



Kitchen Organics Diversion and Composting Project #619

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1 PROJECT DESCRIPTION

Upper Dublin Township (Township) is located in Montgomery County, Pennsylvania. The Township is mandated by the Pennsylvania Municipal Waste Planning, Recycling and Waste Reduction Act of 1988 (Act 101) to conduct a curbside recycling program for residential establishments, including the collection of yard waste. The Township has operated a yard waste composting facility for over 25 years. The compost facility is an essential part of the Township's integrated waste management program that includes a wide range of collection and processing services provided by the Sanitation Division of the Public Works Department. The Township requested technical assistance to evaluate the potential collection and diversion of residential kitchen organics.

The purpose of this project is to evaluate kitchen organics collection and processing options and develop guidance to inform decisions regarding program implementation. Key challenges and important project considerations include:

- **Opportunities:** Diverting kitchen organics presents opportunities to reduce processing costs, reduce environmental impacts, and return valuable compost products back to the community. In particular, the addition of food as a nitrogen source can accelerate composting and increase the quality of compost in carbon-rich yard waste composting operations.
- **Cost:** Transporting, storing, and managing food scraps can be dynamic and/or cost prohibitive due to scale, processing options, and handling requirements.
- **Efficiency:** Adding collection services for kitchen organics can potentially impact the existing solid waste collection program by increasing capital and operation costs.
- **Special Handling and Permit Requirements:** Food scraps recovery and processing requires special handling due to the unique characteristics of food (e.g., odor and moisture content). The compost facility is not currently permitted to accept residential kitchen organics.

2 SUMMARY OF WORK

This section summarizes the work activities performed as part of this technical assistance project.

Task #1 – Data Collection & Compost Site Visit

Sustainable Resources Consulting (SRC) obtained background information from the Township and other sources to verify existing operating conditions, material quantities (e.g., yard waste and leaves), and program costs. SRC staff met with Township representatives to conduct a simple assessment of the Township's composting facility (see photos in **Appendix A**). The following information was obtained to evaluate options and develop guidance:

- Annual quantities of yard waste and leaves
- Solid waste program budget data
- Generation rates for kitchen organics
- Recovery and processing methods and requirements
- Regional markets/processors permitted to accept food scraps

Task #2 – Permitting Requirements

SRC researched permitting requirements for organics processing and contacted Pennsylvania Department of Environmental Protection (PADEP) staff for clarification on permit requirements to allow kitchen organics to be handled or processed at the Township's composting facility.

Task #3 – Review and Recommend Preferred Program Options

SRC reviewed several options for collection and processing kitchen organics. Implementation factors were considered to screen and select preferred alternatives, including: collection methods and efficiency, participation rates and program type (e.g., mandatory or opt-in), containers, fee structure, costs, and education/outreach.

Task #4 – Final Report

This project report, and supplemental appendices, were prepared to summarize the project findings and recommendations.

3 RESULTS

3.1 CURRENT PROGRAM

The Township Public Works Department's Sanitation Division collects refuse and single stream recyclables from approximately 8,500 households on a weekly basis. Yard waste is collected curbside weekly in 95-gallon carts from March through November. Residents may use paper bags, bundles, and/or rigid containers for yard waste set outs. Leaf vacuum service is provided from October through December and Christmas trees are collected at the curb in January and February.

Yard waste collected curbside is delivered to the Township's compost facility for processing. The compost site is permitted under PADEP guidelines. The site is a "permit-by-rule" facility that is limited to 5-acres and yard waste processing only (i.e. food processing is not permitted). The operating footprint is approximately four acres. Facility operating hours are Monday through Friday, 7:00am – 2:30 pm (closed during lunch). Processing activities include grinding brush and woody wastes and mechanically turning windrows. Equipment includes an articulated loader, tub-grinder, and a Scarab windrow turner. The Township transports its portable Dura-Tech tub grinder from the Public Works building to the compost facility once per week to process accumulated yard waste. Ground yard waste is mixed in with the leaf windrows. Inbound vacuumed leaves arrive pre-shredded and are stockpiled before they are shaped into heaped windrows with the loader. Windrows are turned periodically to promote composting over a four to six-month period.

With proof of residency, residential customers may drop-off yard waste. No commercial drop-off is permitted. Residents, non-residents, and commercial entities are allowed to pick up compost at the compost facility, or at the two self-service sites. Some finished compost is delivered to the Dog Park on Camp Hill Road and to a lot on Fort Washington Avenue for residential self-load. A loader operator is at the compost site to load trucks there for no charge.

As shown in **Table 1**, the compost is a mix of ground yard waste and leaf compost. After the compost containing leaves from the previous fall is gone, the remaining compost consists of ground yard waste that is collected curbside through the summer and fall. Most of the Township's mulch is removed by small landscapers and most yard waste grindings go to large contractors in bulk loads. Between 10 and 15 landscape companies remove finished products in any given year using small dump trucks or trailers. Four large commercial companies removed compost products in 2017. The Township targets the months of September or October to have enough material removed from the prior season to begin accepting inbound truckloads from the fall leaf collection season.

Table 1. Estimated Organic Material Removed from Township Compost Facility (By Customer Class)

2017	Raw Leaves (%)	Compost ² (%)	Ground Yard Waste Mulch (%)
Residential ¹	-	10	5
Small Landscapers	-	50	5
Large Contractors (bulk loads > 20 cubic yards)	5	30	60
Other	All the rest mixed with grindings	10	30
Total	100%	100%	100%

1. Includes self-service sites where material is staged in the Township for public use.
2. Includes composted leaves and some ground yard waste.

3.2 COMPOST FACILITY SITE VISIT

On June 5, 2018, SRC conducted a simple visual assessment of the Township’s Compost Facility located on 1128 Camp Hill Road, in Fort Washington, Pennsylvania. **Appendix A** includes a Site Visit Photo Summary. Key observations, with consideration of site suitability to process kitchen organics, included:

- Site access is restricted via gate, fencing and earthen berms.
- Primary working areas appear to be an impervious surface comprised of compressed aggregate mixes including asphalt millings and ballast/concrete, with a tipping pad of blacktop.
- The site is visually screened by trees.
- An operational water spigot is located toward the southeast end of the site.
- Despite heavy rainfall in the days prior to the visit, no surface water ponding was observed and the stormwater basins did not contain visible standing water.
- There were no ruts from equipment or vehicles and no erosion rivulets or channels.
- Unprocessed yard wastes are staged adjacent to the facility entrance (**Photo A**).
- Windrows were uniformly shaped and were very clean. Only very small quantities of visible contaminants were observed (**Photo B**). Windrows are approximately 250’ in length and constructed between the two stormwater basins (**Photo C**).

- No foul odors were detected.
- Generally, the Compost Facility is very well maintained and operated. The configuration, infrastructure, processing area/capacity, site location, and site features (e.g. stormwater systems, water spigot, etc.) are compatible to accept the quantities of food scraps anticipated from a residential-only program assuming the Township effectively distributes finished mulch and compost. This assumes best practices are implemented (e.g., to manage odors) and features like impervious surfaces are verified or added if required.



Photo A – Accumulated Yard Waste



Photo B – Mixed Leaf (left) and Yard Waste Only (right) Windrows



Photo C – Large Stormwater Basin (West End)

3.3 KITCHEN ORGANICS RECOVERY PROGRAM OPTIONS

Expanding existing collection services to include kitchen organics can potentially create opportunities for long-term savings (e.g., avoided landfill tip fees) and yield environmental benefits. SRC considered several kitchen organics collection program options. Decisions regarding collection and processing have significant impact on operating requirements, risks, residential participation rates, and costs. For example, outsourcing collection and processing increases risks to long-term program success because the Township and program is reliant on one or more third party contractors for critical program elements such as collection, hauling, and/or processing. When contractors increase hauling fees or stop accepting compost products, organic materials accumulate, and this can negatively impact compost operations.

As SRC reviewed various combinations of collection and processing scenarios, the considerations and questions in the bullet list below were considered to select preferred options. The Township is encouraged to perform the same exercise.

- **Ease of Implementation:** How difficult is program implementation? Is the proposed program compatible with existing collection system infrastructure, operations, and customer behaviors and requirements?
- **Collection Efficiency and Collection Costs:** Is the new program efficient? Does it optimize the utilization of existing equipment, collection routes, and crews?
- **Tip Fees:** Are adequate measures taken to maximize avoided disposal fees and to reduce fees that may be incurred to process kitchen organics (e.g., fees for contaminated loads)? Does the Township have effective means to control processing/tip fees of the new program?
- **Risk factors:** What factors threaten the success and longevity of the proposed recovery program?

- **Scale and Residential Participation Rates:** What scale and participation levels justify program need, benefit, and implementation?
- **Transportation:** Since hauling (not processing) costs are often significant, have transportation efficiencies and risks been considered?
- **Customer Service:** Is the program convenient, beneficial, and aligned with the customer service levels currently provided by the Township?
- **Finished Product Quality & Markets:** Does accepting kitchen organics benefit the Township's existing compost products and improve quality and marketability?

Appendix B presents a Summary of Kitchen Organics Program Options with details about program elements such as collection, processing, and hauling. Of the options reviewed, the following two collection and processing scenarios could be implemented in the Township.

1. Township co-collection of loose (i.e. non-bagged) residential kitchen organics in the existing 95-gallon carts used for yard waste. Delivery of mixed food and yard waste to the Township's compost facility for processing (e.g., composting). All residential establishments participate.
2. Township co-collection of bagged residential kitchen organics in the existing 95-gallon carts used for yard waste. Kitchen organics must be bagged separate from yard waste because the Township's vendor, Two Particular Acres, does not accept kitchen organics mixed with yard waste. After collection, the material is delivered to the Township's compost facility and dumped. The bags containing kitchen organics are sorted from other yard waste, untied or cut open, and emptied into a leak proof container (e.g., sealed roll-off container with cover tarp system). To reduce odor and vectors like flies, mulch or compost is spread over the food each day. The Township delivers loads of food to Two Particular Acres weekly.

3.4 ORGANIX SOLUTIONS COMPOSTABLE BAG PROGRAM

During this project, the Township and SRC obtained information and costs for the Green Bag Program offered by Organix Solutions for food recovery (www.organixsolutions.com). The program is usually a subscription service where each household voluntarily enrolls for a fee. Durable compostable bags are delivered to participating households. The compostable bags and program allow co-collection of bagged food with other waste streams (e.g. refuse or yard waste). It is SRC's opinion that the Green Bag Program is not practical or economically preferable for the Township for these reasons:

- Bagged food recovery significantly increases administrative requirements and material handling compared to non-bagged collection. Bag procurement, bag distribution, bag sorting, bag removal, and bag disposal are program elements that add to implementation complexity.

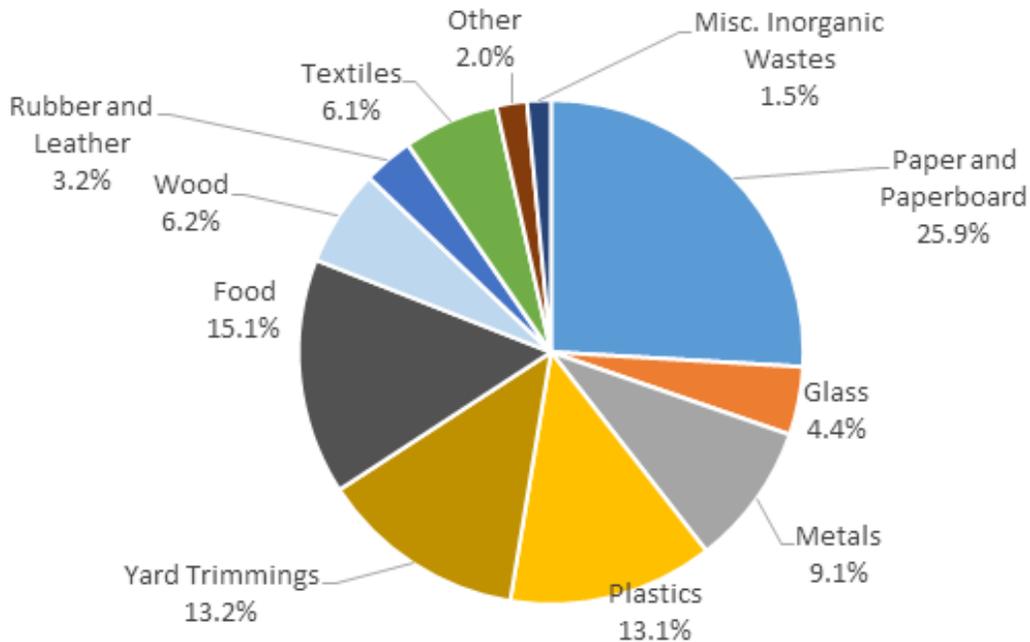
- Bags (even compostable) are not accepted by the only locally available compost facility permitted to accept food - Two Particular Acres. Per the owner of Two Particular Acres, “whole bags potentially hide unwanted contaminants and shredded bags disrupt the composting process by creating pockets of unmixed material.”
- The Green Bag Program rate structure introduces a new residential bill to participating customers. This fee is not integrated with taxes and general fund allocations for all other Township Sanitation Division services. Revenue recovery via customer bills (e.g. a bag fee) is likely to cover only a portion of actual costs and profit remitted to Organix Solutions. Since hauling and processing costs (e.g. compost processing or tip fees) are unknown and variable, the Township assumes some financial risk. Assuming full cost recovery, the rate per household may be high and discourage customer participation.
- The opt-in program is anticipated to result in a small percentage of household participations (e.g. well below 10 percent). Recovering small quantities of kitchen organics from widely distributed households results in inefficient collection routes and increased program costs.

It is SRC’s opinion the Organix’s Green Bag Program is not compatible with implementing kitchen organics recovery in the Township. However, the Organix Solution programs have worked well in other communities, particularly where a transfer or processing facility can separate compostable bags containing food from other waste streams. **Appendix C** contains a detailed overview of Organix’s Green Bag Program.

3.5 KITCHEN ORGANICS RECOVERY ESTIMATES AND ANALYSIS

SRC conducted a simple analysis to estimate the potential impact to solid waste disposal and diversion rates assuming the Township implements a residential curbside kitchen organics collection program. **Exhibit 1** presents the United States Environmental Protection Agency’s (USEPA) national statistics on waste stream composition. The aggregate of food, yard trimmings, wood, and miscellaneous organics represents 36 percent (by weight) of total municipal solid waste generated. The amount of potentially recoverable food is 15 percent. SRC differentiates “potential food” and the “capture rate” of kitchen organics. Capture rate is the proportion, expressed as a percentage, of a targeted material that has been collected relative to total generation. The capture rate is representative of the amount of material collected and processed into compost products.

Exhibit 1. Total MSW Generated by Material, 2015



Source: EPA Facts and Figures About Materials, Waste and Recycling 2015

The Township conducted a three-month curbside collection kitchen organics pilot study beginning in November 2017. Thirteen households participated using seven-gallon buckets with liners provided by the Township. On average, participants diverted 6.9 pounds per week of kitchen organics including food, coffee grounds and shredded paper. **Appendix D** contains details on the Township’s kitchen organics pilot study.

Based on data from the BioCycle Nationwide Survey (conducted in 2014), State College Borough, and the Township’s kitchen organics pilot, about six to 12 pounds of food scraps per household per week is expected to be captured. For analysis, eight pounds per household per week was assumed. **Exhibit 2** presents the Township’s 2017 baseline waste generation profile (left column). The baseline shows the primary materials and how they were managed: refuse (disposed), yard waste and leaves (composted), and single stream (recycled). The Township generated nearly 19,200 tons of material in 2017. The column on the right side of **Figure 2** estimates diversion impact assuming 10 percent (850 households) participate in a kitchen organics program. A 10 percent participation is representative of participation levels expected in a successful program with residents voluntarily opting-in and paying a separate fee. Ten percent of households participating captures and diverts about 180 tons per year to composting, or about one percent of the Township’s total municipal solid waste (MSW). For comparison, if all 8,500 households in the Township participate, an estimated 1,700 tons could be diverted to composting, or about nine percent of total MSW.

Exhibit 2. 2017 Annual Total Waste and Recycling Quantities in Tons (10% Household Participation Rate)

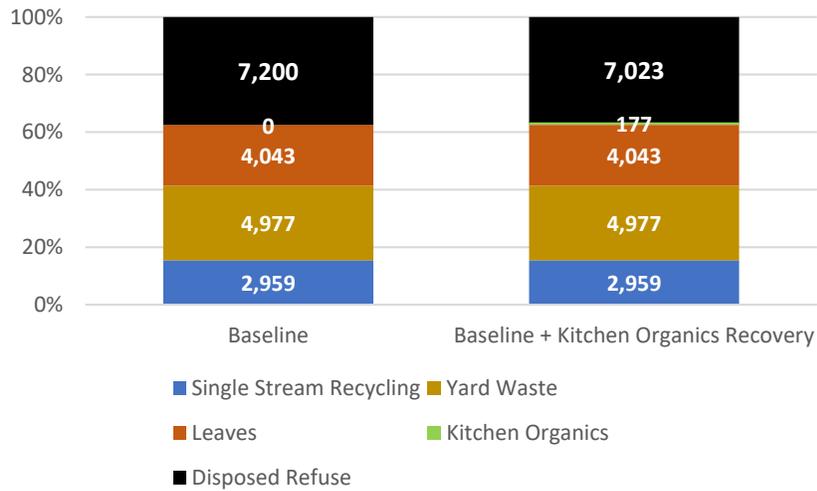


Table 2 presents estimated diversion and avoided costs corresponding to household participation rates assuming eight pounds per household, per week of food diversion from a waste-to-energy facility at a per ton tipping fee of about \$62. The results offer insights on participation levels and corresponding diversion rates to evaluate compatibility with the Township’s capabilities and desired outcomes for the program.

Table 2. Annual Kitchen Organics Diversion and Avoided Costs

Participation Rate	# of Households ¹ (of 8,500)	Kitchen Organics Weight Diverted (tons)	Kitchen Organics Volume (cubic yards)	Avoided Refuse Tip Fees (\$62/ton) ²
5%	425	88	382	\$5,456
10%	850	177	764	\$10,974
20%	1,700	354	1,527	\$21,948
30%	2,550	530	2,291	\$32,860
40%	3,400	707	3,055	\$43,834
50%	4,250	884	3,819	\$54,808
60%	5,100	1,061	4,582	\$65,782
70%	5,950	1,238	5,346	\$76,756
80%	6,800	1,414	6,110	\$87,668
90%	7,650	1,591	6,873	\$98,642
100%	8,500	1,768	7,637	\$109,616

1. Per the U.S. Census Bureau, there are 2.74 persons per household.
2. Refuse is delivered to Covanta’s waste to energy plant at a rate of \$61.39 as of 2018.

3.5.1 Analysis Results & Program Considerations

The simple analysis reveals a basic truth that is consistent across nearly all material collection and processing programs: scale matters. Maximizing household participation increases recovery, improves collection efficiency, and reduces disposal costs - elements of economically sustainable collection systems. Participation rates include two key components: 1) the amount of food set out per collection, and 2) the total number of households participating (i.e., setting out separated food for recovery at least some of the time). Participation is not predictable and implementation methods and other factors affect recovery rates significantly. **Table 3** provides factors that may influence participation and recovery rates.

Table 3. Factors Affecting Participation and Recovery Rates

Program Factors	Impact Considerations
Program Maturity	Recovery rates are typically lower in initial years and increase as programs “mature.”
Opt-in & Fee Structures	“Opt-in” versus “all-in” programs. Fees and administrative burdens like enrollment and paying a new bill can discourage participation.
Convenience	The easier enrollment and program use, the higher the participation and recovery rate.
Seasonal Impacts	Recovery rates (i.e. pounds set out per collection) and participation rates tend to drop significantly after the New Year’s holiday during the colder winter months.
Competition For Food	Waste disposal options, including regular trash and garbage disposals, capture recoverable food. The Township estimates that over 90 percent of households have garbage disposals.
Containers	Type and number of customer containers provided and provision of container to all eligible customers.

3.6 FOOD VOLUME, WEIGHT, SIZE REDUCTION AND COMPOSTING

The proposed kitchen organics program can capture a significant amount of material by weight. Material *volume*, more that weight, drives collection and processing requirements (e.g. container sizes and how much area is needed to compost food feedstocks). Food is very dense. Its composition promotes rapid size reduction and easy incorporation with other materials for composting. Residential food averages about 70 percent moisture and 30 percent dry weight. Boosted by nitrogen content, food rapidly decomposes, and water content evaporates as compost temperatures elevate to 140° F to 160 °.

In Breitenbeck and Schellinger’s¹ mass and volume study, composting in uncovered blended windrows of different mixtures (e.g. bagasse, spoiled corn silage, cotton gin trash, rice hulls, grass hay, wood chips, municipal biosolids), resulted in volume losses of 15-58 percent of the initial material amount. For practical application to this study, the volume of diverted kitchen organics incorporated into windrows would decrease by 15-58 percent from their initial volume. Therefore, incorporating food into windrows may slightly increase mass and volume of

¹ Breitenbeck, Gary A., and David Schellinger. 2004. “Calculating the Reduction in Material Mass And Volume during Composting.” *Compost Science & Utilization* 12 (4): 365–71.
<http://search.ebscohost.com/login.aspx?direct=true&db=asm&AN=15348273&site=chost-live>.

windrows temporarily but would not be expected to noticeably increase the processing area (commonly called “footprint”) requirements at the Township or other compost site – particularly since incorporated food accelerates decomposition.

3.7 PERMIT REQUIREMENTS FOR FOOD COMPOSTING

Based on review of compost facility permit information and discussions with PADEP representatives, General Permit WMGR025 is the applicable permit for residentially generated food. Permit WMGR025 is the PADEP-approved permit in place for State College Borough’s compost facility – arguably the most successful residential curbside food recovery program in Pennsylvania. The permit application can be obtained from the PADEP website (www.dep.pa.gov). The cost of permit preparation, including application fees and consulting fees, may range from \$10,000 to \$20,000. Determining the feasibility of permitting the Township’s compost facility to accept food waste under permit WMGR025 was beyond the scope of this Study. Important considerations regarding permit WMGR025 include:

- **Limited, Small-scale Processing Availability Elevates Program Risks:** With only one nearby PADEP permitted facility available to process food, it is unrealistic to assume this facility will be available and cost effective to use indefinitely.
- **Sensitive Receptors:** Food decomposition generates odors that may negatively affect neighbors, result in complaints, and could result in facility shut down by PADEP. Under WMGR025, the Township is required to issue certified mail notices to all adjacent property owners of the proposed permit and food scraps composting program.
- **Impervious Surface.** Under WMGR025, an impervious surface will be required in receiving and processing areas. It is unknown if the existing compost facility surface (a mixed, compressed aggregate) will satisfy permitting requirements for the compost pad surface. If not, paving or concrete material and installation costs will be significant, but may be eligible for Act 101, Section 902 Grant funds under compost facility improvements.
- **Proposed Convenience Center Permit.** PADEP is developing a “convenience center permit” that is expected to be released in the next couple of years. This permit is intended to be a streamlined process allowing municipalities to consolidate small quantities of food in up to two roll-off containers at each permitted location. This information is preliminary. This scenario would allow the Township to collect food in roll-off containers. It is SRC’s preliminary opinion, due to food handling requirements and roll-off container hauling costs, this approach would be labor intensive and cost-prohibitive.
- **PADEP Pre-Application Meeting.** PADEP requires a pre-application meeting for general permits. As part of its evaluation of permitting requirements and feasibility, Township representatives should participate in the required meeting.

Note: Permit WMGR025 increases maximum allowances for facility area and processing capacity to 15 acres.

4 RECOMMENDATIONS

The following recommendations are based on review of available data, case study experience, permitting requirements, preliminary analysis, and existing operating and market conditions. These recommendations are presented for consideration by the Township as it evaluates recovery and composting alternatives for residential kitchen organics.

4.1 CONFIRM INITIAL PLANNING DECISIONS

Since it was beyond the scope of this study to conduct a detailed analysis of all operating scenarios, the Township should confirm key planning decisions before making a final decision to collect kitchen organics. Key decisions and actions include:

1. **Compost Product Marketing & Plan:** A potential operating risk factor and implementation barrier is operating near or at maximum permitted material storage capacity. The Township should improve material marketing and distribution and reduce the amount of material stored on site at any given time. Operating at maximum capacity may limit the Township's options for kitchen organics recovery, including processing food scraps at the Township's Compost Facility, which would require a General Permit issued by PADEP. The compost product marketing plan should address these elements:
 - a. Contracts with multiple end users for bulk material removal.
 - b. Bids or requests for proposals (RFP's) for bulk removal of finished compost products.
 - c. Periodic material testing by a laboratory (e.g. Penn State University Agricultural Analytical Services Laboratory) and provision of data to prospective end users.
 - d. Specifications requiring Township-generated compost products to be incorporated within Township projects (e.g. construction, stormwater, park maintenance, etc.).
 - e. Increased distribution to residents and small landscapers.
 - f. Improving material quality and diversification of compost and mulch products. The Township should better differentiate compost products and should market mulch (a cover material), compost (for plant growth), and soil blends.

Note: It is recommended the Township purchase a Trommel Screen, and seek Act 101 Section 902 reimbursement of eligible costs as part of its long-term marketing plan. Screened, finished compost has a market value of \$15 - \$35 per cubic yard and would increase demand for material.

2. **Horizontal Grinder and On-Site Processing:** The Township is in the process of procuring a grinder to replace its tub grinder used for yard waste processing. It is recommended the Township purchase a horizontal grinder and keep this equipment at the Compost Facility. Owning a horizontal grinder eliminates transportation costs and the inefficiencies of mobilizing equipment, while improving operating flexibility (e.g., grind daily or as

needed). It is recommended the horizontal grinder have remote operation capability to allow one operator to control grinding while loading material. Horizontal grinders effectively grind food, leaves and/or woody wastes for incorporation into windrows. The fence that surrounds the Scarab windrow turner could be expanded to provide for secure storage of grinding equipment.

3. **Select a Preferred Implementation Strategy:** There are many approaches and methods available to implement a kitchen organics recovery program. The Township's decisions regarding the overall implementation strategy will impact operating requirements, costs, customers, and implementation details. This study reveals three core implementation options that are fundamentally different (below). Details of two kitchen organics program options are presented in Section 4.1.
 - a. **No Kitchen Organics Program (now).** Do not implement a kitchen organics recovery program at this time. Delay implementation to address improved material distribution, to evaluate PADEP "Convenience Center" permit that may allow containerized consolidation of food, and to confirm feasibility and costs of permitting the Compost Facility in accordance with PADEP requirements to accept kitchen organics.
 - b. **On-Site (Township Compost Facility) Kitchen Organics Processing.** This is the most integrated and streamlined alternative but is contingent on Township implementation and PADEP-approval of general permit WMGR025.
 - c. **Off-Site Kitchen Organics Processing:** Township collects separated food waste only (without bags) for delivery to Two-Particular Acres.

4.1 KITCHEN ORGANICS COLLECTION AND COMPOSTING PROGRAM ALTERNATIVES

It is SRC's opinion there are two possible program alternatives for kitchen organics recovery in the Township (**Table 4** and **Table 5**). Township representatives should review the pros/cons, evaluate collection-processing methods for each alternative, and conduct additional research to confirm feasibility.

Table 4 (Option 1) presents the preferred collection and processing option that maximizes program scale, efficiency, diversion, and long-term program sustainability. This approach places the Township, not third parties, in the position to manage risks along all key program elements: administration, collection, processing, and distribution. Under any scenario where the Township is not the processor of the materials, the costs of transportation and processing are expected to be higher and passed on to residential customers.

Table 5 (Option 2) presents the collection and processing alternative that results if the Township does not assume processing responsibility. Option 2 is an excellent example of how the market (processor) determines the collection methods. Since Two Particular Acres will not accept bagged food scraps or loads of comingled yard waste and food scraps, kitchen organics must be

separated prior to delivery and tipping. **Table 5** presents the program details and costs based on phone discussions with the owner/operator of Two Particular Acres.

Table 4 – Option 1: Township Co-collection & Processing

Summary	All residents allowed to participate in source-separating kitchen organics for weekly curbside collection in yard waste carts. The Township issues countertop kitchen containers to households for collecting organics in the kitchen. Co-collect loose (i.e. un-bagged) kitchen organics and yard waste in Township issued carts and processes mixed organics at its permitted compost facility.
Implementation	<ul style="list-style-type: none"> • Pursue a permit and get approval from PADEP to process kitchen organics on-site at the Township Compost Facility. Next steps include: <ul style="list-style-type: none"> ○ Complete Residual Waste Permit Forms (Checklist of required permit forms is attached in Appendix B) ○ Participate in pre-application meeting ○ Distribute certified notification letters to adjacent landowners ○ Evaluate options for asphalt or concrete pad for food waste compost • Determination of Applicability Fee of \$500 payable to the Commonwealth of Pennsylvania (2 E Main Street, Norristown, PA 19401)
Considerations	<ul style="list-style-type: none"> • Reduces long term program risks because the Township directly manages collection and processing • Available and convenient to all customers, with no change to curbside yard waste collection service • Maximizes participation rates • No administrative requirements for bags (billing and distribution) • Reduces handling/separation requirements associated with bags • <u>Not</u> immediately viable since Township compost facility in not permitted by PADEP to accept food

Table 5 – Option 2: Township Separated Food Collection and Off-Site Processing

Summary	All residents participate in source separating their kitchen organics in Township-issued countertop kitchen containers lined with a bag. Bagged kitchen organics are placed in Township provided carts with yard waste for weekly collection. The Township removes bags and consolidates kitchen organics in roll-offs and delivers to Two Particular Acres weekly for processing. The Township continues to process its own yard waste on-site.
Implementation	<ul style="list-style-type: none"> • Pursue a permit and get approval from PADEP to transfer kitchen organics at the Township Compost Facility • Create collection fee to participate in new program • Collect participation and material recovery data

Considerations	<ul style="list-style-type: none"> • Allows time to assess residential interest in the new program before scaling up • Must establish handling requirements to remove the food from the bags prior to delivery to Two Particular Acres • Clean, un-bagged kitchen organics processing fee: \$55 per ton • 20-yard roll-off service (swap): \$175 per pull <ul style="list-style-type: none"> ○ Assume 5-6 tons per 20-yard container at 70 percent full • 20-yard roll-off with rubber gasket: \$6,000 each. (two needed) • Penalties: <ul style="list-style-type: none"> ○ \$150 penalty for a contaminated load that has been dumped ○ Rejected loads: No penalty. Township assumes landfill fees (i.e. tip fee plus transportation cost) • Not immediately viable since Township compost facility is not permitted by PADEP to transfer food and no such permit exists yet.
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4.2 KITCHEN ORGANICS COLLECTION AND PROCESSING BEST PRACTICES

Since “collection” costs typically represent 60 to 80 percent of municipal solid waste program costs, a best practice is to implement strategies that promote the efficient collection of materials, including kitchen organics. Specific best practices and strategies to achieve efficient collection and processing include:

- Increase or maximize the quantity of material collected per collection stop and per customer served. For example, co-mix kitchen organics and yard waste.
- Avoid adding a new collection route for a targeted material (e.g., kitchen organics), unless the amount of material diverted, the cost recovery per customer, and the anticipated avoided costs - including reduced disposal, processing and/or collection costs - justify the addition of an additional collection route for the targeted material.
- Maximize participation rates to increase program scale and diversion impact. Increased participation improves collection efficiency and usually translates to a more equitable fee for paying customers.
- Incorporate incoming kitchen organics directly into windrow or immediately mix with yard waste at compost facility
- Mix in bulking agent with kitchen organics.
- To minimize leachate and odors, organics with a high moisture content should be turned regularly with windrow turning machine.
- Moisture should flow away from the center in windrows
- Send samples of compost to Penn State for quality testing.
- Consider marketing engineered soils.
- Evaluate aerated static pile composting techniques. This processes biodegrades organic material during the active compost phase without mechanical manipulation (e.g. turning) and usually involves placing blended organics on perforated pipes with controlled air

circulation. Aerated composting increases the volume of organics composted within a given area, while accelerating the rate of composting compared to traditional windrow composting. Aerated static pile composting is not recommended for leaves and yard waste only.

4.3 RESIDENTIAL EDUCATION

If the Township implements a kitchen organics program, it should adapt public education information to highlight program changes. Public education information should emphasize the importance of diverting only clean kitchen organics. This information should be integrated with the Township's communication channels including the Township website, newsletter, and direct mailings.

5 CONCLUSION

The Township, through its Sanitation Division, implements a top-notch, comprehensive and integrated municipal waste collection, disposal and recycling program. This program has successfully implemented waste diversion program for years – with priorities including reduced disposal fees and environmental impacts. The Township has the expertise to collect and process (i.e., compost) residential organics but its compost facility is not permitted by PADEP for this purpose. Considering risks due to limited processing options in the area, the Township should evaluate the possibility of upgrading and permitting the existing compost facility to accept kitchen organics.

Appendix A
Township Compost Facility Photos

Upper Dublin Township
Site Visit Photo Summary (06-05-18)



Photo 1: 06-05-18.
Entrance Gate and Signs.



Photo 2: 06-05-18.
Stormwater Basin (near tipping/loading area).



Photo 3: 06-05-18.
Impervious Surface (compacted millings, asphalt, and concrete).



Photo 4: 06-05-18.
Stormwater Basin (western end of site).



Photo 5: 06-05-18.
Ground Yard Waste (windrowed).



Photo 6: 06-05-18.
Mixed yard waste grindings and leaf compost.

Upper Dublin Township
Site Visit Photo Summary (06-05-18)



Photo 7: 06-05-18.
Bulk Loading Area.



Photo 8: 06-05-18.
Dura-Tech Tub Grinder (portable).



Photo 9: 06-05-18.
Scarab Windrow Turner (on site).



Photo 10: 06-05-18.
Overview of Windrow Layout.



Photo 11: 06-05-18.
Leaf Compost (very clean).



Photo 12: 06-05-18.
Mulch Product (very clean).

Appendix B

Summary of Kitchen Organics Recovery Program Options

Summary of Kitchen Organics Recovery Program Options (Selection of Preferred Options)

Six program options or scenarios were identified to recover and process kitchen organics. These options are shown in **Table 1**. After preliminary review and screening, two options were determined preferable and four options were removed from further evaluation. The basis for determination of non-preferred or non-compatible options included:

- Adding a separate collection route to collect only kitchen organics was cost prohibitive and would negatively impact labor utilization and Sanitation Division operations.
- Two Particular Acres is the only PADEP permitted compost facility close enough to the Township to be potentially feasible for deliveries of kitchen organics.
- Plastic bags, even when constructed of compostable material, are not desired by Two Particular Acres. Plastic and compostable bags are not accepted by many compost facilities operating in Pennsylvania and the U.S.
- The use of plastic bags complicate implementation, increase administrative and handling requirements (e.g., purchasing, distribution to customers, collection, sorting, removal, etc.), and decrease marketability.

Table 1 – Summary of Residential Kitchen Organics Program Options

	Kitchen Organics Program Description	Preferred
1	Township co-collects non-bagged food with yard waste. 3 rd party facility composts material (Two Particular Acres).	Yes
2	Township co-collects food with yard waste. Township composts food at its own yard waste facility.	Yes
3	Two Particular Acres collects. Two Particular Acres processes.	No
4	3 rd party hauler collects food. 3 rd party compost facility processes.	No
5	Township co-collects food with YW. Private company (e.g. Mascaro) processes.	No
6	No kitchen organics program.	–

Tables 2 and 3 present the preferable options as determined by SRC during this evaluation. **Table 2** summarizes the preferred option where the Township assumes responsibility of food collection mixed with yard waste and then processes the food at its compost facility (assuming a proper permit is obtained through PADEP).

Table 2 – Township Collects & Processes Kitchen Organics

Program Description/Summary	In this option, all residents can participate in kitchen organics recovery by source separating their food waste and setting it out curbside in carts provided by the Township. The Township is responsible for co-collecting kitchen organics curbside and consolidating, processing, and composting all organic materials set out by residents at the Township Composting Facility.
Materials Accepted	Residential only food scraps (unbagged) Yard waste Leaves
Households	Total: 8,500 Start (10%) – 850 1 year (15%) – 1,275
Household Selection	All households provided with food waste carts.
Containers/Bags	Kitchen containers Carts
Container Odor Control	Seal and cover roll-off outside facility operation hours. Mix kitchen scraps with bulking agent. Incorporate in windrows immediately.
Collection Frequency	Weekly
Hauler	Township
Collection Method	Automated collection vehicle
End Use Facility	Township Compost Facility
Fee Recovery Method	No new fee anticipated. Integrated with current tax assessment cost recovery method for Sanitation Department services.
Considerations Moving Forward	Quality control Equipment (e.g. Leach Split Rear Loader) Delivery schedule Local market end compost buyers
Permit Forms	Residual Waste Permit Forms General information Form (GIF) Form 20 Form B - Professional Certification 2540-PM-BWM0358 Form E - Contractual Consent of Landowner 2540-PM-BWM0353 Form HW-C - Compliance History 2540-FM-BWM0058 Form L - Contingency Plan 2540-PM-BWM0384 Form 5 - Map Requirements 2540-PM-BWM0154

Table 3 – Food Collection by Township & Two Particular Acres Processes

Program Description/Summary	In this option, all residents can participate in kitchen organics recovery by source separating their food waste and setting it out curbside in carts provided by the Township. The Township is responsible for collecting kitchen organics curbside from residents and consolidating the kitchen organics at the Township Composting Facility. The Township or Two Particular Acres delivers the recovered, unbagged kitchen organics to the on-farm composting site at Two Particular Acres for processing.
Materials Accepted	Residential only food scraps
Households	Total: 8,500 Start (10%) - 850 1 year (15%) – 1,275
Household Selection	All households provided with food waste carts.
Containers/Bags	Kitchen containers Carts
Container Odor Control	Seal and cover roll-offs during transport and outside facility operation hours. Switch/deliver food roll-offs regularly.
Collection Frequency	Weekly
Hauler	Township or Two Particular Acres
Collection Method	Automated collection vehicle or vehicle supplied by Two Particular Acres
End Use Facility	Two Particular Acres
Fee Recovery Method	Fee dependent on participation and avoided landfill costs.
Considerations Forward	Moving Resources needed rip open and empty incoming bags Quality control Equipment (e.g. Leach Split Rear Loader) Delivery schedule Fees (e.g. contamination) Convenience center permit

Appendix C

Organix Green Bag Program - Detailed Overview

Organix Solutions

Costs

- \$69.95 per household per year
- Bags
- Processing costs

Program Features

- Organix Solutions pilot and ongoing support for activities such as education/outreach, sign up, and follow up
- Recommendations for data collection
- Enrollment starter kit (welcome letter, residential how-to brochure, refrigerator magnet)
- 1-year supply of Green Bag Organix 13-gallon extreme duty compostable bags
- Education and marketing templates
- Customer service to residents (telephone and onsite)
- Bags completely biodegrade into biomass, water, and CO₂ in 45 days

Cost Structure Options

Option A- Opt-In: All households in Upper Dublin pay a program fee

Option B- Subscription: Only participating households pay a program fee

Implementation

- Starts at 10% enrollment
 - 3-5 years until 40% enrollment
-

Appendix D
Kitchen Organics Pilot Summary

UPPER DUBLIN – KITCHEN ORGANICS PILOT SUMMARY

OVERVIEW

Upper Dublin conducted a simple pilot study to investigate kitchen organics recovery from residential households. Elements of the pilot included:

- 13 volunteer households
- 7-gallon buckets provided by the Township
- Plastic compostable liners
- Clean bucket replacement provided by the Township (for participant convenience)
- Curbside collection of separated kitchen organics

RESULTS

KITCHEN COMPOST PILOT PROGRAM 11/22/2017 - 2/7/2018												
Delivered to: Two Particular Acres - 248 Rittenhouse Rd. Royersford, PA												
STOP #	11/22	11/29	12/6	12/13	12/20	12/27	1/3	1/10	1/17	1/24	1/31	2/7
1	X	X	X	N/O	N/O	X	NO	X	N/O	X	NO	X
				7:47	7:51, 9:16		PICK-UP				PICK-UP	
2	X	N/O	X	X	X	X	X	X	X	X	X	X
		7:12		UNTIED			UNTIED					
3	X	X	X	NO	X	X	N/O	X	X	X	NO	X
				PICK-UP			8:47				PICK-UP	
4	X	X	B. X	X	X	X	X	X	X	X	X	X
5				X	X	X	X	X	X	X	B. X	X
6	X	X	B. N/O 8:13	X	X	N/O	X	NO	X	X	X	X
			LATE 11:12	UNTIED	UNTIED	7:45,8:59		PICK-UP				
7	X	X	X	X	X	X	N/O	X	X	X	X	X
							9:04					
8	X	X	B. X	X	X	X	X	X	X	B. X	B. X	X
9	X	X	X	X	X	X	X	B. X	X	N/O	X	X
										11:31		
10	X	X	X	X	X	X	X	B. X	X	X	X	X
11	X	X	X	B. NO	X	NO	X	NO	X	NO	X	X
				PICK-UP		PICK-UP	UNTIED	PICK-UP		PICK-UP		
12	N/O	N/O	NO	N/O	X	NO	N/O	N/O	N/O	N/O	N/O	N/O
	8:14		PICK-UP	9:36	LOOSE	PICK-UP	9:49			11:43	11:22	
13	N/O	N/O	X	X	N/O	N/O	X	X	N/O	B. X	X	X
	7:48	8:38			9:10	9:29			9:17			
78.4% Wkly Participation Rate.				Collection averaged 72 lb/wk, and 6.92 lb/bucket.								

"N/O" – Not out

"No Pick-Up" – Participant called in to indicate that collection was not required

B. Extra bags provided to participants who ran out of bags.

Based on the kitchen organics pilot operated by the Township, observations include:

- 78 percent participation rate (setout rate), but this represents customers who were very enthusiastic about participating in the pilot.
- 6.9 pounds per week per household
- Bags were not always tied
- Cardboard and shredded paper were allowed

PHOTOS



Delivered Organics (and paper shreds) – On ground at Two-Particular Acres



Curbside Set Out – Bagged Kitchen Organics