fair fee for an additional level of service beyond what provided as a base level of service. People learn they are responsible for the materials they generate.
- The total quantity of leaves recovered at the curbside should decrease, thus decreasing tip fees and operating costs, which in turn should help keep the whole of residential waste management costs affordable.

GF has used “Collection 1”, “Collection 2” and “Collection 3” to describe the three Township-wide vacuum services provided each season. As one approach, the Township could modify leaf waste service as follows:

- **Collection 1** - Continue this Township-wide vacuum collection route in the same way the service is provided now on a scheduled day in a designated zone.
- **Collection 2** - Residents would be able to participate in a second curbside collection day provided they fill and place kraft bags at the curbside for collection. The service could be structured as follows:
 - Residents call in for service or register on-line for service at least one week in advance (to allow sufficient time to design an efficient collection route).
 - Using a PAYT structure, residents must pay for the second scheduled collection day, either through the billing process, pay per bag, or payment for stickers that will be placed on kraft bags. Pay-per-bag programs typically range from \$.25 cents per bag to \$4.00 per bag in Pennsylvania.
 - Curbside collection of kraft bags can be completed using a waste packer vehicle, which has more capacity than a leaf box and has compaction capability.

6.2.2 Eliminate the Leaf Clean Up Collection Route

- **Collection 3** - Refers to the unscheduled leaf collection day cleanup that is conducted by municipal crews throughout the Township, but not advertised to residents. After residents have had two opportunities to set out leaves, Collection 3 is provided as a cleanup day to assure leaves set out late are collected and removed from Township streets. Currently, many residents abuse this “extra” opportunity and set out leaves like cleanup is a scheduled collection. This cleanup route draws on the small pool of Township labor resources and adds program costs, even passing unnecessary cost to other residents who participate in the program as required. A reasonable alternative is to eliminate this route or to manage it more effectively, which may require some or all of the following:
 - Changing this unadvertised service to an optional collection day that is provided to residents as a call-in vacuum service. Bill participating residents who want this service for the additional pickup.
 - Change Collection 3 to a PAYT service, where residents must purchase kraft leaf bags or stickers to participate. All leaves would need to be placed in paper bags at the curbside for collection and residents would have to call in at least a week in advance to get on the collection schedule.

- Using a phased approach, eliminate this route entirely. Notify residents that due to high costs, the Township will not continue to clean up leaves that are placed at the curb after scheduled collections. Develop a warning and fine process to notify and then penalize residents for non-compliance. Place the responsibility of leaves raked to the curb after the scheduled collections back onto the property owner. The owner should be required to remove leaves from the curb for backyard composting or deliver them to a compost facility by a certain time frame after notification and face penalties for non-compliance.
 - For each approach, the Township will need to educate residents and actively enforce that residents who place leaves at the curb for collection, do so in time for scheduled collections.

6.3 Equipment Utilization

The current leaf waste collection operation is configured and operated as follows:

A dump truck fitted with a leaf box (typically 14-cubic yards) is connected to a belt driven “tow-behind” vacuum unit (ODB LCT650). The leaf system is operated by a 3-man crew to vacuum leaves at the curb. Once the leaf box is filled, the entire equipment assembly is driven the Delaware County Solid Waste Authority composting facility in Chester Township and unloaded with all 3 crew members on board. Unloading occurs 3 to 4 times per day.

A suggested alternative to the existing equipment utilization is as follows:

A dump truck fitted with a 14-cubic yard leaf box and a belt driven “tow-behind” vacuum unit (ODB LCT650) is operated by a 3-man crew to vacuum leaves at the curb. When the leaf box is full it is disconnected from the vacuum unit and a backup dump truck is called in with an empty leaf box and is immediately attached to the leaf vacuum to resume operation. The filled dump box is transported to the processor by the driver and the two other crew members stay behind to continue leaf collection.

6.4 Leaf and Yard Waste Processing Options

The Township does not host or operate a municipal yard waste compost facility. Leaf wastes are processed by the Delaware County Solid Waste Authority (Plant #1). The primary costs associated with the use of Plant #1 include:

- Leaf waste processing tip fees:
 - \$23.45 per ton (2010)
 - Approximately \$10,000 annually
- Transportation/fuel costs for delivery to the facility

- Labor costs during the transportation and unloading.

A primary reason to consider an alternative location to process Township-generated leaf wastes is to reduce costs. The cost reductions typically will come in the form of reduced tipping fees and/or less labor and operating expenses if the alternate site reduces travel time and distance. Generally, the Township processing alternatives can include one, or a combination of the following:

- Continued Processing by Delaware County Solid Waste Authority
- Identify and use one or more privately owned compost sites
- Develop, host and operate a compost site
- Utilize a municipally operated compost site located outside of the Township
- Apply leaves on an approved farm.

Nearly every acre of Upper Chichester is consumed by residential or commercial dwellings or similar infrastructure. Consequently, the opportunities for developing and hosting a compost site that could be operated by the Township, or perhaps operated by another entity or through a shared arrangement, are very limited. There are two small privately owned farms in the Township: the Hanby farm (11 acres) and the Butler farm. The Butler farm is currently unused and could possibly be an option for a compost site.

Although opportunities are limited, a local compost site offers some important benefits:

- Eliminates tipping or processing fees. The Township paid \$15.90 per ton for leaf waste disposal in 2008.
- Reduce or eliminate tipping fees (\$23.45 per ton). “Avoided” tip fees lowers total municipal costs and passes through to stabilize residential costs associated with the entire organic management program. Compost products remain available locally where they can benefit municipal projects and the residents who participate in the recycling program instead of its use by others.
- Decrease transportation distance and associated fuel and mechanical costs and also reduce the total amount of time that collection crews are idle and not collecting leaves.

Although there are some clear benefits to operating a compost facility, a key problem is the cost for land procurement, site development and design, permitting, operation and capital equipment costs. When all of these costs are factored in, municipally-operated compost facilities almost always add costs to the overall organics and waste management programs. Although composting can be a successful business, usually financial success occurs when operated at a very large scale. From a preliminary

review, the Township does not have the scale, and is not in a favorable position to host and operate a leaf waste management facility. Consequently, in the short-term, it appears more feasible for the Township to review its nearby processing options to determine if there are viable outlets for organics where tipping fees are lower than the current \$23.45 per ton. The following municipalities in the County operate or share use of some type of drop-off facility for leaf and yard wastes:

- Radnor Township
- Newton Township
- Swathmore Borough and Nether Providence Township (shared site at Swathmore College)
- Haverford Township and Marple Township (share site in Haverford Township)

The only known private compost facility located within Delaware County that will accept loads of leaves, brush and other wood products delivered by the truckload is HAK Clearing and Recycling Corp. (HAK). Based on discussions with HAK, they will accept truckloads of leaves from Upper Chichester Township. HAK views leaves like wood chips in terms of pricing and indicated that leaf boxes would cost \$15 to \$20 per load unless contaminated with unwanted debris.

The table below compares the estimated processing costs for 400 tons of leaves delivered to the Delaware County Solid Waste Authority and to HAK. Provided pricing at HAK stays at \$20 or less per load, annual processing fees for leaves sent to HAK will be lower than the cost for using Plant#1. Both facilities are less than 10 miles from the Township, but it is noted that GF did not calculate the time of travel and associated labor cost for delivery to each facility. Even at a lower processing cost, it may not be feasible to use HAK if it requires more travel time per trip.

Leaf Waste Processing Cost Comparison			
Facility	Price	Annual Cubic Yards of Leaves	Extended Cost
DELCO Plant#1	\$23.45/ton	2,285	\$9,380
HAK	\$20/load ⁽¹⁾	2,285	\$3,260

⁽¹⁾ Assumes 14 cubic yards per load delivered

6.4.1 Land Apply Leaves on an Approved Farm

Local farms can be a valuable outlet for leaves by providing a solution for a disposal problem. Without an existing compost facility and due to the high cost of developing and operating a compost facility, land application of leaves is a sound alternative. Application of municipally collected leaves increases soil organic matter content, and

improves soil tilth and water holding capacity. Chemical analysis of municipal leaves shows that leaves contain a variety of valuable crop nutrients including nitrogen, phosphorus, potassium and other nutrients. Because of the high carbon content relative to nitrogen content, the nitrogen in leaves is not immediately available to crops and typically fertilizer is added to meet the deficiency. Land application of yard waste to farmland requires completion and approval of PADEP's Land Application Yard Waste Form which falls under the Permit-By-Rule Guidelines (see **Appendix A**). It is important to establish a good relationship with one or more local farms, including: education on the benefits and best practices for leaf utilization; support in completing the Land Application Form; ongoing assurance that incoming material is free of unwanted material; and possible payment to the farmer for processing as further incentive to participate. When approving farms for land application, the source (e.g. generating municipality) of the leaf waste must be identified. The Township will need to follow up with local farms to investigate this option further.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

Leaf waste management is a time consuming and expensive venture. During an economic period when costs are rising for equipment, fuel and labor, it is important the Township evaluate and make tough decisions regarding leaf waste collection and it's entire waste management program. For every ton of organic material and municipal waste collected for composting or disposal, the Township pays \$23.45 to the Delaware County Solid Waste Authority. In 2010 it is expected that the Township's municipal waste processing costs will exceed \$174,000, or about \$25 per household. Although processing costs (tip fees) are a new cost that must be managed carefully, it is the cost incurred during collections by municipal crews (operation, maintenance and labor) that makes up the bulk of the waste management program costs. Therefore, improving collection efficiency must be a focal point of the Township's waste management strategy.

Modifying the Township's leaf waste management program will present challenges. Not only is it difficult to change operating "the way it's always been done", it can also have social impacts. For example, a majority of residents desire curbside municipal leaf collection service, and some are even willing to pay a premium price for the service. Consequently, even minor adjustments to collection schedules or reducing the frequency or level of service provided will upset some residents.

Based on this evaluation, a number of alternatives have been identified that can be implemented to improve the efficiency of the leaf waste management program and reduce costs. Some alternatives like making equipment retrofits or new equipment will have little public impact to the existing program while other alternatives may impact

how and/or how often leaf waste is collected at the curbside. Although it will be up to the Township to make the final decisions on how the leaf waste management program evolves, Gannett Fleming has made the following observations during this study that reinforce the need to make adjustments to the existing leaf waste collection program:

- The cost for leaf collection service continues to rise, and is magnified by new and escalating tip fees assessed by the Delaware County Solid Waste Authority. This high cost is ultimately absorbed by the residents, so it is necessary to implement a cost-effective and equitable municipal program.
- The Township does not own and operate a compost facility. Without a mature municipally-operated compost facility already in place, the Township is not in a position to cost effectively deliver robust curbside collection services to its residents. Since leaf waste is delivered offsite, the compost commodity is used and marketed by others and its value is not returned to the community. Due to limited access to land, Recycling Grant uncertainty, limited staffing and many other economic factors, it is not favorable that a compost facility could be cost-effectively developed in the Township in the near future.
- Peak leaf season utilizes 100% percent of the municipal labor force. Having limited access to the municipal workforce during leaf season negatively impacts and delays other municipal activities.
- Some of the existing equipment leaf waste equipment was purchased in 2001, and is approaching the point where increased maintenance costs are expected. New leaf collection equipment is available that is at least 25 percent more efficient at collecting leaves than current tow-behind leaf waste vacuum method and that can be operated by a single crew member.
- Due to a limited pool of staff resources, the time allocated to leaf collection must be properly balanced with other municipal obligations and projects.

7.2 Recommendations

Gannett Fleming developed the list of recommendations below to support the Township's ability to continue to provide a reasonable level of leaf waste management services at an affordable cost to residents. Refer to Section 6.0., Leaf Waste Management Alternatives for additional details pertaining to these recommendations. Gannett Fleming's recommendations take into account that: 1) the entire municipal waste management program is an integrated system; 2) the Township draws on a limited pool of staff resources for a wide variety of municipal services and responsibilities; and 3) the level of participation by property owners and the leaf waste generated by each property is highly variable.

Develop a three-year Phased Implementation Strategy - 2010 should be the start of a three-year strategy to make phased improvements to the leaf waste collection program. This three year strategy should focus on: 1) achieving cost reductions through improving the collection efficiency of the existing leaf waste vacuum service; 2) reducing processing costs for municipal waste through additional recycling; 3) reducing processing costs for segregated organics by collecting fewer quantities of leaves at the curbside and by diverting organics away from the Delaware County Solid Waste Authority (Plant#1) to one or more economically feasible processors. A component of this strategy will be ongoing analysis of the full costs of the leaf waste collection program and developing a budget line item for the leaf collection program every year.

Make Equipment Modifications - To improve the leaf suction rate of existing vacuums, it is recommended the Township modify two of the ODB LCT650 belt driven “tow-behind” units currently used by replacing the nozzle attachment with ODB LCT650.1001 Intake Hose Boom Assembly. The cost including shipping will be about \$3,000 each or \$6,000 for two units.

Purchase a Self-contained Leaf Vacuum - It is recommended the Township budget for and procure a self-contained leaf vacuum truck to increase leaf collection efficiency and reduce total program costs. It is recommended that the specifications for this vehicle include the conversion package to dually operate as a brush chipper (refer to specifications in **Appendix B.**)

Modify Collection Methods using “Pay-as-you-throw” (PAYT) - For a portion of the curbside leaf waste collection, it is recommended the Township implement a PAYT collection format, where only the customers who use additional curbside leaf services pay. A plausible scenario would include providing standard vacuum service for the first fall seasonal collection plus one or two additional “PAYT” curbside collections using waste packer trucks to collect kraft bags (or bags tagged with stickers). Bags or stickers would be purchased from the Township and/or at local stores.

Eliminate the Clean-up Route collection service for leaves: It is recommended the Township review the alternatives described in Section 6.2.2, and implement one alternative or a combined approach to eliminate the leaf cleanup route (Collection 3) that is conducted each leaf season to cleanup remaining leaves from residents who fail to comply with the leaf collection schedule.

Utilize New Processing Sites for Leaves: In order to reduce processing costs for leaf wastes, it is recommended the Township pursue use of the following:

- HAK Clearing and Recycling Corp. (HAK) - At the current cost per ton or per load, it would be less expensive to deliver leaves to HAK than to Plant#1. The Township should verify transportation costs to confirm final feasibility.

- One or more Farms Permitted for Land Application of Leaves – the Township should work with the Hanby and Butler farms to determine their willingness to accept loads of leaves. If support is obtained from either farm, the Township should work with the farm to complete and submit the simple Land Application Form (**Appendix A**) to the Pennsylvania Department of Environmental Protection. Additionally, the Township should work closely with the farm on an ongoing basis to ensure that all leaves received are managed properly and are beneficial to both parties. Since the Butler Farm is inactive, there may be an opportunity to conduct very low-tech windrow leaf composting on the acreage if the Township gets permission to use the site.

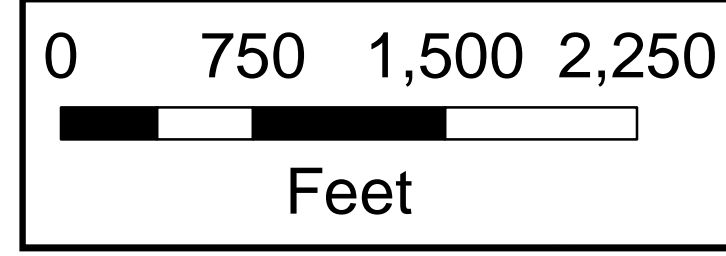
Backyard Composting – It is recommended the Township encourage and increase backyard composting of leaf and yard wastes. This educational campaign could include the following components:

- Educational workshops
- Work with a local lawn and garden supplier (e.g. Lowes) to create a rebate or discount program for backyard compost bins.
- Contact the Penn State Cooperative Extension to learn when they may be offering composting workshops in the area and notify residents of these opportunities.




FIGURE

Figure 1 - Project Location Map



UPPER CHICHESTER TOWNSHIP
DELAWARE COUNTY, PENNSYLVANIA

PROJECT LOCATION MAP

 **Gannett Fleming** JUNE 2009

APPENDIX A

Land Application Form

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF LAND RECYCLING AND WASTE MANAGEMENT

LAND APPLICATION OF YARD WASTE FORM

Please familiarize yourself with the Pennsylvania Department of Environmental Protection GUIDELINES FOR LAND APPLICATION OF YARD WASTE prior to filling out this form.

1. Sponsoring Municipality or County (Name and Mailing Address) Telephone Number

2. Name of Farm _____ Contact Telephone Number _____

Contact Person at Farm _____

Property Owner's Name _____

Address of Farm _____

(Include Access Road Name and Legislative Number)

State _____ Zip Code _____

City-Borough-Township _____

County _____

Attach a U.S.G.S. 7.5 map identifying the yard waste site boundaries outlined on it.

3. Total acres of farm land application area. _____

4. Volume of yard waste to be received annually in cubic yards. _____

5. Prepare and include in this application a general site plan* for the facility which illustrates the location of the following items:

access roads in relation to the nearest public road

tipping area

surface water controls (tipping area only)

fields proposed for land application.

** Please note that a hand drawn sketch which includes site dimensions is acceptable. An engineer's drawing is not required.*

6. Please address the following items:

- A complete list source(s) of yard waste to be received.
- Describe the method for inspecting incoming yard waste.
- Describe the plan for rejecting or disposing of unacceptable materials and residuals.

- Provide the name and location of the disposal or processing site for unacceptable materials and residuals.
- Attach the farm soil conservation plan and nutrient management plan.
- Describe the volume of yard waste processed during the previous year or expected to be processed during the first year of operation.
- Please provide an operational narrative which includes a description of each of the following:
 - Operational hours for receiving yard waste
 - Land application and incorporation frequency
 - Plan for removal of yard waste from bags
 - Spreading and incorporation methods and frequency
 - Source of leaves and grass clippings.



APPENDIX B

Equipment Specifications

Specification not included in on line report