City of
Philadelphia

Organics Diversion Feasibility Study

REVIEW DRAFT – May 3, 2018

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E. EXECUTIVE SUMMARY

E 1. INTRODUCTION

The City of Philadelphia's residential, institutional and commercial sectors currently generate hundreds of thousands of tons of organics annually. In 2012, approximately 29,000 tons of combined residential and commercial organics were reportedly diverted from disposal in the City, which represents less than eight percent of the City's estimated combined organics waste stream.

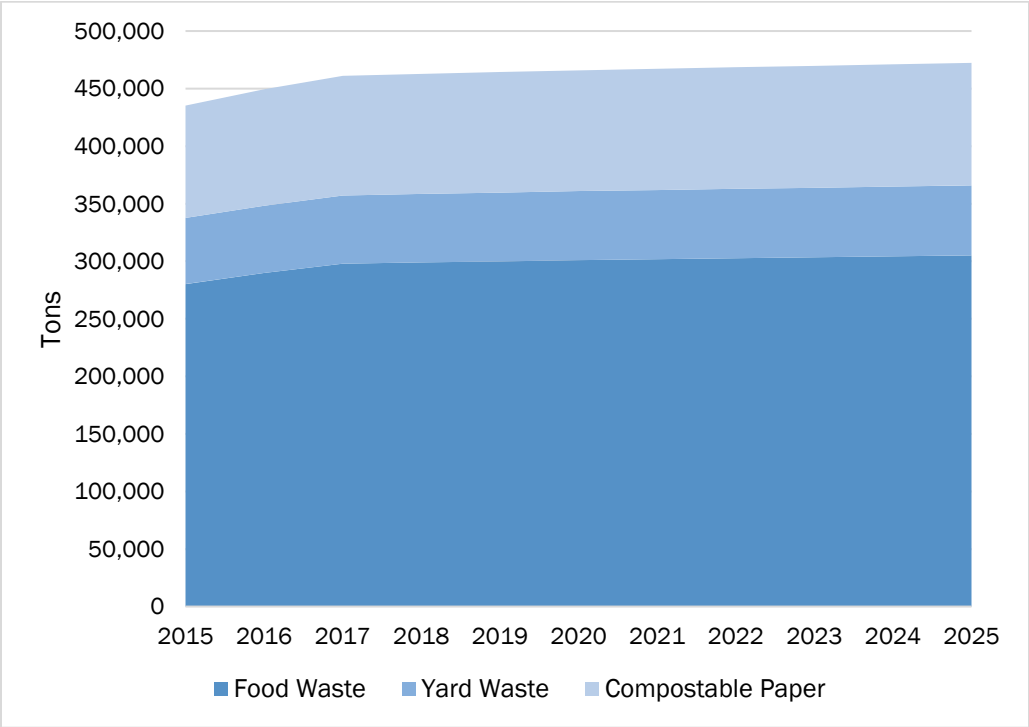
The City launched a comprehensive sustainability plan in 2009 (Greenworks Philadelphia); its Environmental focus area annually reassessed waste stream reduction strategies and recognized the importance of diverting organics from disposal as a key component of waste reduction. The City enacted a Zero Waste program in late 2016 that calls for a 90 percent reduction in waste disposal by year 2035. The City's latest Municipal Waste Management Plan reinforces this long-term waste reduction goal.

Diverting additional organics from the City's waste stream can 1) reduce the tons of waste being incinerated or landfilled, 2) avoid and/or redirect current organics disposal expenses to segregation and recovery activities, 3) reduce potential environmental impacts of disposal, and 4) effectuate a higher and better utilization of organics as a resource. This feasibility study estimates quantities, identifies processing and recovery options, analyzes these options, and recommends specific steps to increase current organics diversion practices in the City of Philadelphia.

E 2. ORGANICS GENERATION AND PROJECTIONS

As Figure E-1 illustrates, the City generates over 450,000 tons per year of organics. Based on a 2017 waste characterization study of the residential sector and estimates of organics in the commercial/institutional sector, it is believed that organics in the Philadelphia waste stream represent approximately one-third of current waste discards.

Figure E-1 Projected Organics in Philadelphia Refuse Stream, 2015-2025 (Tons)



However, not all organics in discarded wastes are equally "capturable" for recycling. Based on experiences in other parts of the U.S., this study estimates that about 30 percent of residential sector wastes and 24 percent of commercial wastes can be reasonably diverted and recycled through aggressive recycling programs and widespread adoption of associated collection programs. Table E-1 shows the percentages of various components of organics in the waste stream that can reasonably expect to be captured through an aggressive and comprehensive residential and commercial organics management program. Together, about 100,000 tons annually could potentially expect to be captured in Philadelphia through widespread organics reduction programs.

Table E-1 Projected Maximum Capture Rates

Generator Type	Raw Tons	Capturable in Collection Program	Recoverable Tons
Residential Wastes			
Food Waste	76,874	15%	11,531
Yard Waste	38,312	75%	28,734
Compostable Paper	25,572	5%	1,279
Subtotal	140,758	30%	41,544
Commercial Wastes			
Food Waste	203,340	20%	40,668
Yard Waste	19,117	75%	14,338
Compostable Paper	72,125	10%	7,213
Subtotal	294,582	21%	62,218
Total	435,340	24%	103,762

E 3. REGIONAL ORGANICS MARKETPLACE

A core requirement of an expanded organics diversion/recycling program is the availability of processing infrastructure within a reasonable distance of the generators, at a reasonable cost.

Existing facilities located within 25 miles of downtown Philadelphia (an assumed reasonable distance for the direct hauling of organics), with processing capacity available, are limited. A total of six sites exist within 25 miles of Philadelphia that can potentially process yard wastes (including two City Parks and Recreation department sites with limited processing capacity). No processing sites exist for food waste and compostable paper within 25 miles of the City, other than the City's small prison aerated static pile composting system.

If the City constructed a simple organics transfer facility, it may be able to haul organics to more distant processing facilities (say, 50 miles or further). Within 25-50 miles of Philadelphia, four additional yard waste composting sites come into consideration as well as two food waste/compostable paper sites (although willingness and ability to accept City materials and cost were not confirmed). Expanding to a 50-mile radius, two additional private composting facilities come into consideration, but incoming material quality restrictions and cost are yet to be determined.

Table E-2 summarizes the existing processing facilities within 50 miles of downtown Philadelphia that have potential capacity to receive and process yard waste, food waste, and/or compostable paper.

Table E-2 Existing Regional Marketplace Capacity Summary

Facility Type	Organics Processing Facilities		Capacity within 25 Miles (tpy)	
	Total, Within 50 Miles	Within 25 Miles	Permitted	Available for Add'l Organics
Yard Waste Composting	10	6	28,400	10,000
Food Waste Composting	3	1	900	750
Anaerobic Digesters	[1]	[1]	[1]	[1]
Total	**13**	**7**	**29,300**	**10,750**

[1] Although no sites exist now, research identified potential for new sites in Pennsylvania and New Jersey capable of processing between 50,000 and 100,000 tpy.

As shown in the table, no anaerobic digesters (AD) currently exist within 50 miles of Philadelphia that are equipped and permitted to process food waste or compostable paper. However, there are several AD options either under consideration or under construction that could eventually play an important role in future organics processing infrastructure for Philadelphia.

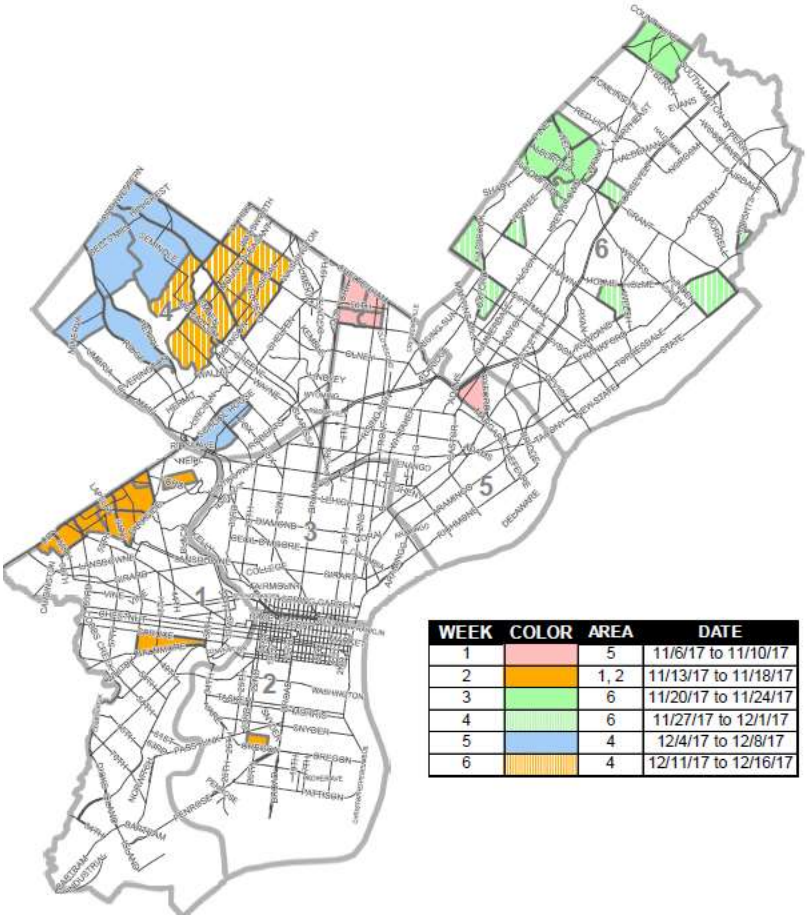
E 4. COLLECTION OPTIONS

The City of Philadelphia currently provides seasonal curbside collection of leaves to a very limited portion of the City, as shown by the shaded areas in Figure E-2. The City also has leaf and yard waste drop-offs at 24 sites throughout the City to provide additional service to those areas.

Given that the City of Philadelphia provides only seasonal leaf collection, and serves only limited areas with curbside leaf collection, the City has numerous options for expanding the collection of leaves and other yard waste, and possibly adding food waste collection. Although the specifics of any expanded or new program cannot be defined in detail, four options were identified that might be considered in Philadelphia in the future as organics processing infrastructure develops and diversion efforts ramp up. Three of these options would impact the residential sector as currently serviced by the City, and the fourth option would launch organics diversion in the commercial sector.

- **Option 1 - Geographic Expansion of Fall Residential Leaf Waste Collection**: The simplest option involves expanding the six-week mechanical leaf collection program to serve all City residents, including collecting bags of leaves at the curb from non-mechanical collection areas.
- **Option 2 - Extended Seasonal Yard Waste Collection for Residential Sector**: A more aggressive option would be to expand the program to include grass and yard waste along with the fall leaves and increase collection to a full nine months per year like many municipalities across the country.
- **Option 3 - Implement Full Organics Collection Including Food Waste for Residential Sector**: The most aggressive option, which is currently undergoing roll-out in New York City, would be to provide carts or other type of food waste containers to each resident and collect the combined mix of yard waste and food waste year-round.
- **Option 4 - Downtown Commercial Organics Collection**: Many cities across the nation have identified regions that have numerous commercial and institutional generators of food waste, such as restaurant districts, food wholesalers, and large institutions, and have begun offering limited commercial organics collection to "close the loop" in these regions.

Figure E-2 Current Leaf Collection Areas



The estimated costs to expand the public-sector organics collection program in the City, for these four options, is presented in Table E-3.

Table E-3 Summary of Organic Collection Options (Excludes Processing)

Residential Collection Option	Annual Tons Collected	Estimated Annual Cost ($ Million)	Cost/Ton	Estimated Diversion Rate [1]	Monthly Cost per Household [3]
Current Mechanical Leaf Collection [2]	1,687	$0.19	$113	0.4%	$1.93
Option 1: Universal Leaf Collection [2]	4,360	$1.54	$354	0.9%	$1.74
Option 2: Seasonal Yard Waste Collection	28,734	$9.74	$339	6.3%	$1.84
Option 3: Full Year Organics Collection	41,544	$15.72	$382	9.0%	$2.22
Option 4: Downtown Commercial Collection	2,275	$0.18	$82	N/A	N/A

[1] Based on the total estimated residential tons of waste discarded in 2015 (459,330 tons).

[2] Based on 2 months of service.

[3] Based on months of service provided.

E 5. PROCESSING OPTIONS

An extensive investigation was made to identify prospective processing sites in and around the City. A comprehensive map of the prospective sites is shown in Figure E-3. Much of the study attempted to identify publicly owned parcels that could most easily be developed. These options for expanding or accessing the organics processing infrastructure of the region are briefly highlighted below:

- **Increase Fairmont Park Compost Site Capacity**: The windrow layout of this Philadelphia Parks and Recreation (PPR) site could be improved to double its existing leaves and yard waste composting capacity to 3,000 tons per composting cycle, and with more aggressive windrow turning/processing operations, to 9,000 tons per year. This site could also continue to process an undetermined additional tonnage of brush and limbs/trees. Costs for site improvements are relatively small; however, the site has a significant need to increase its processing equipment redundancy.
- **Adding Composting to the NE Philadelphia Maintenance Shop Site**: The brush and tree processing operations at this PPR site could be expanded to include leaf and yard waste composting. This site is undeveloped, so it would require new grading, roads, paving, equipment and related improvements. If developed similar to the Fairmont Park improvements, it could process up to 9,000 tons per year of leaves and yard waste, plus an undetermined additional amount of brush and limbs/trees. If, instead, developed to use the extended aerated static pile technology (forced aeration), the leaf and yard waste (and other compostable organics, if desired) processing capacity could be doubled at this site, to 18,000 tons per year. It is assumed that air biofiltration could be provided with a compost blanket on top of the beds.
- **Philadelphia Prison System**: This existing site, currently under expansion, will be able to process food waste from all six correctional facilities in the City's prison system before the end of 2018. The expanded processing capacity of this site will be approximately 900 tons per year. It is not expected to have available capacity beyond serving the Prison System needs.
- **Philadelphia Water Department Modifications/Organics Preprocessing RFI Project**: The PWD has been investigating the feasibility and details of contracting with a private vendor to pre-process an estimated 100-200 tons per day of food scraps and similar compostables, with subsequent anaerobic digestion in PWD's existing anaerobic digesters. If this project moves forward, it could provide approximately 30-60,000 tons per year of additional processing capacity to the Philadelphia region. No cost information is available on this project, and PWD has reportedly not decided whether or not to proceed with it. If it proceeds, it would significantly increase the organics processing infrastructure in the region, especially for food waste.
- **Organics Transfer Operation**: An area of the ongoing Philadelphia Northwest Transfer Station Modifications project has been reserved for possible organics transfer into long-haul trucks, to economize on accessing more distant organics processing sites. It is anticipated that this facility would be capable of processing 50-100 tons per day of organics. The types of materials transferred will determine the need for biofiltration of building air; this is an optional component at this time, and not included in the project cost estimate. The contract terms, material requirements, and tip fees of using a distant processing site would need to be evaluated on a case-by-case basis, along with estimated hauling costs, in determining the feasibility of developing a public organics transfer facility project. Table E-4 shows the estimated costs to haul organics to some more distant processing sites.

The estimated capital cost of the above public processing infrastructure options is presented in Table E-5. As shown, the total capital cost to upgrade all sites is between $6 and $8 million, with the potential to add roughly 60,000 to 120,000 tons per year of organics processing capacity.

Table E-4 Long Haul Cost Table

Facility	Available Capacity, tons/yr.	Distance (mi.)	$/ton Transfer Facility Fixed Cost (1)	Cost per Load	
				Yard Waste Transfer and Haul	Food Waste Transfer and Haul
Organics Diversion LLC	15-30,000	15	Direct Haul	$138	$155
DCSWA Compost Farm	10,000	22	Direct Haul	$202	n/a
Waste Mgmt. Warner East	20,000	29	$3.80	$186	n/a
FCS Pottstown	20,000	43	$3.80	$231	$260
FCS Easton	24,000	67	$3.80	$290	$342
Veteran Compost	17,000	70	$3.80	$300	$353
Prince George's Co MD MES Site	TBD	140	$3.80	$524	$590

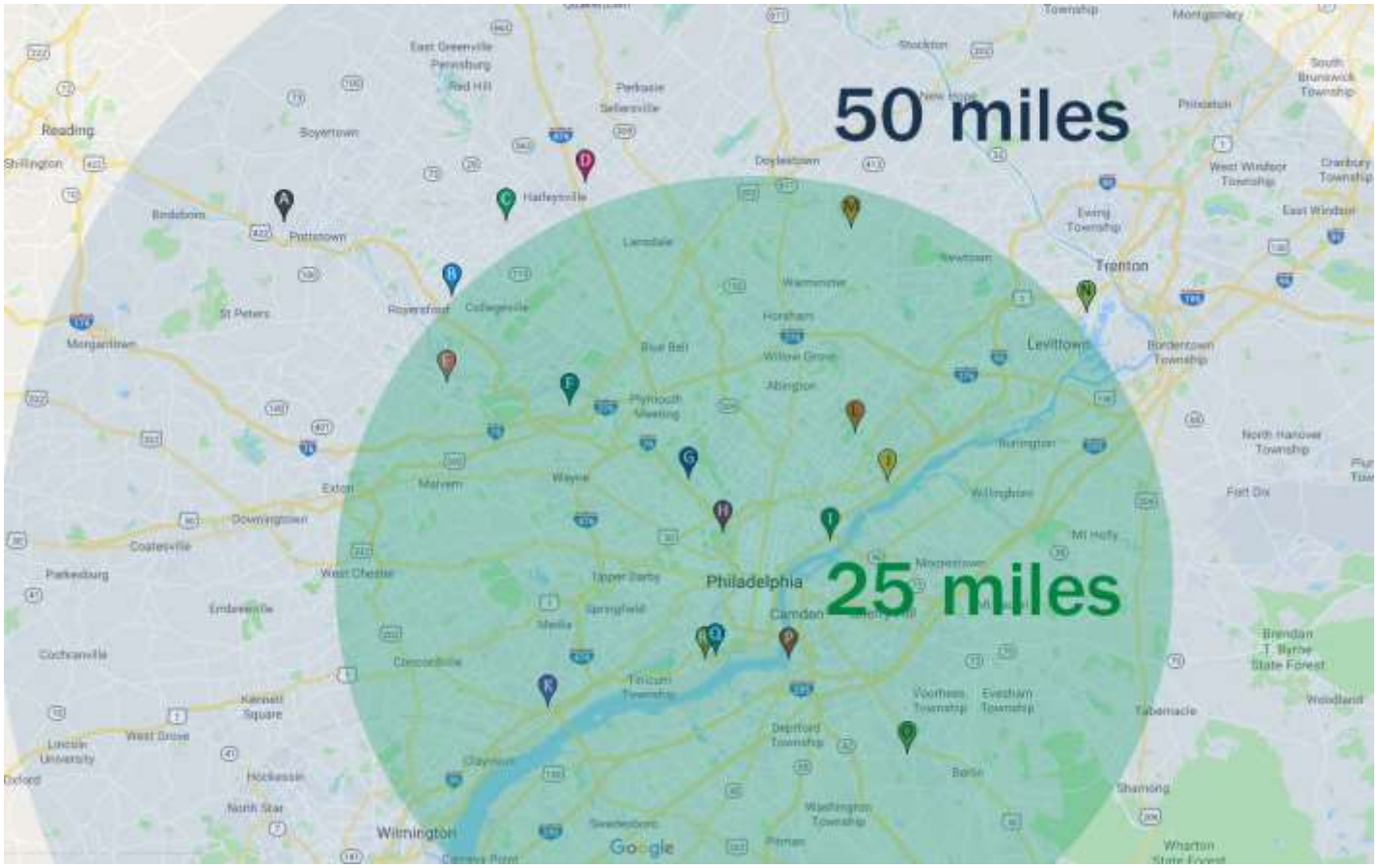
[1] Facility capital cost based on a $0.75 million-dollar transfer facility, amortized over 20 years at 8 percent, with annual throughput of 20,000 tons.

Table E-5 Public Organics Handling/Processing Options and Costs

Name	Estimated Capital Cost	Annual Capacity (tpy)	Type of Organics Processed
Fairmont Park Compost Improvements	$1-2 million	9,000	leaves, yard waste, brush/trees
Option A -NE Phila. Maint. Shop Site - Windrow Expansion	$4.6 million	9,000	leaves, yard waste, brush/trees
Option B - NE Phila. Maint. Shop Site - Extended Aerated Static Pile Expansion	$4.8 million	18,000	leaves, yard waste, brush/trees; food waste possible
Philadelphia Water Department AD Preprocessing Project	undetermined	30-60,000	food waste
Organics Transfer Facility at NW Transfer Station	$0.75 million	15-30,000	leaves, yard waste, brush; food waste possible
Total	**$6.4-7.6 million**	**63-117,000**	

It is also noted that the prospects of development of the Organics Diversion Anaerobic Digestion Facility in Gloucester City, New Jersey, could add 15,000 to 30,000 tons per year of yard waste and food waste/organics processing capacity to the regional infrastructure within the next year or two. Further, it is reported that a number of Pennsylvania on-farm anaerobic digesters, located 50 miles or more from Philadelphia, have a combined permitted capacity of over 50,000 tons per year of food waste. Hauling costs would be a factor in feasibility of using any of these sites, as well as contract terms and material requirements. These are less feasible options than other available options due to distance, and therefore have not been given further consideration at this time.

Figure E-3 Potential Organics Processing Sites



A. FCS Pottstown
B. Two Particular Acres
C. Barnside Farm YW Site
D. Mascaro Composting YW Site
E. Valley Forge Fill Site
F. Upper Merion T. YW Site
G. Transfer Haul to Remote Processors
H. Fairmont Park Organics Recycling Center
I. Philadelphia Water Department Site (B)
J. Philadelphia Prison System Composting Site
K. DCSWA Compost Farm
L. PPR NE Phila. Maintenance Shop Organics Site
M. Warwick Green Grinders
N. Waste Management Warner East YW Site
O. Gloucester Twp. MUA YW Site
P. Gloucester City Organics Recycling/Organics Diversion
Q. Victory Site
R. Philadelphia Water Department Site (A)

E 6. CONCLUSIONS AND RECOMMENDATIONS

There are many components to an integrated strategy to increase organics diversion and recycling in the City of Philadelphia; there is not a one-solution answer to recycling organics and working toward "zero waste." Rather, a successful program in the City will involve an extended process with multiple components that each chip away at the long-term goal, much as have been done at other successful organics diversion programs across the country.

One glaring distinction between other successful programs studied and Philadelphia's current waste management system is the level of dedicated funding to initiate and sustain the organics diversion program. Many high-diversion cities that offer organics collection and composting programs, including several that were benchmarked in this study, have a dedicated, direct revenue mechanism to charge waste generators the cost of providing the diversion programs. In Philadelphia's case, there does not currently appear to be a sustainable source of funding that is tied directly to the residential, institutional and commercial generators that would support the cost of the initial projects recommended here.

A number of recommendations are included here for the City's consideration, with a hypothetical implementation schedule presented in Figure E-4. The City should review these recommendations, review funding needs and options, and refine its own implementation program. The following, in brief, are recommendations of this organics feasibility study:

1. **Improve the operations, equipment and processing capabilities of the Fairmont Park Composting Site** for leaves, yard waste, brush and tree parts. This will involve some re-permitting, site cleanup and equipment repairs and purchases. Some staffing additions may be needed at higher processing throughputs.
2. **Develop the NE Philadelphia Maintenance Shop Site into a windrow composting site** for leaves, yard waste, brush and tree parts. This will involve site investigations, site design, permitting, and construction and equipment procurement. Note that if processing equipment from this site can be mobilized between the Fairmont Park and the NE Phila sites, some economy of redundant backup equipment is possible.
3. Support the PWD to **investigate the feasibility and cost of preprocessing food waste for anaerobic digestion**, with the caveat that organics generated from within the City be given priority for processing at these facilities.
4. **Continue to track the Organics Diversion AD project in New Jersey**, as an outlet for additional City organics primarily from the commercial sector.
5. **Revise the City's ordinances and regulations to encourage further organics diversion** and recycling from that sector of the City.
6. **Support private installation of kitchen sink grinders** where individual residents desire this, as a simple way to increase home organics diversion to PWD digesters.
7. Depending on growth of the regional organics processing infrastructure over time, assess the timing, funding and implementation of **expanding curbside collections of yard waste, and in the future, food waste and compostable paper**. Collection system growth should follow the growth of processing infrastructure, and not the reverse of this.
8. Determine the interest and processing capacity for a **downtown commercial organics collection program**; note that until and only if nearby organics processing infrastructure becomes available should the City consider this option.
9. **Reserve space at the Philadelphia Northwest Transfer Station site** for possible future addition of an organics transfer facility, if and when conditions and contract terms at a more distant organics processor justify the economical transfer of organics to the site.
10. **Community/Neighborhood Organics Programs should be encouraged to continue and to grow**. They provide an important niche service.
11. **Public education**, and continued training and education of new and growing organics diversion and recycling programs, should be a mainstay of any programs adopted.

Figure E-4 Philadelphia 5-year Implementation Schedule

Task	Subtask	Responsible Party	Proposed 5-Year Implementation Schedule																					
			2018				2019				2020				2021				2022				2023	
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1. Organics Feasibility Study Review & Approval																								
1a.	Delivery of Draft Sections to City	Consultant																						
1b.	Vetting of Report, Presentations	Streets Department																						
1c.	Comments, Edits, Finalization, Adoption	Streets, Consultant, Etc.																						
2. Revise Regulations on Private Waste Haulers																								
2a.	Work on Draft Revisions	Streets Dep't, Consultant																						
2b.	Public Review and Comments, Adoption	Streets, City Dep'ts																						
2c.	Public Meetings, Education on Changes	Streets																						
3. City Ordinance Changes for Organics Expansion																								
3a.	Draft Concepts/Changes from Consultant	Consultant																						
3b.	Develop Changes in Draft Ordinance	Streets, Consultant, Etc.																						
3c.	Adoption of Ordinance Changes	Streets, City Dep'ts																						
3d.	Public Meetings, Education on Changes	Streets																						
4. Fairmont Park Improvements																								
4a.	Finalize Improvement Plans, Equip. Needs	Consultant, Streets, PPR																						
4b.	Secure Funding for Project Improvements	Streets, PPR, City Dep'ts																						
4c.	Procure Needed Equipment/ Repairs	Streets,City Dep'ts																						
4d.	Permitting for GP030	Consultant, Streets, PPR																						
4e.	Clean Up Site for Expanded Use	PPR																						
4f.	Modify Operations for Efficiency	Consultant, Streets, PPR																						
4g.	New Operations at Site per Improvements	PPR																						
5. NE Phila. PPR Maint. Shop Site Improvements																								
5a.	Finalize Improvement Plans, Equip. Needs	Consultant, Streets, PPR																						
5b.	Secure Funding for Project Improvements	Streets, PPR, City Dep'ts																						
5c.	Wetlands Delineation, Habitat Resolution	Consultant																						
5d.	Site Design Plans & Specs.	Consultant																						
5e.	Permitting for GP030	Consultant, Streets, PPR																						
5f.	Site Clearing and Grubbing	Streets, PPR																						
5g.	Site Improve. Bidding and Construction	Consultant, Streets, PPR																						
5h.	Procure Operations Equipment	Streets,City Dep'ts																						
5i.	Commence Windrow Compost Ops.	PPR																						
6. Leaves and Yard Waste Collection Changes																								
6a.	Assess Timing of Collection Changes	Streets Dep't, Consultant																						
6b.	Secure Funding for Equipment Changes	Streets, Consultant, Etc.																						
6c.	Equipment, Staffing Coord. - Option 1 Coll.	Streets Dep't, Consultant																						
6d.	Public Education of Option 1 Collection	Streets Department																						
6e.	Option 1 Collections, to Fairmont Park	Streets Department																						
6f.	Secure Funding for Option 2 Equipment	Streets, Consultant, Etc.																						
6g.	Equipment, Staffing Coord. - Option 2 Coll.	Streets Dep't, Consultant																						
6h.	Public Education of Option 2 Collection	Streets Department																						
6i.	Opt. 2 Collections, to FP or NE Phl. sites	Streets Department																						
7. Other Measures																								
7a.	Public and Community Outreach	Streets Department																						
7b.	Followup Tracking/Coord. - PWD/OD/Etc.	Streets Dep't, Consultant																						
7c.	Reassess Add'l Organics Opportunities	Streets Dep't, Consultant																						

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1. INTRODUCTION

1.1 ORGANICS IN THE PHILADELPHIA MUNICIPAL WASTE MANAGEMENT PLAN UPDATE

The 2017-2026 Municipal Waste Management Plan (MWMP or Plan) for the City of Philadelphia (City) was prepared in September 2017 in accordance with the Pennsylvania Municipal Waste Planning, Recycling, and Waste Reduction Act of 1988 (Act 101). Prior to this, the City's last plan revision was submitted to PADEP on June 21, 2005. This is a "non-substantial plan" and is based on draft plan revision information prepared in March 2017, updated to include more recent data, programs, and policies supporting the City's goal of Zero Waste by 2035 (see Section 1.3 below). The 2017 plan update was developed incorporating many of the City's sustainability goals of the Greenworks Philadelphia program (summarized in Section 1.2 below). The Greenworks program was launched in 2009 and served as the City's first comprehensive sustainability plan. The City intends to prepare a "substantial plan" revision in 2018, which will coincide with issuance of a Request for Proposals in 2018 for disposal of City-collected waste (effective July 1, 2019) and an update of facilities designated for disposal of privately-collected waste.

The 2017 MWMP contains information on organics tonnage quantities and projections, as well as the current limited public and private activities and infrastructure to collect and process organic wastes in the region. The Plan also lays out some initial thoughts on recommended organics management ideas, but generally defers detailed organics strategies to this Organics Feasibility Study.

1.2 GREENWORKS PHILADELPHIA PROGRAM

Greenworks Philadelphia, the City of Philadelphia's first comprehensive sustainability plan, was launched in 2009. It encompasses five overall goals related to energy, environment, equity (making sustainability opportunities available to all cultures and language-speaking citizens), economy, and engagement. The 2015 Greenworks annual report reflected both an annual update of implementation progress, a final report on the program, and a list of initiatives for future sustainability efforts.

The "Environment" category of the Greenworks Program focuses on environmental stewardship, which encompasses three primary focus areas: greenhouse gas emissions, air quality, and the waste stream. From 2009 through 2014, the City's curbside recycling rate increased from eight percent to over 20 percent, and commercial and construction/demolition-related recycling rates in the City achieved all-time highs. The City's single stream recycling program, increased public events recycling, and implementation of "BigBelly" solar compactor waste receptacles throughout the City have all made recycling and litter control easier in the City. The City also met or exceeded its goal of diverting over 70 percent of its wastestream from landfilling through a combination of waste reduction, recycling, and waste-to-energy practices. The City's Streets Department has taken a lead role in shepherding initiatives to increase waste diversion and recycling in the City.

The 2015 Greenworks final report recognizes this Organics Feasibility Study as a future initiative that can help explore opportunities to divert organics from the City's wastestream. The Greenworks report recommends developing a strategy to reduce the amount of organics, both food and yard waste, in the wastestream. Given the large percentage of organics in the current waste stream, potential for further wastestream reduction through organics diversion and recycling is significant.

1.3 PHILADELPHIA ZERO WASTE PROGRAM

The City of Philadelphia's Executive Order 13-16 was signed by Mayor James F. Kenney on December 20, 2016. Executive Order 13-16 created a Zero Waste and Litter Cabinet to move the City toward a

zero waste and litter-free future. Philadelphia's long-term zero waste objective is to eliminate the use of landfills and conventional incinerators to process City wastes by 2035. To do this, Philadelphia must reduce waste generation and increase waste diversion by 90 percent by 2035 (based on 2015 waste totals), with the remaining 10 percent utilized as waste-to-energy.

The Zero Waste and Litter Cabinet was created as an interdepartmental effort to combat litter, enhance the cleanliness of streets and public spaces, and increase the City's waste diversion rate. The Cabinet, including the Mayor's office, City departments, City council, and public and private stakeholders, will engage in advancing legislation, policy, and coordinated initiatives to "achieve a city that wastes less and is litter-free." Cabinet subcommittees are focusing on work in five target areas: zero waste, litter enforcement and cleaner public spaces, data collection, behavioral science, and communications and engagement.

The Cabinet's Action Plan states that Philadelphia will achieve the goal of zero waste by year 2035 by implementing the following principles:

- Advocating for the design and management of products and processes that systematically eliminate the volume and toxicity of waste materials, while recovering these resources without disposing of them through incineration or burial.
- Not sending materials of economic or environmental value, whether for reuse, resale, or recycling, to landfills. Any materials that cannot be recovered or recycled should be utilized as waste to energy. However, the City will strive to make sure that waste to energy materials will represent only 10% of the total city waste stream by 2035.
- Developing a systematic approach to evaluating and managing the flow of resources and waste created by different communities, sectors, and institutions."

The Cabinet will issue annual reports on its progress in achieving its goals, similar to annual reports that were issued by the Greenworks program. Organics management can become a key strategy in helping the city attain its zero-waste initiative, which can help move Philadelphia toward achieving the Greenworks Philadelphia vision of becoming a more sustainable city.

1.4 ORGANICS FEASIBILITY STUDY OVERVIEW

The City wishes to add a focused organics management component to the recent effort to update its Municipal Waste Management Plan. Therefore, it secured Section 901 planning funds from the Pennsylvania Department of Environmental Protection (PADEP) to help support this Organics Feasibility Study.

The City estimates that as much as 350,000 tons per year of organics may currently be generated and disposed by Philadelphia's combined residential, institutional, and commercial sectors. In 2012, approximately 29,000 tons of combined residential and commercial organics were diverted from disposal in the City, which is less than eight percent of the City's estimated combined organics waste stream. There is potential to divert additional organics from the City's waste stream, to reduce the tons of waste being incinerated or landfilled, to avoid and/or redirect current organics disposal expenses to segregation and recovery activities, to reduce potential environmental impacts of disposal, and to effectuate a higher and better utilization of organics as a resource.

This feasibility study estimates quantities, identifies processing and recovery options, analyzes these options, and recommends specific steps to increase current organics diversion practices in the City of Philadelphia. A brief summary of the phases of developing this feasibility study is shown below.

1.4.1 PHASE 1

From project initiation through a contractual pause in the work on June 30, 2016 requested by the City of Philadelphia Department of Streets, the Consultant Team of Alternative Resources, Inc. (ARI) and Mid-Atlantic Solid Waste Consultants (MSW Consultants), supported by Keene Environmental Consulting conducted a number of scope tasks from the original Scope of Services for the Organics Feasibility Study, culminating with preparation and delivery of an interim progress report delivered to the Client and DEP in early July 2016. Based upon some of the interim "Phase 1" findings through June 30, 2016, certain modifications to scope and direction were incorporated into "Phase 2" of the study.

During Phase 1, the Team conducted the following summary tasks and subtasks from the original Scope of Services:

- **Task 1 - Project Initiation and Data Gathering**: The Team assisted the City of Philadelphia (City) with the preparation of a PADEP Act 101, Section 901 Planning Grant Application for the City's use in funding up to 80% grant assistance for this feasibility study. The Team gathered and reviewed data and background information that had been developed to date on the generation of organics in the City. These data and estimates regarding various sources of organics from within the City's municipal waste stream were tabulated and documented by ARI in a memorandum that is further discussed in Chapter 2 of this report. Future projections in these organics tonnages (types and tonnages) were also developed and included in the memorandum.
- **Task 2 - Organics Marketplace Assessment**: Under this task, the Consultant Team identified organics processors in the region, including outlets for leaves, brush, and food scraps, both public and private. The capacity for these outlets to accept additional organics from the City was assessed, and market rates for services were gathered. This information is presented in Chapter 3. Based on the findings of this Phase 1 Task, Phase 2 of the study refocused on existing and expanded capacity of the public sector in the City of Philadelphia to collect, process and recycle organics from the City's municipal wastestream.
- **Task 3 - Assessment of Organics Processing Options:** Under Phase 1, the Team made repeated requests to the Philadelphia Water Department (PWD) to provide data related to its capacity to accept additional organics at its anaerobic digestion (AD) facilities for processing, with very limited response. The Team also prepared an assessment of pre-processing options for organics prior to anaerobic digestion by the PWD. The need to refocus on existing City-related facilities in Phase 2 was identified in Phase 1.
- **Task 4 - Organics Collection Analysis:** Under Phase 1, the Team was to conduct an analysis of the existing City public collection system's capacity to begin collecting organics separately. However, based on the realization of limited funding and staffing to expand curbside organics collection by the City, Phase 2 of this study conducted a scaled-down analysis of the City's yard waste collection equipment and capacity to expand yard waste collection from City sources, as well as a limited assessment of curbside collection of source-separated organics (SSO) from its residents.
- **Task 5 – Report:** Under this task, the Team prepared initial findings of Task 1, Task 2, and Task 3 documentation (memorandums, tables, exhibits, etc.) that were delivered to the Client in early July 2016.

1.4.2 PHASE 2

Phase 2 of this feasibility study reflects a modified and refined scope and redirected budget, reflecting findings to date, and responsive to clarified and updated expressed interests of the City. Phase 2 of

this study is being completed by MSW Consultants with assistance and support from Keene Environmental Consulting.

Phase 2 focuses more on possible public solutions for organics recovery that are targeted and practical, in light of the limited available private marketplace infrastructure options. Phase 2 also includes insights into ways to stimulate long-term private interest in growing the organics management infrastructure in the region.

Included in this refocused Phase 2 analysis, incorporated in this report, are the following tasks:

- **Task 1 – Background Reports Review/ Benchmarking Review**: Several important documents were prepared since the Organics Study initiation.
  - The City's Solid Waste Management Plan (SWMP) was completed, with findings and recommendations regarding organics management in the City; Philadelphia Greenworks and ZeroWaste goals and visions related to enhanced organics management were unveiled; and Organics Subcommittee of the Solid Waste Recycling Advisory Committee discussions have continued.
  - Both New York City and Washington DC have made significant progress in developing organics management plans for their regions over the past 2-3 years. Due to their size, their proximity to the City of Philadelphia, and their timeliness to this study, the components of these plans are reviewed and considered for implementation n in the City of Philadelphia. Two other organics programs with possible relevance to the City's program due to size of unique features are the Seattle Washington and the San Jose, California Organics programs. These four programs are reviewed and summarized in Chapter 4 of this report and documented in more detail in appendices to this report.
  - A recent update to the City's waste and recyclables characterization analysis is reviewed for its relevance to City organics projections developed during Phase 1. This assessment is presented in Chapter 2 of this report.
- **Task 2 - Organics Marketplace Assessment Follow-up:** Under this task, the Team updated its marketplace analysis by reaching out to several key non-responsive (from Phase 1) or recently identified organics management players in the region, to determine interest and capacity to accept organics from the City and under what terms.
- **Task 3A Assessment of Organics Processing Options – Public Refocus:** Surveys conducted under Phase 1 of this study confirmed that, based on data gathered, there are presently limited private infrastructure options to handle the City's expansion of organics management. Therefore, this task was refocused to conduct a number of site visits and meetings to assess public infrastructure expansion or development to handle an expanded organics management role. For each site, determine its suitability and ability to play an expanded role in composting, determine required operational changes, and develop a conceptual site plan if appropriate. Potential sites are summarized in Table 1-1.

Table 1-1 Historic and/or Potential Sites for Organics Processing

Site	Summary
Phila. Parks and Rec. Department (PPR) - Fairmont Park Organics Recycling Center	Current leaf and yard waste windrow composting facility in NW part of City, processing the City's curbside-collected leaves since the 1980's. Current practices and site layout were reviewed to determine ways to increase operational efficiency and capacity of site to process additional leaves and yard wastes from the City.
PPR NE Phila. Area Maintenance Shop	Current tree and brush processing site from PPR sources in NE part of City. Current site layout reviewed to determine capacity to add capacity to compost leaves and yard wastes at this site.
Phila. Prison System Food Waste Composting	Current aerated static pile (ASP) bin composting operation in NE Phila. next to site of a former Phila. Correctional Facility. Utilizes trained prison staff to process food scraps from three City correctional facilities; under expansion to serve additional City corrections sites.
Phila. Water Department (PWD) Anaerobic Digesters (AD)	The PWD operates a total of 20 ADs, with a total capacity of approx. 40 million gallons, for biosolids stabilization and energy recovery at three (3) PWD wastewater treatment facilities in the City. These ADs have capacity to process additional organics, such as food scraps, if properly preprocessed prior to addition to the AD biomass. Also, capacity to accept additional residential and commercial food grinder organics via sewers.
PWD Biosolids Reclamation Center Site	Former site of PWD aerated windrow composting operation for biosolids. Currently houses Phila. Synagro Pelletization Facility, processing biosolids from PWD. Another paved portion of site is currently unused but may house an oyster shell processing operation.
Organics Transfer Operation – Phila. Northwest Transfer Station	Potential to include organics receipt and transfer as part of a current or future upgrade to the City's NW Municipal Waste Transfer Facility. This could help provide access to more distant public or private organics processing facilities.

- **Task 3B - Assessment of Organics Processing Options – Growing the Private infrastructure and Interests:** The New York City and Washington DC organics programs, as well as Seattle and San Jose may help provide insight to the City of Philadelphia into ways to stimulate private interest in the processing of organics generated by the City. Benchmarking these programs may yield ideas on recommended steps to stimulate on-site commercial composting from large organics generators from within the City; recommended steps to stimulate small scale commercial composting operations; recommended steps to stimulate long-terms development of composting infrastructure from within the City.
- **Task 4 - Targeted Organics Collection Assessment:** In consideration of current City budgetary and equipment restrictions, it may be difficult to consider initiation of a wholesale organics collection program in the City. Therefore, this task was restructured to:
  - Assess the current City waste collection fleet, staffing and operations. This was done by meeting with key public works/sanitation operations managers on-site to review the City's current waste collection practices, and to discuss the concept of expanded organics collection in the City, to obtain feedback and opinions from the managers on preliminary staffing and equipment requirements to expand operations.
  - Consideration of expanded brush and yard waste collection and management, to return to pre-2009 collection methods and quantities; possible food scraps collection options (such as

curbside vs. drop-off); consideration of ways to stimulate the growth of small-scale commercial organics collections serving targeted City waste generation sectors.

- Working with the Recycling Office to focus on how the commercial sector can be required and/or incentivized to collect and divert from disposal/recycle food scraps and other organics that are collected from within the City. A review of organics-related ordinances on the City books (from the SWMP summary appendix of City ordinances) can be made, and possible modifications to existing ordinances can be suggested.
- Identification of infrastructure changes that are needed to facilitate targeted and practical organics collection/diversion in the City.

- **Task 5 – Report:** under this task, the Team will document the findings and recommendations from the Phase 1 and Phase 2 activities, and provide appendices with supporting documentation to the Organics Feasibility Study report.

1.5 REPORT ORGANIZATION

This report is organized into the following sections:

- **Introduction** – this chapter lays out the overall background, goals and tasks in the study.
- **Organics Generation Projections** – this chapter presents estimates and projections of the quantities, types and sources of organics that found in the City of Philadelphia's municipal wastestream. Current estimated organics tonnages and near-term projections from the recently completed Solid Waste Management Plan for the City are presented in this chapter. The results from a recently completed waste characterization study of the City's municipal waste and recycling streams, highlighting recent changes in the municipal organic fraction of the wastestream, are also highlighted here.
- **Regional Marketplace** – in order to expand organics diversion and recycling in the City, the infrastructure to process these additional tons of organics need to be in place. This chapter presents the findings of an assessment of the existing regional marketplace to accept, process and compost/digest additional organics from the City. Shortcomings in the current (primarily private) system, and possible public measures to increase processing and disposal capacity of City organics, are presented here.
- **Benchmarking** – In this chapter, an assessment of other large organics diversion and recycling programs is conducted and presented. The programs chosen for benchmarking are selected for their proximity to the Philadelphia region, for their population size, and/or based on special programs and features that may be relevant to inclusion in this study. Good ideas from these programs are highlighted in this chapter for consideration.
- **Processing Options** – Since the existing regional infrastructure to handle expanded organics processing from City sources was determined to be very limited, this section focuses on opportunities to grow the public-sector facilities to handle additional organics.
- **Collection Options** – the existing City municipal waste and organics collection vehicle fleet and manpower are assessed in this chapter, and the capability and estimated cost to expand City organics collections are investigated. Means to stimulate additional organics collections by the private sector that serve organics-rich City waste generators are also noted.
- **Strategies for Expanding Organics Recovery** – Taking information and findings from the previous chapters that document City goals and objectives, current and future organics tonnages, marketplace capabilities to process and recycle organics, opportunities to grow public sector organics collection and processing infrastructure, and good ideas from other similar organics

programs that are underway (benchmarking), summary strategies for the City of Philadelphia to consider will be presented.

- **Recommended Implementation Schedule** – this chapter outlines the steps needed to implement the recommended organics expansion program in the City of Philadelphia, and the time period over which it is envisioned that these steps will be implemented.
- **Public Participation and 901 Grant Coordination** – this chapter documents the solid waste planning measures undertaken and public meetings held during the process of conducting this study. A Section 901 (Act 101) planning grant funded a significant portion of this organics feasibility study, so this section is also important for those purposes.
- **Appendices** – Detailed background and specifics of this study are presented in appendices, as a way to help keep the text of the report readable while providing necessary backup and details via appendices. The specific appendices included in this study are included in the Table of Contents to the study.

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2. ORGANICS GENERATION PROJECTIONS

2.1 PHILADELPHIA WASTE STREAM COMPOSITION OVERVIEW

The City of Philadelphia Streets Department, Sanitation Division is responsible for providing waste and recyclables collection and management services to the approximately 540,000 households[1] and small businesses it serves ("Residential Sector"). The Sanitation Division provides residential curbside refuse, bulky waste collection, and single stream recycling collection City-wide; and also performs illegal dumping clean-ups, litter removal, and street sweeping. The Division is responsible for the community outreach and educational initiatives that encourage recycling among its residential customers.

Commercial waste and recycling collection and management services, to larger businesses, restaurants, multi-family dwellings in excess of 6 units per building[2] and similar types of waste generators ("Commercial Sector"), are provided by the private sector.

A discussion of the likely composition of the residential and commercial MSW streams is provided below.

2.1.1 RESIDENTIAL WASTE STREAM COMPOSITION

To achieve a clear understanding of residential waste stream composition, the City of Philadelphia has conducted waste characterization studies at regular intervals. The City first performed such a study for its residential waste stream spanning data collection events in 1999-2000, (2000 Study), again in 2009-2010 (2010 Study), and most recently in 2017 (2017 Study). These studies quantify the total amount of waste and recyclables collected by the City of Philadelphia's curbside residential collection system, and estimate the composition of these disposed wastes to identify opportunities for increasing diversion within the framework of the City's long-term sustainability goals.

Table 2-1 presents the refuse (discarded waste) composition results from the 2017 Study, and compares them with the 2010 Study results for the same major waste components. For the purposes of this organics feasibility study, we have evaluated net discarded composition data (refuse, or disposed residential refuse), which best reflects the waste that is discarded and potentially available for new organics diversion and/or recycling opportunities.

[1] Confirmed February 2018 by the City of Philadelphia Streets Department

[2] Some multi-family buildings with more than 6 dwelling units are grandfathered in, and the City still provides them with refuse and recycling services.

Table 2-1 Compostable Organics in Residential Refuse

Material	2010 Study	2017 Study
ORGANIC/COMPOSTABLE		
Food scraps	10.8%	16.7%
Yard/Woody Waste	11.4%	8.3%
Compostable Paper	4.5%	5.6%
Subtotal Organic/Compostable	*26.7%*	*30.6%*
OTHER COMPONENTS		
Paper & Cardboard	10.2%	8.6%
Plastics	10.0%	11.2%
Metals	3.5%	3.1%
Glass	1.9%	2.2%
C&D	24.1%	19.0%
Textiles	7.5%	7.1%
Other	16.1%	18.1%
Subtotal Other Components	*73.3%*	*69.4%*
TOTAL	100.0%	100.0%

Significant changes in the organics fraction of residential refuse composition that have occurred between 2010 and 2017 are:

- Food scraps have increased significantly, from 10.8 percent to 16.7 percent of discarded refuse.
- The yard and woody waste component has decreased by several percentage points. However, this may be explained by the fact that the 2010 Study conducted sampling events in the spring and fall, both at times of seasonally increased yard waste generation and disposal activities. The 2017 Study sampling events were conducted during the winter and summer of 2017, both at times of the year when seasonal yard waste generation is expected to be lower. The difference in the two studies may merely reflect normal seasonal variations in yard and woody waste collection and disposal.
- Even with the lower off-season yard and woody waste totals measured in 2017, the combined organics/compostable fraction of the City's residential waste stream has grown from 26.7 to 30.6 percent from 2010 to 2017.

In autumn 2015, the City expanded its leaf collection service, including increasing the number of seasonal collection sites to 23 and re-establishing mechanical leaf collection in certain areas. This may result in a lowering of discarded yard and woody wastes.

2.1.2 COMMERCIAL WASTE STREAM COMPOSITION

Commercial waste generation and disposal in the City are not specifically tied to population growth, but are, rather, a function of the type of businesses and commercial establishments present, the size of those establishments, and the number of employees working there. The Philadelphia waste composition studies summarized above analyzed residential sector refuse disposal and recyclables activities and composition, not commercial sector activities. Therefore, a number of other commercial waste composition studies in the Northeastern and Mid-Atlantic regions of the United States were reviewed, and their composition

results compared. An average commercial waste composition breakdown was calculated from these other studies. Table 2-2 presents the results of this analysis.

Table 2-2 Commercial Refuse Composition Benchmarks

Material	Delaware Statewide 2016	Connecticut Statewide 2016	Maryland Statewide 2017	Wheelabrator Saugus (Boston Area) 2016	Regional Average Commercial MSW
ORGANIC/COMPOSTABLE					
Food scraps	21.9%	25.5%	18.3%	28.1%	23.4%
Yard/Woody Waste	3.8%	3.0%	0.5%	1.5%	2.2%
Compostable Paper	10.2%	12.3%	6.6%	4.2%	8.3%
Subtotal Organic/Compostable	*35.9%*	*40.8%*	*25.4%*	*33.8%*	*33.9%*
OTHER COMPONENTS					
Paper & Cardboard	15.7%	15.2%	20.8%	21.7%	18.3%
Plastics	16.9%	13.3%	14.1%	15.2%	14.9%
Metals	2.9%	4.4%	4.3%	3.4%	3.8%
Glass	1.7%	2.1%	1.2%	1.6%	1.7%
C&D	11.9%	11.3%	21.1%	18.0%	15.6%
Textiles	4.8%	3.1%	4.4%	3.0%	3.8%
Other	10.1%	9.8%	8.8%	3.2%	8.0%
Subtotal Other Components	*64.0%*	*59.2%*	*74.7%*	*66.1%*	*66.1%*
TOTAL (1)	99.9%	100.0%	100.1%	99.9%	100.0%

(1) Totals do not always round to 100.0% due to rounding.

The average composition values shown above in Table 2-2 are used as a basis for estimating the composition of Philadelphia's commercial waste stream.

2.2 ORGANICS IN THE PHILADELPHIA WASTE STREAM

The 2017 MWMP provides 2015 estimated residential and commercial disposed waste quantities. Table 2-3 presents a summary of residential and commercial sector organic waste composition fractions and estimated tonnages for year 2015 refuse totals. As Table 2-3 indicates, there are about twice the estimated tons of organics in commercial sector discards (294,582 tons) as in residential sector discards (140,758 tons), although both of these primary sources of organics discards are significant in both percentage and in quantity of their respective waste streams.

Table 2-3 Estimate of Organic Fraction in the City's Municipal Waste Stream – 2015(1)

Parameter	Residential Municipal Waste	Commercial Municipal Waste (2)	Total Waste Disposal
Waste Disposed from Philadelphia (tons) (2015)	459,330	868,974	1,328,304
Estimated Organic Fraction (%) (3)(4)			
Food Scraps	16.7%	23.4%	21.1%
Yard/Woody Waste	8.3%	2.2%	4.3%
Compostable Paper	5.6%	8.3%	7.4%
Total Percent	30.6%	33.9%	32.8%
Estimated Organic Fraction (tons) (3)(4)			
Food Scraps	76,874	203,340	280,214
Yard/Woody Waste	38,312	19,117	57,429
Compostable Paper	25,572	72,125	97,697
Total Tons	**140,758**	**294,582**	**435,340**

(1) Adapted from Table 5-2, Estimate of the Organic Fraction of Municipal Waste (2015), from the City of Philadelphia Streets Department Municipal Waste Management Plan 2017-2026, dated September 2017. Updated to reflect the 2017 Residential Sector waste composition study results, also updated to reflect revised Commercial Sector organics estimates that are based on recent Northeastern US and Mid-Atlantic US commercial waste composition study results.
(2) Excludes C&D waste.
(3) Residential waste characterization is based on the City's Residential Waste and Recyclables Characterization Study, 2017.
(4) Commercial waste characterization is estimated based on the average of data for four published composition studies: Delaware 2016 ICI; Connecticut 2016 ICI; Maryland 2016 ICI; Wheelabrator Saugus MA 2016 Commercial Sector.

Given a 2015 estimated City population of 1,567,443 (based on estimates used in Chapter 3 of the 2017 MWMP), City residents generate approximately 0.09 tons of organics per resident per year.

There were approximately 722,847 City employees in 2015, based on employment estimates used in the 2017 MWMP. Using business type, business size, and employment data across the various waste generators within the commercial sector, as well as estimated per-employee food waste generation rates from these commercial business sectors (from various literature sources), an estimated 0.41 tons of commercial-sector organic wastes were estimated to be generated per employee per year, on average.

Upon review of various websites and published studies presenting methodologies to identify major sources of organic waste from the commercial sector, an estimate was made of the types of commercial establishments that are expected to contribute to generating organics in the City of Philadelphia. Table 2-4 presents a breakdown of estimated commercial sector food waste generation by type of commercial establishment:

Table 2-4 Philadelphia's Estimated Sources and Quantities of Commercial Sector Food Waste 2015

Type of Establishment	Food Waste (tons/year)	
Restaurants	29,242	14.4%
Grocery Stores	25,038	12.3%
Food Manufacturing Establishments	7,539	3.7%
Grocery and Related Product Merchant Wholesalers	7,100	3.5%
Hospitals	6,242	3.1%
Nursing and Residential Care Facilities	15,894	7.8%
Colleges, Universities and Professional Schools	8,580	4.2%
Philadelphia School District	2,498	1.2%
Lodging and Hotels	2,765	1.4%
Venues and Events	848	0.4%
Other Commercial Establishments/Multi-Family Homes (>6-unit buildings)	97,594	48.0%
Total Food Waste	**203,340**	**100.0%**

2.3 ORGANICS PROJECTIONS THROUGH 2025

Using projected growth in the residential population in the City (from the Delaware Valley Regional Planning Commission/2017 MWMP) and a per-capita organics generation rate of 0.09 tons of discarded organics per capita per year, residential sector organics discards can be projected (assuming current waste composition and recovery programs continue without further change). The City's residential population is only projected to grow by a total of approximately 3.1 percent between 2015 and 2025.

Likewise, using City employment forecasts (from the DVRPC/2017 MWMP) by business sector and per-employee food waste projections that vary by sector (and average 0.41 tons per employee per year), commercial sector organics discards can also be projected. Employment in the City is projected to grow by a total of about 10.3 percent between 2015 and 2025.

Table 2-5 presents estimates and projections of organics generation from the residential and commercial waste streams in the City of Philadelphia through 2025, based on these growth rates and assuming no significant change in the rate of generation per person or per business.

Table 2-5 Projected Organics in Philadelphia Refuse Stream, 2015-2025 (Tons)

	Commercial Organics (tons)				Residential Organics (tons)				Total
Year	Food	Yard	Paper	Total	Food	Yard	Paper	Total	Organics
2015	203,340	19,117	72,125	294,582	76,874	38,312	25,572	140,758	435,340
	69.0%	6.5%	24.5%	100.0%	54.6%	27.2%	18.2%	100.0%	
2016	212,409	19,970	75,342	307,721	77,313	38,531	25,718	141,562	449,283
2017	220,247	20,706	78,122	319,075	77,582	38,665	25,808	142,054	461,129
2018	221,009	20,778	78,392	320,179	77,850	38,799	25,897	142,546	462,725
2019	221,771	20,850	78,662	321,283	78,120	38,933	25,986	143,039	464,322
2020	222,532	20,921	78,932	322,386	78,388	39,067	26,076	143,531	465,917
2021	223,146	20,979	79,150	323,276	78,605	39,175	26,148	143,927	467,203
2022	223,760	21,037	79,368	324,165	78,822	39,283	26,220	144,324	468,489
2023	224,374	21,095	79,586	325,055	79,038	39,390	26,292	144,720	469,775
2024	224,988	21,152	79,804	325,944	79,255	39,498	26,364	145,117	471,061
2025	225,602	21,210	80,022	326,834	79,471	39,606	26,436	145,513	472,347

As Table 2-5 shows, there is a significant fraction of organics in both residential and commercial sector discards that are potentially available for some type of organics recovery program. Also, this indicates that in order to achieve MWMP and Zero Waste Program initiatives, a significant reduction in organics discards will be necessary.

3. REGIONAL ORGANICS MARKETPLACE

3.1 PHASE 1 OF THE MARKETPLACE SURVEY

In the initial phase of the Organics Feasibility Study (Phase 1), MSW Consultants and another consultant working for the City, Alternative Resources Inc. (ARI), identified potential yard waste composters, organics processors, and large soil processors within a 25-50-mile radius of the City of Philadelphia. The 25-mile hauling distance is considered a reasonable distance for direct hauling of yard waste materials and some other organics. A longer hauling distance may be reasonable for mixed organics and larger volumes of organics if some kind of organics transfer haul operation is developed and utilized. Some food waste processors of longer distances than 50 miles were also identified and considered in this study, as food waste processors were found to be rarer in the region, and transfer of food wastes and similar organics to farther sites may be determined feasible under the right set of transfer and tip fee financial terms.

The initial list of prospective survey sites was presented and discussed with the Organics Subcommittee of the Philadelphia Solid Waste RAC on February 23, 2016, and the subcommittee was asked to suggest any additional sites for consideration.

3.1.1 SURVEY METHODOLOGY

Initially, a short survey was prepared containing questions regarding existing organics processing site capacity, features, capabilities and interests in accepting a significant quantity of organic materials from the City of Philadelphia. A form containing the survey questions that were asked is presented in Appendix B1. Both food waste processing sites and yard waste/soil processing sites were queried. Some sites provide multiple services.

The City's consultants conducted a series of phone calls in early to mid-2016 to collect survey data from these two primary groups of marketplace participants. Where the surveyors were not successful in obtaining survey responses (after making repeated calls), written surveys were then e-mailed to the targeted processing sites. Some facility information was also obtained from follow-up face-to-face meetings with site owners. The sites that were contacted for this survey are presented in a series of exhibits in this chapter, and responses are summarized in tabular form, as further described below.

3.1.2 SURVEY TARGETS

The facilities targeted in the survey fell broadly into three types:

- **Yard Waste and Soil Processors** – this targeted survey site list is comprised of primarily public sites, with a smaller number of private sites represented. This is reflective of the regional saturation of municipal yard waste composting sites that service Southeastern Pennsylvania. A number of private yard waste and soil processing sites were also queried for the Phase 1 survey.
- **Food Waste Processors** – the sites surveyed for food waste processing/composting were, due to the lack of public composting infrastructure in the region, focused on private-sector facilities. Even within 50 miles of the City, limited food waste composting options exist, so the query for this survey was expanded beyond 100 miles for several sites. Distant food waste processing sites to the northeast of Philadelphia, in the direction of New York City, received little focus for this Phase 1 survey, due to the fact that New York City is undergoing its own aggressive organics diversion program which is generating large quantities of curbside-collected and drop-off site organics that need to be processed by their own existing and expanded food waste processing infrastructure in that region. To the southwest of Philadelphia, in the direction of Washington D.C., publicly-sponsored organics recovery programs are in much more of a fledgling state, so two sites in that area were also included in our Phase 1 survey.

- **Anaerobic Digestion Processors** - due to close proximity to the City and potential untapped processing capacity, the initial target for anaerobic digestion (AD) of food waste and organics in Phase 1 of this study was the Philadelphia Water Department (PWD). PWD's Northeast Treatment Plant has eight (8) digesters with a combined capacity of approximately 16 million gallons (MG); the PWD Southwest Treatment Plant has 12 digesters with a combined capacity of 24 MG. In total, the 20 PWD digesters have a combined capacity of 40 MG; for planning purposes (with one AD unit out of service at each site), "available" capacity in PWD's ADs totals 36 MG. Approximately half of this available capacity may not be needed to process current quantities of wastewater plant biosolids from PWD's sewer system service area. Therefore, potential exists for PWD digesters to receive significant quantities of City food wastes, if properly pre-processed. However, PWD was generally non-responsive to Phase 1 inquiries to discuss this potential.

3.1.3 SURVEY RESULTS

The City's consultants obtained relatively good responses from the yard waste and soil processing business sector but had less success in surveying the food scraps processing sector, despite multiple calls and e-mails to each contact. A geographical representation of the 25 and 50-mile regional marketplace planning radius around the City of Philadelphia, along with a depiction of sites that did, and did not, respond to the Phase 1 regional marketplace survey, are presented in a series of Chapter 3 exhibits.

Those from the marketplace that participated in the Phase 1 Food Waste Processors Survey are presented geographically in Exhibit 3-1, with a total of 13 Phase 1 respondents. Since there were a significant number of non-respondents to the Phase 1 Food Waste facility survey (initially, about a dozen), these non-participating sites are depicted separately in Exhibit 3-2. A detailed tabulation of feedback obtained from respondents to the Phase 1 Food Waste Survey is presented in Appendix B2. General trends and overall feedback from this marketplace sector are summarized in the results section below.

Those from the regional marketplace, as defined above, that participated in the Phase 1 Yard Waste and Soil Processors Survey are presented geographically in Exhibit 3-3. There was a high level of participation from this type of processing facility, with a total of about 30 Phase 1 respondents. A detailed tabulation of feedback obtained from respondents to the Phase 1 Yard Waste and Soil Processors Survey is presented in Appendix B3. Also, general trends and overall feedback from these respondents are summarized in the results section below.

- **Results: Yard Waste and Soil Processors**

Of the 30-yard waste and soil processors successfully surveyed in Phase 1, nine (9) sites (primarily private sites) indicated a potential willingness to take leaves and yard waste from the City of Philadelphia. These sites are summarized in Table 3-1 and in the narrative bullets that follow the table.:

Table 3-1 Potential Processing Capacity from Yard Waste and Soil Processors

Site Name	Site Location	Distance From Central Phila. (mi.)	Permitted Capacity	Available Capacity	Interest in Accepting Phila. Organics?
Within 25 Miles of Central Philadelphia					
Gloucester T. MUA	Glendora NJ	13.2	128,600 cy (equiv. 8,000 tons @ 250 lbs./cy)	TBD	Yes - if capacity available
Organic Diversion LLC (PROPOSED SITE - UNDER CONSTRUCTION)	Gloucester City, NJ	15.4	400 tons max./day mixed organics (@250 tons/d avg., 72,000 tons/yr.)	TBD - 50-100 tpd (15-30,000 tpy) possible, mixed organics	Yes - commercial sector
Upper Merion T.	Upper Merion, PA	20.2	4,000 tons	TBD	Undetermined
DCSWA Compost Farm	Clifton Heights, PA	21.4	15,000 tons	10,000 tons	Yes
Valley Forge Fill Site	Merion, PA	21.8	n/a, processing only	TBD	Yes
Subtotal:			91,000+ tons	25-40,000+ tpy	Yes - if capacity available
Available Capacity w/in 25-50 Mi. of Phila.					
four sites (combined)	various	25-32 miles	22,000+ tons (est.)	Undetermined	Yes - if capacity available
Total Capacity ID'ed w/in 50 Mi.			113,000+ tons (est.)	TBD	Yes - if capacity available

- **Gloucester T. MUA Compost, Glendora, NJ** – permitted to take 126,800 cubic yards (cy) of material. Available capacity for Philadelphia is based on capacity at the time a formal request for materials processing is submitted.
- **Organics Diversion, Gloucester City, NJ** – Facility is permitted and currently under staged construction. This is proposed as an AD facility plus possible second-stage digestate composting that will process take food waste and organics along with yard waste. A total of 15-30,000 tons of capacity may be available annually from this facility, once constructed, to accept additional mixed organics from the region.
- **Upper Merion T. Compost, Upper Merion T., PA** – permitted for 4,000 tons, interest and capacity for Philadelphia materials undetermined at this time (but believed open to consideration).
- **DCSWA Compost Farm, Clifton Heights, PA** – approx. 5,000 tons of remaining permitted capacity exists.

- **Valley Forge Fill Site, Merion, PA** – processing site only, interest exists in taking materials (no specific quantities indicated in survey).
- **Warwick Green Grinders, Warwick PA** – processing site only, interest in taking brush, but no indication of quantities available.
- **Mascaro Composting, Franconia, PA** – permitted for 6,000 cy; quantities of leaves and yard waste that could be accepted would be based on available capacity at the time.
- **Waste Management Warner East Compost, Morrisville, PA** – permitted for 20,000 tons; quantities of leaves and yard waste that could be accepted would be based on available capacity at the time.
- **Barnside Farm, Schwenksville PA** – 5,000 cy of capacity reportedly available; quantities of leaves and yard waste that could be accepted would be based on available capacity at the time.

In summary, a significant quantity (25-40,000 tons annually) of permitted and available capacity exists (or will soon exist, once the Organics Diversion facility construction is complete), for potentially taking leaves, yard waste and/or brush from the City of Philadelphia at five (5) of these sites that are located within 25 miles of downtown Philadelphia. All of these prospective sites would require further follow-up, negotiation of terms and conditions of materials delivery, and determination of acceptable sources and quantities that could be delivered, on a case-by-case basis. Hauling equipment/manpower requirements, and costs to haul to these sites would need to be determined on a case-by-case basis.

- **Results: Food Waste Processors**

Of the 13 food processing sites that responded to the Phase 1 survey (of approximately 25 sites contacted), six (6) sites (primarily private sites) expressed some interest (or did not rule out acceptance), and have some available capacity, for taking food waste from the City of Philadelphia. These sites are summarized in Table 3-2 and the narrative that follows the table.

Table 3-2 Potential Processing Capacity from Food Waste and Organics Processors

Site Name	Site Location	Distance From Central Phila. (mi.)	Permitted Capacity	Available Capacity	Interest in Accepting Phila. Organics?
Within 25 Miles of Central Philadelphia					
None Identified (other than Organics Diversion LLC (OD LLC), listed in Table 3-1, for mixed commercial waste acceptance)					
Subtotal:			None Add'l to OD LLC	None Add'l to OD LLC	n/a
Available Capacity w/in 25-50 Mi. of Phila.					
two sites (combined)	various	33-43 miles	55,000 tons/year	23,500 tons/yr.	Yes - with conditions
Total Capacity ID'ed w/in 50 Mi.			55,000 tons/year	23,500 tons/yr.	Yes - with conditions

- **Oregon Dairy Organics, Lititz, PA** – availability of 5,000 tons per year (tpy) of organics receipt, depending on daily delivery limits; terms negotiable.
- **Veteran Compost, Aberdeen, MD** – 60 tons per day of remaining capacity available (equivalent to 15,000-16,000 tpy); preference is for trailer loads of source-separated pre-consumer organics from grocery stores and food distribution centers.

- **Prince George's County Compost Site, Upper Marlboro, MD** – this Maryland Environmental Services (MES) site is currently expanding to process an additional 4,000 tpy of food waste and additional yard waste (see the Appendix A benchmarking writeup on the Washington DC organics program for further information on the PG County facility expansion plans); the willingness of this site to serve Philadelphia's needs is unknown.
- **Two Particular Acres, Royersford PA** – this site may have 3,500 tpy of remaining capacity. Will accept trailer loads of organics clean of contamination.
- **FCS Pottstown Trap Rock Composting Facility, Douglassville PA** – this site may have 20,000 tpy of remaining capacity. Will accept trailer loads of organics clean of contamination.
- **FCS ABE Materials, Easton PA** – this site may have up to 24,000 tpy of remaining capacity once it is fully built out. Will accept trailer loads of organics clean of contamination.

In summary, these food waste composting sites do have some interest and capacity (a combined 23,500 tpy for sites within 50 miles of Philadelphia) to take food waste from the City of Philadelphia (not including Organics Diversion LLC, which could offer an additional 15-30,000 tpy of mixed commercial organics processing capacity), depending on source and type of the material, absence of contamination, delivery vehicle type, and other terms and conditions of service. However, none of these sites are within 25 miles of downtown Philadelphia, other than Organics Diversion, which is listed in Table 3-1, and is under construction. Hauling distance from Philadelphia will be a prime factor in the feasibility and transportation cost of hauling organics to a site or sites; organics transfer may make longer distance hauling more feasible, as further considered in Chapter 5.

Also, as with yard waste, terms and conditions, as well as availability of capacity, will be on a case-by-case basis, and quality of the materials delivered will be of high importance in securing and retaining a food waste composting site contract or contracts.

- **Results: Anaerobic Digestion**

Under Phase 1, the Team made repeated requests to the Philadelphia Water Department (PWD) to provide data related to its capacity to accept additional organics at its anaerobic digestion (AD) facilities for processing, with very limited response. While the PWD has made its own internal assessment of AD potential for accepting additional organics at its AD facilities, it had not shared report details with the Team at the conclusion of Phase 1 of this study.

PWD strongly believes that pre-processing of organics would be a minimum requirement of any project that considers using its ADs to process food waste and similar organics. A generic assessment of pre-processing options/technologies for preparing organics for AD treatment was assembled during Phase 1 on behalf of the City of Philadelphia by City consultant ARI. A memorandum documenting this pre-processing options analysis is included in Appendix B4 of this report.

PWD has since proceeded to gather information on its own from potential bidders (a non-binding Request for Information, or RFI) regarding possible bidding of PWD AD organics processing services (with vendor-provided preprocessing of organics), to potentially utilize some of PWD's unused AD processing capacity. RFI submissions were submitted in 2017 and are under review by PWD.

- **Phase 1 Survey Conclusion**

This feedback obtained from the Phase 1 survey indicates that, in general, there is (will be, once the Organics Diversion LLC facility in New Jersey is constructed) potential capacity, primarily in the private sector, to process 25-40,000 tons per year of leaves, yard waste, and food waste/compostables from facilities located within 25 miles of downtown Philadelphia. Further determination of feasibility should be made on a case-by-case basis; financial feasibility will be highly dependent on hauling costs and tipping fees at the site(s). Quality and lack of contamination of the organic materials being delivered for processing will be of paramount importance to the acceptance of these materials from the City for processing by these

sites. When expanding consideration for hauling to more distant processing sites (25-50 miles from Philadelphia), potential exists for processing 50-65,000 tons of organics at the identified sites. These numbers do not include possible processing at PWD AD facilities or other AD sites that were further identified in Phase 2 below. Still, these is may not be sufficient capacity at existing processing sites near Philadelphia to accept as much as 100,000 tons of organic materials that the City initially estimated as available for diversion and alternate processing, and there is no guarantee that all identified existing processing capacity near Philadelphia will be made available to process City organics sources under reasonable financial terms.

3.2 PHASE 2 FOLLOW-UP

The results of the Phase 1 survey resulted in a refocused marketplace assessment during "Phase 2" to see if the capacity at City-related outlets for organics can be further developed/expanded to accept additional tons of organics (leaves, yard waste and brush) from City sources. Also, Phase 2 attempted to gather additional information on key non-responsive organics processors from Phase 1 (such as the PWD) that are still thought to be of potential benefit to a City program, as well as farm-based AD facilities that may be able to provide some services in organics processing for City organics (at some additional hauling cost).

3.2.1 PUBLIC SECTOR FOCUS

Sites that were identified for further evaluation, the results of which are presented in Chapter 5 of this report, included:

- **The Philadelphia Parks and Recreation (PPR) Fairmont Park Organics Recycling Center** – this site currently accepts leaves, yard waste, and brush/logs for processing. A review of the feasibility of expanding operations at this site could result in modifications that become a key part of the City's growing program to manage yard waste. An analysis of expanding site operations in included in Chapter 5.
- **The PPR NE Philadelphia Maintenance Shop Site** currently processes logs and brush. Consideration for expanding site operations to also compost leaves is evaluated and presented in Chapter 5.
- **The Victory Site**, under control of the City Aviation Department and located near the Philadelphia Airport, was given a site visit by the consultant. Initial reaction is that this site is too small to be of use for the City's leaf and yard waste composting and brush processing needs.
- **The Philadelphia Water Department's (PWD) Biosolids Reclamation Center (BRC) Site** formerly housed the PWD's outdoor aerobic windrow composting system, and that contains large paved areas of the site that are presently unused. However, after visiting the site and conferring with City officials, it is understood that this site has been obligated on a long-term basis to other uses and parties that are under contract with the PWD.
- **The Philadelphia Prison System's Aerated Static Pile Composting Site**, which is currently under expansion for the processing of food scraps from select prison buildings, to serve additional buildings within the prison system, was visited and considered for support of organics composting in the City.
- **PWD Wastewater Pollution Control Plant (WPCP) Anaerobic Digestion (AD) Facilities** (located at two of the three PWD WPCPs) have unused processing capacity that may 1) potentially play a larger role in accepting pre-processed food scraps and/or additional organics loadings from residential and commercial food grinders in the service area and may 2) accept additional organics (beyond wastewater biosolids) from the City. The PWD is in the process of reviewing responses from a Request for Information (RFI) conducted by PWD during 2017 for informal ideas from private entities to pre-process and deliver prepared organics to the PWD AD sites. The PWD prospects and the RFI are further discussed in Chapter 5.

- The City should consider the requirements and need for possible transfer and hauling of organics to a more distant processing location; this concept is further analyzed in Chapter 5 of this report.

Exhibit 3-1 presents the geographical location of the BRC site (Map Pin ID "P", co-located with Synagro, which processes PWD biosolids post-AD), the Philadelphia Prison ASP site (Map Pin ID "R"), the Philadelphia NW Transfer Station location (Map Pin ID "S") where organics transfer could be added in the future, and a couple additional existing sites that have been given further consideration in discussions.

Exhibit 3-3 shows the location of the two PPR sites (Map Pin IDs "e" and "f"), where expansion of current leaf/yard waste/brush operations are under consideration for possible expansion, as well as Britton Industries (Map Pin ID "g"), an additional existing soil and organics processor.

3.2.2 ADDITIONAL PRIVATE FACILITIES

Other AD facilities in the larger geographic region that have been permitted by PADEP to accept food waste for processing, which are farm digesters with some capacity to process food waste, have been identified in Phase 2 of this study. Although there are no farm digesters located in Southeastern or northeastern PA, the Southcentral PADEP region of PA has issued permits for a total of eleven (11) farm digesters, which have potential to serve some of the City's expanded organics management needs. An April 2014 presentation by the PA Recycling Markets Center indicated that farm digesters located in the SC region are permitted to accept as much as 55,000 tons of food waste for processing (although this does not indicate remaining capacity or interest in serving the City's needs.

Exhibit 3-4 presents the location of eleven (11) farm digesters that are located in the Southcentral Region of PADEP that are permitted to accept quantities of food waste for AD.

Two additional private facilities of interest that were further followed up with during Phase 2 are the Organics Diversion LLC composting facility that is proposed (with sitework and utilities completed, and construction to begin in 2018) in Gloucester City, NJ. Organics Diversion indicates that they may have 50-100 tons per day of uncommitted capacity in the new 2-stage (AD and digestate composting) organics processing facility, and they already service existing commercial clients in Philadelphia and throughout the region. Organics Diversion currently collects organics, which are delivered to farms in NJ as animal feed. Due to close proximity to the City and existing service to commercial accounts in the City, this facility warrants consideration as a part of the City's organics management future. Secondly, Britton Industries has a large soil and mulch materials processing and distribution site in NE Philadelphia that already provides some services to the City of Philadelphia. This site should be considered due to its City proximity, its size, and its current relationship with the City. These sites are further discussed in Chapter 7 of this report.

In addition, it is noted that there are some small composting operations in or near the City that are expected to play a continued role in diverting and processing smaller quantities of organics from various sectors of City organics generators. These include Bennett Compost, Circle Compost, The Compost Coop, and the Dirt Factory. The role of facilities like these in the organics management strategy of the City in the future are further addressed in Chapter 7.

3.3 CONCLUSIONS

Regional marketplace capacity in existing and nearly constructed facilities is presented in Table 3-3, which summarizes information presented in the preceding sections of this chapter. As this table shows, existing facilities within 25 miles of downtown Philadelphia could provide as much as 40,000 tons per year of organics processing capacity (once the Organics Diversion LLC facility comes on-line); perhaps more processing capacity may be available from additional facilities that did not declare specific capacity availability.

Table 3-3 – Existing Regional Marketplace Capacity Summary

	No. of Responsive Facilities Identified in Chapter 3 – Phase 1 and Phase 2		Capacity of Identified Sites	
Facility Type	Total	Within 25 Miles	Permitted Capacity w/in 25 Miles	Available Capacity w/in 25 Miles
YW	9 (+ 2 PPR Sites)	5 (+ 2 PPR Sites)	91,000 tpy (+ PPR)	(25-40,000 tpy (+ PPR)
Food Waste	6 (+ OD LLC Site, included in YW above)	1 (OD LLC, also included above)	None Add'l to OD LLC	None Add'l to OD LLC
AD	11 (+ 2 PWD Sites, OD LLC)	Only the 2 PWD Site Digesters and OD LLC	Undetermined	Undetermined
Total	**30**	**9**	**91,000+ tpy**	**25-40,000+ tpy**

Table 2-5 of Chapter 2 contains discarded organics projections from the City of Philadelphia through year 2025. From 2015 through 2025, discarded organics from the residential wastestream are projected to grow from 140,000 tons to over 145,000 tons annually. During this same time period, commercial organics discards in the City are projected to grow from nearly 300,000 tons to over 325,000 tons per year. Combined, these organic discards will total over 470,000 tons annually by 2025. Philadelphia's zero waste initiatives have a goal of 90% waste reduction by year 2035. Clearly, the existing organics processing infrastructure needs to be expanded significantly by 2035 if this goal is to be attained (or even approached).

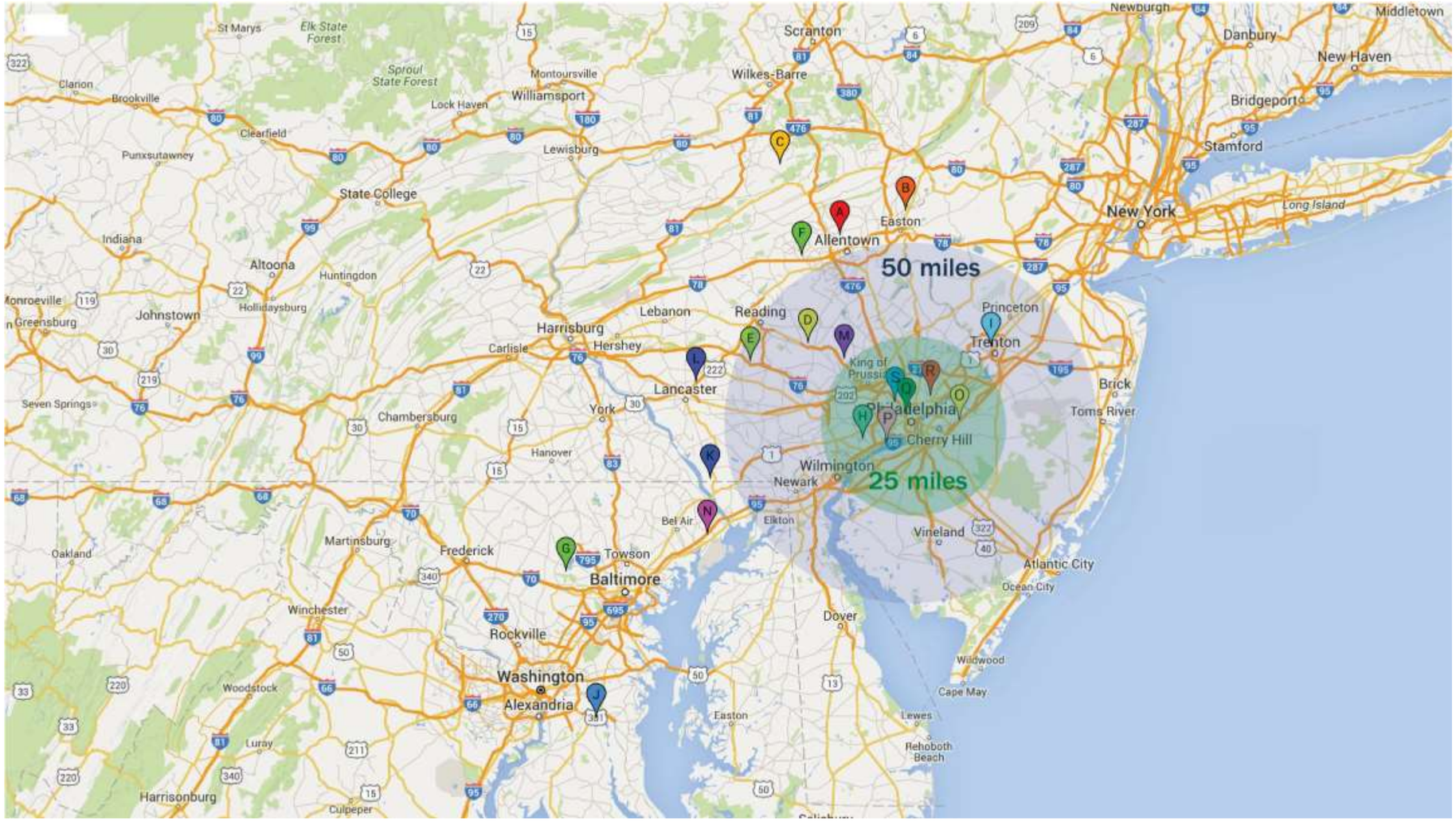
Initial infrastructure expansion should first look at expansion of existing public facilities, including the two existing Philadelphia Parks and Recreation (PPR) organics processing sites and the 20 PWD anaerobic digesters. Transfer to more distant (beyond 25 miles from Philadelphia) organics processing sites may make these additional processing sites more accessible, via organics transfer to more economical hauling vehicles. All of these options are further assessed in Chapter 5.

Expansion of private sector facilities and requirements is an additional strategy that will be addressed in Chapter 7.

EXHIBIT 3-1 – 3-4

Exhibit 3-1 Regional Food Waste Processing Facilities Survey

Responsive



PHASE 1 SURVEYS

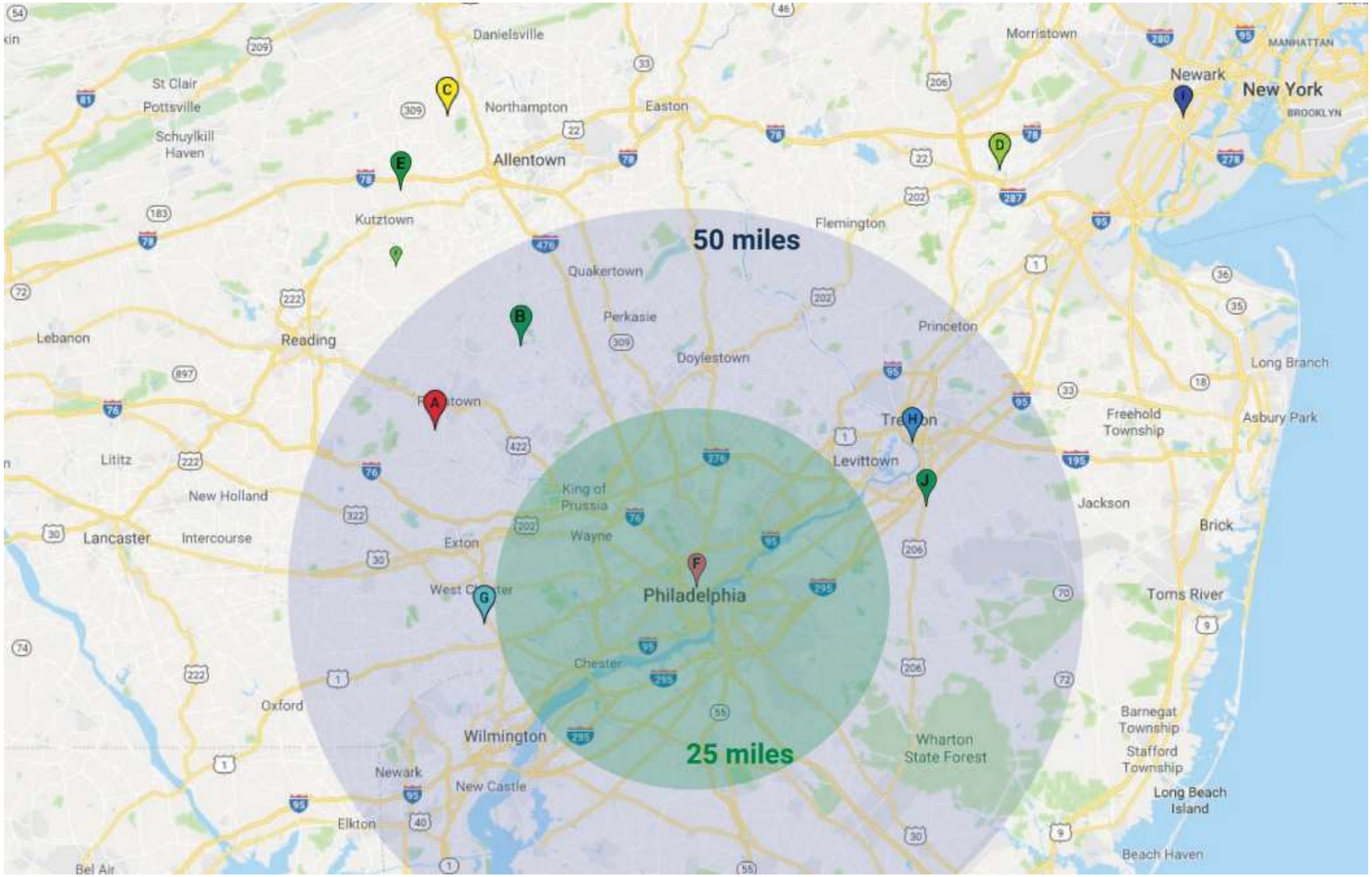
A: FCS Partners, LLC - Haines & Kibblehouse, Inc.: ABE Materials, Allentown
B: FCS Partners, LLC - Haines & Kibblehouse, Inc.: ABE Materials, Easton
C: FCS Partners, LLC - Hazleton Material Composting Facility
D: FCS Partners, LLC - Pottstown Trap Rock Composting Facility
E: FCS Partners, LLC - Silver Hill Quarry
F: Four Springs Farm
G: Howard County Pilot Composting Facility
H: Linvilla Orchards
I: Premier Food Waste Recycling
J: Prince George's County Yard Waste Composting Facility
K: Terra-Gro: Graywood Farms
L: Terra-Gro: Oregon Dairy
M: Two Particular Acres

PHASE 2 FOLLOW UP

N: Veteran Compost
O: Gloucester City Organic Recycling/Organics Diversion
P: Synagro Philadelphia Biosolids Reclamation Center
Q: Bennett Compost
R: Philadelphia Prison System ASP Composting Site
S: Philadelphia NW Transfer Statn, Pot'l Organics Transfer

Exhibit 3-2 Regional Food Waste Processing Facilities Survey

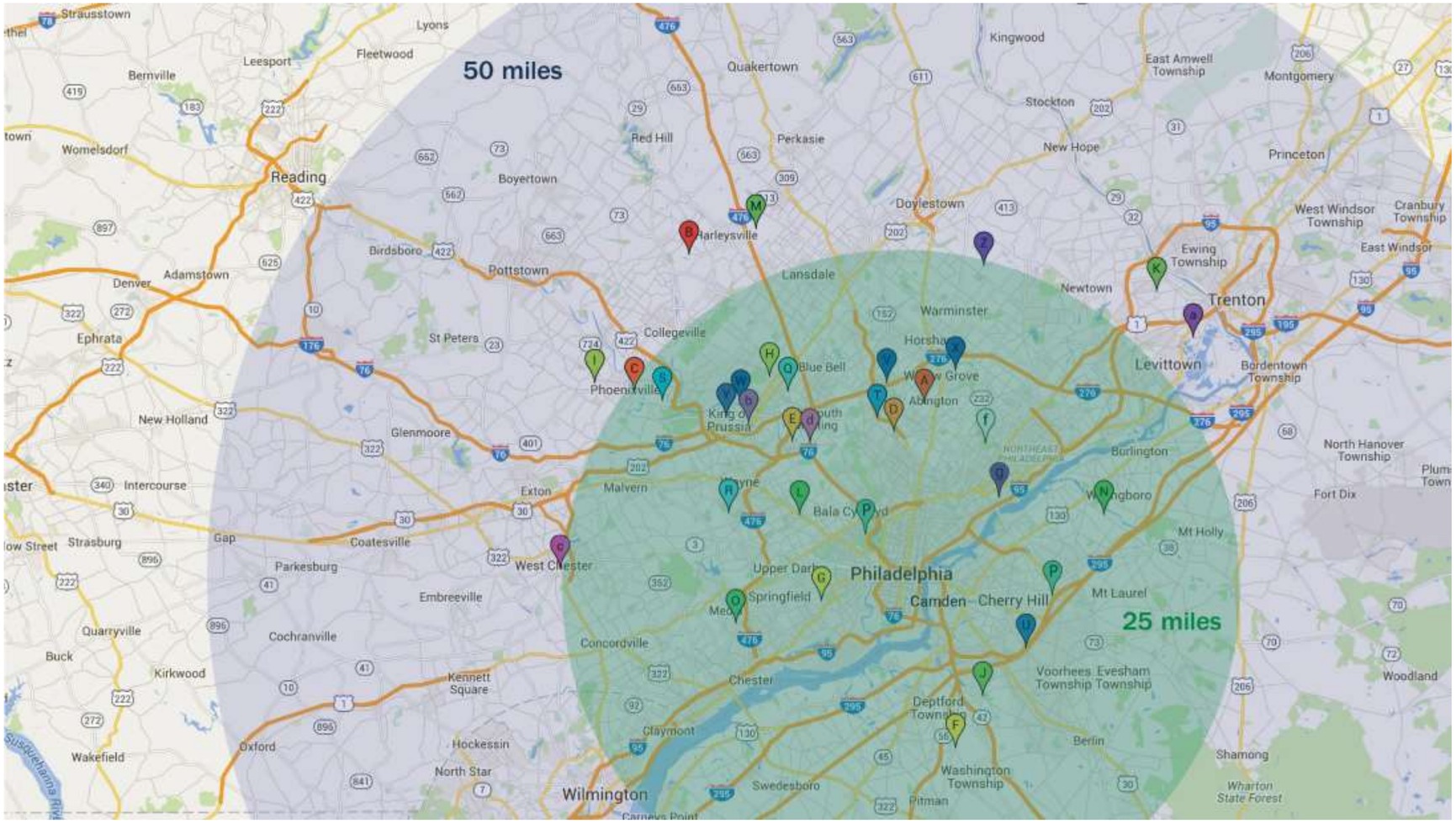
Unresponsive



A: Arborganic Acres
B: Hidden Creek Stock Farm
C: Lehigh County Organics Recycling Facility
D: Republic Services of NJ, LLC d/b/a Midco Waste
E: Rodale Institute
F: Save Some Green
G: Thornbury Farm
H: Trenton Biogass, LLC
I: Waste Management of New Jersey, Inc.
J: WeCare Organics Burlington Co. Co-Composting Facility

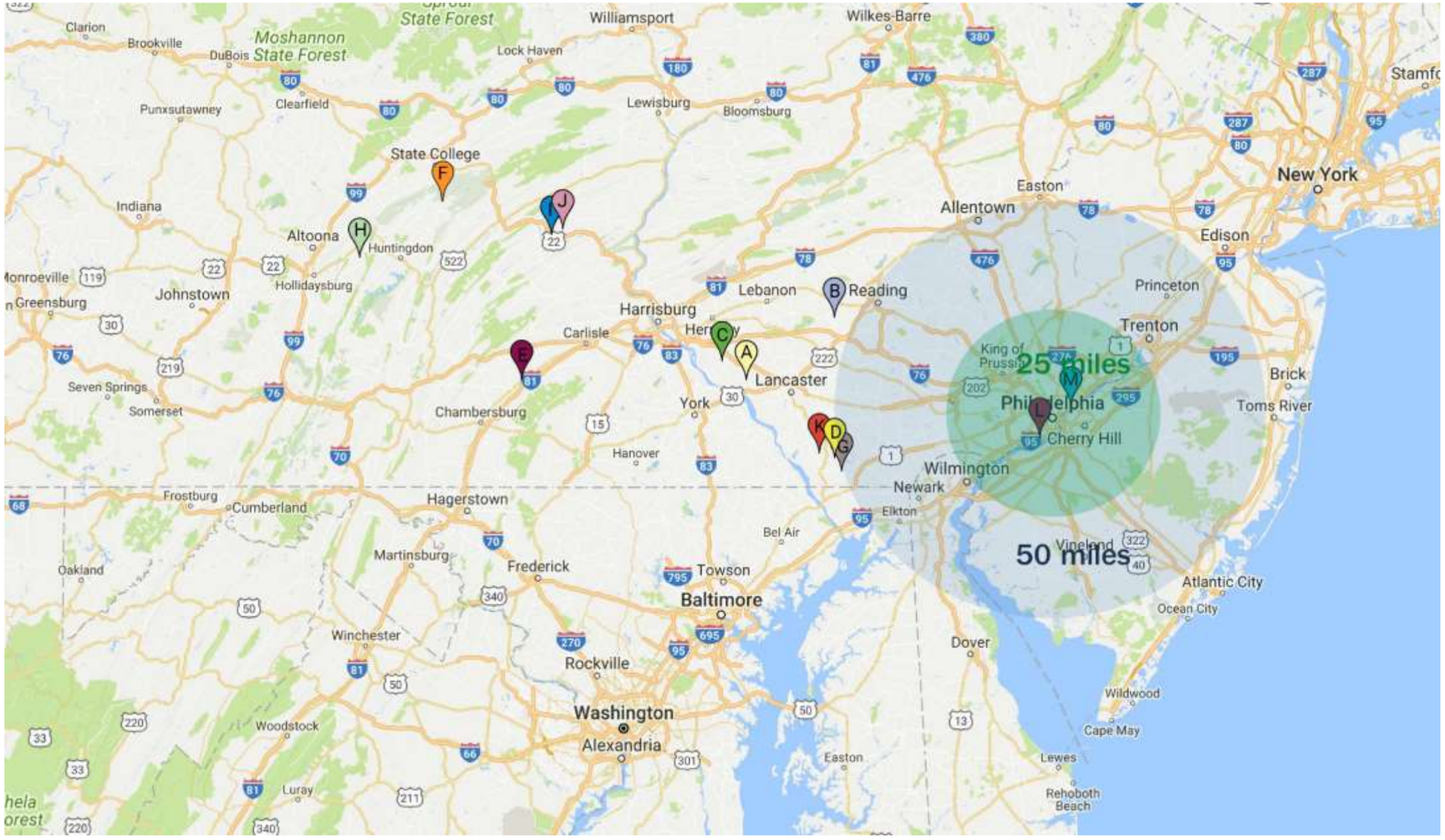
Exhibit 3-3 Regional Yard Waste and Soil Processing Facilities Survey

Responsive



A: Abington Township Composting Site
B: Barnside Farm
C: Borough of Phoenixville
D: Cheltenham Township Compost Site
E: Conshohocken Borough Compost Site
F: County Conservation Co. LLC
G: DCSWA Compost Farm
H: East Norriton Twp. Norristown Farm Compost Site
I: East Pikeland Township Compost Site
J: Gloucester Township Municipal Utilities Authority Compost
K: Lower Makefield Township Compost Site
L: Lower Merion Township Compost Site
M: Mascaro Composting
N: Moorestown Compost
O: Nether Providence Township Recycling Center/Highway Yard
P: Organic Diversion, LLC (Currently being developed)
Q: Plymouth Township Compost Site
R: Radnor Township, Skunk Hollow site
S: Schuylkill Township Compost Site
T: Springfield Township Compost Site
U: Triboro Sand & Stone, Inc.
V: Upper Dublin Township Compost Site
W: Upper Merion Township Compost Site
X: Upper Moreland Township Compost Site
Y: Valley Forge Fill Site
Z: Warwick Green Grinders
a: Waste Management Warner East Compost
b: Wayne Carmint Landscaping, Inc
c: West Chester
d: Whitemarsh Township Compost Site
e: PPR Fairmont Park Organic Recycling Center
f: PPR NE Phila. Area Maintenance Shop Log/Brush Site
g: Britton Industries Organics and Landscape Products

Exhibit 3-4 PA Regional Anaerobic Digester Facilities Approved to Accept Food Waste



A: Benner's Yippee Farms
B: Green Harvest Augsburger
C: Brubaker Farms
D: Cliff Sensenig Farm
E: Keefer Hard Earned Acres
F: Kish View Farm
G: Oak Hill Farms
H: Penn England Farm
I: Reinford Farms
J: Reinford-Frymoyer Farm
K: S & A Kreider & Sons Dairy
L: PWD Southwest WPCP (Potential)
M: PWD Northeast WPCP (Potential)

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4. BENCHMARKING OF ORGANICS MANAGEMENT PROGRAMS

4.1 INTRODUCTION

Benchmarking in this study is the process of reviewing comparable or cutting-edge programs in other large municipalities or regions that may provide guidance and ideas to Philadelphia on 1) the potential for organics recycling/diversion from good organics programs, 2) successful components of those good programs that may be adaptable to Philadelphia, and 3) lessons learned from those programs that can be incorporated or avoided in Philadelphia as appropriate. Four cities were selected for this exercise:

- New York
- Washington, DC
- San Jose
- Seattle.

These cities were selected for several reasons. First, all are large cities similar in magnitude to Philadelphia. Two are East Coast peer cities to Philadelphia that have taken steps to implement organics diversion programs. The other two are West Coast cities with well-documented, aggressive organics diversion (as well as overall recycling) programs.

Appendix A contains a more detailed description of each of the four benchmarked programs. Summary findings of the benchmarking research is provided below, and key program details are presented in Table 4-1.

4.2 NEW YORK CITY

New York (NYC) is a city of 8.5 million people that generate an average of 10,500 tons of refuse and 2,000 tons of recyclables from the residential and institutional sectors daily. Three (3) composting facilities are used to process collected organics. The New York City Department of Sanitation (DSNY) services residential and institutional customers, and City-licensed private haulers service the commercial sector. Commercial organics collection is mandated by ordinance that applies to a growing list of commercial establishments based on size. The City has conducted studies, piloted organics collection programs, and passed ordinances over the past 20-25 years to determine the best options and path to increased organics recycling/diversion. In 2015, the OneNYC program committed the City to serving all city residents with either curbside or drop off organics collection (voluntary participation) by the end of 2018 (this is the largest curbside organics collection program in the US), and to achieving Zero Waste by 2030. There are approximately 100 drop off sites for organics in the City. Types of collections trucks and frequency of organics collections per week vary widely across the 59 sanitation districts depending on density, residence type, and other factors.

An important factor in the success of the NYC organics program is the willingness of the City to invest in infrastructure improvements to collect and process organics. From investment in organics collection trucks and vehicles, to development of composting facilities, to contracting with private facilities to preprocess organics (to remove contaminants such as non-biodegradable plastic bags favored by residents) for composting or anaerobic digestion, NYC has shown its willingness to invest in the capital and programs needed to make organics diversion successful in the City. Community partners provide community-level composting facilities and operate many of the food scrap drop off sites. A strong educational effort, with reinforcement of program goals by top management personnel to DSNY staff, is key to successful program implementation.

4.3 WASHINGTON DC

Washington DC is a city of 650,000 people with 105,300 households (single family homes and up to 3 residential units per building) in eight (8) service wards, with waste and recyclables collection services provided by the Washington DC Department of Public Works (DPW). DPW hauls refuse to two transfer stations, which accept an average of 1,460 tons of waste daily (this total includes an unknown quantity of out-of-District privately-hauled waste). DPW also collects an average of 100 tons or recyclables daily. Larger multi-family buildings, and industrial, commercial, and institutional (ICI) customers are served by the private sector.

Regional infrastructure to process organics is very limited. DPW does not own or operate any yard waste or organics composting facilities. The nearest public or private composting facilities are approximately 40 miles from the City. In 2014, the City adopted a sustainability act with an 80% diversion and recycling goal for solid waste; a zero-waste plan is being prepared by the City in 2018. Feasibility studies for development of a composting facility, a co-digestion study for anaerobic digestion of organics with wastewater solids, and schedule of steps to implement phased source-separated curbside organics collection over five (5) years are being completed.

DPW collects and delivers about 5,700 tons of yard waste to a private composting facility each fall. 41 community gardens compost 60 tons per year of food waste and garden debris annually, and the community gardens are growing at a rate of 25% annually. At the end of the 5-year residential curbside collection rollout, between 10,000 and 30,000 tons of organics could be collected annually. Once composting and/or anaerobic digestion infrastructure is developed and operational, the City may mandate ICI organics segregation and processing via ordinance.

This fledgling program is early in its development, but it appears to have the support of City administration to make it successful.

4.4 SAN JOSE, CA

San Jose has a population of approximately 1 million residents. The City generates approximately 5,900 tons of waste daily from 320,000 single family and multi-family residential units, 8,000 businesses and 200 City facilities. Residents receive weekly refuse, recycling, and yard waste trimmings (yard waste is an optional fee-based additional service) collection services through City-licensed haulers. The City encourages more recycling by charging more for larger refuse cart service, while charging nothing additional for recycling service, and charging a flat fee for yard trimmings collection, regardless of the size cart used. In 2007, San Jose released a Green Vision Plan that called for zero waste to be delivered to landfills and waste-to-energy facilities by 2022. The city currently diverts over 60% of waste from landfills. The City contracts with the Zero Waste Energy Development Company for processing of its organic waste (pre- and post-consumer source-separated food waste from commercial sources, residential food scraps from a pilot curbside collection program, wet and dry processing residuals, and yard waste) via an anaerobic digestion facility that opened in 2012. The City currently sends over 200 tons per day of organics to the ZWEDC facility. Haulers are encouraged to deliver clean organic loads to this facility through a sliding fee structure that charges more for contaminated loads.

It is estimated that the commercial waste stream is comprised of 42% food scraps. While the City does not provide for City-wide residential food scraps collection, it does encourage home composting, and in 2015, it began a voluntary pilot food scraps collection program (at no extra fee) that extends until March 2018. Should it be determined that the food scraps collection program is successful, it will become a permanent addition to San Jose's organics program. The City employs multiple educational initiatives and rules to encourage a more compostable waste stream and sustainable practices. California's State Assembly issued a rule in 2014 (AB 1826) that requires that all businesses and large (five or greater) multi-family dwellings that generate over four cubic yards of garbage per week to recycle organic waste. If this measure

does not result in a 50% waste reduction from these sources, this requirement could be extended to smaller commercial waste generators.

4.5 SEATTLE, WA

Seattle has a population of approximately 705,000 residents, and generates 725,000 tons of waste materials, of which nearly 60% (440,000 tons) of recyclables and organics is recycled/diverted from disposal. Seattle set a goal (Zero Waste Resolution of 2007) of recycling 72% of the waste stream (including organics) by 2025. Seattle Public Utilities (SPU) provides weekly collection of waste and segregated organics, and bi-weekly recyclables collection. Approximately 150,000 households, 6,000 apartments and 8,000 businesses receive SPU services. Commercial customers with organics may choose public or private collection. Organics are sent for processing to two private composting facilities (Cedar Grove Everett and Cedar Grove Maple Valley) that have been in operation for over 25 years. The City will investigate new composting contracts as well as possible anaerobic digestion facility processing contracts in the future. Organics processing at these sites includes yard waste, food waste, compostable paper, and compostable food packaging. The City intends to add pet waste and diapers composting in 2020.

Organics were banned from residential refuse carts in 2014, and from multi-family refuse carts in 2015. Residents pay a sliding fee for organics collection based on the size of the cart used; home composters can obtain an exemption. City laws requiring compostable or recyclable food packaging has led to additional commercial sector organics recycling/diversion. Educational efforts have been a strong component of Seattle's organics management program.

4.6 TAKEAWAYS

We make the following observations about best practices from a review of these benchmarked programs.

- **Establishing a Vision/Goals:** In all cases studied, the cities or public entities established long-term plans and goals to reduce waste (sustainability, integrated waste management, waste reduction and/or zero waste plans). These normally involve the establishment of ordinances and regulations to help implement the initiatives of the program.
- **Availability of Infrastructure**: In all municipalities benchmarked, the presence (or lack, in the case on DC) of organics processing infrastructure is critical to the success (or potential success) of an organics diversion program. Where no convenient organics processing alternative exists, it usually falls on the public entity to either 1) design, build and operate such facilities, or 2) contract for organics processing services from these facilities. This is especially critical in cities that establish zero waste programs, since organics are a significant component of the waste stream that needs to be diverted from disposal/recycled.
- **Capital Funding Commitment**: In most or all cases, the success of these programs is tied to a significant public capital commitment (either through direct capital investment or through contracting with the private sector for services) to implement necessary components of waste reduction strategies. Public sector segregated organics collection (the common practice, at least for residential sector collections) requires the purchase of collection trucks and carts, the staffing of additional crews, the establishment of educational programs, the adoption of ordinances and regulations, and the development or contracting of organics processing (such as composting or AD) infrastructure. These programs, requiring money manpower and political/public support, will not usually be successful without this public financial support.
- **Importance of Education:** In all cases, a strong educational effort is important to buy-in from both the public/commercial sectors at large, and from the public entities (public works departments) providing such services. School education is usually an important component to these programs, and has a secondary benefit of children taking sustainability and recycling ideas back to their homes and to their families.

- **Integrated, Multiple Component Programs:** Usually, a many-faceted organics management program is needed to significantly reduce organics in the disposed waste stream. The days of processing a mixed waste stream to recover organics in the waste have lost favor in the US over the past several decades (due to many factors), in favor of implementation of multi-faceted source-segregated organics (SSO) collection and processing strategies.
- **Community Programs and Support**: The NYC and DC programs include a strong community drop-off/garden/composting contingent which can serve to provide local support, convenient locations for organics drop off and compost pickup and use, and community buy-in to sustainability efforts. Further, volunteer efforts at these sites can provide economical organics management services.
- **Incentivizing Organics Separation:** Banning organics in refuse cart setouts and mandating segregation of organics from the waste stream can stimulate organics recovery. Structuring collection fees (based on type of cart, cart size) can be used to incentivize the reduction in refuse disposal and the increase in recyclables and organics set out.
- **Commercial Sector Strategies:** In all cases, commercial sector organics recycling is normally accomplished via ordinances and regulations that impart waste diversion and requirements on this sector. Commercial sources can generate significant tonnages of organics, and by legislating requirements on this sector, organics recycling can be implemented without direct public capital investment in recycling and waste reduction. It is critical, however, that organics processing infrastructure be in place to accept the commercially legislated diverted organic tons.

Table 4-1 Organics Benchmarking Summary Data

Program Elements	NYC	DC	Seattle	San Jose
Program Vision/Goals Development	1991-2015	2013-2017	2004-2013	2007-2014
Zero Waste Goal?	By 2035	Under Development	72% Recycling Goal by 2025	By 2022
Population	8.5 Million	0.65 Million	0.7 Million	1 Million
Commercial Sector Organics				
Commercial Collection	Yes	Not Currently	Yes	Yes
# of Participating Businesses	Larger Food Service Establishments and Arenas	Future ICI Requirements Possible	All (commercial organics ban in refuse)	All Larger (>4 cy/wk.) Generators
Commercial Organics Requirement Tool(s)	Yes (City ordinance for larger generators)	To be determined	Yes (organics ban in refuse)	Yes (state law for larger generators)
Public or Private Collection?	Private City-licensed Haulers	Private Haulers Serve the ICI Sector	City or Private Collectors (optional)	Private Contract Collector
Date Started	2016/2018	To be determined	2016	2014 (CA AB 1826)

Residential Sector Organics				
Residential Collection	Yes (all served by 2018 – frequency varies)	Yes, Within Next 5 Years	Yes, Weekly Curbside	Optional Yard Waste; Pilot Voluntary Food Scraps Collection Ongoing
Date Started	1990 + (infrastructure and yard waste); 2015 (expanded curbside organics)	2017-2018 (5-year infrastructure and collection rollout)	2009 (curbside organics)	2012/2015
Allowable	Yard, Food, Compostable Paper	Will Include Yard, Food, Compostable Paper	Yard, Food (including meat and dairy), Compostable Paper	Yard Waste (voluntary); Food Scraps Pilot (voluntary)
Processing Infrastructure				
Technology	Compost (public sector multiple sites)/Pre-processing for Contaminants Removal (contracts with private sector)	Existing Private Composting is 40 miles away; Proposed Public Compost or AD in Planning	Composting (private sector, multiple sites)	AD (private facility under contract)
Available Capacity	Yes	Private is Expanding but Distant; new Public Compost or AD System Under Development	Yes	Yes

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5. PROCESSING OPTIONS

5.1 INTRODUCTION

The purpose of this chapter is to document investigations into sites and/or facilities that may serve as expanded processing outlets for organics generated from within the City of Philadelphia. Based on findings from Section 3, it appears that options for taking significant quantities of organics from the private sector (the primary organics processing provider in the regional marketplace) are limited at this time, and current opportunities from the public sector are even more limited. The primary focus of this chapter is to investigate public options for growth of organics processing infrastructure. At a minimum, the City has stated that it would like to expand its collection and processing of leaves and yard waste/brush back to prior (7-10 years ago) reported levels of approximately 7,000 tons of materials per year.

Options for publicly-owned sites within the City that can be used for expanded organics processing are extremely limited. However, this section investigates the following organics processing options spanning both local publicly and privately-owned sites as well as long haul:

- **Fairmont Park Organics Recycling Center**: Operated by the Philadelphia Parks and Recreation Department (PPR), this facility occupies less than 1.5 acres of yard waste windrows on a 12-acre portion of the property dedicated to organics management, and composts leaf, yard waste, brush and special events organics.
- **PPR Maintenance Shop Organics Site**: Situated near Pennypack Creek and Pennypack Park, this site accepts trees and large brush from other City parks.
- **Philadelphia Prison System Composting Site**: This is an aerated static pile (ASP) bin composting facility for prison organics at a site adjacent to the former Holmesburg Prison.
- **Philadelphia Water Department Sites**: The Philadelphia Water Department (PWD) operates anaerobic digesters at two locations that may have significant capacity to accept additional organics from City or other sources, if properly pre-processed.
- **Victory Site**: Located near the Philadelphia International Airport, the 2-acre site is believed to be owned by the Aviation Unit of the City/Airport.
- **Transfer Haul to Remote Processors**: The City is in the process of modifying its Northwest municipal waste transfer station, and the design for the improvements could potentially include accommodation (or reservation of space) for acceptance and transfer of 50-100 tons per day of segregated organics from the City, for transport to a more distant organics processing facility.
- **Anaerobic Digestion Options**: PWD has a total of 20 anaerobic digesters (AD) with a combined "reliable" capacity of approximately 36 million gallons, some of which may be available to process food wastes.

These options are discussed more fully in the remainder of this section.

5.2 FAIRMONT PARK ORGANICS RECYCLING CENTER

Fairmont Park is a large City park that straddles both sides of the Schuylkill River to the northwest of downtown Philadelphia, as depicted on Exhibit 5-1. Shown as public space in the original Philadelphia city plan of 1683, Fairmont Park grew in the early 1800's from a smaller park with varied uses to its current size, encompassing roughly 2,800 acres, by around 1868. The current Organics Recycling Center is located on the west side of the Schuylkill River, in West Fairmont Park. Most of the current infrastructure and site improvements were reportedly constructed in the 1970's and 1980's. It is believed that yard waste has been processed/composted at this site for at least 30-40 years.

The approximately 12-acre Center footprint includes the following infrastructure:

- An entrance gate, scale and scalehouse,
- A maintenance building with operations staff offices,
- A fueling station,
- A 3.5-acre (approx.) composting pad (not all of which is currently in windrows), plus adjacent asphalt maneuvering areas,
- A stormwater retention pond.

Processing equipment currently in use at the site include:

- A Scarab straddle-type windrow turner,
- A Vermeer TR521 Trommel Screen,
- A Bandit Model 3480 "Beast" horizontal grinder,
- Two large loaders (CAT 930K-type loaders).

According to the Organics Recycling Center website, the Center processes approximately 3,700 tons of leaves, brush, wood/logs, and manure annually. The Center reportedly distributes/sells about 800 tons of finished compost, 800 tons of mulch, and 200 tons of firewood annually. Other City departments use a significant fraction of the organic materials produced at the site. The facility has public distribution areas for mulch and finished compost pickup and has a "cut at your own risk" free firewood distribution area.

The facility is open to the public Monday thru Friday from 7:30 am – 3 pm, and on Saturdays between April 1 and October 31, 7:30 am to 11:30 am. In addition to City deliveries, the site is open to receiving loads from private landscapers, garden centers, contractors and soil dealers. Those parties pay a minimum fee of $10 per load. Larger deliveries are charged as follows: $40 per ton for clean leaves and grass clippings; $10 per ton for wood chips; $50 per ton for brush; and $10 per ton for herbivore manure deliveries. Materials must be delivered segregated, and no contamination of delivered materials is tolerated. All payments are via credit card, check or money order; cash is not accepted.

The scalehouse keeps daily operating records of deliveries, and notes the date received, customer number or other ID, materials accepted, full and tare weights, and revenue collected.

Finished products are sold at the following rates: Leaf compost $20-36 per ton based on quantity purchased; $10-20 per ton for single-ground mulch based on quantity; $20-40 per ton for double-ground mulch based on quantity; and $30 per ton for herbivore manure. There is no charge for firewood pickup. City residents presenting proof of residency (driver's license) can obtain up to a 30-gallon can of material at no charge.

Exhibit 5-5, located at the end of this chapter, shows an aerial photograph of the Organics Recycling Center, circa July 2016. Figure 5-1 is a photograph of the current operations and layout of the site, looking north from the southern corner of the compost pad.

Figure 5-1 Fairmont Park Organics Recycling and Leaf Composting Windrows

Figure 5-2 shows the large brush storage pile on the eastern edge of the compost pad. To the east and northeast of this long pile is a large area of logs and trees, some of which are available for firewood cutting and pickup.

Figure 5-2 Fairmont Park Brush Receiving

Figure 5-3, Figure 5-4 and Figure 5-5 show the entrance truck scale and gate, the scalehouse, and the maintenance building, respectively.

Figure 5-3 Fairmont Park Entrance Gate and Scale

Figure 5-4 Fairmont Park Scalehouse

Figure 5-5 Fairmont Park Maintenance Building

5.2.1 SITE VISITS

Between December 2016 and December 2017, the consultant visited the Fairmont Park site several times. Site staff were courteous and accommodating during our visits. A search of on-site drawings, and a later archive file search by key PPR staff yielded only minimal drawings of the facility. No original design or construction drawings of the compost pad, stormwater management and controls, or the contact water recycling/rewetting system for the compost piles were located. Current site operations and equipment were observed.

Operations staff was not able to locate a copy of a permit-by-rule notification or other general permit issuance by PADEP. The facility did receive an approval from PADEP in 2017 to operate as a captive facility to receive and process food scraps from special events, such as the Philadelphia Marathon. The facility has multiple bunkers to receive food scraps and related organics from City events. These materials are then mixed in the leaf windrows; quantities of food waste currently processed at this site are minimal.

5.2.2 SITE FEATURES AND OBSERVATIONS

- **Compost Pad Neatness and Integrity:** The concrete windrow pad, shown in Figure 5-6, appears to be in good shape, with minimal cracking for its age. The leaf windrows are neat and laid out symmetrically. Minimal contamination of material in the piles was noted.

Figure 5-6 Concrete Compost Pad and Windrows

- **Processing Equipment Selection:** The Scarab windrow turner, the Vermeer trommel, and the Bandit Beast grinder are all preferred pieces of equipment that are commonly used in the composting industry. These are shown in Figure 5-7, Figure 5-8 and Figure 5-9.

Figure 5-7 Scarab Windrow Turner

Figure 5-8 Vermeer Trommel Screen

Figure 5-9 Bandit Horizontal Grinder

- **Quality of Compost Produced:** As shown in Figure 5-10 the facility produces a finished leaf compost with a good, uniform consistency with minimal contamination observed.

Figure 5-10 Finished Windrow Compost Product

- **Quality of Mulch Produced** – The facility prepares an attractive double-grind mulch product for distribution. Mulch piles are shown in Figure 5-11

Figure 5-11 Ground Mulch Piles

- **Organization of Materials Flow:** During multiple site visits, including the end of leaf delivery season 2017, smooth flow of delivery vehicles and processing equipment was observed, with no congestion of operations noted.

5.2.3 OPPORTUNITY FOR IMPROVEMENT

- **Keeping Equipment Functional:** In the December 2017 site visit, the entrance truck scale was not working. This required the use of the truck scale at the Northwest transfer station to weigh at least some loads prior to delivery to the site. The two sites are 20-30 minutes diving time from each other. Also, during the December 2017 visit, the Bandit grinder was observed to be out of service due to mechanical problems. Waiting for service was reportedly going to take weeks or months. During this time, no large brush was being processed on-site.
- **Lack of Equipment Redundancy:** Same issues noted above, due to lack of backup equipment on-site. While the site does have two large loaders, a third loader on-site is not functional, and loss of another loader may cause a serious impact on processing capabilities at the facility. The windrow turner and horizontal grinder are key equipment pieces on site with no real backup in case of significant mechanical breakdown or breakage.
- **Limited Staffing and Funding:** The site appeared to have limited manpower to perform required functions; an expansion of processing capabilities on-site (suggested below) may require additional staff and equipment (or at least acquisition of redundant equipment, to maximize efficiency of available staff).
- **Equipment Abandonment:** Some site infrastructure has broken down on-site and been abandoned, such as the pumping station and pad perimeter rewetting spray system for compost piles. The pump station vault is overgrown and deteriorated (See Figure 5-12), and no one on site knew when it last operated, or how it operates. The perimeter spray system reportedly had rotating "rain-bird" type spray nozzles mounted on plastic pipes on concrete pedestals that quickly broke off due to high pressures and vibration (see Figure 5-13). This system it non-functional at this time.

Figure 5-12 Recycle Water Pumping Station

Figure 5-13 Windrow Water Spray Risers

- **Double Handling of Leaves:** Leaves delivered to the site were observed to be double-handled by emptying leaf delivery vehicles in a temporary storage pile to the side of the compost pad. This may be a function of the limited capacity of the current windrow layout, which does not easily accommodate the volume of leaves delivered each fall. As leaves are fully composted and the windrows are broken down, new windrows are built throughout the year from the temporary stockpile. This problem may be improved with a larger and more efficient composting pad layout. Figure 5-14 shows the excess leaf staging pile.

Figure 5-14 Excess Leaves Staging/Storage Area

- **Use of the Site for PPR Materials Storage:** As shown in Figure 5-15, the site was observed to be used for inoperable equipment storage (screen, loader), bleacher and picnic tables storage, other PPR events material storage (benches made out of logs, large (100-200 gallon) plastic liquids storage containers that may have had an artistic purpose), etc. Use of the Organics Recycling Center for storage of these materials limits use of this space for the primary organics processing purpose.

Figure 5-15 Parks and Recreation Materials Storage

- **Use of the Site Perimeter as a Dumping Ground:** In general, and particularly since the July 2016 Google Earth Aerial Photograph of the site was taken (see Exhibit 5-5), the eastern and western perimeters of the site appear to be receptors of a large volume of dirt, broken concrete, wood, plastic pallets, tires, and other materials. This is shown in Figure 5-16. These materials take away from available space for organics processing, and many of which probably are defined as wastes and should be removed and landfilled. Further, the continued practice of using this site as a dumping ground should be curtailed in the future for space and environmental protection reasons. In 2016-2017, the site also became the recipient of excavation spoil material from the "Love Park" reconstruction project, which likely totals at least 5,000 cubic yards of dirt and rock placed on-site, and which now encroaches on the windrow pad in the southern corner of the pad. A photo of this encroachment is shown in Figure 5-17 and a close-up of the materials is in Figure 5-18. This material could be removed (at least where it is encroaching on the pad) and placed as clean fill elsewhere.

Figure 5-16 Dumping/Storage Area (Typical of Eastern Site Perimeter)

Figure 5-17 "Love Park" Construction Spoil Material on Windrow Pad

Figure 5-18 Makeup of Large Pile of Dumped Spoil Material On-Site

5.2.4 OPTIMIZATION CONCEPT PLAN

A Pennsylvania Natural Diversity Index (PNDI) inquiry of the site was conducted with the State, through use of the on-line Environmental Review Tool, to determine whether any sensitive environmental concerns should be further investigated or addressed. None were identified. A copy of the PNDI search results for the Fairmont Park Organics Recycling Center site are presented in Appendix C of this report.

A concept plan was developed for increasing the efficiency and capacity of the site to receive and process leaves, yard waste and brush. The proposed site improvements are presented in Exhibit 5-6 at the end of this chapter. Recommended site and operational improvements are as follows:

- Maintain a counterclockwise flow of leaf delivery trucks around the site perimeter, but through expansion of the windrow pad, try to direct leaf deliveries right to the location of the active windrow face (which will move as the windrows are built) to minimize double-handling of leaves.
- Increase the volume of leaves being processed in windrows on the pad at any one time from an estimated 5,500 cubic yards of materials in five windrows (1,400 tons of materials) to nearly 12,000 cubic yards of materials (3,000 tons) at one time, by building windrows in pairs (five pairs of windrows, or 10 windrows total) and by expanding the footprint of the windrows on the pad (see Exhibit 5-5). This is essentially a doubling of site capacity on the existing pad. Additionally, this site layout provides for additional curing pile capacity and brush processing capabilities.

- If needed to further increase site organics processing capacity, a more aggressive turning schedule of the windrow piles (e.g., weekly) can create a finished compost product more quickly, clearing the windrow pad for placement of new leaf materials. New windrows can be constructed 3-4 times annually on the same pad in this manner, directly increasing annual processing throughput capacity.
- Mulch grinding and storage has been moved closer to the area where brush is stockpiled.
- Finished leaf screening and curing/storage has been moved to the area where mulch is now stored.
- If determined that wetting or rewetting of the windrows is necessary, this can be accomplished by either retrofitting/mounting a water tank on the Scarab windrow turner that waters the piles as they are turned, or by the addition of a new frost-free hydrant system, tied into the on-site potable water supply line. It is not believed that the abandoned rewetting system can easily be restarted.
- Cleanup of dumped waste, construction spoils (to the extent they infringe on operations) and abandoned equipment storage is strongly recommended for environmental and operational space reasons. Also, it is recommended that storage of PPR equipment not related to the organics processing function (i.e. bleachers, picnic tables, display features) be moved to another area of Fairmont Park for storage.
- Repair of the entrance truck scale is required, if not already done, and regular maintenance of this equipment if recommended if not currently done.
- Repair and regular maintenance of site processing equipment is recommended. Further, the addition of redundant or backup (even if not equivalent top-of-the-line, but still functional) equipment for turning windrows, for screening compost, and for grinding brush, should be added to this facility over time. Especially in an expanded future processing mode, this equipment must be reliable and be backed up during equipment breakdowns as well as normal maintenance.
- No permit for the site (permit-by-rule or otherwise) was located by operations staff (one may have been obtained by the City at one time, but this could not be located). Also, site modifications are recommended in Exhibit 5-6 which should be covered in a new general permit. Based on the size of the revised operation, it is recommended that a new General Permit WMGM030 (for yard waste composting on sites from 5-15 acres) be prepared and submitted to PADEP for approval. A GP030 based on the concept layout presented in Exhibit 5-6 is recommended. Upon initial review of the GP030 requirements, the consultant does not believe there are site issues that would preclude this site from being permitted under GP030. A copy of PADEP's GP030 guidelines is included in Appendix C. The special events food waste and organics recovery operation can continue to be permitted separately under the captive facility approval from PADEP.

A preliminary estimated cost for upgrading this site and improving its supply of processing equipment as shown in Exhibit 5-6 is presented in Chapter 7 – Recommended Strategies for Organics Management.

5.3 NORTHEAST PHILADELPHIA MAINTENANCE SHOP ORGANICS SITE

The Philadelphia Parks and Recreation Department operates a second yard waste site near Pennypack Creek/Pennypack Park in the northeastern part of the City. The location of this site is shown on Exhibit 5-2. This site accepts brush and logs for processing, but not leaves. The site is rudimentary, with a gravel access road and an unpaved working pad on a relatively flat site in the middle of the woods. An aerial photograph of the current site is presented in Exhibit 5-7, showing the area that is being considered in this study for expanded leaf and yard waste processing and composting. Figure 5-19 and Figure 5-20 show the current site conditions.

Figure 5-19 Northeast Philadelphia Maintenance Shop Brush Site Access

Figure 5-20 Northeast Philadelphia Maintenance Shop Tree/Brush Processing Area

A preliminary PNDI search of this site was performed through the on-line Environmental Review Tool to identify possible environmental issues that may need further investigation. These results of this preliminary inquiry are presented in Appendix C of this report. Two areas of possible concern were noted in the PNDI search that would require further investigation if this site is to be developed: 1) a wetlands identification and delineation study is needed in the project area (none was ever done, to the knowledge of the consultant), and; 2) the Pennsylvania Fish and Boat Commission may require further confirmation of no impact to threatened species (note – the Pennsylvania Game Commission, Pennsylvania Department of Conservation and Natural Resources, and US Fish and Wildlife Service responses all indicated no concern with potential impacts to threatened or endangered species, so this may be a non-issue).

This site was evaluated (preliminarily) by the consultant for possible development into a second yard waste and brush processing/composting site similar to that recommended in Fairmont Park. If so developed, the capacity of the City to process these materials would double (that is, this site as conceptually designed would have the same yard waste and brush processing features and capacity as that of the recommended expanded Fairmont Park site) and would provide better geographic coverage of leaf and brush processing and finished products distribution options to City Departments, City residents and private site users.

A conceptual development plan for expanded yard waste and brush processing/composting at the NE Philadelphia Maintenance Shop site is presented in Exhibit 5-8. Leaf windrows as shown in the exhibit would provide nearly 12,000 cubic yards of materials composting capacity (3,000 tons) at one time, plus curing piles and brush processing capabilities.

Remoteness and buffer distances around this site are positive features. The rolling topography would need to be graded to create a compost pad with a more gradual and consistent slope if a composting site similar to the Fairmont Park site is developed. Minimum isolation distances from the Pennypack Creek should be adhered to during site design and construction.

The site appears to be conducive to including all of the yard waste materials handling features that now exist at Fairmont Park. In addition to site development and infrastructure work, this site would require a complete addition of processing equipment (windrow turner, screener, grinder, and front loaders) that exists at Fairmont Park. Equipment redundancy could perhaps be provided by purchasing one backup for each type of equipment to cover both sites as a backup. The need for an entrance truck scale would need to be determined but would be needed if the City is to collect the same weight data on deliveries as exists at Fairmont Park. It is assumed that no new maintenance building would be required at this site for maintaining equipment. The current Concept Plan for this site includes public material pickup areas similar to Fairmont park; this feature is optional.

The most suitable general permit for this site would be the GP030, for yard wastes facilities of between 5 and 15 acres. This should be obtained if development of this site is pursued.

A preliminary estimated cost for developing this site as shown in Exhibit 5-8 is presented in Chapter 7 – Recommended Strategies for Organics Management.

5.4 PHILADELPHIA PRISON SYSTEM COMPOSTING SITE

5.4.1 CURRENT FACILITIES

The Philadelphia Prison System developed an aerated static pile (ASP) bin system years ago adjacent to the former (now inactive) Holmesburg Prison complex on Torresdale Avenue in the northeastern part of the City. Exhibit 5-4 illustrates features of this facility.

The prison system currently houses approximately 5,800 inmates in a total of six prison facilities. These inmates are serviced 24/7 by a total of approximately 2,300 full time and contract employees. In total, the prison system generates wastes from a total of approximately 8,100 people. A 2010 food waste study conducted by food service provider Aramark determined that each inmate generates approximately 1.4

pounds of food waste daily. Prior to ASP composting, all wastes generated in the prison system were either serviced by City garbage trucks and disposed or segregated and recycled (recyclable containers).

The Prison developed an aerated static pile bin system using the design of O2 Composting. What started as a pilot operation was then expanded to a 7-bin system. Each bin is approximately 6 feet by 8 feet by 4 feet high when full. Organics are currently collected from two of its six facilities (serving approximately 1,200 inmates and 700 staff), by trained inmates that are overseen by guards, are loaded into a box truck with a lift, using 22-gallon cans, and transported to the compost site. Inmates then unload the cans on-site and place the food waste into a selected bin. Layers of food waste and amendment are added to the bin until it is full.

Bins are aerated for a minimum of 60 days under a simple positive underfloor aeration system with blowers in a shed. After composting, the materials are removed from the bins and stacked for further curing on site in a pile as needed. A homemade trommel screen is used to screen out the "overs" for further processing. The finished compost is used off-site as soil amendment at prison orchards. Fruit and vegetables grown at the site are used in the prisons, creating a closed-loop system for organics. The ASP site sometime uses wood chips as a bulking amendment from the Northeast Philadelphia Maintenance Shop site or from Fairmont Park.

An on-site classroom, associated with Temple University, provides training to inmates that work at the composting site, and offers a Vocational Certificate in Organic Agriculture to successful students.

Laura Cassidy of the prison's executive staff estimates that the current ASP system processes approximately 900 pounds of food waste daily from the two correctional facilities served. Ms. Cassidy states that the system works very well and has good acceptance from local neighborhood residents.

Exhibit 5-4, located at the end of this chapter, provides an aerial view of the site and the adjacent former prison. Figure 5-21, Figure 5-22 and Figure 5-23 illustrate features of the current ASP system.

Figure 5-21 Department of Prisons Aerated Static Pile Compost Bins

Figure 5-22 Forced Aeration System for ASP Compost Bins

Figure 5-23 Aeration Channels Under Existing ASP Bins

5.4.2 FACILITY EXPANSION

The current ASP bin system is currently being expanded to add larger ASP bins across the driveway from the current ASP bins. These bins are approximately four times as large as the current bins and are designed to provide access to the piles of materials from both sides of the bins. Figure 5-24 and Figure 5-25 depict the current state of the new construction project, which is scheduled for completion in Spring of 2018. Once completed, Ms. Cassidy states that the composting program will bring on the remaining four buildings in the prison system and will provide expanded organics recycling and composting.

Ms. Cassidy also states that between single-stream recycling and organics segregation and composting, they expect to save the City of Philadelphia as much as 70 percent of the tipping fees the City would otherwise pay to dispose of the prison system's wastes.

Figure 5-24 Expansion of ASP Compost System

Figure 5-25 New Aeration Floor Construction

5.5 PHILADELPHIA WATER DEPARTMENT (PWD) SITES AND FACILITIES

There are multiple sites and facilities within the Philadelphia Water Department (PWD) that process organics materials and could be modified to handle incremental food wastes. These include:

- Biosolids Reclamation Center (BRC), which includes the Philadelphia Synagro Facility and adjacent acreage,
- Anaerobic Digestion Facilities, located at two of PWD's three Water Pollution Control Plants.

Details are provided in the following subsections.

5.5.1 BIOSOLIDS RECLAMATION CENTER SITE AND SYNAGRO FACILITY

In 1987, the PWD, in charge of wastewater and stormwater management in the City, opened an 18-20-acre aerated windrow site for the composting of wastewater treatment residuals (biosolids) at a site on Penrose Ferry Road near the Philadelphia International Airport (see the location of this site on Exhibit 3-1, Map pin locator "P" at the end of Chapter 3). A current aerial photo of the site, with features noted, is depicted in Exhibit 5-3 at the end of this chapter.

This facility processed biosolids from the three PWD treatments plants with aerated windrow composting from 1987 until approximately 2007, at which time the operation was reportedly closed due to operational

issues and product marketing difficulties. In October of 2008, the PWD entered a long-term contract for the processing of its anaerobically digested biosolids by Synagro, a private operator. Synagro dries and processes the biosolid materials under contract with the PWD and creates a small pellet for fertilizer and fuel use. A photo of the Synagro site is shown in Figure 5-26. Synagro has a 25-year contract with the Philadelphia Municipal Authority for use of the central portion of the former windrow composting site, as depicted in Exhibit 5-3.

Figure 5-26 Synagro Facility at Biosolids Reclamation Center

Currently, the original composting pad (18-20 acres) remains open and unused (other than some temporary storage), as shown on Exhibit 5-3 and in Figure 5-27. PWD has reportedly entered a long-term contract with an oyster shell processor to use the site. Therefore, the PWD BRC site is reportedly not available for consideration as a possible site for use to process additional City organics.

Figure 5-27 Former Biosolids Windrow Composting Pads and Aeration System at BRC Site

5.5.2 PWD ANAEROBIC DIGESTION FACILITIES AND PROCESSING

As reported in Chapter 3, the PWD has a total of 20 anaerobic digesters (AD) with a combined "reliable" capacity of approximately 36 million gallons. It has been suggested that as much as half of this AD capacity may not presently be needed to serve the wastewater management needs of the City, leading to the prospect that some of this AD capacity could possibly be used to digest pre-processed organics from sources such as City food wastes. It has not been definitively determined if such processing is within the "charter" of the PWD services.

Nonetheless, PWD recognizes the potential for leveraging its AD processing capability. However, in order to prepare food wastes for the AD systems, it will be necessary to pre-process food wastes to achieve desired feedstock characteristics.

In 2017, PWD issued a non-binding Request for Information (RFI) to collect feedback from potential parties that may be willing to develop a project, under contract with the PWD, to collect and pre-process food wastes and similar organics, and then deliver them to PWD treatment facilities for AD processing under contract with PWD. The RFI resulted in a wide variety of responses from a total of 12 interested companies with varying approaches to meeting the intent of delivering a set volume of pre-processed organics to PWD for processing. A PWD summary of RFI responses received is included in Appendix C.

To date, this consultant is not aware if the PWD has made a decision yet on whether to proceed to issuing a formal Request for Proposals (RFP) for these preprocessing and delivery services. There remains a basic question whether the PWD will accept pre-processed food waste scraps and similar organics to be processed in its existing digesters. Even if it proceeds with an RFP issuance, there is no current commitment that a responding vendor needs to collect and deliver food waste generated by sources from within the City of Philadelphia. So, the impact of this potential project on helping meet the City's organics diversion and processing needs is unclear at this time, on multiple levels. Should this RFP proceed, the City would be well-served if the PWD included a requirement in the RFP that organics generators located within the City receive first priority in obtaining collection/processing service from the vendor proposing to supply PWD with pre-processed organics.

5.6 VICTORY SITE

The "Victory Site," located approximately one-half mile beyond the rear truck entrance to the BRC site (as shown on Exhibit 5-3), was visited by the consultant in 2017. Also located near the Philadelphia International Airport, the approximately 2-acre site is believed to be owned by the Aviation Unit of the City/Airport. It appears that this site was under development by a private party in the recent past, and site improvements were added by that entity, including a truck scale and scale office, some gravel base, and a top-loading platform designed to load railcars on a rail siding that traverses the site. Photos of the Victory Site are shown in Figure 5-28 and Figure 5-29. It is believed that the development deal fell through.

The consultant's reaction on the initial site visit is that the site is long and narrow (possibly only 100-120 feet wide), with possible drainage features along its long axis, with an adjacent Sunoco gas pipeline valve station along its perimeter. The existence of a truck scale at this site is a plus, but the geometry of the site would only allow the placement of one or two long windrow pairs on the site (that is, if environmental issues are not a concern). Therefore, it was determined to be too small to be of any significant benefit to the City in processing yard waste and brush, and a search continued for better, bigger sites.

Figure 5-28 Victory Site

Figure 5-29 Victory Site Truck Scale

5.7 TRANSFER HAULING OF ORGANICS TO DISTANT PROCESSING SITE

As the Chapter 3 Marketplace Survey documented, existing outlets for processing organics from the City are limited, and the capacity of those facilities is far less than what may be needed to significantly reduce organic wastes requiring disposal from the City. One way to broaden options for organics processing is to consider transferring these materials from smaller collection trucks into a larger transfer vehicle, for hauling to a more distant composting or anaerobic digestion site that has available capacity, the willingness to accept City Organics, and reasonable tipping fees.

The City is in the process of upgrading/replacing its existing Northwest Transfer Station on Domino Lane. The Concept Plan for this upgrade now contains a reserved area on the site for the possible future addition of an organics transfer operation. Water-tight sealed storage and transfer trailers would need to be used at the site, and the future design may include an on-site biofilter system to capture and control fugitive odors (if generated) from the transfer operation.

The location of the Northwest Transfer Station is shown on Exhibit 3-1 at the end of Chapter 3 (pin ID locator "S"). The Concept Plan for the upgraded transfer station is presented as Exhibit 5-9.

A preliminary estimated cost for developing an area of the Northwest Transfer Station site to receive and transfer-haul organics to a distant processing location is presented in Chapter 7 – Recommended Strategies for Organics Management.

5.8 OTHER ANAEROBIC DIGESTION PROCESSING OPTIONS

As stated in Chapter 3, and as shown on Exhibit 3-4 at the end of that chapter, this study identified a total of eleven (11) permitted anaerobic farm digesters located in the Southcentral region of Pennsylvania (none exist in Southeastern or Northeastern regions) that may have some capacity to process organics from the City of Philadelphia.

A 2014 estimate of permitted capacity at nine (9) of these facilities (those that were permitted in 2014) by the Pennsylvania Recycling Markets Center (RMC) estimated total permitted capacity of these sites at 55,000 tons of food waste per year. The RMC assessment did not identify how much of this total permitted processing capacity is actually unused and available capacity; that would require a further and detailed file search at the regional PADEP office, and possibly a meeting with each project developer. This would need to be followed by a transportation hauling cost analysis, by direct haul and by transfer vehicle, coupled with good tipping fee information, to determine feasibility and comparative cost of this option to existing methods. Given that none of these facilities are within 50 miles of downtown Philadelphia, hauling cost could add significant cost to this option; therefore, a further investigation of this option is not warranted at this time.

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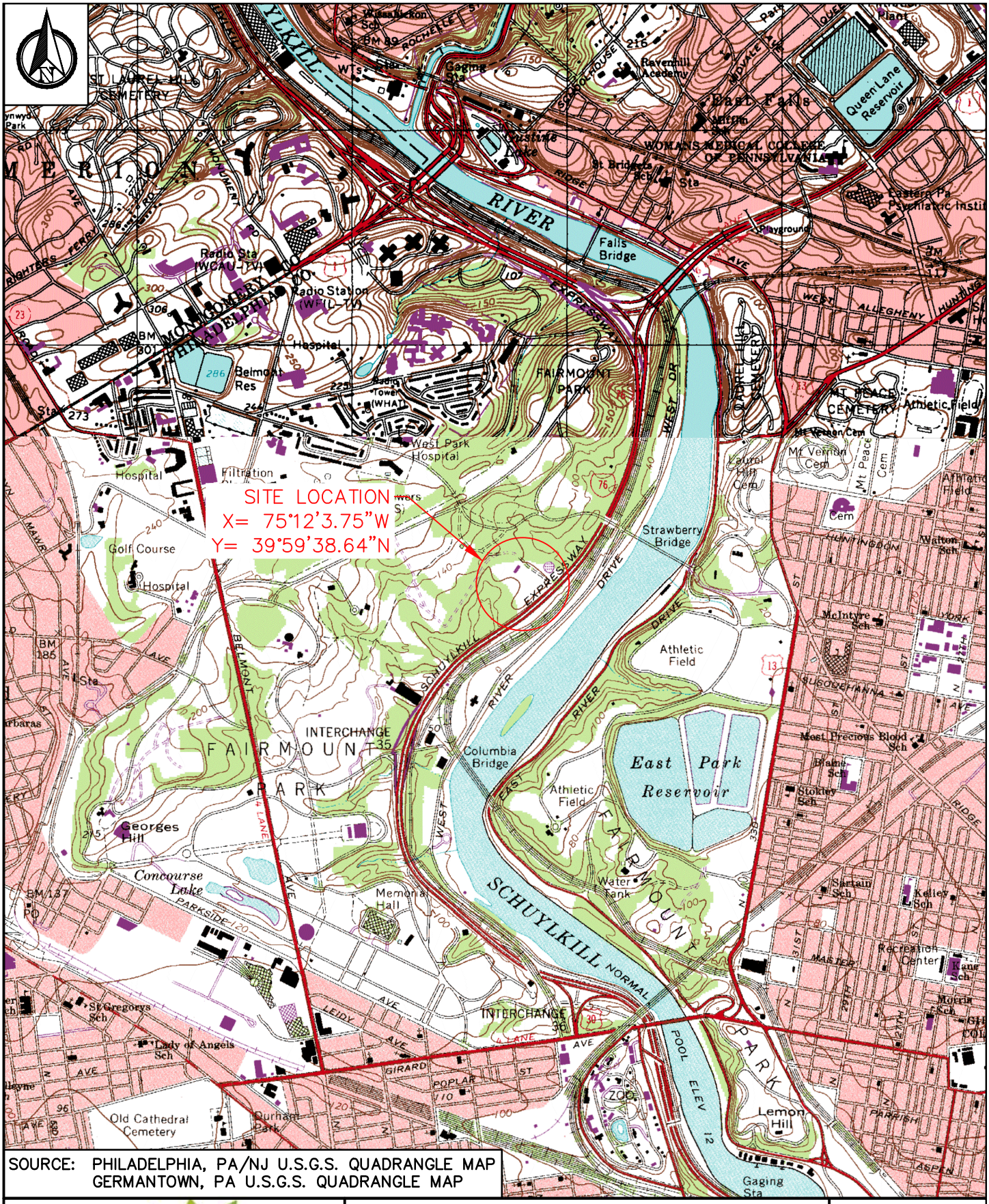
EXHIBIT 5-1 – 5-9



SOURCE: PHILADELPHIA, PA/NJ U.S.G.S. QUADRANGLE MAP
GERMANTOWN, PA U.S.G.S. QUADRANGLE MAP

Keene Environmental Consulting LLC

CITY OF PHILADELPHIA
PHILADELPHIA ORGANICS FEASIBILITY STUDY

FAIRMONT PARK ORGANICS RECYCLING CENTER SITE LOCATION MAP

CITY OF PHILADELPHIA PHILADELPHIA COUNTY, PENNSYLVANIA

Date	Scale
FEBRUARY 2018	1' = 2000"

Exhibit Number
5–1

Project Number
2037.001.001

Plotted: Mar 26, 2018 – 4:09PM SYR By: dsp
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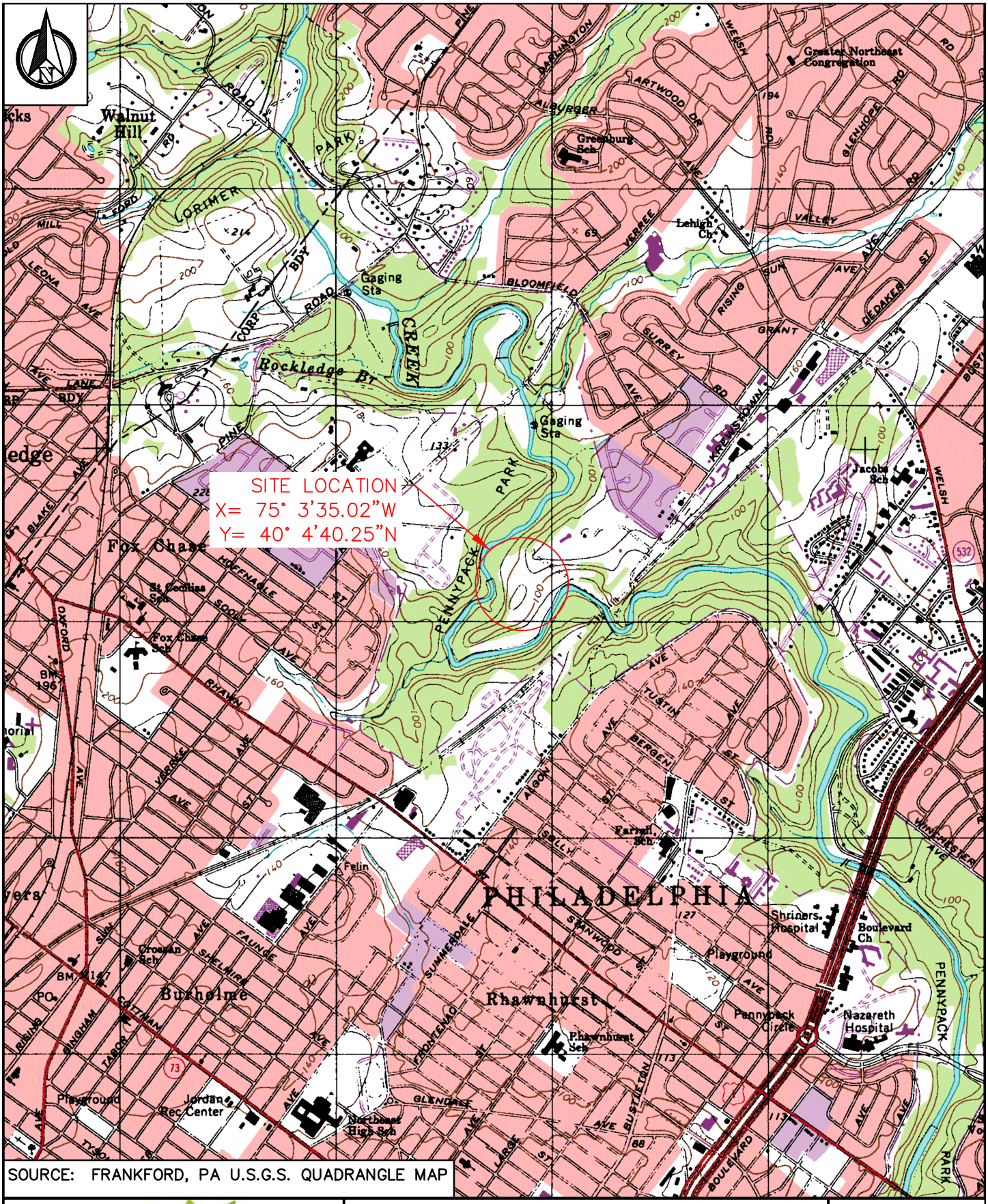

SOURCE: FRANKFORD, PA U.S.G.S. QUADRANGLE MAP

Keene Environmental Consulting LLC

CITY OF PHILADELPHIA
PHILADELPHIA ORGANICS FEASIBILITY STUDY

PPR NE PHILADELPHIA MAINTENANCE SHOP SITE LOCATION MAP

CITY OF PHILADELPHIA PHILADELPHIA COUNTY, PENNSYLVANIA

Date	Scale
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Exhibit Number
5–2

Project Number
2037.001.001

Plotted: Mar 26, 2018 – 4:10PM SYR By: dsp
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NOTE:
AERIAL JULY 2016 PHOTOGRAPHY PROVIDED BY GOOGLE EARTH

SCALE	1"=200'
DATE	MARCH, 2018
PROJECT NUMBER	2037.001.001
EXHIBIT NUMBER	5-3

CITY OF PHILADELPHIA
PHILADELPHIA ORGANICS FEASIBILITY STUDY
BIOSOLIDS RECLAMATION CENTER (BRC) AREA SITE AND VICTORY SITE ACCESS
PHILADELPHIA COUNTY, PENNSYLVANIA
CITY OF PHILADELPHIA

DRAWN BY DSP
DESIGNED BY TDK

Keene Environmental Consulting LLC

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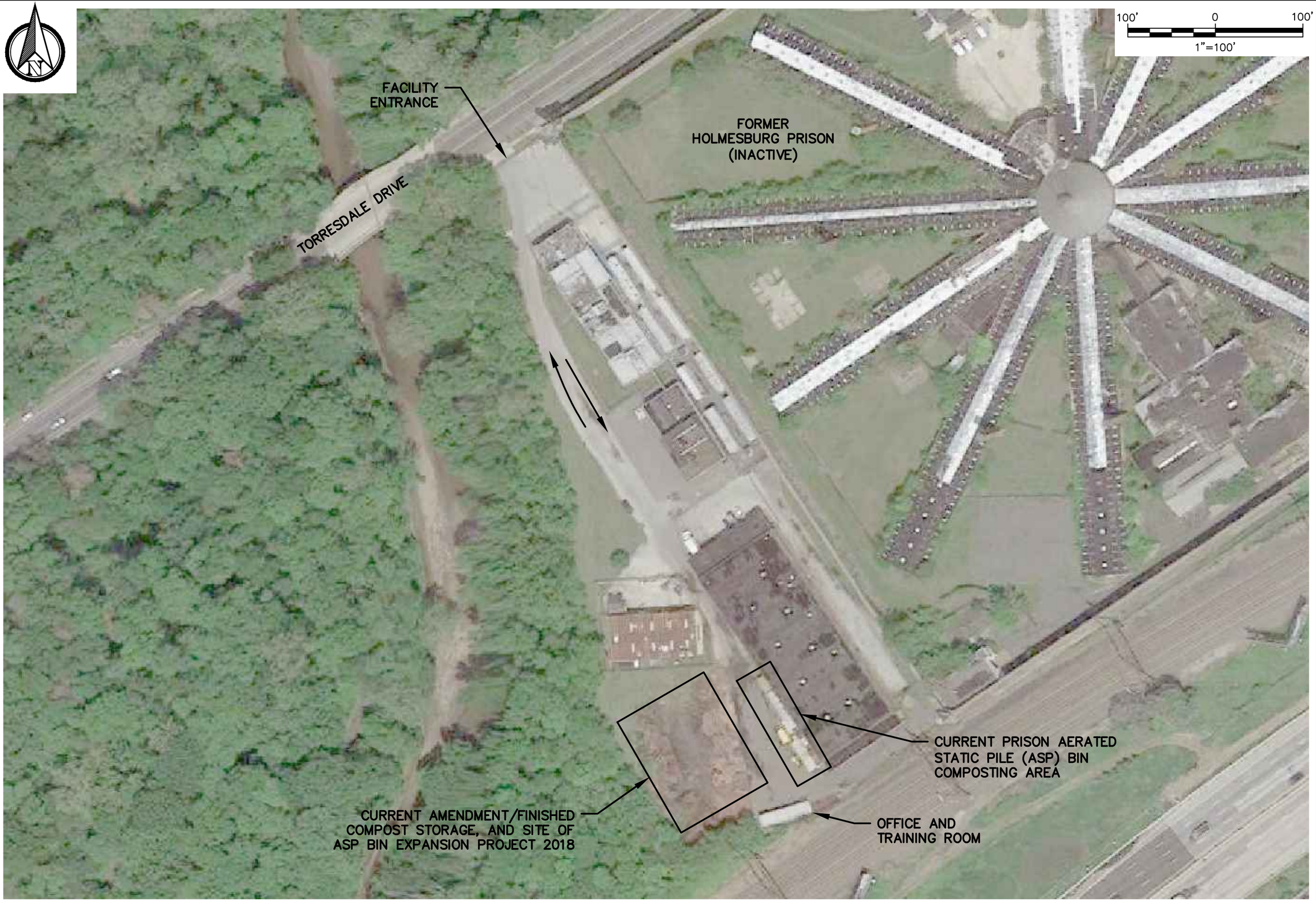

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DATE	MARCH, 2018
PROJECT NUMBER	2037.001.001
EXHIBIT NUMBER	5-4

CITY OF PHILADELPHIA
PHILADELPHIA ORGANICS FEASIBILITY STUDY
PHILADELPHIA PRISON SYSTEM
AERATED STATIC PILE COMPOSTING FACILITY
PHILADELPHIA COUNTY, PENNSYLVANIA
CITY OF PHILADELPHIA

DRAWN BY DSP
DESIGNED BY TDK

Keene Environmental Consulting LLC

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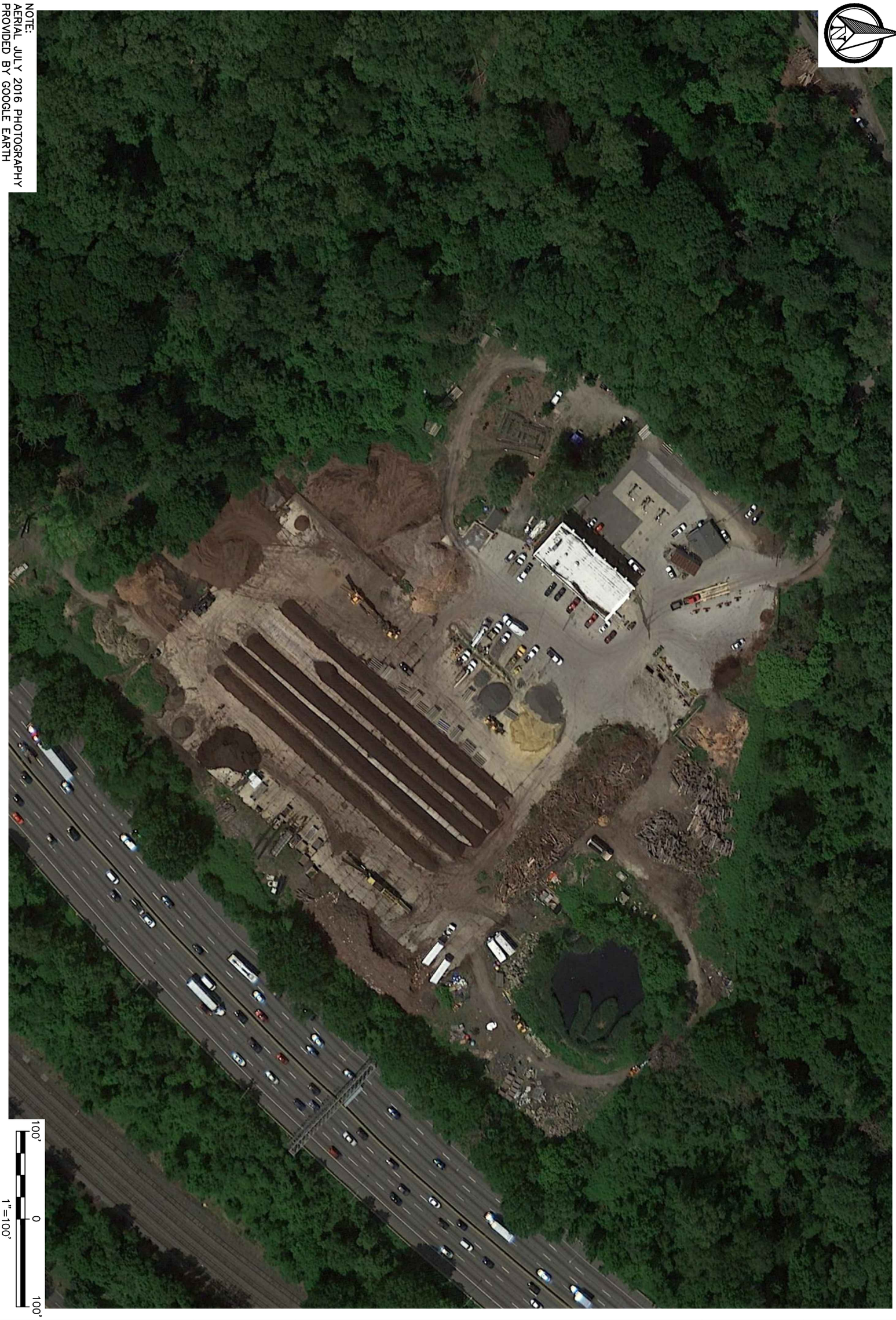
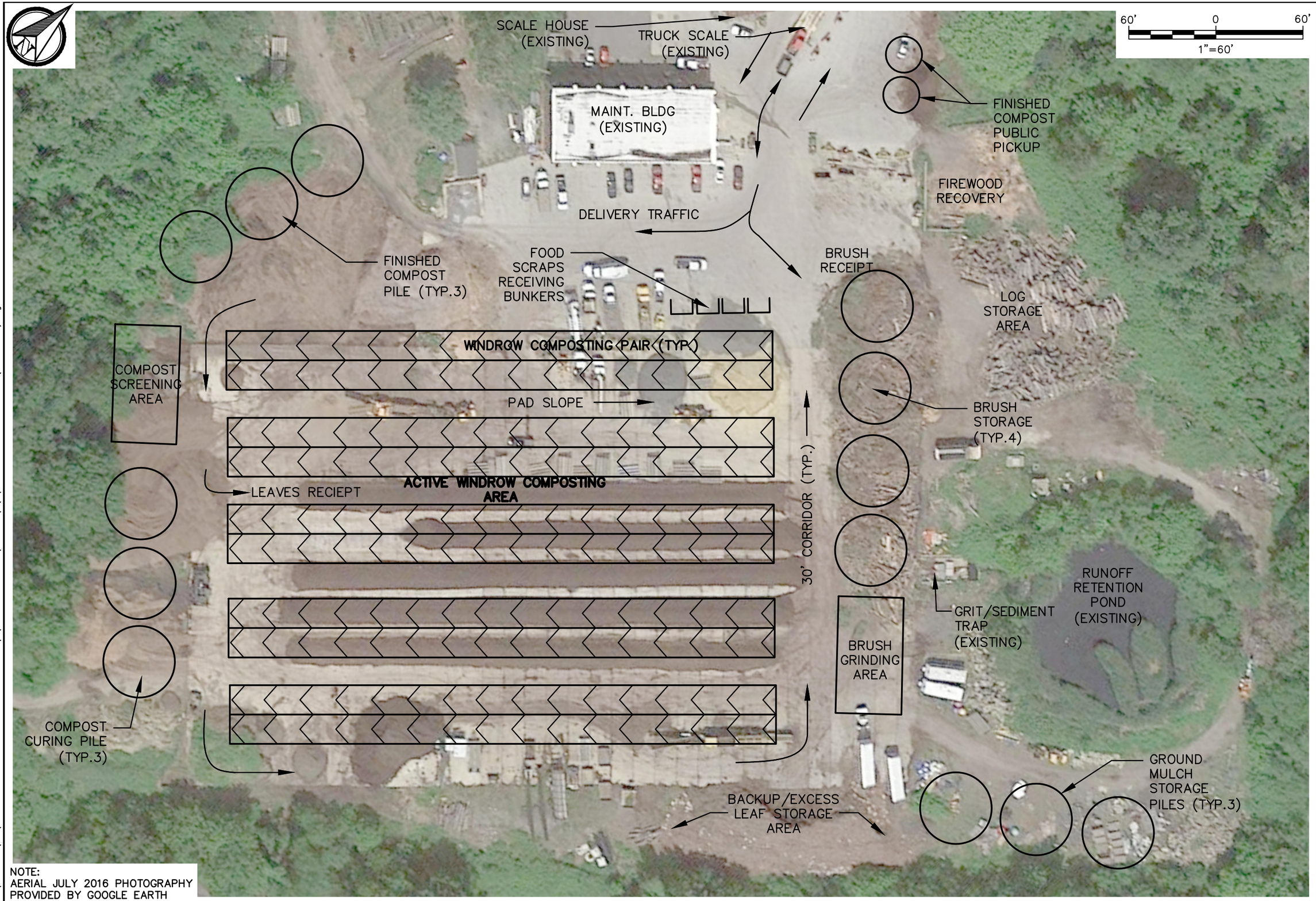
NOTE:
AERIAL JULY 2016 PHOTOGRAPHY
PROVIDED BY GOOGLE EARTH



Keene Environmental Consulting LLC

DRAWN BY	CITY OF PHILADELPHIA PHILADELPHIA ORGANICS FEASIBILITY STUDY **PARKS AND REC. FAIRMONT PARK ORGANICS RECYCLING CENTER** **EXISTING (2016) SITE AERIAL PHOTOGRAPH**	PROJECT NUMBER	SCALE
DSP		2037.001.001	1"=100'
DESIGNED BY		EXHIBIT NUMBER	DATE
TDK	CITY OF PHILADELPHIA PHILADELPHIA COUNTY, PENNSYLVANIA	5-5	MARCH, 2018



NOTE:
AERIAL JULY 2016 PHOTOGRAPHY PROVIDED BY GOOGLE EARTH

SCALE	1"=60'
DATE	MARCH, 2018
PROJECT NUMBER	2037.001.001
EXHIBIT NUMBER	5-6

CITY OF PHILADELPHIA
PHILADELPHIA ORGANICS FEASIBILITY STUDY
FAIRMONT PARK ORGANICS RECYCLING CENTER SITE
COMPOSTING PLAN CONCEPT LAYOUT MODIFICATIONS
PHILADELPHIA COUNTY, PENNSYLVANIA
CITY OF PHILADELPHIA

DRAWN BY JGS
DESIGNED BY TDK

Keene Environmental Consulting LLC

Z:\BL-Vault\ID2\18217AD2-1C71-4823-8927-99D5C4054147\0\1397000-1397999\1397148\L\L\2037.001.001 Fairmont Site (ID 1397148).dwg

NOTE:
AERIAL JULY 2016 PHOTOGRAPHY PROVIDED BY GOOGLE EARTH

PROJECT NUMBER	2037.001.001
EXHIBIT NUMBER	5-7
SCALE	1"=250'
DATE	MARCH, 2018

CITY OF PHILADELPHIA
PHILADELPHIA ORGANICS FEASIBILITY STUDY
PHILADELPHIA PARKS AND REC. NE PHILADELPHIA AREA MAINTENANCE SHOP SITE
PHILADELPHIA COUNTY, PENNSYLVANIA
CITY OF PHILADELPHIA

DRAWN BY DSP
DESIGNED BY TDK

Keene Environmental Consulting LLC

Z:\BL-Vault\ID2\18217AD2-1C71-4823-8927-99D5C4054147\0\1411000-1411999\1411658\L\L\2037.001.001 Krewstown Rd (ID 1411658).dwg

NOTE:
AERIAL 2016 PHOTOGRAPHY PROVIDED BY GOOGLE EARTH

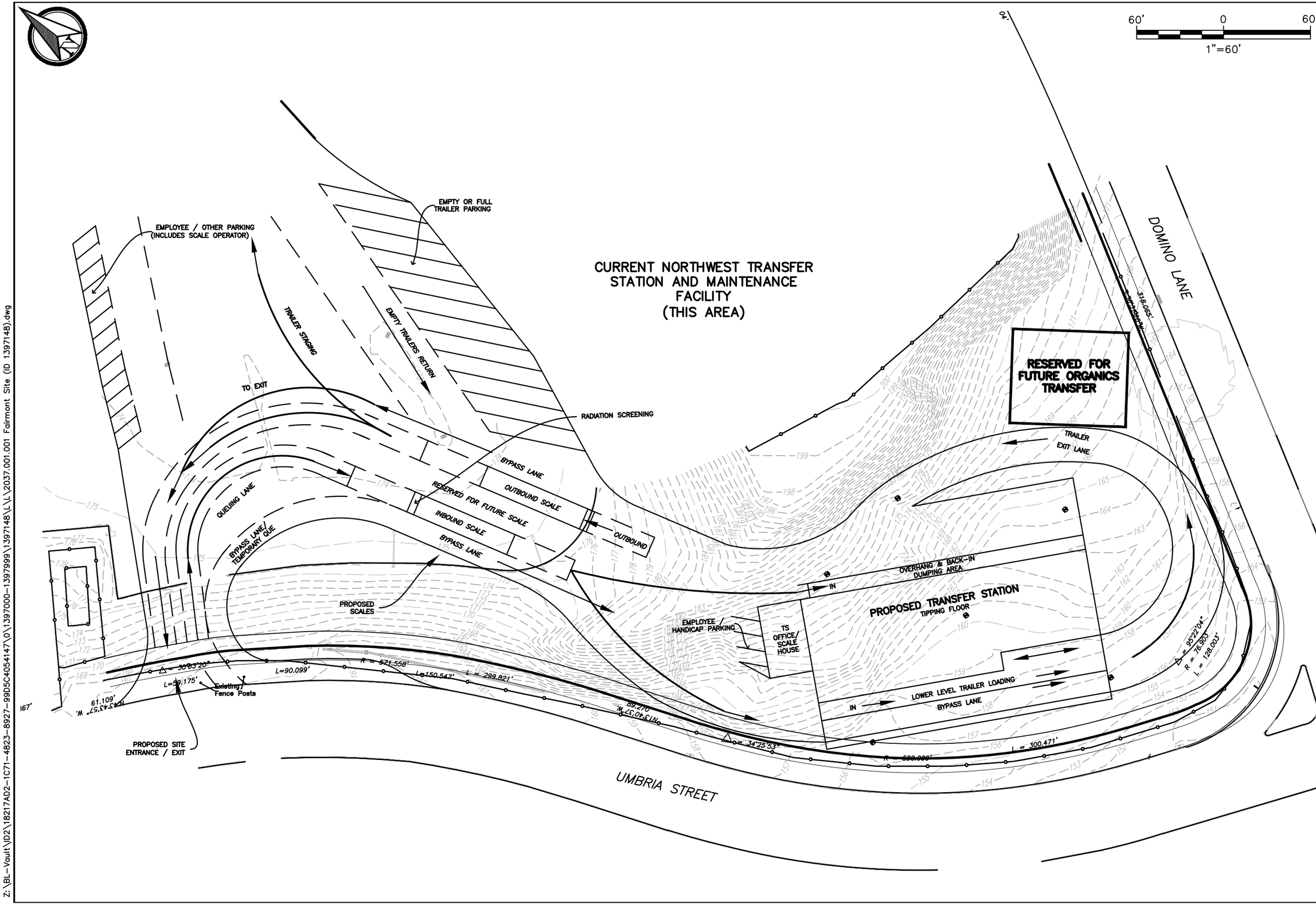
SCALE	1"=100'
DATE	MARCH, 2018
PROJECT NUMBER	2037.001.001
EXHIBIT NUMBER	5-8

CITY OF PHILADELPHIA
PHILADELPHIA ORGANICS FEASIBILITY STUDY
PARKS & REC. NE PHILADELPHIA AREA MAINTENANCE SHOP
PROPOSED COMPOSTING CONCEPT LAYOUT MODIFICATIONS
PHILADELPHIA COUNTY, PENNSYLVANIA
CITY OF PHILADELPHIA

DRAWN BY	DSP
DESIGNED BY	TDK

Keene Environmental Consulting LLC

Z:\BL-Vault\ID2\18217AD2-1C71-4823-8927-99D5C4054147\0\1411000-1411999\1411658\L\L\2037.001.001 Krewstown Rd (ID 1411658).dwg



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DATE	MARCH, 2018
PROJECT NUMBER	2037.001.001
EXHIBIT NUMBER	5-9

CITY OF PHILADELPHIA
PHILADELPHIA ORGANICS FEASIBILITY STUDY
CONCEPT PLAN
PROPOSED PHILADELPHIA NORTHWEST TRANSFER STATION MODIFICATIONS AND FUTURE ORGANICS TRANSFER AREA
PHILADELPHIA COUNTY, PENNSYLVANIA
CITY OF PHILADELPHIA

DRAWN BY DSP
DESIGNED BY TDK

Keene Environmental Consulting LLC

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6. COLLECTION OPTIONS

6.1 INTRODUCTION

The City of Philadelphia has long been involved in leaf collection from residential dwellings. At a minimum, leaf waste collection serves as the primary feedstock into the City's organics processing facility. Over time, the City could consider expanding organics collection to other green wastes and/or food wastes, with processing at either an expanded City processing facility or at another organics facility.

Green wastes generated by commercial businesses and by institutions (e.g. hospitals, colleges) is currently collected by landscapers and/or other private sector haulers. Commercially generated food wastes are either disposed as refuse, or perhaps may be diverted in small amounts where economically feasible and where organics processors with available capacity exist. However, green waste and food waste collection in the commercial and institutional sector is not managed by the City.

This section summarizes the current City-managed leaf waste collection system. It then describes multiple options for increasing organics collection from both the residential and commercial sectors.

6.2 CURRENT PROGRAM DESCRIPTION

6.2.1 HISTORY

Prior to 2009 the City collected leaf waste at the curb for the entire City for a six-week period in the fall. Citizens were required to place all leaves in biodegradable paper bags. The City operated one rear-load packer truck in each of what was then 12 districts (it has since expanded to 13 districts). Each truck operated with a 3-person crew to collect the biodegradable paper leaf bags. This system was found to be expensive and the City did not have the equipment, staff or budget to continue the operation of the service. The City-wide collection program was reduced in 2009.

6.2.2 CURBSIDE COLLECTION PROGRAM SUMMARY

Since 2010, the City has provided leaf collection only to areas of the City with the heaviest accumulation of leaves. Those five specific areas are shown in Figure 6-1.

Residents are required to place all leaves at the curb loose (un-bagged) for collection. Currently there are 65,784 homes (11 percent of entire City) included in the curbside leaf collection program as shown below in Table 6-1.

Figure 6-1 Current Leaf Collection Areas

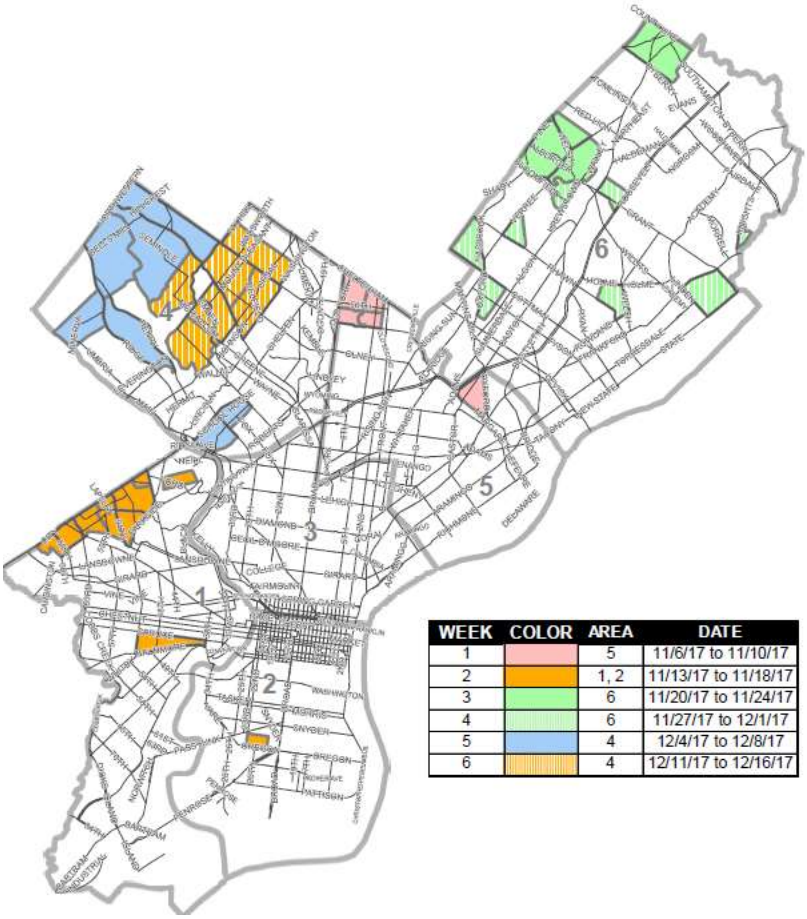

Table 6-1 shows leaf collection covers 730 curb miles, or roughly 20 percent of total curb miles. The City collected 1,678 tons of leaves during the 2017 fall leaf collection season as shown in Table 6-2.

Table 6-1 2017 City Mechanical Leaf Collection Statistics

District	Housing Units [1]	Households with Leaf Collection	% of Total Households Participating	Total City Curb Miles [2]	Leaf Collection Curb Miles	Leaf Curb Miles as % of Total Curb Miles
1A	54,106	17,588	33%	221.7	75.8	34%
1B	53,205	1,032	2%	285.9	25.8	9%
2B	59,022	-	0%	300.3	N/A	0%
2D	35,675	1,733	5%	210.2	11.9	6%
3C	45,334	-	0%	298	N/A	0%
3F	32,149	-	0%	319.5	N/A	0%
4G	47,356	4,530	10%	247.1	117.6	48%
4M	44,978	18,469	41%	316.7	234.8	74%
5F	39,773	1,898	5%	283.6	21.7	8%
5L	38,836	3,188	8%	245.5	41.4	17%
6A	45,459	13,291	29%	393.5	141.5	36%
6B	45,309	2,244	5%	316.2	41.0	13%
6L	48,469	1,811	4%	219	18.7	9%
Total	**589,671**	**65,784**	**11%**	**3,657**	**730**	**20%**

[1] Provided by City (8/17/17 filename *san_bnd_w_household_counts.xlxs*)

[2] Provided by City (3/2/18 filename *san_leaf_miles_sum3-18.xlsx*)

Table 6-2 2017 Leaf Collection Tonnage (2017)

Area	Households with Leaf Collection	Tons Collected [1]	Percent of Tons Collected	LBS. per Unit Collected	LBS. per Mile Collected
1	18,620	63.9	4%	6.86	1,258
2	1,733	15.83	1%	18.27	2,662
3			0%	N/A-	N/A-
4	22,999	1,252.79	75%	108.94	7,111
5	5,086	102.96	6%	40.49	3,266
6	17,346	242.52	14%	27.96	2,410
Total	**65,784**	**1,678**	**100%**	**51.02**	**4,596**

[1] Provided by City (2/17/18 filename *Leaf Collection Schedule 2017.xlxs*)

The 2017 Leaf Collection and Recycling Program began on Monday, November 6th and ended on Saturday, December 16th. The schedule is also shown in Figure 6-1.

One significant problem with the mechanical curbside leaf collection is that parked cars make the collections difficult. Crews often have to rake piles of leaves from between cars so crews can collect the leaves. City should create an ordinance that requires residents to utilize off-street parking on collection days.

6.2.3 LEAF COLLECTION METHODS

The City uses two collection systems for its seasonal leaf collection service, depending on the street characteristics of the neighborhood being served and on the availability of equipment and crews:

- Rubber tire loader with dump trailer support vehicles, and
- Leaf vacuum with box truck.

A listing of the City equipment used for fall leaf collection is shown in Table 6-3. It should be noted that all of this equipment is available to the leaf collection crews but some equipment may not be in use every day due to maintenance issues or lack of staff availability.

Table 6-3 2017 Leaf Collection Equipment

Equipment Type	# of Units
Leaf Vacuum	3
Sweeper	3
Packer Truck	1
Dump Truck	4
Rubber Tired Loader	2
Total	13

Each collection system is described in more detail below.

Rubber Tire Loader Collection

The majority of the leaves are collected by crews using rubber tire loaders. During the six weeks of leaf collection season, the City dispatches two to four of these crews each day depending on availability of equipment and staff. A crew consists of a rubber tire loader, two to four tractor trailer dump trucks, and a boom type street sweeper. These crews are staffed by an operator for the loader and drivers for each truck. Two ground staff are also included in the crew to rake the leaves away from the curb and parked cars. After the loader collects the leaves from along the curb the street sweeper completes the cleanup. Loader collection is shown in Figure 6-2, and the street sweeper is shown in Figure 6-3.

Figure 6-2 Leaf Collection Using Rubber Tire Loader

Figure 6-3 Mechanical Leaf Collection Sweeper

Both the loader and sweeper dump into one of the dump trucks (or a rearloader if available). Each dump truck averages 4 to 6 loads per day based on area of the City scheduled for collection. The sweepers that follow the crews generally make two loads per day. The average payload for a dump truck is 3.8 tons. The loaded trucks are driven to the Fairmont Park Organic Recycling Center where they are dumped and the leaves are processed. Figure 6-4 shows a leaf-bearing dump truck leaving the Northwest Transfer Station truck scale for delivery to the Fairmont Park facility.

Figure 6-4 Leaf Collection Dump Truck

Leaf Vacuum Collection

The leaf vacuum system is used to collect smaller piles of leaves and piles that are located between cars and cannot be collected by the rubber-tired loader. Up to three leaf vacuum trucks were dispatched each day depending on availability of equipment and staff. These crews are staffed by a driver and two ground staff that rake up leaves along the curb and operate the vacuum. After the vacuum truck and crew collect a street, the sweeper collects any leaves that have been left behind by the vacuum crew.

Figure 6-5 Leaf Vacuum

The vacuum truck generally makes two loads per day. The payloads of these loaded vacuum trucks weigh 2.7 tons on average.

6.2.4 LEAF COLLECTION COSTS

The cost to provide mechanical curbside leaf collection is covered out of the City's General Fund appropriation to the Streets Department, and it is not possible to isolate these precise expenses for providing this service. MSW Consultants collaborated with City operations staff to quantify the labor and equipment resources devoted to the curbside collection program, and to estimate the cost based on a combination of City-provided unit costs supplemented with estimates based on MSW Consultants' knowledge of the industry.

Table 6-4 and Table 6-5 compile these unit cost assumptions and the derivation of the direct operating cost needed to provide these services for one season. The hourly operating cost and labor rates shown in these tables were provided by the City and exclude vehicle depreciation.

Table 6-4 Leaf Collection Equipment Operating Cost

Equipment Type	# of Units	Hourly Op Cost	Days	Season Cost
Leaf Vacuum	3	$3.64	30	$2,621
Box Truck	3	$7.65	30	$5,508
Sweeper	3	$10.98	30	$7,906
Packer Truck	1	$10.92	30	$2,621
Dump Truck	4	$17.88	30	$17,165
Rubber Tired Loader	2	$9.00	30	$4,320
Sub-Total Equipment Cost				**$40,140**

Source: Provided by City (file name "Blank 2018 Cost Sheet.xlsx")

Table 6-5 Mechanical Leaf Collection Labor Costs

Position	# of Employees	Hourly Rate	Days	Season Cost
Leaf Vacuum Driver	3	$21.37	30	$15,386
Leaf Vacuum Helper	6	$16.51	30	$23,774
Sweeper Operator	3	$21.37	30	$15,386
Packer Truck Driver	1	$18.47	30	$4,433
Dump Truck Driver	4	$22.45	30	$21,552
Dump Truck Helper	4	$16.51	30	$15,850
Rubber Tired Loader	2	$22.45	30	$10,776
Benefits		40%		$42,863
Sub-Total Labor Cost				**$150,021**

Source: Provided by City (file name "Blank 2018 Cost Sheet.xlsx")

As shown by summing the subtotals in the tables above, the total direct operating cost of the City's fall curbside mechanical leaf collection system is just over $190,000 for the six-week seasonal service. It was beyond the scope of this study to more fully analyze the staffing plan for curbside leaf collection, or to

evaluate the capacity of the broader sanitation collection operation to expand collection of organic materials under current staffing and equipment levels.

6.2.5 DROP-OFF COLLECTION FOR YARD WASTE

The City of Philadelphia does not provide routine curbside yard waste or grass collection to the residential sector. However, the City provides 23 drop-off locations for year-round use by residents, as shown in Table 6-6. Yard wastes must be placed in biodegradable Kraft paper bags, and the yard waste material collected at these sites is transported to the Fairmont Park Organic Recycling Center for processing.

Table 6-6 Yard Waste Drop-off Locations

• 1400 Cottman Ave. (Jardel Recreation)	• Fisher & Ogontz Ave.
• American & Thompson Sts.	• 5th & Chelten Ave. (water reservoir)
• 15th & Bigler Sts.	• Graver Lane & Seminole St.
• Broad & Christian Sts.	• 66th & Haverford Ave.
• 20th & Hartranft Sts.	• Upsal & Lowber Sts.
• Castor & Foulkrod St.	• 72nd & Buist Ave.
• 2901 Princeton Ave. (Mayfair Recreation)	• Washington Ln. & Ardleigh St.
• Cathedral St. & Ridge Ave.	• 7901 Ridgeway St. (Fox Chase Rec.)
• 43rd St. & Powelton Ave.	• Wayne Ave & Logan St. • 8101 Bustleton Ave.
• Corinthian & Poplar St.	• 2900 Comly Rd. (Palmer Playground)
• Domino Lane	• 7231 Torresdale Ave. (Russo Park)
• 54th & Woodbine Ave.	

Bagged yard wastes delivered to the drop-off sites are placed in rear load packer trucks for storage and transportation. A picture of one such site is shown in Figure 6-6.

Figure 6-6 Rearloader at Drop-off Site

Some yard waste drop-off sites also have rear load containers for extra yard waste storage when the truck departs to empty at Fairmont Park. The rearload truck generally weighs an average of 6.39 tons per payload. Figure 6-7 shows the yard waste containers at one of the sites.

Figure 6-7 Rearloader Containers at Drop-off Site

6.2.6 ORGANICS COLLECTION IN THE COMMERCIAL SECTOR

The City of Philadelphia is not engaged in organics collection of any type (neither green waste nor food wastes) from the commercial sector. Such collection is provided by private haulers as demanded by the City's commercial and institutional generators. These commercial accounts are generally large producers of food waste such as food distributors, large restaurants or cafeterias, or institutions such as hospitals and colleges. Food waste is collected in the food preparation areas and transported to collection containers outside the buildings. These collection containers are either transported to organics processing facilities or dumped into collection trucks for transportation to the processing facilities. Figure 6-8 shows two photographs of internal food waste collection in food preparation areas.

Some commercial and institutional generators such as Ace Insurance, and Marriott Hotels and Conference Center collect food waste from the food preparation areas using smaller plastic carts, often lined by plastic bags. Regional compost facilities usually will not accept material contained in plastic bags unless the bags are compostable; acceptability of compostable bags, biodegradable utensils and tableware, etc. should be confirmed with sites on a case-by-case basis. The main reason that generators have already switched to processing organics is to reduce cost, which in some case is more favorable for processing separated organics compared to disposal.

Figure 6-8 Commercial Food Waste Diversion Programs

6.3 EXPANDING ORGANICS COLLECTION

6.3.1 INTRODUCTION

Given that the City of Philadelphia provides only seasonal leaf collection, and serves only limited areas with curbside leaf collection, the City has numerous options for expanding the collection of leaves and other yard waste, and possibly adding food waste collection. Although the specifics of any expanded or new program cannot be defined in detail, this section describes and discusses four options that might be considered in Philadelphia in the future as organics processing infrastructure develops and diversion effort ramp up. Three of these options would impact the residential sector as currently serviced by the City, and the fourth option would launch organics diversion in the commercial sector.

- **Geographic Expansion of Residential Leaf Waste Collection**: The simplest option involves expanding the six-week mechanical leaf collection program to serve all City residents, including collecting bags of leaves at the curb from non-mechanical collection areas.
- **Extended Seasonal Yard Waste Collection for Residential Sector**: A more aggressive option would be to expand the program to include grass and yard waste along with the fall leaves and increase collection to a full nine months per year like many municipalities across the country.
- **Implement Full Organics Collection Including Food Waste for Residential Sector**: The most aggressive option, which is currently undergoing roll-out in New York City, would be to provide carts or other type of food waste containers to each resident and collect the combined mix of yard waste and food waste year-round.
- **Downtown Commercial Organics Collection**: Many cities across the nation have identified regions that have numerous commercial and institutional generators of food waste, such as restaurant districts, food wholesalers, and large institutions, and have begun offering limited commercial organics collection to "close the loop" in these regions.

The remainder of this section more fully evaluates the operating and cost impact of these four options.

6.3.2 POTENTIAL CAPTURE OF ORGANICS

Section 2 of this report estimates the City of Philadelphia residential sector currently generates over 435,000 tons of various organics annually. However, even the most effective recycling and diversion program will not capture all or even a majority of these materials. Experiences in other cities has shown that waste generators are slow to utilize diversion programs for food wastes and compostable household low grade papers.

Table 6-7 estimates the capture rates that might be achievable within the residential and commercial sector if appropriate collection programs were provided and supported by more aggressive solid waste management policies.

Table 6-7 Projected Maximum Capture Rates

Generator Type	Raw Tons	Capturable in Collection Program	Recoverable Tons
Residential Wastes			
Food Waste	76,874	15%	11,531
Yard Waste	38,312	75%	28,734
Compostable Paper	25,572	5%	1,279
Subtotal	**140,758**	**30%**	**41,544**
Commercial Wastes			
Food Waste	203,340	20%	40,668
Yard Waste	19,117	75%	14,338
Compostable Paper	72,125	10%	7,213
Subtotal	**294,582**	**21%**	**62,218**
Total	**435,340**	**24%**	**103,762**

Although overall capture rates may be relatively low, the large fraction of tonnage is compelling to achieve higher diversion.

Focusing on the residential sector, initial opportunities focus on expanding yard waste collection and eventually expanding to include food wastes. However, the City's waste characterization study does not differentiate between various yard waste categories.

To get a better understanding of the types of yard waste, other waste composition studies can be consulted. The 2017 Maryland Statewide Waste Composition Study provides a breakdown of leaves, grass, and brush/pruning's/trimmings. Table 6-8 applies the breakdown of different types of green waste found in the Maryland Statewide Study. The Maryland Study involved sampling at urban, suburban and rural solid waste disposal facilities, and it is likely that yard wastes generated across Maryland are not exactly similar to the likely mix of yard waste in Philadelphia. However, it is likely that grass and yard trimmings generated over the course of a year equal and possibly outweigh leaf wastes.

Table 6-8 Breakdown of Residential Yard Waste Tonnage

Types of Yard Waste	Percent of Disposed Waste	Percent of Yard Wastes	Estimated Philadelphia Tons Generated
Grass	2.4%	47%	18,029
Leaves	0.5%	10%	3,756
Brush/Pruning's/Trimmings	2.2%	43%	16,527
Total	5.1%	100%	38,312

Source: 2017 Maryland Waste Composition Study

As discussed above, an aggressive year-round yard waste collection program would not be expected to capture 100 percent of this material. Based on limited data in other cities, the capture rate could be much lower.

6.3.3 OPTION 1: GEOGRAPHIC EXPANSION OF RESIDENTIAL LEAF COLLECTION

A relatively simple and low-cost option to increase organics collection would be to expand the fall six-week leaf collection to include all households within the City limits. Assuming the diversion of leaves from unserved households is comparable to currently served areas of the City, fall leaf collection could increase by 2,673 tons, from 1,687 to 4,360 curbside tons. This estimate is based on the assumption that currently unserved households generate only 20 percent of the leaves as the mechanically served areas.

City staff estimated that each District would require two collection routes for the six-week time period, which would operate concurrently with the existing mechanical collection in Area 1, 2, 4, 5, and 6. The City would dispatch two extra rearload packer trucks in each District except in Area 4 to complete these leaf collections. The additional cost for leaf collection for the new leaf collection routes are shown in a subsection below.

6.3.4 OPTION 2: EXTENDED SEASONAL YARD WASTE COLLECTION FOR RESIDENTIAL GENERATORS

The City could also expand leaf waste collection to include grass and brush/pruning's/trimmings, in which case the service would need to operate during the typical growing season from April through January. This collection schedule would include the spring cleanup of yards, spring grass, fall leaves, and Christmas trees. It is assumed that a universal yard waste system, operating effectively and with proper outreach and education, would capture as much as 75 percent of these materials from the residential sector. As previously described (Table 6-7), this would result in collection of up to 75 percent of the available yard waste, or 28,734 tons.

To accommodate this increased collection of yard waste, each District would require two additional collection routes. Each of the two District routes per day would collect 5.67 tons of mixed yard waste, which falls in the expected range for a residential yard waste route and equates to one load per day per route. The additional cost for leaf collection for the seasonal yard waste collection routes are shown in a subsection below.

6.3.5 OPTION 3: IMPLEMENT FULL RESIDENTIAL ORGANICS COLLECTION INCLUDING FOOD WASTE

The most aggressive option would be to implement full curbside organics for 12 months per year. This service would allow residents to combine yard waste (grass, leaves, brush) with food waste and compostable papers such as napkins, tissues and pizza boxes. However, available data from other

programs show that these programs achieve much lower capture rates of food and compostable papers. As shown in Table 6-7, the annual organics tonnage under an expanded residential sector organics collection program (yard waste, food waste, and compostable paper) would be 41,544 tons.

To accommodate this increased collection of organics each District would require two additional collection routes for all 12 months per year. Because there would be relatively little incremental food waste and compostable paper waste, the routes are projected to collect 6.15 tons per day, equivalent to one load per day per route. The additional cost for year-round organics collection routes are shown in a subsection below.

6.3.6 OPTION 4: DOWNTOWN COMMERCIAL ORGANICS COLLECTION

Some municipalities are initiating government-sponsored food waste collection programs for areas with a high density of food waste generators as well as for the largest food waste generators in the region. These systems are generally home grown and start small but develop over time. Generators are provided 32 or 64-gallon plastic wheeled carts for storage and collection. These carts are purchased by the City and either given to the generators or rented on a monthly basis. The collection vehicles are not the typical rearload, sideload, or frontload types because of the high moisture content and weight of food waste. The collection trucks are specially designed with 15-foot bodies and 10-foot high sides. There are specially designed tailgates that tightly seal to prevent spillage or leakage of the moisture; these trucks can accommodate approximately 10 tons of material. A picture of a typical organics collection truck is shown below in Figure 6-9.

Figure 6-9 Organics Collection Truck

Commercial organics generators are usually packed tightly together within the downtown area of a city, and a typical mature route can collect about 100 stops per day or about 8.75 tons. This is shown in Table 6-9.

Table 6-9 Single Route Commercial Food Waste Collection Capacity

Parameter	Value
Weight per 64-Gal Cart (lbs.)	175
Carts per Day	100
Tons/Day	8.75
Tons/Week	43.8
Tons/Year	2,275

Note: Estimated by MSW Consultants

As shown, such a route could accommodate accounts generating up to 2,275 tons annually. This amount equates to only one percent of the total food waste estimated to be generated by the City's commercial sector. The commercial accounts to be targeted include restaurants, grocers, and other food service providers and reflect the "low hanging fruit" among commercial generators.

Establishment of a commercial organics collection program would presumably occur in conjunction with a promotional campaign targeting interested businesses within the City. Other cities with such programs have cultivated a green brand that includes "farm to table" restaurants that close the loop by using their own compost to cultivate the foods served at their locations.

It should be noted that one of most significant problems with organics collection is contamination. Participating generators have to take special precautions to minimize contamination levels. Many generators use plastic wheeled carts with lids which can be rolled into high food generation areas. Some use plastic bags to line the carts while others wash every cart after each use. The loaded carts are rolled to a loading dock or collection area for scheduled pick-ups. The City should expect to provide training to participating businesses at the outset of the program and should also give routine and detailed feedback on the quality and cleanliness of the organics supplied by each business. Ultimately, the goal is to make the program a "win-win" where businesses can leverage their participation in the organics diversion program and have incentive to use the program effectively.

6.4 ESTIMATED COST OF COLLECTION OPTIONS

City staff provided collection tonnages and basic financial information for the refuse and recycling collection systems, summarized in Table 6-12. It is hypothesized that the cost of a residential yard waste or organics collection route would most closely mimic the current recycling collection service.

Table 6-10 Operational Cost for Current Collection Systems (2017)

System	Tons (2016)	Total Cost/Ton [1]	Disposal/ Processing Cost/Ton [1]	Operational Cost/Ton	Annual Operational Cost
Residential Refuse	497,040	$174.00	$ 60.04	$ 113.96	$ 56,642,685
Residential Recycling	108,615	$243.00	$120.04	$ 122.96	$ 13,355,298

[1] Source: City of Philadelphia

The annual operational collection cost was used to estimate the average annual operational cost for a route, average monthly cost for a route and average weekly cost for a route. These estimated costs are shown in Table 6-11.

Table 6-11 Estimated Unit Cost (2016) for Evaluating Organic Collection Cost Impacts

System	Routes per Week	Annual Operating Cost	Implied Cost per Route	Implied Route Cost per Month	Implied Route Cost per Week
Refuse Collection	138.0	$56,642,685	$410,454	$34,204	$7,893
Recycling Collection	27.6	$13,355,298	$483,888	$40,324	$9,306

Table 6-12 illustrates the estimated cost for each of the collection system options discussed below.

Table 6-12 Incremental Cost for Residential Organic Collection Options (Excludes Processing)

System	Routes per Week	Unit Cost per Route		Duration of Service	Incremental Annual Collection Cost [2]
Fall Leaf Collection for Remainder of City (6 weeks)	24	$9,306	per week	6 weeks	$1,352,690
9 Month Yard Waste Collection for Entire City	26	$40,324	per month	9 months	$9,548,355
12-month Organics Collection [1]	26	$483,888	per year	12 months	$15,529,433

[1] Includes cost for 589,671 carts at $50 per cart.

[2] Calculations may differ because of rounding in the cost model.

It should also be noted that the City would need to supply carts as a pre-condition of implementing curbside organics collection that includes food wastes. The capital cost to supply carts to the City's residential households, assuming one cart per household, is $29.5 million, which adds roughly $3 million on an annualized basis to the cost of this option shown in Table 6-12.

The City does not currently operate any collection services that are similar to a commercial organics collection route. Consequently, the estimated incremental cost of operating a commercial organics route is tabulated below in Table 6-13. This table assumes that a commercial organics route would be in operation every day serving commercial and institutional generators who have signed up for the program. In addition to the collection route costs, the City should expect to spend $20,000 to purchase and distribute 400 40-gallon and 60-gallon carts (estimated $50 per cart) to participating businesses (although an alternative would be to charge the businesses for these carts in exchange for receiving the service).

Table 6-13 Commercial Organics Collection Route Cost Estimate (Excludes Processing)

Line Item	Annual Cost
Truck Fixed [1]	$12,000
Truck Variable [2]	$22,714
Labor [2]	
Operator 1 - HEO II	$46,696
Operator 2 - EO II	$42,120
Benefits (35%)	$31,086
Overhead (20%) [1]	$30,923
Total Annual Cost	**$185,539**

[1] Estimated by MSW Consultants
[2] Provided by City of Philadelphia

6.5 CONCLUSION

In conclusion, the City of Philadelphia has numerous options to increase the diversion of leaves, yard waste, or even food waste and compostable paper. However, doing so will necessarily require the addition of collection resources and the associated cost of these expanded or new collection services. The total cost will likely be considered high, although on a per-household basis the cost appears to be reasonable. Table 6-14 compares these three collection alternatives to the current fall leaf collection system, as well as the downtown commercial organics route cost. (Note that the full cost of each option includes the existing cost of the mechanical leaf collection, and hence the values in this table differ slightly from preceding tables.)

Table 6-14 Summary of Organic Collection Options (Excludes Processing)

Residential Collection Option	Annual Tons Collected	Estimated Annual Cost (including continued Mechanical Leaf Collection)	Cost/Ton	Estimated Diversion Rate [1]	Monthly Cost per Household
Current Mechanical Leaf Collection [2]	1,687	$190,161	$113	0.4%	$1.93
Opt. 1: Universal Leaf Collection [2]	4,360	$1,542,851	$354	0.9%	$1.74
Opt. 2: Seasonal Yard Waste Collection	28,734	$9,738,516	$339	6.3%	$1.84
Opt. 3: Full Year Organics Collection	41,544	$15,719,594	$382	9.0%	$2.22
Opt. 4: Downtown Commercial Collection	2,275	$185,539	$82	N/A	N/A

[1] Based on the total estimated residential tons shown in Table 2-3.
[2] Base on 2 months of service.

It should be noted that the incremental quantities collected would require available processing depending on the type of organic material. Additional cost could be incurred for processing and potentially for transportation if long-haul is required. The next section combines collection and processing costs of various options to paint a full picture of the scenarios available to the City to expand organics diversion.

7. STRATEGIES FOR EXPANDING ORGANICS RECOVERY

7.1 SUMMARY

The primary purpose of this section is to bring together the ideas of the first six sections of the report, and to offer recommendations and strategies for increasing the diversion of organics generated in the City pf Philadelphia.

Section 1 summarizes the current interests and goals of the City to reduce waste and increase organics recovery. The overarching goal of the City's Zero Waste program (adopted in December 2016) is to reduce overall waste disposal in the City by year 2035 by 90 percent, by lowering waste generation and increasing waste diversion from disposal, and by using waste-to-energy to extract value from the remaining 10 percent of the waste stream.

Section 2 estimates organic waste discards from the City's residential and commercial waste stream. The City currently collects and disposes approximately 460,000 tons of municipal waste annually. Of this, the residential sector of the City discards over 140,000 tons per year of leaves and yard waste, food waste, and compostable paper; this is projected to grow to over 145,000 tons by 2025. This does not include approximately 1,700 tons of materials that the City currently collects and composts annually at Fairmont Park. The City's commercial sector generators, whose waste is collected and disposed by the private sector, discarded nearly twice as much refuse as the residential sector, close to 870,000 tons. Of this, it is estimated that nearly 300,000 tons are comprised of organics (again, twice as much as from the residential sector), and this is projected to grow to over 325,000 tons by 2025. Successful organics reduction programs should target both residential and commercial sector waste reduction.

Section 3 reviews the results of a survey to determine available capacity in the public and private regional marketplace, defined as the area within 50 miles of downtown Philadelphia, to process additional organics from the City. This study assumed direct haul of organics wastes could economically reach sites within 25 miles of Philadelphia; with more distant processing sites requiring aggregation of materials into long-haul trailers. Several yard waste processors, both existing and under construction, may offer between 10,000 and 40,000 tons per year of processing capacity for leaves and yard waste; one site under construction in New Jersey accounts for up to 30,000 tons year of this additional processing capacity. Other than the New Jersey facility under construction, no additional food waste and compostable organics processing facilities have been identified within 25 miles of down Philadelphia. If the goals of the Zero Waste Plan are to be realized, additional organics processing capacity will need to be developed in closer proximity to the City.

Section 4 researched organics management programs in place in other large U.S. cities. Two large East Coast cities, New York and Washington DC, and two progressive West Coast cities, San Jose and Seattle, were investigated. Of these, the most extensive regional program is that of New York City (which in 2015 began phasing in a program to offer either curbside or dropoff collection of organics to all city residents). The program that is most similar to (and slightly ahead chronologically of Philadelphia's) is the Washington DC organics program, located in a geographic area with very limited organics processing capacity within 40 miles of DC (not so different from Philadelphia's marketplace). In that case, the study recommends the five-year development of a new Aerated Static Pile Composting Project by the District (in years one and two), followed by a multi-year rollout of a new organics collection program in years three to five. In all cases benchmarked, public financial commitment to an expanded organics management program is paramount to success, either through a public project or through bidding for private processing services.

Section 5 evaluates the current status of public and private processing options for organics management and focuses on City-sponsored expansion projects. The City's potential sites for expansion of organics processing are limited. Two sites that are evaluated in detail for yard waste and brush processing are the Philadelphia Parks and Recreation's (PPR) Fairmont Park Organics Recycling Center (Fairmont Park) and

PPR's Northeast Philadelphia Maintenance Shop Brush Processing Site (NE Philadelphia Site). Section 5 also identified several other sites that were ruled out for further consideration and documents the current expansion of the Philadelphia Department of Prison's Aerated Static Pile Compost Bin Site. Cost estimates for development of the two PPR sites are presented in this Section 7. Section 5 also discusses the Philadelphia Water Department's (PWD) current Request for Information (RFI) process to gather information on potential pre-processors of organics prior to anaerobic digestion in PWD's existing digesters.

Section 6 describes the recent and current City leaf collection program, which is provided for six weeks each fall to a subset of collection districts. Multiple options for expanding organics collection are described and analyzed. Alternatives to the current system include: (a) geographic expansion of existing leaf waste collection, (b) providing nine-month City-wide yard waste collection for the residential sector, (c) implementing full organics collection including food waste for the residential sector, and (d) establishing a downtown commercial organics collection service for restaurants, grocers, university and other institutional dining services, and related businesses and institutions. Section 6 identifies the operational and cost requirements of each collection option.

7.2 GAP ANALYSIS

7.2.1 ORGANICS PROCESSING NEEDS

Table 7-1 presents a summary of recoverable tons from various subcomponents of residential and commercial organics that are discarded n the City annually.

Table 7-1 City of Philadelphia Organics Procesing Needs

Generator Type	Raw Tons Generated per Year (2015)	Capturable in Collection Program	Recoverable Tons per Year	Tons per Day, 5.5 Days per Week (average)
Yard Waste				
Residential	38,312	75%	28,734	100
Commercial	19,117	75%	14,338	50
Yard Waste Subtotal	**57,429**	**75%**	**43,072**	**151**
Residential Organics				
Residential Food Waste	76,874	15%	11,531	40
Residential Compostable Paper	25,572	5%	1,279	4
Residential Organics Subtotal	**102,446**	**13%**	**12,810**	**45**
Commercial Organics				
Commercial Food Waste	203,340	20%	40,668	142
Commercial Compostable Paper	72,125	10%	7,213	25
Commercial Organics Subtotal	**275,465**	**17%**	**47,881**	**167**
Total	**435,340**	**24%**	**103,762**	**363**

Processing needs for various portions of the overall City-wide stream of organics are discussed below:

- Leaves and Yard Waste: An estimated 38,000 tons of leaves and yard waste are discarded annually from the residential sector, plus another 19,000 tons from the City's commercial sector. However, based on other studies, it is expected that only 75 percent of discarded residential and commercial grass, leaves, and yard waste brush/prunings/trimmings could realistically be "captured," for a total of about 43,000 tons of materials annually.
- Food Waste and Compostable Paper: Discarded food waste and compostable paper is estimated at approximately 102,000 tons from the residential sector plus 275,000 tons from commercial sector sources. However, as shown in Table 7-1, it is estimated that less than 20 percent of food waste and compostable paper can be reasonably expected to be separated from the waste stream; this total approximately 61,000 recoverable tons of food waste and compostable paper annually from the combined residential and commercial sectors.
- Residential Sector Processing Needs: Looking at just residential sector organics, Table 7-1 shows that approximately 29,000 tons of yard waste (equivalent to 145,000 cubic yards of material) may be potentially capturable for processing/recycling. A total of 13,000 tons of residential food waste and compostable paper (approximately 26,000 CY) could potentially be segregated for processing. Together, this amounts to 41,544 tons annually of capturable residential tons (with an extensive expansion of organics collection by the City by implementing Collection Expansion Option 3 from Section 6). This quantity is equivalent to an average of roughly 145 tons per day, five-and-one-half-days-per-week basis, with a peak daily total of about 180-190 tons per day.
- Combined Residential and Commercial Processing Needs: To process both residential and commercial yard waste, food waste, and compostable paper, facilities that can process a total of approximately 100,000 tons of the City's organics annually (an average of about 365 tons per day, five-and-one-half-days-per-week basis; with a peak daily total of about 450-460 tons per day) would be necessary. This number is at the high end of the City's previous initial estimate of 50,000-100,000 tons per year of organics that it felt could be potentially recoverable from the waste stream to be processed each year. If 100,000 tons were diverted and recovered from the City's waste stream, this would represent a 23 percent reduction in the City's combined organics waste stream, or a 7.5 percent reduction in the overall combined residential and commercial refuse waste stream. Collecting this quantity of organics would require not only the implementation of 12-month residential organics collection (Collection Option 3), but establishment of 25 new collection routes serving the commercial sector (Collection Option 4 x 25 routes).

7.2.2 CURRENT REGIONAL PROCESSING CAPACITY

As Section 3 and Section 5 explained, the current regional marketplace to accept and process additional organics from the City is limited. Tables 3-1 and 3-2 outlines facilities located within a 50-mile radius of downtown Philadelphia, with distance from the downtown to each site, type of waste(s) accepted, permitted and available capacity, and cumulative regional available capacity.

- The City's Fairmont Park Organics Recycling Center currently accepts and processes less than 1,700 tons of leaves annually (Table 6-14), and together with brush/trees, grass clippings, and herbivore manure, receives about 3,700 tons of material annually for processing and/or resale. The existing facility is sized for processing about 1,400 tons of leaves in windrows at one time. The site could process three times that amount by cycling materials through the facility over a 3-4-month period, for a total of 4,200 tons of leaves processed annually. This is roughly equivalent to the tonnages that would require processing with an expanded fall leaf collection program to all residential customers at pre-2009 levels (Table 6-14, Collection Option 1 – Universal Leaf Collection). Also, there is opportunity to roughly double the processing throughput at this site through more efficient site layout and operations, as detailed in Chapter 5 and further discussed in a subsection below.

- The NE Philadelphia Maintenance Shop Site receives and chips an undetermined amount of trees and branches annually from that area's streets and parks by PPR. This site is not currently set up for composting leaves, but leaf composting and other organics processing could be added to this site as further discussed in a subsection below.
- The Philadelphia Prison System Aerated Static Pile Bin Composting System currently processes about 0.5 tons of food waste daily from its correctional facilities, and is undergoing an expansion to 2.5 tons daily, to handle all food waste from its six (6) buildings. This facility is on a small site and does not have additional capacity to serve organics processing needs of the City.
- The PWD's Existing Anaerobic Digesters have unused capacity at its wastewater plants, but PWD does not currently accept food waste for processing. It is investigating its future options for this.
- A number of farm digesters were identified in Section 5 that are permitted to accept food waste (with a cumulative permitted capacity to process 55,000 tons per year of food waste), but none of these are located within 50 miles of downtown Philadelphia, and remaining capacity and interest in receiving Philadelphia organics is unknown at this time.
- Organics Diversion, together with another identified nearby facility (Delaware County, PA), may have capacity for processing up to 40,000 tons per year of additional organics, although negotiation of terms of service must be determined on a case-by-case basis.

If all available and under-construction processing capacity within 25 miles (as identified in the marketplace survey in Section 3) is dedicated to Philadelphia's needs, this may fulfill the City's residential and commercial yard waste processing needs; however, this expectation is unreasonable. The developer of the New Jersey facility (Organics Diversion LLC) that comprises most of this potential capacity serves exclusively commercial customers currently and will likely want to expand its commercial food waste and compostable paper customer base for processing at this site. Also, Organics Diversion's customer service area is much broader than just the City of Philadelphia. Organics Diversion states that it expects to bring on an additional 15,000 to 30,000 tons per year of new processing capacity once it completes its current construction project.

The City does not currently have the capacity to accept and transfer more "solid" organics to a larger vehicle for hauling to a more distant site. The concept for such a transfer operation was discussed in Section 5 and is further discussed in a subsection below.

Beyond these options, a potential shortage of leaves and yard waste processing capacity is likely, and a complete lack of additional facilities exist within a 25-mile radius to serve the food waste and compostable paper processing needs.

It is believed that the expansion of public organics processing capacity should be the initial thrust to divert and process additional organics and reduce waste disposal. Options for this are further discussed below.

7.3 PUBLIC SECTOR INFRASTRUCTURE EXPANSION OPTIONS

Achieving meaningful increases in organics diversion will require expansion of regional processing. Options are described below.

7.3.1 FAIRMONT PARK ORGANICS RECYCLING CENTER

This processing site has capacity for composting 1,400 tons of leaves at any one time. The site has a temporary storage pile for leaves until they can be placed in windrows. Through this operation, the site handles existing leaf quantities of about 1,700 tons annually. As noted above, by more aggressively turning piles and reaching compost maturity more quickly, the site should be able to triple its current annual throughput (three cycles of windrows annually), to about 4,200 tons of leaves.

A more efficient windrow layout and operational procedure, presented in Exhibit 5-6 of Section 5, could more than double the quantity of leaves that can be placed in windrows at any one time at the existing site

(with little or no additional site costs). Through better layout and more efficient operations, the leaf composting capacity of the site could be increased to 9,000 tons of leaves annually. Site capabilities to process brush and logs would continue as currently done.

It is not believed that additional site improvements/costs are required at Fairmont Park, other than the possible cleanup of spoil material on-site along with other discarded materials that would be better handled if landfilled. The spoil material, estimated at roughly 5,000 CY, could possibly be relocated to the site of the upcoming Northwest Transfer Station modification project, which has a structural fill requirement on the site of over 10,000 CY. At an estimated $10 per CY to move this material to the transfer station site, this spoil material transfer could cost about $50,000, but should offset similar costs of the transfer station modifications. For budgeting purposes, cleanup of the other site perimeter dumpings may cost $10-20,000, with landfilling or waste-to-energy disposal of the materials.

The Consultant's December 2017 site visit noted some serious equipment breakdowns as well as a lack of compost handling/processing equipment redundancy as required to assure reliable processing capability. The entrance truck scale was inoperable, and the horizontal brush grinder was non-functional, awaiting parts and servicing by an equipment vendor. If not repaired yet, it is recommended that a budget of $25-50,000 be established to immediately repair this equipment. Further, acquisition of an additional large front-end loader, a backup windrow turner, a backup trommel screen and a backup horizontal grinder would greatly improve equipment redundancy; the cost for this equipment (new equipment) is estimated at a total of $1.5 to $2 million dollars (see the equipment pricing section of Exhibit 7-1, plus another $150,000-200,000 if a new CAT loader is purchased rather than a used one). Used backup equipment could probably be secured for half this price. If the City develops the NE Philadelphia site for composting, and outfits that site with new operations equipment, that equipment could serve as a short-term redundancy in the equipment at Fairmont Park, as long as the equipment could be easily transported between sites.

It was observed that the existing Fairmont Park operates with minimal staff. The City should assure that it has adequate staffing for the more aggressive operations that are recommended at this site.

No operational permit could be located for the site and recommended operational and layout changes at this site probably dictate the City obtaining a new PADEP General Permit. It is recommended that a GP030 General Permit application be submitted, with a budgeted cost of $25,000, assuming no environmental issues or additional stormwater measures required.

In total, the recommended capital upgrades at Fairmont Park are estimated to cost between $1 million and $2 million dollars (the total of all cost items in this subsection, including the purchase of either used or new backup equipment).

7.3.2 NORTHEAST PHILADELPHIA MAINTENANCE SHOP

- Northeast Philadelphia Site: Development Option A - This site could be developed as an efficient leaf windrow composting operation, similar to the recommended improvements at Fairmont Park. The site could expand from receiving only brush to taking leaves, brush, trees, and other organics. The improved site would provide all of the leaf and yard waste management functions as Fairmont Park. The suggested site improvements are presented in Exhibit 5-8 of Section 5. The capacity of this site, once improved, would be able to process 9,000 tons of leaves annually, plus brush and trees.
- Northeast Philadelphia Site: Development Option B - If the City wishes to further maximize the processing capacity of this site, and/or to take additional categories of organics (such as food waste and/or compostable paper), it is recommended that the technology of the improved site be changed from a turned windrow operation to an extended aerated static pile system (EASP). This technology allows for the building of higher composting piles on the pad, less required equipment access lanes between the piles, and the elimination of the pile turning operation, in lieu of a static forced-aeration pile system. The same asphalt compost pad could be utilized here as with Option A. The windrow

turner equipment would be replaced by less expensive ag silage mixers, and an additional front-end loader would be added to the site equipment. The small-horsepower blowers and plastic aeration piping are relatively inexpensive additions to the project. An EASP system would at least double the throughput capacity of this site (from 9,000 to 18,000 tons per year of leaves and/or compostable organics).

- Northeast Philadelphia Site – Costs for Option A Improvements - Due to the undulating topography of the site and the fact that it currently has no site improvements (the site access road is dirt, and the chipping area itself is an earth and mulch "pad"), costs have been estimated to completely develop and equip this site. The estimated capital cost to provide a paved entrance and an asphalt compost pad of about 3 acres, plus an additional 5.5 acres of stoned processing and maneuvering areas around the perimeter of the compost pad, is approximately $4.6 million, and includes engineering design and construction management, permitting (GP030) and related investigations, construction of site improvements and equipment purchase. This project cost total also includes a 25 percent contingency. The only difference between this improved site and Fairmont Park is that this estimate does not include an entrance scale/scale-shed; this could be added to the project at an additional capital cost of about $150-200,000 if determined necessary. Exhibit 7-1 presents a breakdown of the Option A project cost estimate.
- Northeast Philadelphia Site – Costs for Option B Improvements: The modified cost to construct a EASP system at the site is estimated at approximately $4.8 million dollars, including contingency; a breakdown of this cost estimate is presented in Exhibit 7-2. This project cost is slightly higher than Option A, but would double the processing capacity of the site in comparison with Option A. It would also allow the site to process additional types of organics. If the site processes food waste, a GP025 permit is recommended for the facility, which allows composting of food waste with leaves and yard wastes. Not included in this cost estimate is an entrance truck scale and shed. Also, not included in the cost estimate at this time is a biofilter system for additional odor control; if determined a necessary feature, this could be added to the facility design and cost.

7.3.3 PHILADELPHIA WATER DEPARTMENT

7.3.3.1 Preprocessing Facility Project

As noted in Section 5, the Philadelphia Water Department, which is responsible for wastewater and stormwater management within the City, owns and operates three water pollution control plants (WPCPs). At two of these three WPCPs are a total of 20 anaerobic digesters (ADs), with a combined reliable processing capacity of 36 million gallons of liquid organics. It has been suggested that as much of half of this AD processing capacity may currently be underutilized. Therefore, there is interest in assessing whether the PWD ADs could feasibly accept and process food waste and other similar organics from the City.

PWD issued a Request for Information (RFI) in 2017 from companies with potential interest in collecting, pre-processing, and delivering an organic slurry to the PWD facilities for processing (this was a non-binding data-gathering process). A total of 12 companies responded to this RFI. A PWD summary of these responses, which was presented to the Organics Subcommittee of the SWRAC in 2017, is included in Appendix C of this report.

In general, the components of such a program would include:

- Subcontracted organics collection from organics generators by a hauler. Generators may include restaurants, grocery stores, food distributors, residential generators, etc. The locations of these generators are not specifically determined at this time.
- Delivery of these organics by the hauler to a vendor's preprocessing facility (probably at a different location than PWD's WPCPs). At the preprocessing facility, the following steps would likely occur:

- Removal of contaminants,
- Maceration/liquefaction of the organics, and
- Grit removal.

- The preprocessed slurry would then be delivered to a PWD site, where a new receiving facility (with several days' storage capacity) would accept and handle the materials for feeding into the ADs for processing.

PWD is believed to be further considering its next steps in this project, including whether to issue a formal, binding RFP from potential vendors, and if so, refining the terms of that RFP.

While the size of this preprocessing facility has not been determined, it is believed that it would need to be at least 100-200 tons per day to make this project feasible. A 200-tons-per-day organics preprocessing facility could provide a significant step forward in recovering food waste from the Philadelphia waste stream, processing it for its energy value, and diverting it from disposal. Such a project could offer significant reuse of a publicly-funded and underutilized City resource (the PWD ADs) while at the same time helping the City reduce its disposable waste stream.

However, some project barriers would need to be addressed for this to happen (the PWD has not provided clarity on these questions over the period of the RFI process to date):

- Is the PWD agreeable to expanding their business model and "charter" of required services to accept and process food waste and similar residuals?
- What are the business terms of such a project? What would the tip fee be for waste generators? What modifications does PWD need to make at its plants, and what would the processing fee be at the PWD site?
- What food waste and organics generators would be served? Can the PWD include a requirement, or financial incentive, that City residential and commercial generators be serviced, or at least be given a priority for waste collections by the subcontracted hauler (this was discussed as a goal at the Organics Subcommittee of SWRAC level)?
- What is the schedule for PWD making a decision on advancing and developing this project?

The answers to these questions have a significant impact on future organics management options for the City of Philadelphia; this feasibility study supports the further advancement of this preprocessing project, under acceptable terms to the City, to capture and recycle significant quantities of organics from City waste generators.

7.3.3.2 Kitchen Sink Food Grinders

A more subtle means of collecting and delivering food waste to the PWD plants, for processing and eventual energy capture through anaerobic digestion, is through the use of residential and commercial food grinders. These macerate selected food wastes and send them down the sewers with other wastewater from the homes and businesses. A study was conducted in Philadelphia from 2012 to 2014 regarding the potential benefits of installing food sink grinders in select neighborhoods. As an outcome of this study and related efforts, in 2015 the City added a building code requirement for new residential construction projects to include in-sink food grinders. Commercial-source food grinders are also required in select establishments, as confirmed through health inspections of those facilities. Including in-sink food grinders in new housing construction is considered more cost-effective than retrofitting existing homes with a new food grinder unit, where the installation cost (including required plumbing and electrical changes) may run at least $400-600.

InSinkerator, the sponsor of the Philadelphia sink food grinder study as well as several other similar studies across the U.S., has estimated the impact of in-sink food grinders on reducing the quantity of food waste being discarded with a household's solid waste. Their study report, contained in Appendix D, estimates

that households with in-sink food grinders can reduce their food wastes discarded with the trash by an average of 30 percent (the Philadelphia and Boston studies averaged 34 percent food waste discards reduction).

The City expects that its residential population will grow by approximately 50,000 people between 2015 and 2025. At an average housing density of 2.7 people per household, this equates to 18,300 new homes affected by the in-sink grinder building code requirement. A 30 percent reduction in food waste discards in these new homes, via garbage disposals, equates to about 730 tons per year of organics diverted from garbage discards by 2025. This tonnage equates to roughly a 0.9 percent reduction in residential food waste discards by 2025, and a 0.5 percent reduction in overall, residential organics discards. This requirement has a small but positive impact on reducing residential organics discards.

7.3.4 CITY COLLECTIONS

Currently, the City provides residential waste and single stream recycling collection to its residents. It also provides limited leaf collection over a 6-week period in a subset of the City's collection districts and provides 23-yard waste dropoff sites throughout the City for additional yard waste collection opportunities. Commercial and institutional sites are serviced by private haulers.

Section 6 of the report evaluated four different options to expand organics collections in the City and estimated the costs for implementing each of these options. For an additional financial investment, the City can expand fall (6-weeks) curbside collections to the entire City; offer 9-months of curbside yard waste collections (spring, summer, fall) to the entire City; and can even further expand to offer an aggressive 12-month curbside yard waste and residential food waste/compostable paper collection program to all City residents. As the service level, service area and months of service increase, so do the costs. The City can also embark on providing public organics collection to a targeted downtown commercial district (restaurants, grocers, etc.) that will minimize the number of stops needed for the tons of organics that can be collected. As Table 6-14 illustrates, as the level of service grows, so do the tons collected.

Any expansion of the City's organics collection program should be chosen as a result of, and as a component of, a comprehensive organics management strategy that includes collection, hauling, processing, marketing of end-products, and public education and training. Collection is only one, albeit important, component of a larger program.

There are further variations of collection options, beyond those examined in Section 6, that can be examined in the future, to help control costs and/or increase organics tons diverted from disposal, such as pay-as-you-throw incentives, modified collection programs (weekly service frequency for organics and recyclables, with every-other-week trash collection), and other tools. Any changes to the current collection system should be tailored to the overall organics management strategies selected and the available processing infrastructure.

7.3.5 CITY TRANSFER OPERATIONS

The regional marketplace survey conducted in Section 3 discovered that existing nearby processing options for yard waste and other organics are limited. At a greater distance from the City, additional processing facilities can be considered, if the transportation infrastructure for hauling organics to distant processing sites can be cost-effectively provided. A hauling cost analysis, presented in Table 7-2, has been prepared to help present comparative hauling costs to organics processing sites of various distances. The sites selected for analysis vary from 15 to140 miles away from Philadelphia and represent sites that indicated significant available processing capacity.

A possible transfer "station" location for loading organics into larger haul vehicles could be at the City's Northwest Transfer Station site (site of a current facility upgrade project), as shown in Exhibit 5-9 of Section 5. It is assumed this facility would be simple, consisting of a small concrete transfer pad under roof, containing an area for large rolloff container loading, plus an optional (if needed) biofilter to treat air

from the building. The estimated capital cost for this facility is $0.75 million dollars. Assuming transfer of 50-100 tons per day of organics, and a 20-year amortization period for facility capital costs, the per-ton fixed capital cost for this facility (with a throughput of 20,000 tons per year of organics) is $3.80 per ton. A cost per ton to transport yard waste and food scraps to each site listed in the table has also been estimated, using industry standards and MSW Consultants' knowledge. The "Total Fixed plus Variable Cost" columns of Table 7-2 represent an estimate of the total costs per truckload to transport these materials to nearby and distant sites.

Table 7-2 Long Haul Cost Table

				Yard Waste Transfer and Haul		Food Waste Transfer and Haul	
Facility	Available Capacity, tons/yr	Dist-ance (mi.)	$/ton Transfer Facility Fixed Cost (1)	Tons/ Load	Cost per Load	Tons/ Load	Cost per Load
Organics Diversion LLC	15-30,000	15	n/a - Direct Haul	20.0	$138.00	22.5	$155.25
DCSWA Compost Farm	10,000	22	n/a - Direct Haul	20.0	$202.40	n/a	n/a
Waste Mgm't Warner East	TBD (permitted for 20,000)	29	$3.80	20.0	$186.20	n/a	n/a
FCS Pottstown	20,000	43	$3.80	20.0	$230.80	22.5	$259.65
FCS Easton	24,000	67	$3.80	20.0	$290.40	22.5	$341.78
Veteran Compost	17,000	70	$3.80	20.0	$300.00	22.5	$353.25
Prince George's Co MD MES Site	TBD (under expansion)	140	$3.80	20.0	$524.00	22.5	$589.50

(1) Facility capital cost based on a $0.75 million dollar transfer facility, amortized over 20 years at 8 percent, with annual throughput of 20,000 tons.

This analysis estimates the cost for direct hauling of organics to nearby sites of around 15-20 miles away ranges from $138 to $202 per truckload ($7 to $10 per ton), while the transfer hauling to more distant sites may cost anywhere from $186 to $590 per truckload ($9 to $26 per ton). Actual tipping fees at each distant site will be critical in determining the economic feasibility of hauling to distant processing sites. This information must be determined on a case-by-case basis as part of facility delivery agreement negotiations, which is beyond the scope of this study.

7.4 PRIVATE SECTOR INFRASTRUCTURE EXPANSION

7.4.1 PRIVATE PROCESSING EXPANSION

There are several private facilities that could be used by the City.

- Private Preprocessing Facility for the PWD ADs: This option, which would involve a PWD RFP solicitation and a long-term contract with a private vendor to accept organics, has been described in detail in paragraph 7.3.3.1. This project could have a significant positive impact on the future or organics management and waste reduction in the City of Philadelphia, largely utilizing public treatment facilities that have been financed with public dollars. No decision has been made by PWD yet on whether it will proceed with this project.

- **Gloucester City/Organics Diversion Organics Recycling Facility**: This construction project has been referenced in Section 3. Located in Gloucester City, New Jersey, the project is currently proposed as a two stage organics processing project: Stage 1 Anaerobic Digestion, and Stage 2 Digestate Composting via aerobic composting. The facility is being sized for a maximum daily throughput of 400 tons per day, with an expected average annual throughput of 250 tons per day. The project developer, Organics Diversion LLC, currently serves a 100 percent commercial/institutional customer base in Southeastern Pennsylvania and Southwestern New Jersey. Northern Delaware and the Baltimore-Washington area. They largely supply animal farmers with feed in New Jersey.

  The status of the new project is: site grading complete; site utilities (sewer, water, gas, etc.) complete; permitting is complete; a design/construction bid package is being solicited. Organics Diversion hopes to have this facility up and running by Spring 2019.

  Available organics processing capacity (beyond existing customers) with the new facility is expected to be between 15-30,000 tons per year. This facility could become an important processor in the Philadelphia region.
- **RNG Energy Point Breeze Renewable Energy Facility (PBRE)**: PBRE recently announced this 1,000 tons per day anaerobic digester project, to be constructed on approximately 22 acres at the Philadelphia Energy Solutions (PES) Refining Complex in the North Yard campus. The facility will generate biogas from a reported 60-mile radius of food waste and agricultural waste generators. PES will be responsible for sale of the biogas once impurities are removed from it.

  This project is very early in its inception, requires much further development, and therefore cannot be relied on at this time as a realistic component of the City's organics program. The project should be monitored at this time; should the project advance through permitting, financing, and construction, it could certainly provide significant future organics diversion opportunities for the City.
- **Small Neighborhood/Community-Level Organics Processing Options**: There are a number of small private or community facilities in or near Philadelphia that fill a niche clientele in their neighborhoods in managing organics, such as:
  - **Bennett Compost** – collects materials from residences and businesses, partners with community gardens and commercial composters, builds bins at gardens around the City, and provides compost to the City's urban growers and other Bennet Compost customers.
  - **The Dirt Factory** – a community compost facility that serves the University City District and provides compost to local growers and gardeners and provides environmental education programs as well. It accepts scheduled dropoff of materials during a couple of limited periods each week.
  - **Philly Compost/The Compost Coop** – Located in the Fishtown and Kensington areas of the City and serving a limited number of commercial and residential neighborhood customers, collected by volunteers and through dropoff of food scraps. Finished compost is provided back to its members and is also available for sale to the general public.
  - **Circle Compost** – established in 2016, this operation picks up food waste by bicycle trailer and composts it for its customers. All finished compost created from food waste, leaves and other organic discards is donated to urban farmers in the City.
- These and similar neighborhood/community programs serve an important service to their customers and should be encouraged to multiply and grow. The benchmarking analysis in Section 4 of this report notes that an important component of successful large-scale organics management programs studied is these types of neighborhood organics composting programs in support of local waste reduction, urban farming and community gardens. For example, New York City has over 100 of these types of small systems in place.

7.4.2 STIMULATION OF PRIVATE SECTOR EXPANSION AND/OR REGULATIONS/ ORDINANCES

The City of Philadelphia does not collect wastes and recyclables from the commercial/institutional sector, which generates two-thirds of the organic wastes in the City. Therefore, its ability to regulate and incentivize organics management from this sector comes through City ordinances and regulations.

The City has a number of ordinances and regulations on the books related to handling of waste and recyclables in the City. A review of the current ordinances determined that they make very few references to organics; these requirements appear to be included under the handling of garbage, which does not focus on organics diversion, recycling, or beneficial use. A summary of current Philadelphia Solid Waste Ordinances is presented in Exhibit 7-3, at the end of this section. The only current City ordinance that appears to specifically reference organics at this time addresses licensees of dumpsters (i.e. commercial/institutional generators), and states that "Licensee shall not mix garbage with rubbish. Licensee shall dispose of grindable garbage in garbage disposal units or arrange for private collection of grindable garbage for composting, anaerobic digestion, or use as farm livestock feed." That section specifically excludes multi-family residential licensees. This "Use of Dumpsters" ordinance could have a significant impact on diverting food waste and similar organics from commercial/institutional generators' dumpsters, if aggressively enforced. The level of enforcement of this ordinance is not believed to be high.

By reviewing a number of other jurisdictions' ordinances and regulations related to organics management, in areas with progressive organics management programs (such as New York City, and the states of Connecticut, Vermont and California), guidance can be extracted that can apply to developing more progressive organics management practices for the City. Exhibit 7-4, found at the end of this section, provides a summary of the types of requirements that can be considered in Philadelphia to help stimulate better commercial/institutional organics management. Some of these programs in other locales establish a phased approach, based on type of commercial/institutional generator and volume or tonnage of waste generated, with this threshold of applicability incorporating smaller generators over time. Examples of the phased implementation of Connecticut's and California's commercial organics requirements are included in Exhibit 7-4.

The City also regulates private sector refuse and recycling through its "Regulations for Private Collection of Refuse and Recycling," which are currently undergoing revision by the Streets Department. MSW Consultants has reviewed the current draft of proposed regulations revisions and has provided suggested edits and additions to the Streets Department for consideration under separate cover.

The City has the opportunity here, and through its Municipal Waste Management Plan and Zero Waste Initiatives has the need, to adopt requirements for better organics management by the private sector. It is recommended that the City strongly consider adopting measures via regulation and ordinance that stimulate more organics capture and recycling in the commercial/institutional sector.

7.5 CONCLUSIONS AND RECOMMENDATIONS

7.5.1 LEAVES AND YARD WASTE COLLECTIONS AND PROCESSING

The City currently pays $60.04 per ton for disposal of waste. Typically, organics processing facilities in a marketplace try to negotiate a combination of 1) tipping fees that are about one-half to two-thirds of the cost of conventional disposal, and 2) revenues from sales of end products (i.e. finished compost and mulch) that help offset operating costs of the facility.

Processing- Regarding yard waste handling, the City has the ability to expand operations at the Fairmont Park site to double its current throughput capacity by a better site layout of windrows. Incremental capacity improvements are available through more aggressive composting operations/shortened cycles (2-3 composting cycles in windrows each year). Costs to accomplish these improvements at Fairmont Park are primarily related to repairing processing equipment and adding redundancy to existing equipment, plus some site cleanup and permitting costs.

A similar efficient leaf/yard waste windrow composting operation can be constructed at the NE Philadelphia Maintenance Shop Brush Management Site. Together with Fairmont Park, development of both sites to process these materials with more efficient windrowing layouts and more frequent turning cycles can increase the current processing capacity in the City by twelve-fold (compared to current operations). Although this will involve additional capital, equipment and operating cost investment, these services can still be provided below the current disposal cost of $60 per ton, thus saving the City money and increasing organics diversion.

With these recommended expansions of existing City properties to process additional leaves, yard waste and brush, the City should be able to easily meet and surpass its organics diversion rates that it experienced prior to 2009, when it collected leaves and yard waste with curbside service across the entire city. Expansion of processing capabilities at Fairmont Park and at the NE Philadelphia site can provide processing capacity to accept residential growth of leaves and yard waste collections at curbside to all City residents.

As a further capacity enhancement, the proposed improved windrow technology at the NE Philadelphia site (or at the Fairmont Park site, for that matter) could be upgraded to an Aerated Static Pile technology, at little additional cost over the recommended windrow compost site development. With the use of ASP technology, the capacity of each site could again be doubled (for processing leaves, grass and yard waste), in comparison with the improved windrowing options.

Collections - To collect additional leaves and yard waste, the City can grow from the current limited mechanical collection program (at $1.93 per month per household served) to 1) full City curbside residential fall leaf collections (Option 1 from Table 6-14 , at $1.74 per month per household served); and eventually to 2) a 9-month seasonal full city leaves and yard waste curbside collection program (Option 2 of Table 6-14, at $1.84 per month per household). At full implementation of the 9-month seasonal curbside yard waste collection program, this collection program is expected to collect/divert a total of nearly 29,000 tons per year of leaves, yard waste, and brush from refuse disposal (at an annual avoided disposal cost of $1.7 million dollars), for processing at the expanded City processing sites. Processing capacity can be expanded through the two site expansions described above (modified windrow operations) at City sites to provide the means to handle all leaves and yard waste that can reasonably be expected to be collected under a 9-month full City curbside residential collection program (Collection Option 2 from Section 6).

This study recommends the continuation of mechanical leaf collection in areas where it is feasible; However, as noted in Section 6, parked cars make the collection of bulk leaf piles at the curb very difficult at times. It is recommended that the City adopt an ordinance or regulation that includes the following: "Residents and businesses should pile their leaves away from storm drains, water meter covers, low wires and parked cars. Further, parking is not permitted in front or near curbside leaf piles on collection days."

7.5.2 FOOD WASTE AND COMPOSTABLE PAPER

There are currently no regional marketplace participants within 25 miles of downtown Philadelphia. One site in New Jersey, 15 miles from Philadelphia, may come on line in the next year, but no tip fee or other contractual terms have been shared with the Consultant at this time. Also, this project has not proceeded on its development schedule, leading to some question as to when the facility will be up and running. To date, the developer, Organics Diversion LLC (OD) has exclusively served commercial customers, so it may be better suited to (and more willing to) service commercial organics customers in the City once it comes on-line. ODstates that over 90 percent of its customers save money by signing onto the OD program, so economics may be favorable for this project.

Two regional marketplace facilities, at a distance of 33 and 43 miles from downtown Philadelphia, respectively, report combined available processing capacity of up to 23,500 tons per year at their sites. Hauling costs to take organics to these sites, if an organics transfer operation is constructed at the City's

Northwest Transfer Station, are estimated at roughly $10-12 per ton. The feasibility of collecting, delivering and obtaining organics processing services at these sites is critically tied to proposed tipping fees at each site (which is unknown at this time), as well as delivery requirements (such as lack of contaminants in the material). Such sites have been known to shut off customers for excessive contamination in the organics.

The PWD Preprocessing Facility Project for food waste and similar organics processing, with treatment in PWD's anaerobic digesters, is still in its early stages, and there is no indication at this time whether PWD will move forward with this project. If it does proceed, it could provide significant food waste processing capacity for the region, with limited hauling distances (expected) to the preprocessing facility site. For these reasons, this study recommends further development of the PWD project, especially if incentives can be included that give preference to food waste generators from the City.

Other potential private anaerobic digestion projects in the region are less developed at this time than the PWD project, and therefore, even more uncertain. For the City to consider processing food scraps and compostable paper at its own Northeast Philadelphia Maintenance Shop brush management site using the ASP technology, many additional project development steps would be required, and careful refinements of the project conceptual plan and operations details would be warranted. It is not recommended at this time that the City move ahead with investing in processing food scraps and other compostables at this site; however, this is always a future option that can be considered upon further study and refinement of the project components and the design.

To collect food scraps and compostable paper at curbside from City residents, a major expansion of the proposed Option 2 curbside collection program (which is recommended above) would be required. Although such full-service organics collection at curbside could be provided economically (Option 3), there are many moving parts to even considering food waste collection and processing, none of which are in place at this time. For this reason, it is not recommended that Collection Option 3 from Table 6-14 be further considered at this time. Further, it is not recommended that the City pursue a public downtown commercial organics collection route until real, cost-effective opportunities become available for this organic material. Once these processing opportunities are developed (either by PWD, the City, or another party), then perhaps Option 3 or Option 4 collections could be reconsidered.

7.5.3 COMMERCIAL/INSTITUTIONAL SECTOR ORGANICS MANDATES

The commercial/institutional sector generates approximately two-thirds of the organics from the City, with residential sources creating the other third of materials. However, collection and handling of the commercial/institutional sector is handled privately. Current City ordinances and regulations do little to govern organics management in the City; this needs to change, to help establish ordinances and regulations that are more in line with the City's Zero Waste Initiatives and its Municipal Waste Management Plan.

A phased approach has been found to be effective in increasing organics diversion in other large cities in the United States. Larger commercial organics generators (in terms of both type of generator and quantity of organic materials generated) are targeted first, followed by a second smaller tier of generators, then a third tier, and so on.

To effectuate organics reduction from these generators, the City should implement changes to both its City ordinances and its regulations over private refuse and recycling activities, to encourage further organics diversion with minimal public financial investment. The City should, however, be cognizant of the fact that the existing regional marketplace for organics processing is limited for the commercial/institutional sector, just as it is for the residential sector. Mandating organics diversion and recycling, when no reasonable organics processing option exists, is a potential recipe for program failure. On the other hand, establishing a mandate of requirements for the commercial/institutional sector with phased implementation may stimulate the growth and development of additional processing facilities or

infrastructure over time to fulfill the needs of the new directives. Phasing of requirements is often a good way to temper the timing of new requirements until the infrastructure exists to manage the materials.

This study includes recommendations for modifying both the City's ordinances and its private hauler regulations. The development of these regulations should be carefully timed to allow proper time for infrastructure development. It is believed that this infrastructure will need to come from the private sector, as it is unlikely that the City has the resources to procure processing capacity to serve the commercial/institutional sector.

7.5.4 COMMUNITY/NEIGHBORHOOD ORGANICS PROGRAMS

Existing programs and facilities that provide local communities in the City with organics management and urban gardeners' growing media do provide an important niche role in the City. Although the quantities of materials diverted may be small, these programs should be encouraged to continue and expand, and are a trait of other large successful organics management programs in the U.S.

7.5.5 IN-SINK FOOD GRINDERS

The use of in-sink food grinders can be an efficient way for residential households and commercial businesses to both reduce disposal tonnages and also utilize existing infrastructure to send organics to the PWD treatment plants for processing. New construction building codes and commercial food grinders are encouraged by existing City rules and ordinances. This should continue. However, it may not be cost-effective to mandate retrofitting of food grinders in existing houses throughout the City. Indeed, mandating this throughout the City, if an estimated half of residential homes do not have grinders, could cost close to $150 million dollars to implement (amortized over 10 years at 8 percent interest, this would result in a $22.3 million dollar annual cost. if implemented as part of a large coordinated financing program). There are more effective solutions presented above, at lower cost, that can yield higher levels of organics diversion.

7.5.6 PUBLIC OUTREACH, EDUCATION, TRAINING AND ENFORCEMENT

Another important, always present, component of successful organics management programs (both large and small) is a strong public outreach and educational program to promote the program. Getting buy-in from the local community is important to program success; this includes City leaders, the Sustainability Cabinet members, local community/organization leaders, Organics Subcommittee of SWRAC members, public works crews and supervisors that need to implement City components of organics collections and processing facilities, schools, commercial sector representatives, and the general public.

The City should seize any opportunities to provide outreach and education at public events, sports venues, civic functions, school programs, and similar activities. Ongoing reeducation and retraining of individuals is important to program success, just as it has been with materials recycling.

The dumpster ordinance that is currently on the City books can have a significant impact on organics diversion from disposal by the commercial/institutional sector, if it is properly enforced. This should be a focus of the City, moving forward.

When promoting organics reduction, recycling and reuse, the City should keep in mind that a successful program needs to be multifaceted in order to be successful; one silver bullet will not solve the organics management puzzle. Keep in mind the U.S. Environmental Protection Agency's hierarchy of priorities in managing organics (EPA's "inverted pyramid"); there are many opportunities that can be promoted to implement organics reuse and management. Note that many of these management strategies are higher on the EPA priority list than end-processing such as composting and AD. These EPA priorities are paraphrased as follows:

- Reduce organics generated at the source (home, business, institution)

- Feed hungry people ("reusing" extra on near-expiration food before it becomes spoiled, by redirecting it to those in need)
- Feed animals (e.g. pig farmers)
- Use organic byproducts in industry
- Process organics via composting, anaerobic digestion
- Use landfilling or waste-to-energy for end-processing of remaining residuals

7.6 RECOMMENDED IMPLEMENTATION SCHEDULE

A five-year implementation schedule has been developed to establish important pieces of this organics management plan. The recommended schedule is presented in Exhibit 7-5.

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EXHIBIT 7-1 – 7-5

Keene Environmental Consulting LLC	**PROJECT:** Philadelphia Organics Feasibility Study **SUBJECT:** NE Phila. Maintenance Shop Site Improvements **METHOD:** Engineer's Preliminary Project Cost Estimate **BY:** TDK 4/7/2018	**Exhibit** **7-1** **Ref. to Dwg:** **Exhibit 5-8**

Proposed Site Improvements at NE Philadelphia Maintenance Shop Brush Management Site
Exhibit 7-1 Preliminary Project Cost Estimate
Turned Windrow Composting Improvements

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	DIRECT COSTS (1) UNIT PRICE	DIRECT COSTS (1) TOTAL PRICE
Construction Estimate					
Entrance	Entrance Gate - Chain Link, 6-Foot high Dual Swing	LS	1	$10,000	$10,000
Entrance	Site Signage	LS	1	$5,000	$5,000
Site Clearing	Clearing and Grubbing	Acre	8.5	$11,250	$95,700
Site Grading	Excavate and Move avg 3-ft-deep of Soil On-site	CY	47,900	$4.88	$233,800
Site Grading	Rough Grading Subbase Soil, Compost Pad/ Maneuvering Area	CY	47,900	$2.24	$107,300
Site Preparation	Compaction of Placed Fill	SY	47,900	$1.00	$47,900
Site Preparation	Asphalt Subbase & Stone Working Area, 6" (2A) Compacted	SY	40,660	$8.00	$325,300
Site Preparation	Fine Grade and Seed Drainage Swales, Stormwater Features	Acre	1.5	$3,000.00	$4,500
Compost Pad	Asphalt - Base Course - 4" BCBC	SY	20,700	$19.00	$393,300
Compost Pad	Asphalt - Surface Course - 2" ID-2	SY	20,700	$9.00	$186,300
Painting	Pavement Painting	LS	1	$7,500	$7,500
Equipment Pads	Two 45' x 80' Concrete Pads for Grinder and Screen Operations	CY	180	$400.00	$72,000
E&S/ Stormwater	E&S, Stormwater BMP Measures/ Basins Allowance	LS	1	$100,000.00	$100,000
Office	Modular Office	LS	1	$50,000.00	$50,000
	Site Construction Subtotal				**$1,638,600**
Processing Equipment Requirements (models listed are for cost estimating only)					
Operations	Caterpillar 930K Loader - Used	Ea.	2	200,000	$400,000
Operations	Windrow Turner - Scarab 20'-wide, 11'-high Straddle Turner	Ea.	1	500,000	$500,000
Operations	Trommel Screen - Vermeer TR521 or McClosky 516	Ea.	1	220,000	$220,000
Operations	Horizontal Grinder - Morbark 3400X, 580 HP	Ea.	1	615,000	$615,000
Operations	Misc. Support Equipment	LS	1	40,000	$40,000
	Proposed Site Equipment Subtotal				**$1,775,000**
Other Project Costs					
	Wetlands Investigation/Delineation, Survey	LS	1	50,000	$50,000
	GP Permiitting	LS	1	50,000	$50,000
	Design (7% of Construction $)	LS	1	114,702	$114,702
	Construction Inspection (5% of Construction $)	LS	1	81,930	$81,930
	Other Costs - Subtotal				**$296,632**
			SUBTOTAL		**$3,710,232**
			CONTINGENCIES (25%)		**$927,558**
			GRAND TOTAL		**$4,637,800**

NOTES:
(1) Direct Costs include labor, material, equipment, overhead and profit.

This opinion of construction and equipment costs is based upon limited information available to the Engineer.

Subject To Revision During Design,Permitting, and Further Refinement of the Project

Keene Environmental Consulting LLC	**PROJECT:** Philadelphia Organics Feasibility Study **SUBJECT:** NE Phila. Maintenance Shop Site Improvements **METHOD:** Engineer's Preliminary Project Cost Estimate **BY:** TDK 4/7/2018	**Exhibit** **7-2** **Ref. to Dwg:** **Exhibit 5-8**

Proposed Site Improvements at NE Philadelphia Maintenance Shop Brush Management Site
Exhibit 7-2 Preliminary Project Cost Estimate
Extended Aerated Static Pile (EASP) Composting Improvements

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	DIRECT COSTS (1) UNIT PRICE	DIRECT COSTS (1) TOTAL PRICE
Construction Estimate					
Entrance	Entrance Gate - Chain Link, 6-Foot high Dual Swing	LS	1	$10,000	$10,000
Entrance	Site Signage	LS	1	$5,000	$5,000
Site Clearing	Clearing and Grubbing	Acre	8.5	$11,250	$95,700
Site Grading	Excavate and Move avg 3-ft-deep of Soil On-site	CY	47,900	$4.88	$233,800
Site Grading	Rough Grading Subbase Soil, Compost Pad/ Maneuvering Area	CY	47,900	$2.24	$107,300
Site Preparation	Compaction of Placed Fill	SY	47,900	$1.00	$47,900
Site Preparation	Asphalt Subbase & Stone Working Area, 6" (2A) Compacted	SY	40,660	$8.00	$325,300
Site Preparation	Fine Grade and Seed Drainage Swales, Stormwater Features	Acre	1.5	$3,000.00	$4,500
Compost Pad	Asphalt - Base Course - 4" BCBC	SY	20,700	$19.00	$393,300
Compost Pad	Asphalt - Surface Course - 2" ID-2	SY	20,700	$9.00	$186,300
Painting	Pavement Painting	LS	1	$7,500	$7,500
Equipment Pads	Two 45' x 80' Concrete Pads for Grinder and Screen Operations	CY	180	$400.00	$72,000
E&S/ Stormwater	E&S, Stormwater BMP Measures/ Basins Allowance	LS	1	$100,000.00	$100,000
Office	Modular Office	LS	1	$50,000.00	$50,000
ASP Option Addition	Power Service Extention to site for Aeration	LS	1	$50,000.00	$50,000
ASP Option Addition	Blowers, Piping, Sheds	LS	1	$50,000.00	$50,000
	Site Construction Subtotal				**$1,738,600**
Processing Equipment Requirements (models listed are for cost estimating only)					
Operations	Caterpillar 930K Loader - Used	Ea.	3	200,000	$600,000
Operations - ASP	Ag. Mixer for Organics Mixing	Ea.	2	75,000	$150,000
Operations	Trommel Screen - Vermeer TR521 or McClosky 516	Ea.	1	220,000	$220,000
Operations	Horizontal Grinder - Morbark 3400X, 580 HP	Ea.	1	615,000	$615,000
Operations	Misc. Support Equipment	LS	1	40,000	$40,000
	Proposed Site Equipment Subtotal				**$1,625,000**
Other Project Costs					
	Wetlands Investigation/Delineation, Survey	LS	1	50,000	$50,000
	GP Permiitting	LS	1	100,000	$100,000
	Design (12% of Construction $)	LS	1	208,632	$208,632
	Construction Inspection (6% of Construction $)	LS	1	104,316	$104,316
	Other Costs - Subtotal				**$462,948**
			SUBTOTAL		**$3,826,548**
			CONTINGENCIES (25%)		**$956,637**
			GRAND TOTAL		**$4,783,200**

NOTES:

(1) Direct Costs include labor, material, equipment, overhead and profit.

This opinion of construction and equipment costs is based upon limited information available to the Engineer.

Subject To Revision During Design,Permitting, and Further Refinement of the Project

Exhibit 7-3

PHILADELPHIA SOLID WASTE ORDINANCES

Ch. 9-604. Refuse Collection

- Definitions appear to include organics in garbage
- Lists:
  - Contracts for Garbage Collection
  - Private Garbage Collection
  - Private Waste Collection
  - Recyclable Material Collection
- Has generic reporting requirements under regulations of Dept.

Ch. 10-700. Refuse and Littering

- Ch. 10-701. Definitions
  - Definitions appear to include organics in garbage
  - No definition of Organics
- Ch. 10-717. Collection of Municipal Waste and Recyclable Materials
  - Organics not referenced
- Ch. 10-718. Enforcement
- Ch. 10-722. Use of Dumpsters
  - 10-722 (4) (d) (1), "Licensee shall not mix grindable garbage with rubbish. Licensee shall dispose of grindable garbage in garbage disposal units or arrange for private collection of grindable garbage for composting, anaerobic digestion, or use as farm livestock feed. This subsection shall not apply to multi-family residential licensees."
- Ch. 10-724. Waste Management and Recycling Requirements for Certain Regulated Premises
  - Requires separation of waste and recyclables
  - Requires Solid Waste and Recycling Plan on Department form
  - Requires education of occupants and signage
  - Does not describe organics
- Ch. 10-726. Set Out Times For City Municipal Waste and Recyclable Materials Collection

Bill No. 150748

- Debris definition changed:
  - ~~construction or~~ demolition of any structure, including ~~wood,~~ stones, bricks, rocks, concrete, gravel or earth.
- Private Business Receptacle definition changed:
  - only - "his or her" to "his/her"
- Ch. 10-717 has been updated in the Code by Bill No. 150748
- Ch. 10-718 was substantially revised by Bill 150748, but it has not been updated in the Code
- Ch. 10-724 was substantially revised by Bill 150748, and the footnote says this was done, but the changes are not in the Code.

- Ch. 10-726 was retitled (Disposal of Curbside Refuse, Rubbish, Garbage and Recyclable Materials) and was substantially revised by Bill 150748, and the footnote says this was done, but the changes are not in the Code

Bill No. 140903

- Ch. 10-722. Use of Dumpsters has been amended in the Code by Bill 140903

Exhibit 7-4

Suggestions for Philadelphia Solid Waste Ordinance Changes to Include Organics:

- Require annual report of regional organics processing capacity to determine if there is enough capacity to require businesses, or certain businesses, to separate organic waste for processing.[1]
- Include donation of food that would otherwise be thrown away.[2]
- Determine and state which types of businesses must comply.[3]
- Definitions to consider:[4]
    - "Beneficial organic waste use" means the processing of organic waste by composting, aerobic digestion, or anaerobic digestion.
    - "Organic Waste" shall have the same meaning as set forth in section _____ of the administrative code of the city of Philadelphia, except that organic waste shall not include food that is donated to a third party, food that is sold to farmers for feedstock, and meat byproducts that are sold to a rendering company.
        - Alternately: "Organics", or organic materials, are any plant or animal materials or byproducts which will decompose into soil. Food scraps like carrot tops, egg shells, coffee grounds, and bread crusts—as well as leaves, grass and wood—are all organic materials. Paper napkins and paper towels are made from wood pulp and will also decompose into soil.[5]
    - "Organic waste processing facility" means a combination of managed processes, structures, machinery or devices utilized to alter the physical characteristics of organic waste by turning it into a product, at which source-separated organic waste is received and processed through a beneficial organic waste use for the purpose of reuse or sale, that is authorized to operate by the Pennsylvania state department of environmental protection if located in the state of, or authorized to operate by the applicable state or local authority, if located outside of the state of Pennsylvania.
- Source separation requirements[6]
- Storage and set-out requirements for containers[7]
- Signage and notice requirements[8]
- Look at current enforcement provisions and be sure they cover organics.
- Food waste hierarchy[9] should be included:
    - Source reduction
    - Feed hungry people
    - Feed animals
    - Industrial uses
    - Composting

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[1] New York City final rules, p. 1: https://www1.nyc.gov/assets/dsny/docs/DSNY%20Notice%20of%20Adoption%20Commercial%20Organics%20Rule.pdf

[2] Ibid, pp. 1 & 2

[3] Ibid. p. 2

[4] Ibid, p. 3 [references to New York changed to Philadelphia or Pennsylvania]

[5] Vermont Department of Environmental Conservation: http://dec.vermont.gov/waste-management/solid/materials-mgmt/organic-materials

[6] New York City final rules, pp. 4 & 5

[7] Ibid. pp. 5 & 6

[8] Ibid. pp. 6 & 7

[9] EPA Food Recovery Hierarchy: https://www.epa.gov/sustainable-management-food/food-recovery-hierarchy

- Connecticut "Public Act 11-217, as amended by Section 4 of Public Act 13-285, provides a phased-in approach to commercial organics recycling. The law (CGS Sec. 22a-226e) says that if you are a commercial food wholesaler or distributor, industrial food manufacturer or processor, supermarket, resort or conference center, **AND** you generate a projected annual volume of 104 or more tons per year of source separated organic material, **AND** you are located within 20 miles of a permitted recycling facility that can accept that material, then you must ensure that those materials are recycled. In 2020, the projected annual volume triggering regulation decreases to 52 tons per year. Other compliance options under the law include on-site composting, or installation of permitted on-site organics treatment equipment."[10]
- California AB 1826 Chesbro (Chapter 727, Statutes of 2014)
    - "**Implementation Dates and Thresholds**[11]
      The law phases in the requirements for businesses, including multifamily residential dwellings that consist of five or more units,* over time based on the amount and type of waste the business produces on a weekly basis, with full implementation realized in 2019. Additionally, the law contains a 2020 trigger that will increase the scope of affected businesses if waste reduction targets are not met. The implementation schedule is as follows:
        - **January 1, 2016:** Local jurisdictions shall have an organic waste recycling program in place. Jurisdictions shall conduct outreach and education to inform businesses how to recycle organic waste in the jurisdiction, as well as monitoring to identify those not recycling and to notify them of the law and how to comply.
        - **April 1, 2016:** Businesses that generate 8 cubic yards of organic waste per week shall arrange for organic waste recycling services.
        - **January 1, 2017:** Businesses that generate 4 cubic yards of organic waste per week shall arrange for organic waste recycling services.
        - **August 1, 2017 and Ongoing**: Jurisdictions shall provide information about their organic waste recycling program implementation in the annual report submitted to CalRecycle. (See above for description of information to be provided.)
        - **Fall 2018:** After receipt of the 2017 annual reports submitted on August 1, 2018, CalRecycle shall conduct its formal review of those jurisdictions that are on a two-year review cycle.
        - **January 1, 2019:** Businesses that generate 4 cubic yards or more of commercial solid waste per week shall arrange for organic waste recycling services.
        - Fall 2020: After receipt of the 2019 annual reports submitted on August 1, 2020, CalRecycle shall conduct its formal review of all jurisdictions.
        - **Summer/Fall 2021:** If CalRecycle determines that the statewide disposal of organic waste in 2020 has not been reduced by 50 percent of the level of disposal during 2014, the organic recycling requirements on businesses will expand to cover businesses that generate 2 cubic yards or more of commercial solid waste per week. Additionally, certain exemptions may no longer be available if this target is not met.

    *Note: Multifamily dwellings are not required to have a food waste diversion program."

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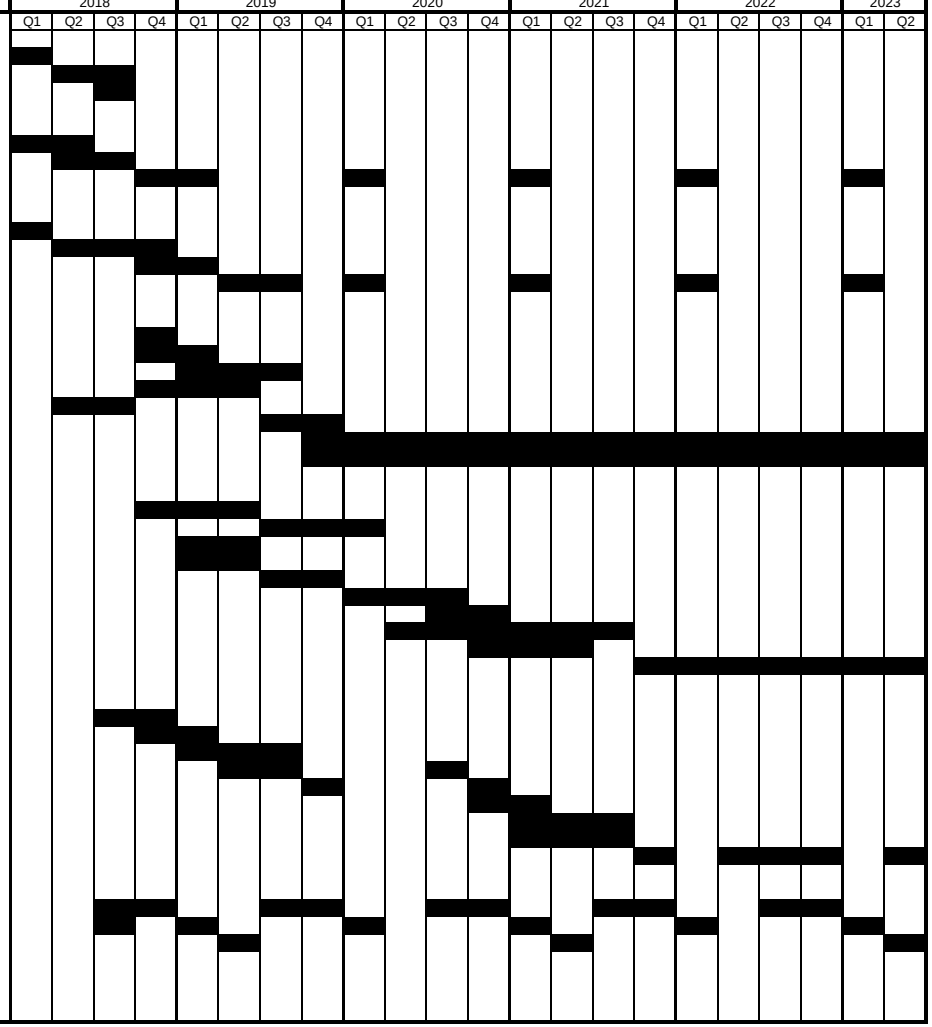
[10] Connecticut Department of Energy & Environmental Protection commercial organics recycling law: http://www.ct.gov/deep/cwp/view.asp?a=2718&q=552676&deepNav_GID=1645

[11] California law requirements: http://www.calrecycle.ca.gov/recycle/commercial/organics/

Philadelphia Organics Feasibility Study

Proposed 5-Year Implementation Schedule

Task	Subtask	Responsible Party
1.	Organics Feasibility Study Review & Approval	
	1a. Delivery of Draft Sections to City	Consultant
	1b. Vetting of Report, Presentations	Streets Department
	1c. Comments, Edits, Finalization, Adoption	Streets, Consultant, Etc.
2.	Revise Regulations on Private Waste Haulers	
	2a. Work on Draft Revisions	Streets Dep't, Consultant
	2b. Public Review and Comments, Adoption	Streets, City Dep'ts
	2c. Public Meetings, Education on Changes	Streets
3.	City Ordinance Changes for Organics Expansion	
	3a. Draft Concepts/Changes from Consultant	Consultant
	3b. Develop Changes in Draft Ordinance	Streets, Consultant, Etc.
	3c. Adoption of Ordinance Changes	Streets, City Dep'ts
	3d. Public Meetings, Education on Changes	Streets
4.	Fairmont Park Improvements	
	4a. Finalize Improvement Plans, Equip. Needs	Consultant, Streets, PPR
	4b. Secure Funding for Project Improvements	Streets, PPR, City Dep'ts
	4c. Procure Needed Equipment/ Repairs	Streets,City Dep'ts
	4d. Permitting for GP030	Consultant, Streets, PPR
	4e. Clean Up Site for Expanded Use	PPR
	4f. Modify Operations for Efficiency	Consultant, Streets, PPR
	4g. New Operations at Site per Improvements	PPR
5.	NE Phila. PPR Maint. Shop Site Improvements	
	5a. Finalize Improvement Plans, Equip. Needs	Consultant, Streets, PPR
	5b. Secure Funding for Project Improvements	Streets, PPR, City Dep'ts
	5c. Wetlands Delineation, Habitat Resolution	Consultant
	5d. Site Design Plans & Specs.	Consultant
	5e. Permitting for GP030	Consultant, Streets, PPR
	5f. Site Clearing and Grubbing	Streets, PPR
	5g. Site Improve. Bidding and Construction	Consultant, Streets, PPR
	5h. Procure Operations Equipment	Streets,City Dep'ts
	5i. Commence Windrow Compost Ops.	PPR
6.	Leaves and Yard Waste Collection Changes	
	6a. Assess Timing of Collection Changes	Streets Dep't, Consultant
	6b. Secure Funding for Equipment Changes	Streets, Consultant, Etc.
	6c. Equipment, Staffing Coord. - Option 1 Coll.	Streets Dep't, Consultant
	6d. Public Education of Option 1 Collection	Streets Department
	6e. Option 1 Collections, to Fairmont Park	Streets Department
	6f. Secure Funding for Option 2 Equipment	Streets, Consultant, Etc.
	6g. Equipment, Staffing Coord. - Option 2 Coll.	Streets Dep't, Consultant
	6h. Public Education of Option 2 Collection	Streets Department
	6i. Opt. 2 Collections, to FP or NE Phl. sites	Streets Department
7.	Other Measures	
	7a. Public and Community Outreach	Streets Department
	7b. Followup Tracking/Coord. - PWD/OD/Etc.	Streets Dep't, Consultant
	7c. Reassess Add'l Organics Opportunities	Streets Dep't, Consultant



APPENDIX A

Comparative Organics Program Benchmarking

New York City Benchmarking
Washington DC Benchmarking
Seattle Benchmarking
San Jose Benchmarking

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APPENDIX A – NEW YORK CITY ORGANICS RECYCLING AND DIVERSION PROGRAM SUMMARY

A 1. PROGRAM HIGHLIGHTS AND SPECIAL FEATURES

- Largest curbside organics collection program in the US.
- Combined curbside and drop-off sites access to serve entire city residential and institutional wastestream by end of 2018.
- Goal is zero waste in residential, institutional and commercial sectors by year 2030.
- Voluntary residential sector participation.

A 2. WASTE MANAGEMENT SYSTEM

- New York City (NYC) is a city of approx. 8.5 million people (2017) living in five NYC boroughs - the Bronx, Brooklyn, Manhattan, Queens and Staten Island – plus millions of daily commuters and tourists.
- The 5 boroughs are broken into a total of 59 sanitation districts. Residential and institutional customers in the districts are serviced by the City's Sanitation Department (DSNY). DSNY currently collects a total of approx. 10,500 tons of refuse and 2,000 tons of recyclables daily. Commercial waste in the City is collected by City-licensed private haulers.
- The DSNY infrastructure includes 9,600 employees and 2,000+ collection trucks. The City is currently served by 4 marine transfer stations, 1 rail haul transfer station, and three compost facilities.

A 3. HISTORY

- In 1989, New York City passed a City Recycling Law, requiring the City's DSNY to seasonally collect and compost leaves and yard waste.
- In 1990, NYC opened its first composting facility, the Staten Island Compost Facility. The City also began collecting fall leaves, yard waste, and Christmas trees.
- From 1991-1996, NYC piloted source-separated food waste collection programs in Brooklyn and Staten island, with less than optimal results. It is believed that it may have been implemented too soon, without DSNY staff and public buy-in
- From 1993 through 2015, NYC passed various laws that strengthened recycling and organics management, and conducted various studies to determine the options and best path to increased organics recycling and diversion.
- A key mayoral initiative was the 2011 Updated PlaNYC that mandated that 75% of NYC waste be diverted from landfills by year 2030.
- In 2013, NYC passed Local Law 77 to establish a voluntary pilot residential curbside organics collection program and a pilot school organics collection program.

- In 2015, the City's OneNYC program committed DSNY to expanding organics collection (either by curbside collection or at drop-off sites) to serve all New Yorkers (all 59 sanitation districts) by the end of 2018, and to achieving "zero waste" by 2030.
- This timeline represents nearly a 20-year period over which organics recycling and diversion programs in NYC matured; it is still growing and maturing.

A 4. PROGRAM SUMMARY – INTRODUCTION

A 4.1 KEY RESIDENTIAL COMPONENT(S)

- "Modern era" pilot program began in May 2013.
- In late 2016, curbside organics curbside collection served nearly 1 million residents. By October 2017, DSNY service had expanded to 30 (of 59) districts.
- Curbside or drop-off service availability is planned to be expanded to all 59 districts by December 2018 (1 year).
- Residential participation is voluntary. Education and outreach are critical to encouraging participation in the program.
- In areas where curbside collection is not practical, drop-off sites are available (approx. 100 sites currently), sponsored by community and other groups.
- Integrated and complementary strategies to include home, community and municipal organics recycling.
- Housing type and density determines the collection containers, trucks and frequency
  - Once weekly collection, on "recycling day," with a dedicated rear loader truck;
  - Twice per week with a split (60/40) rear loader truck, collecting waste and organics in separate compartments;
  - Three times weekly with a dedicated organics truck, on dedicated apartment and high-density neighborhoods.

A 4.2 KEY INSTITUTIONAL COMPONENT(S)

- Over 750 schools and over 100 institutions currently served. In October 2014, DSNY substantially expanded organics recycling, to all public schools in Manhattan and Staten Island, and in selected schools in Queens, Brooklyn and the Bronx. Some private schools are also eligible to enroll in the DSNY organics collection program.
- This collection program targets food scraps, soiled paper, and yard waste. Together with conventional recycling in schools (paper and corrugated board, metals, glass, plastic and carton recycling, and waste reduction, NYC's public schools hope to divert up to 90% of school waste from landfilling.

A 4.3 KEY COMMERCIAL COMPONENT(S)

- Private haulers, licensed by the NYC Business Integrity Commission, collect all commercial waste from within NYC.

- NYC passed an ordinance that requires certain commercial waste generators separate their organic waste. Businesses covered by these rules must separate staff-handled food scraps, plant trimmings, food-soiled paper and certified compostable products from garbage and recyclables. Segregated organic wastes must be properly placed in proper containers and transported and/or processed separately from garbage and recyclables.
- By July 2016, commercial rules applied to:
  - Food service establishments in hotels with 150 or more rooms.
  - Arenas and stadiums with seating capacity of at least 15,000 persons.
  - Food manufacturers with a floor area of at least 25,000 square feet (sf).
  - Food wholesalers with a floor area of at least 20,000 sf.
- August 15, 2018, these commercial rules apply to commercial entities as follows:
  - Food service establishments with at least 15,000 sf of floor area.
  - Food service establishments that are part of a chain of at least 100 or more locations within the City.
  - Retail food stores with a floor area of at least 25,000 sf.

A 4.4 KEY INFRASTRUCTURE COMPONENT(S)

- The City utilizes three (3) processing/composting facilities.
- The City recently contracted for six (6) private preprocessing facilities to remove contaminants from collected organics prior to composting or AD.
- It appears that the City provides the necessary infrastructure investments to support the City's growing organics diversion and recycling program.

A 5. ROLLOUT, EDUCATION AND OUTREACH

- Methodical rollout of the program (by a private vendor) from pilot phase through successive districts. Nearly all residents accept organics container for use.
- Metrics used to determine participation rates and growth of participation over time.
- Social media and hands-on educational opportunities continually used to promote the organics programs. Some examples include prepared and canned food donations; drop-off of fruits and vegetables as local sites; compost giveaways to encourage use; and backyard composting programs.
- Significant community partners provide community-level composting facilities and operate many of the food scrap drop-off sites.

A 6. KEY LESSONS LEARNED AND RECOMMENDATIONS

- Organics, recyclables and organics can have widely varying collection truck collection volume needs based on density and type of customers.
- Split trucks have limitations in collecting waste bulky items such as mattresses.

- A strong training and education effort to obtain buy-in from DSNY staff is critical to program success.
- A comprehensive outreach program is also critical to waste generators' buy-in and success of the program.
- Residents preferred to utilize clear plastic and/or non-biodegradable grocery store bags for can liners and to hold organics, rather than use biodegradable bags as requested by DSNY. As a result, and for convenience of the residents, NYC adapted to this constraint and has contracted with six private companies to take DSNY-collected curbside organics and pre-process them to remove contaminants (such as plastic bags) prior to composting or anaerobic digestion. This required a $47 million NYC investment in private vendor pre-processing facilities.
- Institutional facilities often are not designed with room for multiple collection container areas. This is a similar issue as finding a dedicated area for recycling containers in commercial buildings, restaurants, and offices.
- Likewise, curb setout areas vary widely in the City, creating challenges for organics set out.
- Significant infrastructure investment may be needed to support a substantial organics diversion and recycling program in a large city. This includes collection trucks and staffing, as well as preprocessing and composting/AD facilities.

APPENDIX A – WASHINGTON D.C. ORGANICS RECYCLING AND DIVERSION PROGRAM SUMMARY

A 1. PROGRAM HIGHLIGHTS AND SPECIAL FEATURES

- The organics program in Washington D.C (the District) is a new program with a proposed 5-year rollout. A compost feasibility report outlining the proposed 5-year plan was competed and released for public comment in April/May 2017.
- The program will include curbside co-collected food and yard waste for Department of Public Works customers, and may include mandatory waste diversion and composting requirements for private customers/private haulers.
- Regional marketplace infrastructure to compost food waste is very limited, and/or requires a 40-mile haul to out of area sites. The District plan calls for siting, design and construction of a new food and yard waste composting facility in-District, to save on hauling costs and provide the required processing infrastructure for the curbside organics collection program.
- A 2017 Feasibility Study estimated that it will take between $15 and $23 million dollars to purchase new collection trucks and new curbside organics collection bins, and construct a new aerated static pile composting facility to process organics from the District.

A 2. WASTE MANAGEMENT SYSTEM

- The Washington D.C. Department of Public Works (DPW) collects waste and recyclables from single family homes and multi-family residential units with up to three units in a building. The DPW currently serves approximately 105,300 households in the district. Multi-family homes with four or more units are services by private haulers.
- The 2015 census population for the District is approximately 650,000 people. The District spans nearly 70 square miles, broken into eight (8) service wards. Nearly 20 percent of the District is dedicated to parks.
- Industrial, commercial, and institutional (ICI) customers in the District are serviced by private haulers.
- The DPW owns and operates two (2) transfer stations in the District, Benning Road and Fort Totten. DPW does not currently own or operate any yard waste or organics composting facilities.
- All materials are hauled to processing or disposal facilities located outside of the District. This includes landfills, a waste-to-energy facility, recyclables processing facilities, and yard waste processing facilities.
- Regional infrastructure to handle both yard waste and food waste is very limited. Organics processing sites that accept both yard waste and food waste require approximately a 40-mile haul to either the Prince George's County covered composting system (Gore-type covers) in Upper Marlboro, MD (a MDE facility) or Balls Road (operated by Freestate Farms) in Manassas, VA). The PG County facility currently accepts up to 3,600 tons of food waste yearly, and is expanding capacity to accept up to 8,000 tons of food waste and 60,000 tons of yard waste per year. The Balls Road facility is permitted to accept up to 50,000 tons of yard waste and plant-based food

waste annually. Future phases of expansion, involving anaerobic digestion and advanced composting, could increase processing capacity at Balls Road to 80,000 tons per year, and later to 150,000 tons per year. The DPW does not currently have agreements with these facilities to accept District food and yard waste.

A 3. HISTORY

- In 2011, Washington D.C. established a 20-year vision that reflected broad-reaching policies to help the city become "healthiest, greenest, and most livable city in the United States." Around 2013, D.C released its SustainableDC Plan that encompassed these broad values and policies. The City issues annual progress reports on plan implementation.
- The 2013 SustainableDC Plan includes a section on "Waste" that envisions a zero-waste city. The idea is to accomplish this by implementing goals of waste generation reduction, reuse of waste materials, and increasing the City's recycling rate (including organics).
- In 2014, the District's City Council adopted the Sustainable Solid Waste Management Amendment Act. This act promotes diverting 80 percent of all solid waste generated from within the District away from both landfills and waste-to-energy facilities, through the use of source reduction, reuse, recycling, composting and anaerobic digestion. The Act mandates separation of recyclables from the waste stream, and plans a similar requirement for food waste and yard waste once a composting collection program is implemented.
- The Sustainable Omnibus Act of 2014 requires food service establishments using disposable tableware be either recyclable or compostable as of January 1, 2017.
- A Compost Feasibility Study was prepared for the District in April/May 2017. This study assessed the regional marketplace capacity for composting organics from the District, and reviewed the feasibility and estimated cost of developing compost facility infrastructure. The study also laid out a 5-year plan to implement a curbside source-separated organics (SSO) collection and composting program serving the District's needs.
- A co-digestion study (anaerobic digestion) of the Blue Plains Wastewater Treatment Facility is scheduled to be completed in 2018.
- Details of a Zero Waste Plan are scheduled to be developed during the FY2018-19 period, reflecting feedback from the community on the 2017 Compost Feasibility Study.

A 4. PROGRAM SUMMARY – INTRODUCTION

- The two DPW waste transfer stations currently serving Washington D.C. are Fort Totten and Benning Road, both located either east or northeast of the downtown city area. The 580 tons per day (6-days per week basis, TPD6) Benning Road transfer station operates with two shifts daily. The 880 TPD6 Fort Totten Transfer Station operates three shifts daily. The majority of wastes brought to the two transfer stations (63 percent) are hauled in from private haulers serving multi-unit apartments and ICI customers. The City has no estimate of the quantity of out-of-District wastes brought to the two transfer stations by private haulers.
- In FY2015, the receipt and disposition of materials brought to the two transfer stations was as follows:
  - Approximately 459,000 tons brought into the two transfer facilities.

- 49 percent of materials hauled out to landfills in Virginia (approx. 225,000 tons).
- 43 percent of materials hauled to a waste-to-energy facility in Lorton, Virginia (approx. 197,000 tons).
- Seven (7) percent of materials recycled (approx. 32,000 tons).
- One (1) percent of material was "leaf litter,", most of which was taken to a private composting facility (ACME Biomass Reduction Facility) in Brookeville, MD (approx. 5,700 tons).

A 4.1 KEY RESIDENTIAL COMPONENT(S)

- Approximately 5-7,000 tons of yard waste are collected each fall and taken to the ACME processing facility in MD.
- Starting in year 3 of the 5-year plan, approximately 1/3 of the DPW residential customers will begin to receive curbside mixed food waste and yard waste collections using separate trucks and household carts. The many alleys in the DC region do not currently allow consideration of automated collection trucks, so manual loading of packers will continue (although not very cost-effective). Organics will either be taken to a new DPW in-District composting facility (if on-line), or if not yet available, to existing out of area organics processing facilities.
- Year 4 of the 5-year plan includes rollout of the program to another third of the DPW customers.
- Year 5 includes rollout to the final third of DPW customers.
- Approximately 60 tons per year of food waste and garden debris is currently (2017) composted at 41 community gardens in the district. These community gardens are increasing by 25 percent annually. The DC plan supports the use and growth of these programs.
- Residential curbside organics collections at the end of the five-year rollout could total between 10,000 and 30,000 tons per year of material.

A 4.2 KEY INSTITUTIONAL COMPONENT(S)

- The DCPS Recycles! Program allows all DCPS schools the opportunity to recycle organics. They sort food scraps and soiled paper waste in cafeterias and kitchens. In 2014-15, approximately 250 tons of organics were diverted from landfilling. By 2016-17, participating schools doubled: 61 schools across all eight wards have now opted in to organics recycling. The organic wastes are taken to the Prince George's County Composting Facility in Upper Marlboro, MD.
- Eleven DCPS schools have on-site compost bins, which serve as educational tools to demonstrate composting to students. Many schools also have classroom worm bins to educate students about composting.

A 4.3 KEY COMMERCIAL COMPONENT(S)

- Once more convenient processing facilities are available, the District is considering mandating that the ICI sector institute organics segregation and composting though mandate/ordinance.
- It is reported that the District may review existing ordinances and eliminate restrictions on using food waste from foodservice establishments as animal feed.
- Acceptance of landscaper organics drop-off is part of the overall program.

- Overall, commercial and institutional organics diverted could total between 57,000 and 86,000 tons of material annually, according to the 2017 Feasibility Study. Landscaper organics drop-offs could add 13,000-14,000 tons of materials.

A 4.4 KEY INFRASTRUCTURE COMPONENT(S)

- The 2017 Compost Feasibility Study confirmed that existing and proposed regional infrastructure to process food and yard waste is limited, distant (40 miles away) and will not cost-effectively meet the processing needs of the District's 5-year organics plan.
- In years 1 and 2 of the proposed five-year plan, The District will search for and secure a 10-20 are parcel and conduct design of an enclosed aerated static pile (ASP) composting facility for food and yard waste. It is believed that the cost of this facility (estimated at $7-11 million) can be paid for with the savings gained by eliminating the hauling of organics to distant organics processing facilities. This facility is scheduled to be constructed and on-line to process year 3-yard waste and other organics.
- To collect curbside organics by DPW, it is estimated that 21 to 35 new trucks, and 68 to 114 collection staff, will be required, as well as new collection containers for organics at each household served. The estimate capital costs for organics containers is approximately $4.4 million, and the estimated cost for new organics collection trucks is estimated at $4-7 million.
- The District has underway a co-digestion feasibility study, to determine appropriate feedstock, suitable pretreatment technologies and costs, and impacts on the current DC wastewater treatment systems. However, the Compost Feasibility Study prefers and recommends the District develop a covered Aerated Static Pile composting system.

A 5. ROLLOUT, EDUCATION AND OUTREACH

- See residential section narrative.

A 6. KEY LESSONS LEARNED AND RECOMMENDATIONS

- In order to make the cost per ton of materials collected more economical, co-collection of food waste and yard waste is recommended in the Compost Feasibility Study.
- The cost of transfer hauling of organics is thought to be high (estimated at $37 per ton), so direct hauling of organics to an in-District processing site is recommended.
- Similar to the Philadelphia case, the regional organics processing marketplace in the DC area is limited. Processing capacity must be developed and available prior to beginning curbside organics collections.
- The "high potential" projected level of success with the DPW curbside organics collection, commercial/institutional programs, and expanded infrastructure could total nearly 150,000 tons of organics recovered annually (approximately 60 percent organics recycling/diversion of generated tons).

APPENDIX A – SEATTLE ORGANICS RECYCLING AND DIVERSION PROGRAM SUMMARY

A 1. PROGRAM HIGHLIGHTS AND SPECIAL FEATURES

- Seattle's recycling rate increased from 58% in 2015 to 58.8% in 2016, putting Seattle within reach of attaining its goal of a 70% recycling rate in 2020.
- In 2016, Seattle generated 747,964 tons of municipal solid waste and recycled 439,672 tons for the aforementioned 58.8% recycling rate. It is important to note that Seattle includes organics processing in addition to traditional recyclables in its recycling tonnage and rate.
- The recycling rate is the combined recycling rate of the four sectors Seattle has defined for reporting purposes. Individually, the single-family recycling rate is 74% (153,506 tons recycled), the multi-family recycling rate 38.5% (31,041 tons recycled), the self-haul recycling rate 10.9% (8,083 tons recycled), and the commercial recycling rate 64% (247,042 tons recycled).
- Seattle Public Utilities (SPU) provides solid waste services to residences and businesses through the Solid Waste Fund (SWF) which is almost entirely supported by utility fee revenue.
- The city's solid wastes costs are about $175 million annually with the majority consisting of collection and disposal contract expenses. In addition, Seattle owns and operates two transfer stations running six days a week.
- In 2017, single family and multi-family organics services accounted for 16.5% of solid waste costs. Commercial organics services accounted for 0.4% of solid waste costs.

A 2. WASTE MANAGEMENT SYSTEM

- Seattle has an estimated population of 704,352 residents, making it the largest city in both the state of Washington and the Pacific Northwest.
- Residents receive weekly refuse collection, every other week recycling, and weekly organics collection. Approximately 150,000 households, 6,000 apartments, and 8,000 businesses receive service every week.
- Organics are sent for processing to Cedar Grove Maple Valley and Cedar Grove Everett which have been contracted since 1989. Organics processing includes yard waste, food waste, compostable paper, and compostable food packaging.
- MSW Generation by Sector – Commercial 48%, Single Family 30%, Multi-family 10%, and Self-Haul 12%

A 3. HISTORY

- Until 1988, Seattle prepared its solid waste plan as part of King County's local plan.
- In 1989, Seattle began independently planning its solid waste management with its Integrated Solid Waste Management Plan.
- The 1998 *On the Path to Sustainability* updated the 1989 plan and was subsequently updated in 2004.

- In 2004, Seattle amended its plan, streamlining the municipal waste system and organics diversion program.
- Resolution 30990 (Zero Waste Resolution) was adopted in 2007 which moved the 60% recycling goal to 2012 and 72% recycling goal to 2025.
- The 2011 plan revised the 1998 plan which was then updated in 2013. The plan is then set to be updated every five years.

A 4. PROGRAM SUMMARY – INTRODUCTION

A 4.1 KEY RESIDENTIAL COMPONENT(S)

- Seattle residents can choose from 13 ($6.05 per month), 32 ($9.10 per month), and 96 ($11.65 per month) gallon organics carts which are collected weekly. Exemptions are allowed for residents who compost at home.
- Backyard composting and grasscycling have been mainstays in managing food and yard waste at home since before the implementation of the organics program.
- The 2009 contracts for residential collection added weekly organics pick-up and added meat and dairy to accepted organics for collection.
- Organics were banned from single-family refuse carts in 2014.
- Pet waste and diapers composting is set to be implemented in 2020.
- Multi-family buildings are required to have organics collection since Q4 2011 and in 2015 organics were banned from multi-family refuse carts and containers.
- Multi-family properties can choose from 32 ($33.71 per month), 64 ($65.81 per month), or 96 ($77.14 per month on-site; $11.65 per month curb/alley) gallon organics carts which are collected weekly.

A 4.2 KEY INSTITUTIONAL COMPONENT(S)

- Stakeholders have recommended focusing community grants on schools to increase food and yard waste collection and encouraging schools to comply with food and packaging regulations for recyclable or compostable serve-ware.
- Support for Washington Green Schools to provide teacher training and certify schools. Washington Green Schools is a nonprofit organization that provides a system of support for schools to set and achieve sustainability goals through classroom resources, hands-on support, training, workshops, and recognition.

A 4.3 KEY COMMERCIAL COMPONENT(S)

- A 2008 city law requires quick-serve restaurants to use compostable or recyclable packaging which has led to more businesses requesting organics collection service.
- In 2010, the compostable container food program began for commercial customers.
- Donations of surplus food from commercial food businesses to hunger-relief agencies has increased.

- Commercial customers with organics may choose city or private collection.
- In 2016, organics were banned from commercial refuse.

A 4.4 KEY INFRASTRUCTURE COMPONENT(S)

- Seattle will continue to contract out organics processing and will pursue a competitive contract process after current contract with Cedar Grove ends.
- The city also supports increasing composting capacity and utilizing alternate methods such as anaerobic digestion.
- In 2016, Seattle Public Schools, EPA Region 10, and emergency food system providers partnered to assess opportunities for recovering edible food from school lunches. The joint effort discovered the average school throws away over 100 pounds of recoverable food per week. This resulted in the School Food Share program which collects whole and packaged cafeteria leftovers for food banks.

A 5. ROLLOUT, EDUCATION AND OUTREACH

- Seattle has taken an aggressive approach to the organics collection program through banning organics from refuse carts and containers and implementing wide-reaching education programs.
- The initial violations program of flagging carts after curbside inspection was challenged in court and was ultimately suspended.
- Seattle participated as a member of the Washington Organics Contamination Reduction Work Group to identify sources, causes, and solutions regarding compost contamination and develop best practices for compostable packaging.
- Three sponsored demonstrations were given for on-site food waste processing featuring technologies such as the WISErg Food Harvester and Impact Bioenergy micro-anaerobic digester.
- Seattle has engaged industry organizations and companies involved in packaging to address packaging design, labeling, tinting, recyclability, and compostability.
- Provided technical assistance to more than 250 ethnic food service businesses.

A 6. KEY LESSONS LEARNED AND RECOMMENDATIONS

- Significant financial and outreach commitments are needed to establish a well-functioning organics program.
- Seattle took a three pronged approach to establishing the organics program: aggressive approaches to organics collection regulation such as banning organics from the refuse waste stream and flagging carts with violations, extensive community outreach and education programs to ensure the quality of the organics stream and understanding of the program guidelines, and pricing encouraging larger organics and recycling containers over refuse containers.

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APPENDIX A – SAN JOSE ORGANICS RECYCLING AND DIVERSION PROGRAM SUMMARY

A 1. PROGRAM HIGHLIGHTS AND SPECIAL FEATURES

- In FY2017, more than two-thirds of waste was diverted from landfills. 67,322 tons of organic waste, consisting mainly of yard trimmings, commercial organics, and residential food waste were diverted from landfills and sent to San Jose's anaerobic digestion (AD) processing facility.
- San Jose's commercial system agreements establish performance measures which classify organics feedstock loads based on non-organic contaminants. The organics processing contractor, Zero Waste Energy Development Company (ZWEDC), charges a higher tipping fee from the collection contractors, Republic Services (commercial sector) and GreenWaste Recovery (residential sector), for dirtier (i.e. more contaminated) material streams, which encourages the collection contractors to deliver cleaner material.
- San Jose is open to exploring other options for organics processing than just AD. The residential yard trimmings contract with GreenWaste Recovery enables the city to re-direct up to 6,000 tons of material per year from anaerobic digestion to pilot studies for alternate conversion technologies.
- The city of San Jose has decided that use of organics as an alternate daily cover (ADC) over garbage is not true diversion of waste from landfills. A clause in the residential yard trimmings contract disallows recovered materials to be used as ADC at landfills and ADC does not count as diversion in the City's waste management contracts.

A 2. WASTE MANAGEMENT SYSTEM

- San Jose is the largest city in Northern California with an estimated population of 1.03 million residents. The Integrated Waste Management Division (IMWD) serves more than 8,000 businesses, 215,000 single family units, 106,000 multi-family units, and 200 city facilities.
- Approximately 1,835,000 tons of solid waste are generated annually with the commercial sector generating 300,000 tons of the city's solid waste. Food scraps are estimated to compose 42% of the commercial waste stream.
- Residents receive weekly refuse, recycling, and yard trimmings collection using automated collection carts and trucks. Yard trimmings collection is an optional subscription service for an additional monthly fee. All collection services are provided by licensed haulers under service contracts with IWMD
- Garden City Sanitation and GreenTeam are the licensed refuse haulers for San Jose with Green Team also providing recycling collection service. California Waste Solutions is a licensed recycling hauler for all of San Jose except West San Jose. GreenWaste Recovery handles all yard trimmings collection in the city.
- Recycling and garbage services expenditures comprised 45.6% of the Environmental Services Department's (ESD) total expenditures at $117,322,601.

A 3. HISTORY

- In October 2007, San Jose unveiled its Green Vision plan, outlining 10 Green Vision goals to be achieved in 15 years which included diverting 100 percent of waste from landfills to waste-to-energy facilities. Specifically, the city aimed for a 75% diversion goal by 2013 and zero waste by 2022.
- The 2014 California Assembly (AB) 1826 requires all businesses and multi-family dwellings with five or more units and that generate four or more cubic yards of garbage per week to recycle their organic waste. If the California Department of Resources Recycling and Recovery (CalRecycle) determines that statewide organic waste has not been reduced by 50% since 2014, the organic recycling requirements will expand to businesses generating 2 cubic yards of waste.

A 4. PROGRAM SUMMARY – INTRODUCTION

A 4.1 KEY RESIDENTIAL COMPONENT(S)

- Property owners are able to lower their refuse bills by ordering smaller refuse cans and recycling and composting more. Refuse cart service cost increases when using larger carts but recycling cart service is included in the refuse fee and any size cart can be selected for no additional cost. Yard trimmings service is a flat fee for any cart size. Approximately 86% residents choose the 32-gallon refuse cart out of the 32-, 64-, and 96-gallon options.
- The city of San Jose does not provide residential food waste collection but does encourage home composting. San Jose sponsors educational classes for home composting and sustainable gardening along with selling discounted backyard compost bins.

A 4.2 KEY INSTITUTIONAL COMPONENT(S)

- The University of California Cooperative Extension (UCCE) Education Program provides instructional support to teachers and administrators of Santa Clara. The program includes worm composting demonstrations, compost siting assistance, and assistance diverting lunchroom waste. Organic waste from food scraps and lawn trimmings account for more than one-third of school garbage.
- San Jose is working with the Integrated Waste Management board to reduce yard trimmings going to landfills by 50%. The joint taskforce is also analyzing composting, permitting, alternative daily cover reduction, and compost marketing in an effort to reduce green waste.

A 4.3 KEY COMMERCIAL COMPONENT(S)

- Bay Area Zero Waste Communities is an informal group of cities aiming for zero waste and working together on innovative zero waste policy solutions. One such solution is the development of a service-ware ordinance requiring the use of recyclable/compostable service-ware in restaurants.
- San Jose's 2015 Foam Food Container Ordinance requires all restaurants to use non-foam food service-ware for both dine-in and takeout.

- All San Jose businesses receiving service from Republic Services are in compliance with AB 1826, which requires all businesses producing specified amounts of organic waste to arrange for collection for the organic waste.

A 4.4 KEY INFRASTRUCTURE COMPONENT(S)

- San Jose has a 15-year exclusive organics processing agreement with the Zero Waste Energy Development Company. The ZWEDC Anaerobic Digestion facility is the largest dry fermentation anaerobic digestion project in the world. The materials accepted includes pre- and post-consumer source separated food waste from commercial organic collection and the residential food waste pilot program, wet and dry processing residuals, and yard waste. On July 1, 2012, ZWEDC began receiving San Jose's organic materials (which did not initially contain residential curbside-collected food scraps, as that pilot program did not begin until 2015).

A 5. ROLLOUT, EDUCATION AND OUTREACH

- The UCCE Composting Education Program partners with cities in Santa Clara County to educate communities about composting. Master Composter training courses teach residents how to build compost piles and worm bins and how to use the resulting compost in their own landscaping and gardening. In addition, the Master Composter volunteers provide presentations to local schools, community organizations, and events.
- San Jose and Garden City Sanitation began a one-year voluntary curbside food scraps collection pilot in 2015 which has been extended until March 2018 with a report expected May 2018. Residents can choose from a 20-gallon cart or a split 64-gallon cart for both food scraps and other garbage. The collection days remain the same and there are no extra fees for the service.

A 6. KEY LESSONS LEARNED AND RECOMMENDATIONS

- San Jose is awaiting on the May 2018 report concerning the pilot food scraps collection program to decide if it will become a permanent addition to its existing services. The infrastructure and agreements are in place to support a robust organics collection program for both yard waste and food waste.

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APPENDIX B

Regional Marketplace Survey Supporting Information

Marketplace Survey Form
Phase 1 Food Waste and Organics Marketplace Survey Results
Phase 1 Yard Waste Marketplace Survey Results
Phase 1 Assessment of Food Waste Co-Digestion and Delivery Options

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CITY OF PHILADELPHIA ORGANICS FEASIBILITY STUDY
Soil Processor and Compost Site Survey Form

INSTRUCTIONS
Contact information: Please correct any incorrect information.
Check boxes: Type an X to the left of the appropriate box.
Written Answer: Place curser after the word "Answer" and begin typing.

[insert site/ contact info here]

Site Type: ☐ Private or ☐ Municipal

1) a) Do you have a compost site/facility? ☐ Yes ☐ No

   b) Do you have a soil blending/processing site/facility? ☐ Yes ☐ No

2) a) What is your current/permitted capacity?

Answer:

   b) What permit(s) do you hold for your operation? ☐ Don't know

Answer:

3) What is your current available/remaining capacity?

Answer:

4) Do you have plans for increased capacity? ☐ Yes ☐ No Please describe.

Answer:

5) What material (s) do you accept/ process?

Answer:

6) How do you process materials (processing description)?

Answer:

7) Do you collect organic materials? ☐ Yes ☐ No. Please describe.

Answer:

8) a) Do you receive organic materials from others? ☐ Yes ☐ No.

   b) Do you accept material from municipal sources? ☐ Yes ☐ No.

c) Private firms? ☐ Yes ☐ No.

d) Self-haul? ☐ Yes ☐ No.

e) Do you have delivery or processing contracts? ☐ Yes ☐ No.

f) Delivery restrictions/specifications? ☐ Yes ☐ No. Please describe.

Answer:

9) a) Is there a fee for drop-off or collection of organics? ☐ Yes ☐ No

b) What is your fee schedule?

Answer:

10) Would you consider accepting large deliveries of organics? ☐ Yes ☐ No. Can you accept deliveries of large tractor trailer loads of organics? ☐ Yes ☐ No. Under what terms?

Answer:

11) How do you distribute/market finished product?

Answer:

12) How/what do you charge for the finished product(s)? What is your fee schedule?

Answer:

13) Do you deliver finished product(s)? ☐ Yes ☐ No Please explain.

Answer:

14) What is your delivery area, and do you deliver to ☐ public, ☐ private, ☐ both, or ☐ N/A?

Answer:

Phase 1 Survey of Regional Marketplace for (Primarily) Food Waste/Mixed Organics Processing

Appendix B-2

Facility Name, Type and Contact Info					Permitting Information					Technology	Details of Materials Received and Terms of Receipt			Final Product Distribution			Opportunities for Philadelphia
Facility Type YW=yard waste SP = soil processor MO = mixed organics	**Name of Facility**	**Facility Location (town, state)**	**Approx. Driving Distance (miles) from Central Philadelphia (Mapquest)**	**Do You Own/ Operate A Compost Facility? (Y/N)**	**Do You Hold a Facility Permit? (Y/N) If yes, permit number/type**	**Current Permitted Capacity (or N/A)**	**Remaining Permitted Capacity (or N/A)**	**Materials Accepted (list)**	**Plans to Increase Capacity? (Y/N) If yes, describe**	**Processing/ Composting Description (brief)**	**Types of Material Accepted (list)**	**Charges for Materials Dropped Off or Received? (Y/N) If yes, please describe fee schedule**	**Delivery Restrictions/ Specs. on Material Received? (describe)**	**Final End-Product(s) Produced**	**Distribution of Finished Product (describe)**	**Charges for End-Product(s) Produced? (Y/N) If yes, please describe fee schedule**	**Would You Consider Accepting Large Quantities of New Organics Deliveries to Your Site? (Y/N) If yes, types and quantiles you could accept**
YW, SP, MO	**Linvilla Orchards (managed by Kitchen Harvest, Inc.)**	Media, PA	18.9	Y	Y WMG-M017	13,500 cubic yards maximum quantity of waste materials to be on site at any one time: 1,000 cu. yds. food scraps, 10,000 cu. yds. yard waste, 1500 cu. yds. wood chips, 500 cu. yds. manure, 500 cu. yds. mushroom soil	None. We are at full capacity.	Food scraps, yard waste, other organics products, wood chips, manure, mushroom soil	N We are at capacity for our permit and for the acreage the farm is willing to allocate for composting. We do hope, however, to increase capacity by replicating this successful composting model at another farm	Windrow Composting	Yard waste, other organics products, wood chips, manure, mushroom soil	Y Fees are customer specific.	Kitchen Harvest, Inc. is the only approved hauler of food scraps to the compost site. Yard waste, wood chips, manure, and mushroom soil, are all brought by multiple different customers.	Compost Garden Soil Mulch	Bulk by the cubic yard for pickup or delivery	Y 2016 Compost and Garden Soil (50/50 blend of compost/topsoil) plan to be $40 per cubic yard plus tax and delivery (if needed). Composting customers get at least 20% off depending on order volume	We are at capacity, however, we would entertain discussions to accept from a competitive vendor who could provide organics to meet our standards.
SP, MO	**Oregon Dairy Organics, LLC**	Lititz, PA	73.3	Y	Y GP025	Limited by material on site at any given time, NOT by incoming volume	5,000 tons per year	Food processing by-product, residual clean food waste, fruit/vegetable/bakery/pet feed. Material must contain ZERO plastics, glass, metals, contamination.	N We are at capacity for our permit and for the acreage the farm is willing to allocate for composting. We do hope, however, to increase capacity by replicating this successful composting model at another farm	Active windrow/covered	We work closely with several haulers and are open to new, mutually beneficial cooperative relationships.	Y $35-50 per ton depending on the material	Mon-Fr 7:00 - 4:30 or by arrangement; Clean matieral No plastic, glass or metal contamination.	Compost/soil amendment for use in athletic turf, golf course, landscaping, soil blending, certified construction soil blends	Wholesale distribution	Y Charge per cubic yard for large scale/wholesale distribution	Y Negotiable.
	Philly Compost		0	N Operates as a food waste hauler only. Kitchen Harvest, which operates from Linvilla Orchards and Organics Diversion, LLC took over Philly Compost contracts.													
YW, MO	**Four Springs Farm**	Kutztown, PA	65.2	Y	Y PA DEP GP17	3,000 cubic yards	None.	Source separated organics; food waste; yard waste; wood chips	Y No description provided	Blending; windrows; turning; screening	No description provided.	Y $40/ton food waste; others negotiable	Y No plastic etc.		word of mouth & used on our own farm fields; BIOCYCLE list	$30 / cu yd up to 3 yds; 3 or more cu yds $28/yd	Y No plastic, etc. As dry as possible (not currently)

Phase 1 Survey of Regional Marketplace for (Primarily) Food Waste/Mixed Organics Processing

Facility Name, Type and Contact Info					Permitting Information					Technology	Details of Materials Received and Terms of Receipt			Final Product Distribution			Opportunities for Philadelphia
Facility Type YW=yard waste SP = soil processor MO = mixed organics	**Name of Facility**	**Facility Location (town, state)**	**Approx. Driving Distance (miles) from Central Philadelphia (Mapquest)**	**Do You Own/ Operate A Compost Facility? (Y/N)**	**Do You Hold a Facility Permit? (Y/N) If yes, permit number/type**	**Current Permitted Capacity (or N/A)**	**Remaining Permitted Capacity (or N/A)**	**Materials Accepted (list)**	**Plans to Increase Capacity? (Y/N) If yes, describe**	**Processing/ Composting Description (brief)**	**Types of Material Accepted (list)**	**Charges for Materials Dropped Off or Received? (Y/N) If yes, please describe fee schedule**	**Delivery Restrictions/ Specs. on Material Received? (describe)**	**Final End-Product(s) Produced**	**Distribution of Finished Product (describe)**	**Charges for End-Product(s) Produced? (Y/N) If yes, please describe fee schedule**	**Would You Consider Accepting Large Quantities of New Organics Deliveries to Your Site? (Y/N) If yes, types and quantiles you could accept**
YW	**Graywood Farms**		64.9	Y	This is an On-Farm facility and therefore does not currently have the DEP General Permit 025 that we would need to take the type of waste we're looking for at the volumes that would be needed. Our Oregon Dairy Organics location does have a DEP General Permit 025												
SP, MO	**Veteran Compost**	Aberdeen, MD	70.5	Y	Y, MD GP-CF01	Unlimited	60 tons per day	Clean food waste and compostable ware (cups, plates, etc.) and wood chips. NO yardwaste or biosolids	Y We have 2 other facilities available in Maryland. Permits for those facilities have been drafted and will now move forward because MD Department of the Environment released a new composting facility permit and regulations on 3/28/2016. These locations increase capacity to 60 tpd. We plan to put capacity out to bid later this year.	Positive Aerated Static Piles	Food waste, compostable ware, wood chips	Not applicable	We currently haul aull the matieral that we process, but we are open to disucssion about deliveries	Organic compost	We market our material to the agriculture industry, landscapers and home gardeners in bulk (some material is bagged). It can be picked up (even in tractor trailer quantities) or delivered.	$35/cu yd retail. Wholesale and ag prices are less	We are open to discussing large deliveries. We prefer to receive large quantities such as tractor trailer loads. We also prefer pre-consumer food waste from grocery stores and large food distribution centers
YW, MO	**Prince George's County Yard Waste Composting Facility**	Upper Marlboro, MD	140.2	Y	MDE CF Permit MD published compost facility regulations 3/28/206	Not sure 50,000 tons processed annually	Unknown	Grass clippings, leaves, brush, small tree limbs and Christmas trees. A food scrap composting pilot project collects food scraps	Unknown	Yard waste is processed in windrows; the food scrap pilot uses covered aerated static piles	yard waste; food scraps in a separate process	$45/ton for non-county contractors	Unknown	Final product is a dark humus marketed as Leafgro ™	Marketed by MES through a network of retailers. Revenue is returend to the County to offset the cost of the composting operation.	Unknown	Unkown
	Premier Food Waste Recycling	Ewing, NJ	33.7	N													Premier may be looking into opening a food waste processing facility in the future.

Phase 1 Survey of Regional Marketplace for (Primarily) Food Waste/Mixed Organics Processing

Facility Name, Type and Contact Info					Permitting Information					Technology	Details of Materials Received and Terms of Receipt			Final Product Distribution			Opportunities for Philadelphia
Facility Type YW=yard waste SP = soil processor MO = mixed organics	**Name of Facility**	**Facility Location (town, state)**	**Approx. Driving Distance (miles) from Central Philadelphia (Mapquest)**	**Do You Own/ Operate A Compost Facility? (Y/N)**	**Do You Hold a Facility Permit? (Y/N) If yes, permit number/type**	**Current Permitted Capacity (or N/A)**	**Remaining Permitted Capacity (or N/A)**	**Materials Accepted (list)**	**Plans to Increase Capacity? (Y/N) If yes, describe**	**Processing/ Composting Description (brief)**	**Types of Material Accepted (list)**	**Charges for Materials Dropped Off or Received? (Y/N) If yes, please describe fee schedule**	**Delivery Restrictions/ Specs. on Material Received? (describe)**	**Final End-Product(s) Produced**	**Distribution of Finished Product (describe)**	**Charges for End-Product(s) Produced? (Y/N) If yes, please describe fee schedule**	**Would You Consider Accepting Large Quantities of New Organics Deliveries to Your Site? (Y/N) If yes, types and quantiles you could accept**
YW, SP, MO	**Howard County Pilot Composting Facility**	Marriotsville, MD	120			The County estimates that it takes in 5 tons of food scraps per week. Foodscraps are co-collected with residential yard trim from 3 collection routes totaling about 15,000 homes. Total tonnage a week is about 80 tons.											
YW, SP, MO	**Two Particular Acres**	Royersford, PA	33.3	Y	GP-17	5,000 tons per year	3,500 tons per year	Look it up.	No, not beyond the permitted capacity	Aerated static pile composting, soil blending and screening	yard waste, food waste, food processing waste, spoiled grains, some manure	Yes. $50/ton	Yes. Must be contaminant FREE	Screened compost, blends and custom blends	Deliver Pickup loads/bulk Bags (available for pickup) Weis Market sells bagged compost	$25/cubic yard bulk Bag prices fluctuate	Will accept large trailer loads and large delivers, but all material must be contaminant FREE. Large vehicle scale on site.
	FCS Partners, LLC: Pottstown Trap Rock Composting Facility	Douglassville, PA	43	Y	GP-45	30,000 tons per year	20,000 tons per year	Look it up.	Yes, under the right circumstances. Area is available	Aerated static pile composting, and grinding and screening	pre and post consumer food, yard waste, food processing waste, manure, and waxed cardboard	Yes. $50/ton Expected $5/ton increase by yearend	Yes. Must be contaminant FREE	Screened compost, blends and custom blends	Bulk and bags	$25/cubic yard bulk Bag prices fluctuate	Will accept large trailer loads and large delivers, but all material must be contaminant FREE. Large vehicle scale on site.
	FCS Partners, LLC: ABE Materials, Easton	Easton, PA	66.8	Y	GP-45	30,000 tons per year. 20% of the site is built. Expects to complete site for 100% usage by the end of 2016	80% when the site is completely build	Look it up.	No, not beyond the permitted capacity	Aerated static pile composting, and grinding, blending, and screening.	pre and post consumer food, waxed cardboard, and leaves. Leaves are from Allentown .	Yes. $50/ton	Yes. Must be contaminant FREE	Blends, custom blends, screened compost	Bulk and bags	$25/cubic yard bulk Bag prices fluctuate	Will accept large trailer loads and large delivers, but all material must be contaminant FREE. Large vehicle scale on site.
	FCS Partners, LLC: Hazelton Material Composting Facility	Weatherly, PA	92.9	Yes, but the site hasn't been constructed yet. Construction expected to begin before the end of 2016	GP-45	30,000 tons per year	All. Site has not been constructed yet. Construction expected to begin before the end of 2016										

Phase 1 Survey of Regional Marketplace for (Primarily) Food Waste/Mixed Organics Processing

Appendix B-2

Facility Name, Type and Contact Info					Permitting Information					Technology	Details of Materials Received and Terms of Receipt			Final Product Distribution			Opportunities for Philadelphia
Facility Type YW=yard waste SP = soil processor MO = mixed organics	**Name of Facility**	**Facility Location (town, state)**	**Approx. Driving Distance (miles) from Central Philadelphia (Mapquest)**	**Do You Own/ Operate A Compost Facility? (Y/N)**	**Do You Hold a Facility Permit? (Y/N) If yes, permit number/type**	**Current Permitted Capacity (or N/A)**	**Remaining Permitted Capacity (or N/A)**	**Materials Accepted (list)**	**Plans to Increase Capacity? (Y/N) If yes, describe**	**Processing/ Composting Description (brief)**	**Types of Material Accepted (list)**	**Charges for Materials Dropped Off or Received? (Y/N) If yes, please describe fee schedule**	**Delivery Restrictions/ Specs. on Material Received? (describe)**	**Final End-Product(s) Produced**	**Distribution of Finished Product (describe)**	**Charges for End-Product(s) Produced? (Y/N) If yes, please describe fee schedule**	**Would You Consider Accepting Large Quantities of New Organics Deliveries to Your Site? (Y/N) If yes, types and quantiles you could accept**
	FCS Partners, LLC: ABE Materials, Allentown	S. Whitehall Twp., PA	58.8	Yes, but site is not operational. It's in reserve. No date for develoopment yet	GP-45	30,0000 tons per year	Unablet to open due to local opposition.										
	FCS Partners, LLC: Silver Hill Quarry	Narvon, PA	54.1									Yes. $50/ton	Yes. Must be contaminant FREE				

Phase 1 Survey of Regional Marketplace for (Primarily) Yard Waste Processing

Appendix B-3

Facility Name, Type and Contact Info					Permitting Information					Technology	Details of Materials Received and Terms of Receipt			Final Product Distribution			Opportunities for Philadelphia
Facility Type YW=yard waste SP = soil processor MO = mixed organics	**Name of Facility**	**Facility Location (town, state)**	**Approx. Driving Distance (miles) from Central Philadelphia (Mapquest)**	**Do You Own/ Operate A Compost Facility? (Y/N)**	**Do You Hold a Facility Permit? (Y/N) If yes, permit number/type**	**Current Permitted Capacity (or N/A)**	**Remaining Permitted Capacity (or N/A)**	**Materials Accepted (list)**	**Plans to Increase Capacity? (Y/N) If yes, describe**	**Processing/ Composting Description (brief)**	**Types of Material Accepted (list)**	**Charges for Materials Dropped Off or Received? (Y/N) If yes, please describe fee schedule**	**Delivery Restrictions/ Specs. on Material Received? (describe)**	**Final End-Product(s) Produced**	**Distribution of Finished Product (describe)**	**Charges for End-Product(s) Produced? (Y/N) If yes, please describe fee schedule**	**Would You Consider Accepting Large Quantities of New Organics Deliveries to Your Site? (Y/N) If yes, types and quantiles you could accept**
YW	**Cheltenham Township Compost Site**	Cheltenham , PA	9.4	Yes	Yes - Permit-by- rule	14,000 cubic yards	N/A	Leaves, grass, yard waste, brush	No	Grind materials windrow and turn	Leaves, grass , yard waste, brush	Yes, $15.00 for up to 10 yards and $25.00 for more than 10 yards	Only noted materials	Mulch	Available for pickup by residents and landscapers	No	No
YW	**Lower Merion Township Compost Site**	Ardmore, PA	9.4	Yes	Under transfer permit	3,895 tons	N/A	Brush, leaves,tree trimmings, Christmas trees, yard waste	No	Grind materials, windrow and turn	Brush, leaves, tree trimmings, Christmas trees, yard waste	Yes, Materials drop- off, commingled, brush and leaves, tip fee $.04 per pound, No fee for resident drop-off	No	Mulch	Self load for residents at transfer station	No fee, pick-up for transfer station	No
YW	**Abington Township Composting Site**	Abington, PA	12.9	Yes	Yes - Permit-by- rule	50,000 cubic yards	12,000 cubic yards	Brush, leaves,tree trimmings, Christmas trees	No	Grind- brush and tree trimmings, windrow & turn-leaves	Leaves, yard waste, brush and tree trimmings	No	Only noted materials	Compost and mulch	Available for pickup by residents and landscapers at four designated sites.	Yes, $2.50 per cubic yard	No
YW (grass and leaves, SP	**Gloucester Township Municipal Utilities Authority Compost**	Glendora, NJ	13.2	Yes	Yes- NJ #132029, Class C	126,800 cubic yards	N/A	Leaves, grass	No	Windrow and turn, soil blend with compost	Grass, leaves	Yes, Grass - $10. 00 per yard, one yard minimum Leaves - $5.00 per yard two yard minimum	Leaves and grass only	Compost and top soil	Purchase of products at site	COMPOST; TOPSOIL 3 cubic yards - $72.00; $84.00 5 cubic yards - $100.0; $120.00 7 cubic yards - $126.00; $154.00 30 cubic yards - $410.00; $530.00	Yes , Leaves and grass, quantities would be based on available capacity at time of request
YW	**Moorestown Compost**	Burlington, NJ	13.4	Yes	Yes, NJ #131966, Class C	N/A	N/A	Leaves, brush	No	Leaves-windrow and turn, brush (double grind)	Leaves and brush	No	Segregated leaves and brush	Compost and mulch	Pickup only	No	No
YW	**Upper Dublin Township Compost Site**	Upper Dublin, PA	14.7	Yes	Yes - Permit-by- rule	9,000 cubic yards	N/A	Leaves, brush and tree trimmings	No	Grind-brush and tree trimmings, windrow and turn-leaves	Leaves,yard waste, brush and tree trimmings	No	Only noted materials	Mulch	Available for pickup by residents and landscapers	No	No
YW	**Upper Moreland Township Compost Site**	Upper Moreland, PA	15.1	Yes	Yes - Permit-by- rule	6,000 cubic yards	N/A	Leaves, grass, yard waste, brush and tree trimmings	No	Grind- brush and tree trimmings, windrow and turn-leaves	Leaves,yard waste, brush and tree trimmings	No	Only noted materials	Mulch	Available for pickup by residents	No	No
MO	**Organic Diversion, LLC (Currently being developed)**	Gloucester City, Nj	15.4	Yes	Yes, NJ#563182 Class S&B	400 tpd	N/A, To be determined	Food waste and yard waste	N0, not at this time	Anerobic digestion	Food waste and yard waste	Yes, To be determined	Clean segregated feedstocks	Compost	To be determined	To be determined	Yes, To be determined

Phase 1 Survey of Regional Marketplace for (Primarily) Yard Waste Processing

Appendix B-3

Facility Name, Type and Contact Info					Permitting Information					Technology	Details of Materials Received and Terms of Receipt			Final Product Distribution			Opportunities for Philadelphia
Facility Type YW=yard waste SP = soil processor MO = mixed organics	**Name of Facility**	**Facility Location (town, state)**	**Approx. Driving Distance (miles) from Central Philadelphia (Mapquest)**	**Do You Own/ Operate A Compost Facility? (Y/N)**	**Do You Hold a Facility Permit? (Y/N) If yes, permit number/type**	**Current Permitted Capacity (or N/A)**	**Remaining Permitted Capacity (or N/A)**	**Materials Accepted (list)**	**Plans to Increase Capacity? (Y/N) If yes, describe**	**Processing/ Composting Description (brief)**	**Types of Material Accepted (list)**	**Charges for Materials Dropped Off or Received? (Y/N) If yes, please describe fee schedule**	**Delivery Restrictions/ Specs. on Material Received? (describe)**	**Final End-Product(s) Produced**	**Distribution of Finished Product (describe)**	**Charges for End-Product(s) Produced? (Y/N) If yes, please describe fee schedule**	**Would You Consider Accepting Large Quantities of New Organics Deliveries to Your Site? (Y/N) If yes, types and quantiles you could accept**
YW	**Conshohocken Borough Compost Site**	Conshohocken, PA	15.7	Yes	Yes - Permit-by- rule	385 tons	N/A	Leaves, grass, yard waste, Christmas trees, brush and tree trimmings	No	Windrow and turn- brush and tree trimmings, processed at Upper Merion Compost Facility under municipal agreement	Leaves, grass, yard waste, Christmas trees, brush and tree trimmings	No	Only noted materials	Compost and mulch	Available for pickup by residents and lanscapers	No	No
YW (Leaves only)	**Whitemarsh Township Compost Site**	Whitemarsh, PA	16.6	Yes	Yes - Permit by rule	N/A	N/A	Leaves	No	Windrow and turn- leaves	Leaves	No	Only leaves	Compost	Available for pickup by residents and deliver upon request	No	No
YW (Leaves only) , SP	**Wayne Carmint Landscaping, Inc**	King of Prussia, PA	16.8	Yes	Yes, Permit-by-rule	N/A	N/A	Leaves	No	Windrow and turn	Leaves	$30.00 to $75.00 per load depending on volume of material and quality of feedstocks	Clean uncomtaminated leaves	Compost and specially blended soils	Bulk delivery of compost and soils and pick-up by landscapers and contractors	Yes, No set fee, depends on volume of material and distance to customer and requirements and specifications for compost/soil blends	No
	County Conservation Co. LLC	Sewell, NJ	18.7														
YW, (Leaves only), SP	**Triboro Sand & Stone, Inc.**	Camden, NJ	19.2	Yes	Yes - NJ #584712 Class B&c	N/A	N/A	Leaves	Yes	Windrow and turn	Leaves	N/A	Only leaves	Compost	Used on site for mine reclamation	No, used on site	No
YW	**Nether Providence Township Recycling Center - Highway Yard**	Providence, PA	19.6	Yes	Yes - Permit by rule	6,000 cubic yards	N/A	Leaves, yard waste, brush, tree trimmings	No	Windrow and turn- brush, wood waste delivered to Mulch Express, Inc., Delaware County	Leaves	Yes, For end product only 2.5 cubic yards $65.00, 6 cubic yards $105.00 delivered. Self loading of material is free for residents	Only leaves	Compost	Self load to residents free, charge for delivery	Yes, 2.5 cubic yards 465.00, 6 cubic yards $105.00	No
YW, (Leaves only)	**East Norriton Twp. Norristown Farm Compost Site**	East Norristown, PA	19.8	Yes	Permit-by-rule	N/A	N/A	Leaves only	No	Windrow and turn		No	No delivery, just pickup	Compost	Pickup residents only	No	No
YW	**Upper Merion Township Compost Site**	Upper Merion, PA	20.2	Yes	Unknown	4,000 tons	N/A	Leaves, brush, tree trimmings, grass	No	Windrow and turn, grind brush and tree trimmings	Leaves, brush, tree trimmings, grass	$0.02 per pound Municipal $0.03 per pound Business	Only noted materials	Compost and mulch	Self load to residents free, charge	No	Undetermined
YW	**Plymouth Township Compost Site**	Plymouth, PA	20.5	Yes	Yes - Permit-by- rule	4,000 cubic yards	N/A	Leaves, brush, grass, tree trimmings	No	All materials processed using tub grinder and windrow and turn combined materials	Leaves, brush, grass, tree trimmings	Yes, mulch $30.00 pick up load	Only noted materials, no drop- off	Mulch	Self load is free to residents, $30.00 for up to five yards	Yes, $30.00 up to five yards, product free to contractors/landscapers if needed to clear site prior to fall collections	No

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Facility Type YW=yard waste SP = soil processor MO = mixed organics	**Name of Facility**	**Facility Location (town, state)**	**Approx. Driving Distance (miles) from Central Philadelphia (Mapquest)**	**Do You Own/ Operate A Compost Facility? (Y/N)**	**Do You Hold a Facility Permit? (Y/N) If yes, permit number/type**	**Current Permitted Capacity (or N/A)**	**Remaining Permitted Capacity (or N/A)**	**Materials Accepted (list)**	**Plans to Increase Capacity? (Y/N) If yes, describe**	**Processing/ Composting Description (brief)**	**Types of Material Accepted (list)**	**Charges for Materials Dropped Off or Received? (Y/N) If yes, please describe fee schedule**	**Delivery Restrictions/ Specs. on Material Received? (describe)**	**Final End-Product(s) Produced**	**Distribution of Finished Product (describe)**	**Charges for End-Product(s) Produced? (Y/N) If yes, please describe fee schedule**	**Would You Consider Accepting Large Quantities of New Organics Deliveries to Your Site? (Y/N) If yes, types and quantiles you could accept**
YW	**Springfield Township Compost Site**	Springfield, PA	20.7	Yes	Yes. Permit-by-rule	3,000 cubic yards	3,000 cubic yards	Leaves, brush	No	All materials processed using tub grinder and windrow and turn combined materials	Leaves, brush	No	No delivery	Mulch	Self load to residents	No	No
YW	**DCSWA Compost Farm**	Clifton Heights, PA	21.4	Yes	Yes - Permit-by rule	15,000 tons	10,000 tons	Leaves, yard waste, brush, tree trimmings	No	Windrow and turn, tub grinder for wood and brush	Leaves, yard waste, brush	Yes, drop off is municipal $32.00 per ton contractors $42.00 per ton, residents free	Only noted materials	Compost and mulch	Delivery for municipal, parks and gardens upon request. Municipalities pick-up material distribution at transfer station for residents free of charge	No	Yes, potential exists for delivery to transfer station
YW	**Valley Forge Fill Site**	Merion, PA	21.8	Yes	No, Processing facility only	N/A	Processor - grinding of material, fluctuates	Leaves, brush, tree limbs, stumps	No	Grind leaves, brush, tree limbs and stumps into mulch	Leaves, brush, tree limbs, stumps		Only noted materials	Mulch for soil amendment	Pickup at site by private and public sources		Yes
YW	**Radnor Township, Skunk Hollow site**	Radnor, PA	24.2	Yes	Yes, Permit-by-rule	8,000 cubic yards	N/A	Leaves, brush, tree trimmings	No	Windrow and turn leaves, grind brush and tree trimmings	Leaves, brush, tree trimmings	No	Only noted materials	Compost and mulch	Seven locations self-load compost, five locations self-load mulch	No	No
YW	**West Chester**	Chester, PA	24.8	Yes	Yes, Permit-by-rule	106 tons	N/A	Leaves, yard waste, brush tree trimmings and limited grass	No	Windrow and turn- leaves, grind brush and tree trimmings	Leaves, yard waste, brush tree trimmings and limited grass	No	No	Compost and mulch	Residents pickup/self- load , contracted compost site operator receives remaining product as per agreement	No	No
YW	**Warwick Green Grinders**	Warwick, PA	25.5	No	Unknown	N/A	Fluctuates - product in and out	Brush, tree trimmings, green wood waste	No	Processing, grind wood waste for production of mulch	Brush, tree trimmings and green wood waste	Yes - By vehicle size - 12 foot stake body - $20.00 Brush 14 foot - $25.00 16 foot - $30.00	No	Mulch used for decorative and soil amendment	Pickup at site	Natural mulch - $18.00 per yard, dried mulch $21.00 per yard	Yes, Brush , no quantities specified
YW, (Leaves only)	**Schuylkill Township Compost Site**	Schuylkill, PA	25.9	Yes	Yes, Permit-by-rule	N/A	N/A	Leaves	No	Windrow and turn leaves	Leaves	No	No, leaves only	Compost	Pickup at site, free to residents	No	No
WY	**Borough of Phoenixville**	Phoenixville, PA	26.7	Yes	Yes, Permit-by-rule	N/A	N/A	Leaves, brush	No	Grind leaves and brush. windrow and turn	Leaves, brush	No	Only noted materials	Mulch	Pickup at site, three yards of mulch free to residents	Yes, $16.00 per yard or to residents after initial 3 yards free	No
YW	**Lower Makefield Township Compost Site**	Lower Makefield, PA	28.3	Yes	Yes, Permit-by-rule	N/A	N/A	Leaves, Christmas trees	No	Grind leaves, windrow and turn	Leaves, Christmas trees	No	Leaves only	Mulch	Pickup only	No	No
YW	**Mascaro Composting**	Franconia, PA	28.5	Yes	Yes, Permit-by-rule	6,000 cubic yards	N/A	Leaves, yard waste, brush, tree trimmings	Not at present	Windrow and turn- leaves, grind- brush and tree trimmings	Leaves, yard waste, brush, tree trimmings	Not available	Only noted materials	Compost, mulch	By contracted operator	Yes, Fee schedule not available	Yes,Leaf and yard waste, depending on available capacity

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Appendix B-3

Facility Name, Type and Contact Info					Permitting Information					Technology	Details of Materials Received and Terms of Receipt			Final Product Distribution			Opportunities for Philadelphia
Facility Type YW=yard waste SP = soil processor MO = mixed organics	**Name of Facility**	**Facility Location (town, state)**	**Approx. Driving Distance (miles) from Central Philadelphia (Mapquest)**	**Do You Own/ Operate A Compost Facility? (Y/N)**	**Do You Hold a Facility Permit? (Y/N) If yes, permit number/type**	**Current Permitted Capacity (or N/A)**	**Remaining Permitted Capacity (or N/A)**	**Materials Accepted (list)**	**Plans to Increase Capacity? (Y/N) If yes, describe**	**Processing/ Composting Description (brief)**	**Types of Material Accepted (list)**	**Charges for Materials Dropped Off or Received? (Y/N) If yes, please describe fee schedule**	**Delivery Restrictions/ Specs. on Material Received? (describe)**	**Final End-Product(s) Produced**	**Distribution of Finished Product (describe)**	**Charges for End-Product(s) Produced? (Y/N) If yes, please describe fee schedule**	**Would You Consider Accepting Large Quantities of New Organics Deliveries to Your Site? (Y/N) If yes, types and quantiles you could accept**
YW	**Waste Management Warner East Compost**	Morrisville, PA	29.1	Yes	General permit	20,000 tons	N/A	Leaves, yard waste, grass (limited), tree trimmings, clean wood	possible-no timetable	Windrow and turn, horizontal grinders used for processing of green wood waste	Leaves, yard waste, grass (limited), tree trimmings, clean wood	Yes, Fee schedule was not provided	Only noted materials	Compost, mulch	Handled by contracted operator - L & S Contractors, materials sold at site and delivered	Yes, Fee schedule not provided	Yes, Leaf and yard waste depending on available capacity
YW	**East Pikeland Township Compost Site**	East Pikeland, PA	30.6	Yes	Yes, Permit-by-rule	2,500 cubic yards	N/A	Leaves, grass, brush, Christmas trees, tree trimmings	Yes	Windrow and turn	Leaves and grass, brush and tree trimmings	No	Only noted materials	Mulch	Pickup, self load for residents only, and delivery	Yes, Self load for residents - no charge, four yards of mulch, $50.00 for residents only	No
YW, SP	**Barnside Farm**	Schwenksville, PA	32.6	Yes	Yes, Permit-by-rule	10,000 cubic yards	5,000 cubic yards	Leaves, grass, sod, manure, yard waste, brush, tree trimmings and stumps	Yes, To the extent pratical, based on demand for services and products	Windrow and turn- leaves, grind- brush and tree trimmings	Leaves,grass, sod, manure, yard waste, tree trimmings and stumps	Yes, On site scale, per ton fee. Leaves - $24.00 ($10.00 minimum fee trucks, $5.00 car) Yard waste - $40.00 ($20.00 minimum fee) Mixed load - $40.00 ($25.00 minimum fee) Fill dirt - Pending truck size $55.00 - $75.00 per load Sod and top soil - Free with no red color Stumps - $100.00 per ton Mixed load (stumps	Only noted materials	Compost, mulch, topsoil	Pickup at site or delivered	Yes, By the cubic yard Compost - $32.00 Mulch - $28.00 Top soil - .$30.00	Yes, Depending on available capacity

Alternative Resources, Inc.

Corporate Headquarters

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Concord, MA 01742
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www.alt-res.com

MEMORANDUM

1819 Task 2

TO: MSW Consultants, LLC

FROM: Alternative Resources, Inc.

DATE: June 29, 2016

SUBJECT: **Assessment of Food Waste Co-Digestion and Delivery Options**

ARI has prepared this memorandum to assess the City Water Department's ability to accept food waste at water pollution control plants (WPCP's) for processing in anaerobic digesters. The memorandum also provides additional analysis of potential food waste delivery options to the WPCP's by in-sink food grinders and by curbside or roll-off collection.

Co-Digestion at WPCP's

A 2014 report issued by the USEPA ("Food Waste to Energy: How Six Water Resource Recovery Facilities are Boosting Biogas Production and the Bottom Line") profiled the experience with co-digestion at the following WPCP's:

- Central Marin Sanitation Agency (San Rafael, California);
- East Bay Municipal Utilities Authority (San Francisco, California);
- Hill Canyon Wastewater Treatment Plant (Thousand Oaks, California);
- Sheboygan Regional Wastewater Treatment Plant (Wisconsin);
- West Lafayette Wastewater Treatment Utility (Indiana); and
- Janesville Wastewater Treatment Facility (Wisconsin).

Feedstock for the co-digestion process at these plants ranged from fats, oils, and grease (FOG), various sources of post-consumer commercial waste, and chocolate waste Pre-processing steps to prepare feedstock for anaerobic digestion varied among the plants and feedstock source including such activities as removal of large objects and metal, sorting, and grinding. The anaerobic digester capacity at these facilities ranges from 1 to 22 million gallons per day. Survey results provided by the facilities indicated that estimated pay-back periods ranged from 0-12 years considering required capital investment, revenue from tipping fees, energy-derived savings, and funding assistance. Overall, the report noted that

addition of food waste for co-digestion is receiving increased attention and is becoming more common.

The Philadelphia Water Department (PWD) operates three WPCP's in the City. Biosolids generated by the WPCP's are processed at a Biosolids Recycling Center (BRC). At the BRC, the biosolids are dewatered, dried and pelletized. The resulting product, Philadelphia Renewable Bio-Fuel (PRBF), is marketed as a fuel source for cement manufacturers and for agricultural uses.

Anaerobic digestion capacity is available at two of the WPCPs, Northeast and Southwest. AD capacity at the Northeast WPCP is equivalent to 16 million gallons of capacity. Gas containing 63% methane generated in the digesters is stored, purified (hydrogen sulfide removal), compressed, further purified (siloxane removal) and used to fuel four gas engine-generators each producing approximately 1.4 MW of electricity.

AD capacity at the Southwest WPCP is equivalent to 24 million gallons of capacity. Biogas generated at the Southwest WPCP is primarily used for space heating and to maintain temperature within the AD system. Excess digester gas is delivered by pipeline to the BRC for use in the drying process.

PWD has been accepting aircraft deicer fluid from the Philadelphia International Airport for co-digestion at the Southwest WPCP since 2008. PWD is now actively investigating anaerobic digestion of food waste at their existing WPCP's.

Food Waste Delivery Options

Food Grinders

In 2012 and 2013, the City of Philadelphia collaborated with InSinkErator® on a demonstration project to gather information on the use of garbage disposers in residential homes to reduce the amount of solid waste disposed and to increase the amount of organic waste sent to the City's WPCP's. The demonstration project involved the installation of food waste disposers in selected homes in two neighborhoods in Philadelphia. Community education events were conducted to encourage the residents to use the food waste disposers effectively.

In order to measure the reduction in food waste, conventional waste composition audits were conducted. Audits were conducted prior to the installation of the food waste disposers, and, for comparison purposes, approximately one year after the installation of the food waste disposers. A baseline audit was conducted of homes in the targeted neighborhoods and a final audit was conducted only for the homes with the food waste disposers installed.

At the completion of the study, a survey of the residents indicated that a significant majority reported a reduction in the amount of garbage thrown away on a weekly basis and use of

the food disposers for food scraps. The results of the waste composition audits revealed that the weight of the food waste in garbage was reduced by approximately one-third.

The study noted that in addition to increased biogas production by PWD, a reduction in disposal of residential food waste by 19,000 tons annually and a corresponding reduction in waste disposal fees of $1.1 million annually could be achieved if waste disposers were utilized in homes and apartments throughout the City similar to the target areas. In December 2015, the City enacted an ordinance amending the Philadelphia Building Code to require that in-sink food disposers be installed as part of issuance of building permits for new residential construction.

Curbside or Roll-off Collection

PWD indicates that space is not available at the WPCP's to locate pre-processing equipment for curbside or roll-off collection of food waste and this required step would need to be accomplished off-site for this delivery option. PWD has conducted a survey and preliminary analysis of a range of potential pre-processing systems.

Specialized and proprietary equipment and systems are becoming available for pre-processing source separated food waste including DODA technology, an organic extraction press (OREX™) and other technologies from Anaergia, and a Centralized Organic Recycling equipment (CORe®) process from Waste Management.

DODA

DODA offers organic waste solutions by manufacturing a variety of products for municipal solid waste and other applications. These products include bio-separators anaerobic digester mixers, rotary sludge thickeners, centrifugal chopper pumps, screw separators, and roller separators.

Anaergia

The Anaergia Organics Extraction (OREX) technology features a hydraulic press for separation of waste into biogenic and non-organic fractions and an organics polishing system for removal of plastic film and grit. Anaergia also offers retrofit technology (Omnivore™) consisting of high solids mixers and recuperative or pre-thickening systems for existing anaerobic digesters to increase capacity.

Waste Management

Waste Management's proprietary and patent pending Centralized Organic Recycling equipment (CORe®) process produces an Engineered BioSlurry A bioseparator separates organic source material from inorganic waste (plastic, packaging etc.)

A literature survey was performed but did not provide any publicly available information on the costs associated with pre-processing for co-digestion. Costs would depend on the characteristics of feedstock, types of contaminants, and contaminant levels, among other factors.

After preprocessing, slurry can be delivered to an existing WPCP by tanker truck. Receiving and, if necessary, storage provisions for the slurry would need to be made available at the WPCP site. An organics collection analysis will be performed as part of the Organics Feasibility Study to analyze infrastructure changes needed to facilitate organics collection in the City for the preferred processing system(s).

The Effect of Food Waste on Nitrogen Levels

The potential impact of increased nitrogen loading to WPCPs from food waste processing is being researched by PWD and is recognized as an important concept that requires further analysis.

APPENDIX C

Section 5 Supporting Information

PNDI Query Fairmont Park Og. Recycling Center Results

PADEP WMGM030 Guidelines

PNDI Query NE Phila Maint Shop Site

PWD AD Capacity RFI Response Summary

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1. PROJECT INFORMATION

Project Name: **Fairmont Park Organics Composting Facility**
Date of Review: **3/5/2018 12:04:19 PM**
Project Category: **Waste Transfer, Treatment, and Disposal, Solid waste disposal, Recycling facility**
Project Area: **13.33 acres**
County(s): **Philadelphia**
Township/Municipality(s): **PHILADELPHIA**
ZIP Code: **19131**
Quadrangle Name(s): **PHILADELPHIA**
Watersheds HUC 8: **Schuylkill**
Watersheds HUC 12: **City of Philadelphia-Schuylkill River**
Decimal Degrees: **39.994235, -75.201170**
Degrees Minutes Seconds: **39° 59' 39.2457" N, 75° 12' 4.2136" W**

2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate no known impacts to threatened and endangered species and/or special concern species and resources within the project area. Therefore, based on the information you provided, no further coordination is required with the jurisdictional agencies. This response does not reflect potential agency concerns regarding impacts to other ecological resources, such as wetlands.

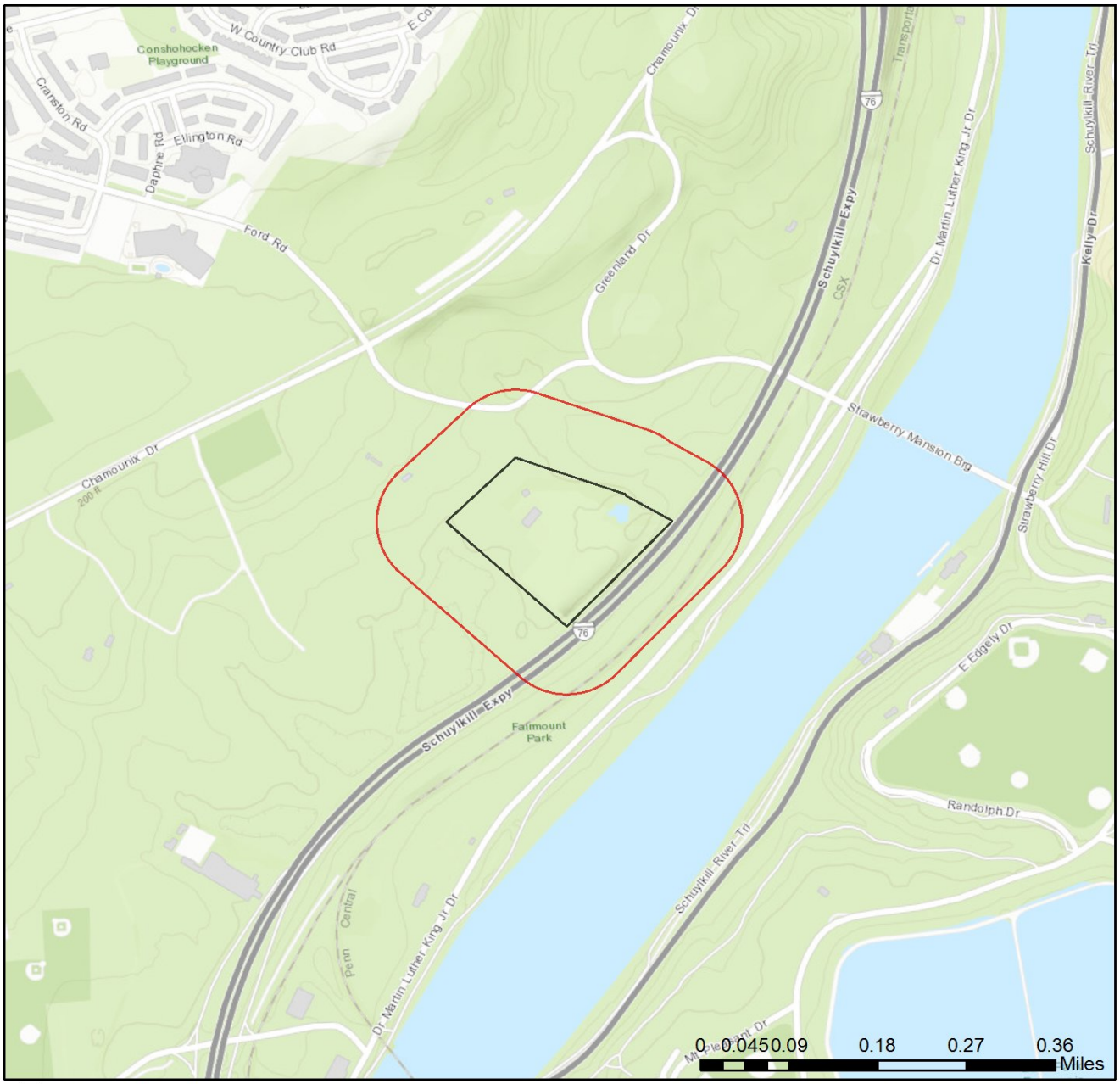
Fairmont Park Organics Composting Facility

Project Boundary

Buffered Project Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community

Fairmont Park Organics Composting Facility



Project Boundary

Buffered Project Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,

RESPONSE TO QUESTION(S) ASKED

Q1: Accurately describe what is known about wetland presence in the project area or on the land parcel. "Project" includes all features of the project (including buildings, roads, utility lines, outfall and intake structures, wells, stormwater retention/detention basins, parking lots, driveways, lawns, etc.), as well as all associated impacts (e.g., temporary staging areas, work areas, temporary road crossings, areas subject to grading or clearing, etc.). Include all areas that will be permanently or temporarily affected -- either directly or indirectly -- by any type of disturbance (e.g., land clearing, grading, tree removal, flooding, etc.). Land parcel = the lot(s) on which some type of project(s) or activity(s) are proposed to occur.
Your answer is: The entire project will occur in or on an existing building, parking lot, driveway, road, road shoulder, street, runway, paved area, or railroad bed.

Q2: Aquatic habitat (stream, river, lake, pond, etc.) is located on or adjacent to the subject property and project activities (including discharge) may occur within 300 feet of these habitats?
Your answer is: No

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission
RESPONSE:
No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources
RESPONSE:
No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Fish and Boat Commission
RESPONSE:
No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

U.S. Fish and Wildlife Service
RESPONSE:
No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq. is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. Two review options are available to permit applicants for handling PNDI coordination in conjunction with DEP's permit review process involving either T&E Species or species of special concern. Under sequential review, the permit applicant performs a PNDI screening and completes all coordination with the appropriate jurisdictional agencies prior to submitting the permit application. The applicant will include with its application, both a PNDI receipt and/or a clearance letter from the jurisdictional agency if the PNDI Receipt shows a Potential Impact to a species or the applicant chooses to obtain letters directly from the jurisdictional agencies. Under concurrent review, DEP, where feasible, will allow technical review of the permit to occur concurrently with the T&E species consultation with the jurisdictional agency. The applicant must still supply a copy of the PNDI Receipt with its permit application. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. The applicant and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at https://conservationexplorer.dcnr.pa.gov/content/resources.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a preliminary screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources
Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552
Harrisburg, PA 17105-8552
Email: RA-HeritageReview@pa.gov

U.S. Fish and Wildlife Service
Pennsylvania Field Office
Endangered Species Section
110 Radnor Rd; Suite 101
State College, PA 16801
NO Faxes Please

PA Fish and Boat Commission
Division of Environmental Services
595 E. Rolling Ridge Dr., Bellefonte, PA 16823
Email: RA-FBPACENOTIFY@pa.gov

PA Game Commission
Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA 17110-9797
Email: RA-PGC_PNDI@pa.gov
NO Faxes Please

7. PROJECT CONTACT INFORMATION

Name:_____
Company/Business Name:_____
Address:_____
City, State, Zip:_____
Phone:(_____)_____Fax:(_____)_____
Email:_____

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

_____ _____
applicant/project proponent signature date

SPECIAL CONDITIONS
GENERAL PERMIT WMGM030

I. AUTHORIZATION

The approval herein granted is limited to the composting of yard waste and beneficial use of the compost so produced at compost sites. The waste streams accepted for composting shall be non-liquid waste[1] and limited to the following categories of municipal waste: yard waste, leaf waste, grass clippings, garden residue, tree trimmings, chipped shrubbery and other vegetative material. The beneficial uses of the finished compost approved in this permit are for the marketing or distribution as soil substitute, soil conditioner, soil amendment, fertilizer, or mulch.

1. Yard waste composting facilities under 5 acres are exempt from this general permit if they are eligible for operation under the permit by rule permit provisions of 25 Pa. Code Section 271.103(a-c) & (h).

2. Approval to operate under this permit is limited to composting facilities which do not exceed fifteen (15) acres. The composting facility shall include all raw materials and waste storage areas, support structures to include buildings, access roads, stormwater devices, the composting and curing areas, and the finished compost storage area (other than areas storing bagged product for retail sales).

II. GENERAL REQUIREMENTS

1. Storage of incoming yard waste, curing materials, building materials and finished compost shall be consistent with Storage Requirements - Chapter 285 of the municipal waste regulations.

2. A person, municipality, or county operating a yard waste composting facility shall, for the duration of yard waste composting activities, identify the operation by posting and maintaining signs that are clearly visible at the junction of each access road and public road. The signs shall be easily seen and read. They should be constructed of a durable, weather-resistant material. The sign wording shall include the name, address, and telephone number of the person(s), municipality (ies), or county (ies) operating the facility, the operating hours, and the materials that can be received by the facility.

3. Nothing in this permit shall be construed to supersede, amend or authorize a violation of any of the provisions of any valid and applicable local law, ordinance, or regulation, providing that said local law, ordinance, or regulation is not preempted by the Solid Waste Management Act, 35 PS §6018.101 et seq.; and the Municipal Waste Planning, Recycling and Waste reduction Act of 1988, 53 P.S. §4000.101 etseq.

4. As a condition of this permit and the permittee's authority to conduct the activities authorized by this permit, the permittee hereby authorizes and consents to allow authorized employees or agents of the Department, without advance notice or search

[1] EPA method 9095 (paint filter liquid test) as described in the EPA Publication No. SW-846

warrant, upon presentation of appropriate credentials and without delay, to have access to and to inspect all areas on which solid waste management activities are being, will be, or have been conducted. This authorization and consent shall include consent to collect samples of waste, soils, water, or gases; to take photographs; to perform measurements, surveys, and other tests; and to inspect and/or copy documents, books, and papers required by the Department to be maintained. This permit condition is referenced in accordance with Sections 6018.608 and 6018.610(7). This condition in no way limits any other powers granted under the Solid Waste Management Act.

5. Failure of the measures herein approved to perform as intended, or as designed, or in compliance with the applicable laws, rules and regulations, and terms and conditions of this permit, for any reason, shall be grounds for the revocation or suspension of the permittee's approval to operate under this permit.

6. The activities authorized by this permit shall not harm or present a threat of harm to the health, safety, or welfare of the people or environment of this Commonwealth. The Department may modify, suspend, revoke or reissue the authorization granted in this permit if it deems necessary to prevent harm or the threat of harm to the public health, the environment, or if the activities cannot be adequately regulated under the conditions of this permit.

7. Any person that operates under the provisions of this permit shall immediately notify, in writing, the waste program operations manager of the appropriate regional office of the Department (address in attached list) of any changes in: the name, address, owners, operators, and/or responsible officials of the company; the generator(s) of the waste; the status of any permit issued by the state or federal government under the environmental protection acts; and the land ownership and the right to enter and operate on the land where the facility is located.

8. The permittee shall comply with the terms and conditions of this general permit and with the environmental protection acts to the same extent as if the activities were covered by an individual permit. The Department may require the permittee to apply for, and obtain, and individual permit or cease operation if the permittee is not in compliance with the conditions of this general permit or is conducting an activity that harms or presents a threat of harm to the health, safety or welfare of the people or the environment.

9. Upon cessation of operations at the composting facilities, the operator shall remove any yard waste and structures or other materials which contain or have been contaminated with other waste and shall provide for the processing and disposal of the waste or material in accordance with the Solid Waste Management Act, the environmental protection acts and the regulations promulgated hereunder.

10. Any waste generated from the composting process shall be managed in accordance with the solid Waste management Act of July 7, 1980, as amended, P.L. 380, No. 97, 35 P.S. §§ 6018,101 et seq. And the regulations promulgated hereunder.

11. All activities conducted under the authorization granted in this permit shall be conducted in accordance with the permittee's application. Except to the extent that the permit states otherwise, the permittee shall operate as described in the approved application.

12. Each permitted facility operating under this general permit must have a certified compost operator on staff. This certification can be the Compost Specialization Certificate from the Professional Recyclers of Pennsylvania (PROP), or other Dep approved certification courses.

III. SUBMISSION OF APPLICATION

1. Persons or municipalities that propose to operate under the terms and conditions of this general permit after the date of permit issuance must obtain a "Determination of Applicability" from the **Department's Central Office.** No activities shall commence unless specifically authorized in writing by the Department.

   At a minimum, the following information must be provided on forms available from the Department's Bureau of land Recycling and Waste management:

   a. Name, address and telephone number of the applicant;

   c. A description of yard waste types to be composted;

   d. Number and title of the general permit;

   e. The location of the compost facility, including identification of the site by outlying perimeter site boundaries on a United States Geological survey 7½ minute topographic map;

   f. A separate map of a general site plan drawn to scale of 1 inch equals 400' for the facility indicating the following:

      1. The location of access roads and gates in relation to public and private roads, wells, and property lines.

      2. The location of the tipping area.

      3. The location of the processing area, including compost piles and windrows.

      4. The location of storage and curing areas.

5. Surface water controls.

6. All support structures associated with the operation

7. The operational narrative shall describe the following:

   a. The yard waste collection methods.

   b. The methods that will be utilized at the facility to construct compost piles.

   c. The proposed dimensions of compost piles and windrows at the facility;

   d. The source of supplemental water that will be used to maintain an optimal 50 percent moisture content of compost piles or windrows at the facility.

   e. The proposed method of turning windrows, the turning frequency for composting at the facility and the method for determining that frequency.

   f. The proposed duration of the composting process, including curing time, storage time, and the proposed term of compost distribution.

   g. A plan for the marketing and distribution of the finished compost.

   h. A residue disposal plan including the location of disposal sites.

   i. Provisions for emergency response.

   j. A public information and education program

   k. The projected volume of material that will be process by the facility during the calendar year.

   l. A description of how leachate is generated and collected will be managed.

   m. Proof that waste and waste management activities are consistent with the general permit.

   n. Signed and notarized statement by the person who seeks "Determination of applicability" to accept all conditions and operate under the terms and conditions of this general permit.

   o. An application fee in the amount of $500, payable to the "Commonwealth of Pennsylvania".

   p. Proof that copies of the Determination of Applicability application have been submitted to each municipality, county, county planning agency, and

county health department, if one exists, in which composting activities are or will be located.

q. Proof that the applicant has legal right to enter the land and perform the composting facility activities approved under this permit.

r. A Preparedness, Prevention and Contingency (PPC) Plan prepared in accordance with the most recent edition of the Department's, " Guidelines for the Development and Implementation of Environmental Emergency Response Plans".

r. An irrevocable written consent from the landowner giving the Department permission to enter upon land where the applicant will be conducting waste management activities.

s. Information that identifies the applicant (i.e. individual, corporation, partnership, government agency, association, etc.) and related parties, including the names and addresses of every officer who has a financial interest in or controls the facility operation.

t. A list of all-previous permits or licenses issued to the applicant or related parties by the Department or federal government under the environmental protection acts; the dates issued status and compliance history concerning environmental protection acts.

u. Proof that any independent contractors retained by the applicant to perform any activities authorized under this permit are in compliance with state and federal laws and regulations relating to environmental protection.

v. For compost facilities operating under this general permit other than a municipal compost facility, a financial bond is **required** guaranteeing the operation of the entire facility.

w. Storm Water Management Control Plan to address on-site runoff and leachate management at the facility must be submitted as part of this application.

x. A description of the method used to maintain the optimal moisture and oxygen level of the windrows and temperatures of the piles or windrows in the production of mulch and compost.

IV. SITING REQUIREMENTS

1. Areas at the permitted facility where incoming materials or waste and finished compost are stored, composted, or cured shall not be located:

a. In or below the 100-year floodplain of waters of this Commonwealth;

b. In or within 300 feet of an exceptional value wetland;

c. In or within 100 feet of a wetland other than an exceptional value wetland;

d. Within 100 feet of a sinkhole or area draining into a sinkhole;

e. Within 300 feet measured horizontally-from an occupied dwelling unless the owner has provided a written waiver consenting to the facility being closer than 300 feet;

f. Within 50 feet of a property line unless the owner has provided a written waiver consenting to the facility being closer than 50 feet;

g. Within 100 feet of a perennial stream;

h. Within 300 feet of a water source unless the owner has provided a written waiver consenting to the facility being closer than 300 feet; or

i. Within 3.3 feet of the regional groundwater table;

j. Within **900 feet** of the following, if existing prior to the date the Department received an administratively complete application, unless a written waiver is obtained from the current property owner of:

   1. A building owned by a school district or parochial school and used for instructional purposes.

   2. A park.

   3. A playground.

V. OPERATIONAL REQUIREMENTS

1. Windrows (yard waste compost piles or windrows) shall be constructed and maintained as follows:

   a. The compost area shall be constructed in a well-drained area with a workable surface and sloped to prevent ponding and to direct and control surface water. The windrows shall be placed to promote drainage away from the windrows.

   b. The size of the compost piles or windrows should not exceed eight feet in height or sixteen feet in width unless the composting technology and or equipment can adequately manage the compost piles, and is approved by the Department.

c. Compost piles or windrows shall be constructed within one week following receipt of organic waste materials at the facility.

d. The facility shall provide adequate space to be maintained between the aerated piles, static piles or windrows to allow the unobstructive movement of emergency personnel and equipment unless other configurations are approved by the Department.

e. During the active composting process, the optimal moisture content of the windrows or compost piles shall range from 40 to 65 percent and the oxygen level during the composting process shall be maintained at a level greater than 5%.

f. Incoming materials or waste, active compost, curing materials and finished compost shall be stored in a manner that prevents harborage or breeding of vectors or creation of odor, litter and other nuisances which may be harmful to public health, public safety or the environment. Storage shall be in a manner that prevents dispersal of waste or compost by wind or water erosion or a risk of fire or explosion. Waste may not be stored in a manner that causes groundwater contamination.

g. The operators shall maintain records to demonstrate that all compost produced by the facility meets the time/temperature standards of **45C – 65C (113F – 140F) for at least 72 consecutive hours.**

h. To promote decomposition, compost piles and windrows shall be turned and reconstructed at least once every three (3) months. A higher turning frequency may be required, depending on the composting technology unless the composting technology requires more intensive management.

VI. Compost Pad Construction

1. The working surface (i.e. processing and storage areas) of the compost should be firm, uniformly graded, dry and as follows:

   a. A compacted mixture of soil or soil like material of at least four feet thick, or select granular material with adequate of fine grained particles to bind it together and provide a stable working surface.

   b. The pad shall be constructed to allow for operations to continue during all types seasonal weather conditions.

   c. The pad shall be constructed to promote the direction of leachate into the leachate management system.

d. The pad shall be accessible at all times for inspection purposes to evaluate the condition of the pad and shall be made of a material that is repairable if damage is incurred during operations.

VII. Stormwater Management

1. Stormwater runoff at the facility should be diverted away from the processing area, tipping, staging, curing and storage areas of the compost material. Surface water controls shall be based on a 24-hour precipitation event to be expected every 25 years. Proper drainage controls such as diversions, dikes and drains must be constructed and maintained to prevent ponding and excessive wetting.

2. Runoff from the from the processing, tipping, staging, curing and storage areas of the compost material , finished mulch material, and finished compost storage areas shall not cause surface water pollution or groundwater degradation and shall be managed in accordance with The Clean Streams Law and regulations promulgated hereunder.

3. Storm water runoff shall be directed to a properly sized vegetated filter area for treatment.

VIII. Air Quality

1. No person, municipality, or count shall cause or allow open burning at the facility.

2. Based on the facility composting volume capacity, the composting facility may be subject to the plan approval and operating requirements of 25 Pa. Code Chapter 127. If plan approval is required, the permittee may not construct, assemble, install, or modify the facility prior to obtaining a plan approval from the Department's Bureau of Air Quality.

IX. Waste Management

1. The operator shall not allow non-combustible residues or solid waste other than yard waste to accumulate at the facility, and shall provide for proper disposal or processing. The operator shall submit a waste management plan addressing the disposal options selected. Yard waste and other municipal waste received at the facility that are not suitable for composting shall be removed weekly and disposed or processed at a permitted municipal waste facility.

2. Plastic bags, food waste, food processing sludge, spent mushroom substrate, manure, dewatered dredge waste, non-compostable residues, waste materials not identified in Condition 1 above, etc., are not authorized under this general permit.

3. Rejected and other wastes, that are not authorized under this general permit, shall be separated from the incoming waste materials intended for beneficial use in the production of compost material.

X. Storage

1. Incoming materials , active compost, curing materials, and finished compost shall be stored in a manner that prevents harborage or breeding of vectors or creation of odor, litter and other nuisances which may be harmful to public health, safety, welfare, or the environment. Storage shall be in a manner that prevents dispersal of incoming materials or compost by wind or water erosion or prevents a risk of fire or explosion.

2. Storage of incoming yard waste, curing materials, building materials and finished compost shall be consistent with Storage Requirements - Chapter 285 of the municipal waste regulations

XI. Erosion and Sedimentation Controls

1. Surface water management and erosion/sedimentation control shall be provided during all phases of construction and operation of the facility, to meet applicable requirements of 25 Pa. Code, Chapter 102 (relating to erosion control). In addition, a storm water management system shall be designed to meet federal and state storm water regulations and managed accordingly. Surface water controls shall be based on the most significant 24-hour precipitation event to occur based on a once in 25 years frequency. The application must contain an approved County Conservation Erosion and Sedimentation control plan.

XII. Feedstock Requirements

1. The operator shall establish a plan for monitoring at an adequate frequency for inspecting the facility to detect hot spots in any composting, curing or storage areas, dust or litter accumulation, surface water accumulation, erosion or sedimentation, vectors, odors, and other problems. The operator shall take prompt, necessary corrective actions to preclude combustion.

2. The Department may prohibit the use of grass clippings at a yard waste composting facility if the grass clippings cause or contribute to nuisances, or if the site is adversely affecting, or has potential to adversely affect, the citizens or environment of the commonwealth. Grass clippings shall not be brought to or received at a yard waste composting facility unless:

    a. Grass clippings delivered to the yard waste composting facility in non-compostable bulk, bags or other collection containers are emptied of all grass clippings.

    b. Grass clippings are incorporated into the windrows of partially composted leaves or other yard waste within twenty-four (24) hours of delivery to the facility.

c. Grass clippings are incorporated into the partially composted windrows of partially composted leaves or other yard waste at a ration not to exceed one part grass to 3 parts leaves or active compost or other carbon source.

d. Plastic bags are not approved to be accepted for processing, only decomposable or Kraft style paper bags are approved to be accepted for processing.

3. The access road to the facility shall be paved or surfaced with asphalt, gravel, and cinder or equivalent material and be capable of withstanding the load limits. The access road shall be maintained to control dust and to prevent or control the tracking of mud onsite or offsite.

4. Each yard waste composting facility shall be operated in a manner, which results in the active biological decomposition of the yardwaste material received.

XIII. RECORD KEEPING

1. The operator shall maintain records to demonstrate that all compost produced by the facility has achieved the thermophillic stage. Records of the weights or volumes and types of incoming yard waste; finished compost shall be maintained on the premises or at another location with the approval of the Department for at least 5 years. These records shall be made available for inspection by the Department staff upon request. The records shall contain: the date of receipt and quantity of incoming materials processed at the site. In addition the following must also be recorded: composting temperatures, and turning frequencies

2. Persons operating under the provisions of this general permit must submit to the appropriate regional waste program of the Department (address in attached list) a summary of volumes of yard waste received at the facility and of compost generated and distributed annually. The annual report is due on March 1st of each year.

3. A copy of a Preparedness, Prevention and Contingency Plan (PPC), that is consistent with the Department's most recent guidelines, "Guidelines for the Development and Implementation of Environmental Emergency Response Plans" shall be maintained at each composting facility and updated at least every 3 years or sooner if information changes. The permittee shall immediately implement the applicable provisions of the Department approved PPC plan for any emergency that affects or threatens public health, safety, welfare, or the environment.

4. The permittee shall maintain records of rejected, unacceptable and unauthorized wastes that are disposed by the permittee. The records shall include the name and address of the disposal location, date of disposal, type of waste volume or weight of the waste that is disposed.

5. The permittee shall maintain records of volume or weight of the finished compost materials that are generated, sold, given away and stored on site.

XIV. FINISHED COMPOST SPECIFICATIONS

1. The beneficial uses of the compost, as listed in condition 1 above, are contingent upon compliance with this permit and if sold, the *Pennsylvania Fertilizer, Soil Conditioner and Plant Growth Substance law* of the Pennsylvania Department of Agriculture. Information related to this law and the necessary registration, labeling, marketing, and other related requirements can be obtained from the Department of Agriculture by writing to the *Bureau of Plant Industry, Division of Agronomic Services, 230 North Cameron Street, Harrisburg, PA 17110-9408.*

2. The finished compost generated under the terms and conditions of this general permit shall cease to be waste when the compost:

   a. Is used, sold, or distributed as soil substitute, soil conditioner, soil amendment, fertilizer, or mulch for landscaping applications or composting; this provision applies to the finished mulch material or finished compost that is sold, traded, distributed, given away or used for landscaping applications or composting locations other than the processing facility where the material is produced

   b. Does not present a greater harm or threat of harm than the use of products which the compost is replacing; and

   c. Is not abandoned or disposed.

XV. NUISANCE CONTROL

1. The operator shall not cause or allow the attraction, harborage or breeding of vectors

2. The operator shall not cause or allow conditions that are harmful to the environment or public health or which create safety hazards, odors, noise or other public nuisances

SPECIAL CONDITIONS
GENERAL PERMIT WMGM030

DEFINITIONS

"Composting"

The process by which organic solid waste is biologically decomposed under a controlled anaerobic or aerobic to yield a humus-like product.

"Composting Facility"

A facility for processing solid waste by composting.

"Composting Pad"

An area within a composting facility where compost or solid waste is processed, stored, loaded or unloaded.

"General Permit"

Except as provided in Subchapter J (relating to beneficial use of sewage sludge by land application), a regional or Statewide permit issued by the Department for a specified category of beneficial use or processing of solid waste, the terms and conditions of which allow an original applicant, a registrant and a person or municipality that obtains a determination of applicability, to operate under the permit if the terms and conditions of the permit and certain requirements of this article are met.

"Landowner"

The person or municipality in whom legal title to the surface of the land is vested.

"Leaf Waste"

Leaves, garden residues, shrubbery and tree trimmings, and similar material, but not including grass clippings.

"Non-Liquid Waste"

Wastes that do not pass the paint filter liquid test (EPA Method 9095) as described in the EPA Publication No. SW-846.

"Permit Area"

The area of land and water within the boundaries of the permit, which is designated on the permit application maps as approved by the Department. The term includes areas which are or will be used or affected by the residual waste processing or disposal facility.

"Source Separated Recyclable Materials"

Materials that are separated from municipal waste at the point of origin for the purpose of recycling. The term is limited to clear glass, colored glass, aluminum, steel and bimetallic cans, high-grade office paper, newsprint, corrugated paper (cardboard), plastics and other marketable grades of paper.

"Source Separated Food Scraps"

Pre-consumer food wastes that are separated from municipal waste at the point of origin for the purpose of recycling and composting.

"Storage"

The containment of waste on a temporary basis in a manner that does not constitute disposal of the waste. It shall be presumed that containment of waste in excess of 1 year constitutes disposal. This presumption can be overcome by clear and convincing evidence to the contrary.

"Yard Waste"

Leaves, grass clippings, garden residue, tree trimmings, chipped shrubbery and other vegetative material.

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1. PROJECT INFORMATION

Project Name: **PPR NE Phila Maint. Shop Organics Composting**
Date of Review: **3/5/2018 11:46:42 AM**
Project Category: **Waste Transfer, Treatment, and Disposal, Solid waste disposal, Recycling facility**
Project Area: **10.45 acres**
County(s): **Philadelphia**
Township/Municipality(s): **PHILADELPHIA**
ZIP Code: **19115**
Quadrangle Name(s): **FRANKFORD**
Watersheds HUC 8: **Lower Delaware**
Watersheds HUC 12: **Lower Pennypack Creek**
Decimal Degrees: **40.077943, -75.059700**
Degrees Minutes Seconds: **40° 4' 40.5946" N, 75° 3' 34.9214" W**

This is a draft receipt for information only. It has not been submitted to jurisdictional agencies for review.

2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	No Known Impact	No Further Review Required
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

NON-OFFICIAL DRAFT USE

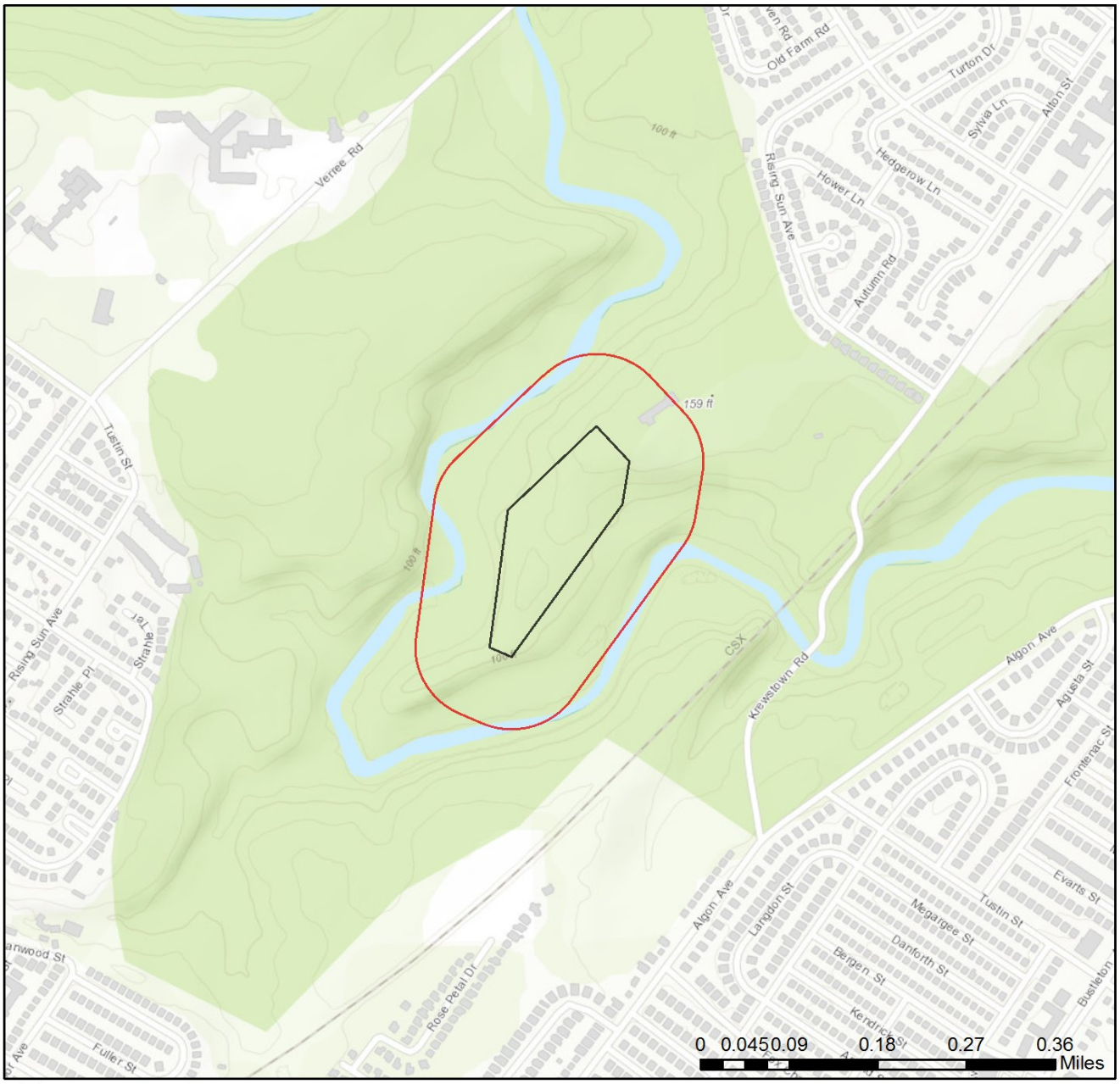
PPR NE Phila Maint. Shop Organics Composting

Project Boundary

Buffered Project Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community

PPR NE Phila Maint. Shop Organics Composting



Project Boundary

Buffered Project Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,

RESPONSE TO QUESTION(S) ASKED

Q1: Accurately describe what is known about wetland presence in the project area or on the land parcel. "Project" includes all features of the project (including buildings, roads, utility lines, outfall and intake structures, wells, stormwater retention/detention basins, parking lots, driveways, lawns, etc.), as well as all associated impacts (e.g., temporary staging areas, work areas, temporary road crossings, areas subject to grading or clearing, etc.). Include all areas that will be permanently or temporarily affected -- either directly or indirectly -- by any type of disturbance (e.g., land clearing, grading, tree removal, flooding, etc.). Land parcel = the lot(s) on which some type of project(s) or activity(s) are proposed to occur.
Your answer is: The project area (or land parcel) has not been investigated by someone qualified to identify and delineate wetlands, or it is currently unknown if the project or project activities will affect wetlands.

Q2: Aquatic habitat (stream, river, lake, pond, etc.) is located on or adjacent to the subject property and project activities (including discharge) may occur within 300 feet of these habitats?
Your answer is: No

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission
RESPONSE:
No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Department of Conservation and Natural Resources
RESPONSE:
No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Fish and Boat Commission
RESPONSE:
Further review of this project is necessary to resolve the potential impact(s). Please send project information to this agency for review (see WHAT TO SEND).

PFBC Species: (Note: The Pennsylvania Conservation Explorer tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)

Scientific Name	Common Name	Current Status
Sensitive Species**		Threatened

U.S. Fish and Wildlife Service
RESPONSE:

No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq. is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other authorities.

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictional agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, upload* or email* the following information to the agency(s). Instructions for uploading project materials can be found here. This option provides the applicant with the convenience of sending project materials to a single location accessible to all three state agencies. Alternatively, applicants may email or mail their project materials (see AGENCY CONTACT INFORMATION).
***Note:** U.S.Fish and Wildlife Service requires applicants to mail project materials to the USFWS PA field office (see AGENCY CONTACT INFORMATION). USFWS will not accept project materials submitted electronically (by upload or email).

Check-list of Minimum Materials to be submitted:
____Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
____A map with the project boundary and/or a basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
In addition to the materials listed above, USFWS REQUIRES the following
____**SIGNED** copy of a Final Project Environmental Review Receipt

The inclusion of the following information may expedite the review process.
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams.

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. Two review options are available to permit applicants for handling PNDI coordination in conjunction with DEP's permit review process involving either T&E Species or species of special concern. Under sequential review, the permit applicant performs a PNDI screening and completes all coordination with the appropriate jurisdictional agencies prior to submitting the permit application. The applicant will include with its application, both a PNDI receipt and/or a clearance letter from the jurisdictional agency if the PNDI Receipt shows a Potential Impact to a species or the applicant chooses to obtain letters directly from the jurisdictional agencies. Under concurrent review, DEP, where feasible, will allow technical review of the permit to occur concurrently with the T&E species consultation with the jurisdictional agency. The applicant must still supply a copy of the PNDI Receipt with its permit application. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. The applicant and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at https://conservationexplorer.dcnr.pa.gov/content/resources.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a preliminary screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

DRAFT
NOT FOR ACTUAL USE

RFI Response Summary

Pre-Processed Food Waste September 2017

PHILADELPHIA WATER DEPARTMENT

PHILADELPHIA WATER DEPARTMENT

1. Respondents
2. FW Collection
3. Pre-treatment
4. Quality Assurance
5. Delivery to PWD
6. Business Plan
7. Conclusion

Respondents

- Summary of Respondents

List of Respondents

12 Total Responses:

Anaergia
BioHiTech
Entsorga Group
GE Water
Grind2Energy
Quasar
Seedling
Stormfisher & RRT
Synagro
Trenton Biogas
Veolia
Waste Management

Characteristics of Responses

- **Length**
  - 60+ pages: 4
  - ~ 30 pages: 3
  - < 20 pages: 5
- **Variations of Responses**
  - Varying Thoroughness
  - Various Process Strategies
  - A few “alternative proposals”

Food Waste Collection

- Summary of Responses for Food Waste Collection

Collection of Food Waste

- **Sources of FW**
  - Residential
    - Green Bins
  - Commercial
    - Grocery Stores
  - Institutional
    - Universities, Hospitals, etc.
  - Industrial
    - Food Processing Facilities

Collection of Food Waste

- **Subcontract Hauling/ Collection**
- **Centralized vs. Decentralized Collection**
- **One direct injection into sewer**

Pre-treatment Process

- Summary or Pre-treatment Processes

Pre-treatment

- **Scalable and/or modular pre-treatment**
    - Ability to scale up by adding shifts or modules
    - Storage of slurry
- **Typical Treatment Process**
    - Mechanical Separation
    - Inert Material Removal
    - Maceration/Liquefaction
    - Grit Removal

Pre-Treatment

Decentralized

Centralized

Pre-treatment

- **Pre-process at WPCP or offsite**
- **Removal of recyclable materials for valuation from MSW**
- **Typically in-line inert material/grit removal**
- **Typical solids composition**
    - 8-12% TS
    - 85% VS
- **Variation of FOG, ammonia, nutrients based on sources**

Quality Assurance

- Summary of Respondent's QA strategies

Quality Assurance

- **Source Separation prior to Collection**
- **Visual Inspection at Delivery to Pre-Processor**
- **Rejection of incoming FW/MSW**
- **Contractual Obligations**

Quality Assurance

- **Testing by PWD: BOD, COD, TS, VS, VFA, nutrients, pH, TSS, metals, TKN, inert materials, BMP, FOG, and conductivity**

- **BMP Results**
  - 6.4 – 9.6 scf/lb VS
  - 9.6 – 11.2 scf/lb VS

Example Analytical Testing

pH	3.85	
Volatile Acids	4,690	mg/L
Total Solids	11.76	%
Volatile Solids	85	%
Total COD	139,000	mg/L
Total BOD	67,200	mg/L
Specific Gravity	1.01	mg/kg
Kinematic Viscosity	700	cps
Ammonia as Nitrogen	409	mg/L
Total Kjeldahl Nitrogen	4,090	mg/L
Total Carbon	54,200	mg/L
Electrical Conductivity	6.4	millimho/cm
Arsenic	<0.20	mg/L
Calcium	1,230	mg/L
Chloride	933	mg/L
Chromium	0.13	mg/L
Magnesium	172	mg/L
Mercury	<0.0006	mg/L
Nickel	0.22	mg/L
Potassium	1,810	mg/L
Sodium	858	mg/L
Total Heavy Metals*	11	mg/L

Delivery to PWD

- Summary of Delivery Strategies to PWD

Delivery to PWD

- **Tanker Trucks**
- **Delivery Schedule**
    - Flexibility in scheduling
    - 5 – 7 days/week
- **Weekly and Seasonal Variability**
- **Receiving Facility Size**
    - 2-3 day storage
    - Varied volume
- **Odor Concerns**
    - Control strategies

Delivery to PWD (cont'd)

- **Spillage Concerns**
- **Construction of Facility at WPCP**
- **Neighborhood Impacts**
    - Route planning
    - Number of trucks
    - Odor control

Business Plan

- Details of Business Plans of Respondents

Business Plan

- **Minimum Amount of FW**
    - Tons/day
    - Contractual Commitment
    - Decentralized Units
- **Scale-Up Ability**
    - Additional Shifts
    - Modularity of Design
    - Demonstration

Business Plan

- **Fee Structure**
    - By Volume
    - By Weight
    - Variability based on TS, VS, etc.
- **Organizational Structure**
    - Varied Organizational Size
    - Partnership with Haulers
    - Public-Private Partnership

Receiving Facility Business Plan

- **Design-Build-Own-Operate-Maintain (DBOOM)**
    - PWD Designs, Builds, Capitalizes
    - Respondent Design, Build, PWD Capitalizes

- **Design-Build-Finance-Operate-Maintain (DBFOM)**
    - Respondent Design, Build, Capitalizes

- **Public-Private Partnership**

Conclusion

- Key Takeaways from Responses
- Considerations for Possible RFP

Key Takeaways

- **Highly Varied Responses**
    - Strategy
    - Thoroughness
- **Subcontracting Hauling**
- **Consistent FW Solids Characteristics**

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APPENDIX D

Section 7 Supporting Information

APPENDIX D1 - INSINKERATOR 5-CITY INITIATIVE REPORT

APPENDIX D2 - PHILADELPHIA ORGANICS 901 PADEP GRANT PROGRESS REPORT 6-30-2016

APPENDIX D3 - PHILADELPHIA ORGANICS 901 PADEP GRANT PROGRESS REPORT 6-30-2017

APPENDIX D4 - 20160223 SWRAC ORGANICS SUBCOMMITTEE NOTES (II)

APPENDIX D5 - 20170221 SWRAC ORGANICS SUBCOMMITTEE NOTES

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The Food Waste Disposer as a Municipal Tool for Waste Diversion

An Evaluation in Five Cities

Project Overview by InSinkErator

This publication is based on an InSinkErator-sponsored review of 432 households over a three year period and is provided for general informational and promotional purposes. Municipalities that are considering alternative waste diversion solutions are encouraged to consult with a qualified waste professional to analyze and consider all potential options.

EMERSON
Commercial & Residential Solutions

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Introduction

The results from five cities conclude that food waste disposer use reduced the amount of discarded food waste by more than 30%, or about one-third. At that rate, after a 3-year period of disposer use, nearly a full year's worth of food waste would be kept out of landfills.

From 2012 to 2015, InSinkErator® initiated partnerships with five major cities across the United States in order to assess the viability of using food waste disposers as a municipal tool to manage food waste and accomplish what is known as "resource recovery."

These initiatives were launched to determine the impact of food waste disposers on reducing the volume of food waste discarded into the trash by a household. The five-city initiatives also sought to assess quality of life impacts on households and to measure municipal cost savings as a result of diverting a portion of food waste from landfills.

In short, the results were significant.

Experts examining data collected during the InSinkErator initiatives estimate that in the course of a week, discarded food waste decreased by about 30% in the areas measured. At that rate, after a 3-year period of disposer use, about a full year's worth of food waste would be kept out of landfills.

This report provides a wide-range view of the results from initiatives **in Philadelphia, Chicago, Tacoma, Milwaukee and Boston, which affected 432 households and the lives and behaviors of the residents living in them.** It presents results that prove the value of food waste disposers extending beyond the home, to surrounding neighborhoods, greater metro areas and regions as a whole.

InSinkErator is proud of the initiatives summarized in this report. This undertaking — a unique public-private partnership of dedicated, creative and hard-working people — was made successful by the efforts of citizens and officials ranging from municipal executives and policy makers to staff and block captains, from community development groups and volunteers to plumbers.

Not to mention, the participants who opened their homes and kitchens to us.

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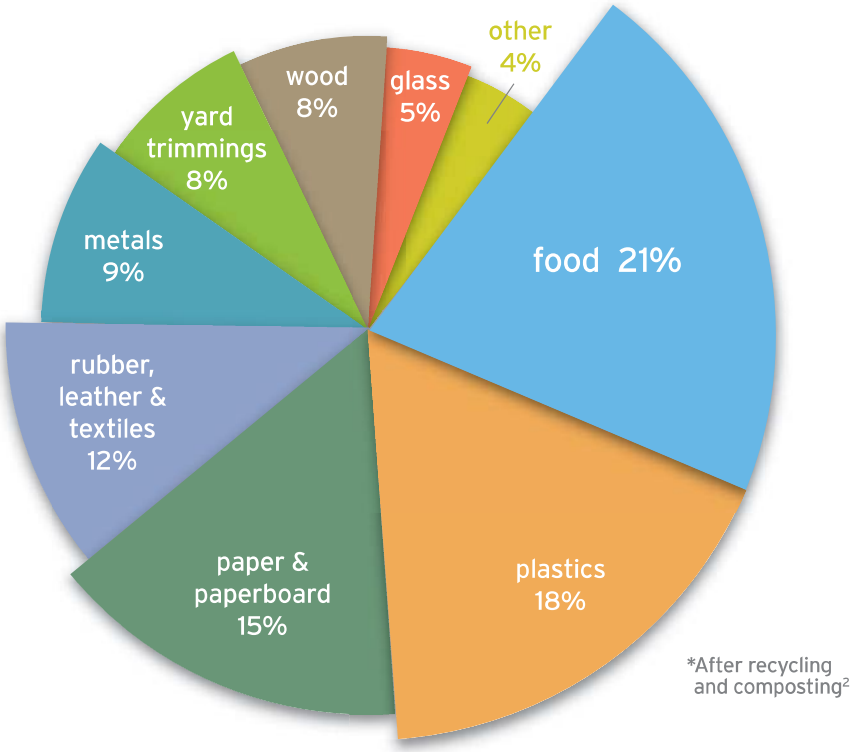
Background

According to the United States Environmental Protection Agency (USEPA) food waste is the largest percentage of municipal solid waste after recycling, with 35 million tons discarded each year. But with a disposer present in about half of all U.S. homes, **there is an opportunity for local governments to leverage the installed base of food waste disposers** to help reduce the volume of solid waste collected, hauled and disposed.

Because disposers convert food scraps into liquid slurry for transport via sewers to local wastewater treatment plants or septic systems, they may also serve as an aid to resource recovery of clean water, renewable energy and fertilizer at capable plants.

In areas served by capable treatment plants, disposers may be an aid to resource recovery resulting in renewable energy and fertilizer recycled from food waste.

2013 Composition of Municipal Solid Waste Discarded in the U.S. (EPA 2015)*



*After recycling and composting[2]

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Project Description

To gauge the effect disposers can make on discarded waste, InSinkErator® measured the reduction in food waste after installation of a disposer in homes previously without one. Each of the five cities was chosen because it shared the goal of organics diversion from the solid waste stream and increasing resource recovery at their wastewater treatment plant.

The Project Steps:

Philadelphia's mayor helped kick off the media campaign to encourage and educate residents on the use of disposers.

Mayor Michael Nutter

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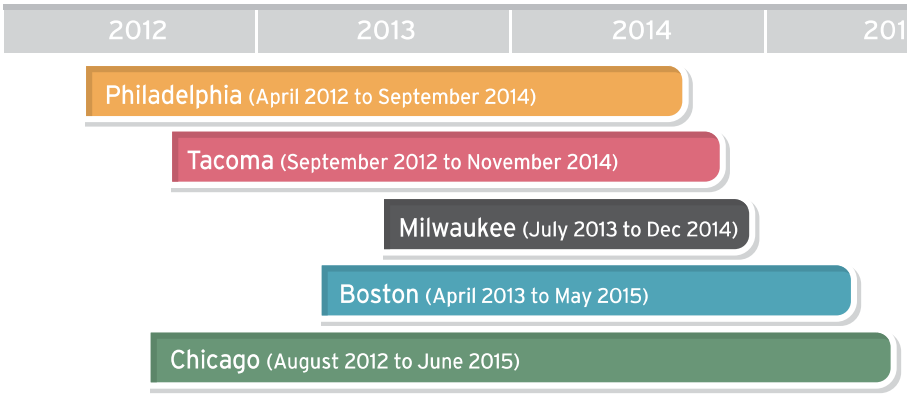
Participants & Timeline

InSinkErator® representatives met with city officials in each city to select the neighborhoods in which to conduct the study. For statistical reliability, a goal of ninety (90) participants in each neighborhood was set, the minimum was set at 70. Both goals proved to be a challenge given the widespread adoption of disposers in the U.S. In Philadelphia, two neighborhoods in close proximity were chosen as one large sample. In Boston, even though a smaller sample size was settled upon, every unit of the apartment complex received a disposer. In Tacoma, 90 homes agreed to get disposers, but fewer (63) eventually received them due to typical neighborhood turnover. In Chicago, while two areas were originally selected, one neighborhood was dropped due to low participation. Each participating household received a complimentary disposer and installation.

Neighborhood Participation by City

City	Neighborhood	Participating Households
Philadelphia, Pennsylvania	Point Breeze & West Oak Lane	173
Tacoma, Washington	Wapato Lake	63
Milwaukee, Wisconsin	Burnham Park	96
Boston, Massachusetts	Thomas Atkins Apartments	48
Chicago, Illinois	Maple Park	52

Timeline of Municipal Projects



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Waste Diversion – Results and Impacts

Generation rates of municipal solid waste vary greatly from region to region, and even within a given location due to culture, diet, economics and other factors.

Consultants specializing in waste characterization were hired for the project evaluation, which included a series of waste measurements before and after the installation of disposers.

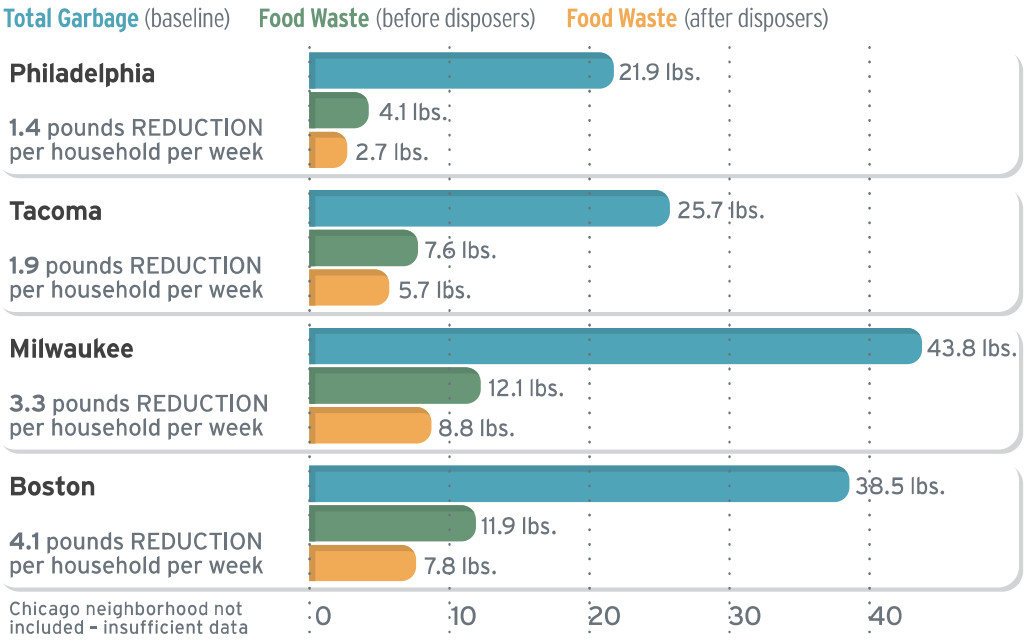
Professional Waste Consultants Utilized

Philadelphia, Pennsylvania	Mid Atlantic Solid Waste Consultants
Tacoma, Washington	Cascadia Consulting Group
Milwaukee, Wisconsin	Mid Atlantic Solid Waste Consultants
Boston, Massachusetts	Mid Atlantic Solid Waste Consultants
Chicago, Illinois	CDM Smith

Waste consultants concluded that on average, after the use of disposers, food waste in the trash was reduced by about 30%.*

The estimated amount of food waste processed by disposers was 1.4 to 4.1 pounds per household per week.

Project Results Weekly Household Waste Generation



*Reductions were calculated by measuring the food waste in the garbage. The actual amount of food waste processed by disposers not available.

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The potential anticipated environmental implications of city-wide disposer use are shown below. By projecting the waste characterization data from each neighborhood to the whole city for a year, the total potential diversion was calculated for illustration purposes. Then, using a proprietary tool developed for InSinkErator® the potential reduction of greenhouse gas emissions due to food waste diversion was calculated. The potential increase in methane production at the wastewater treatment plant was also estimated. Each of the cities employed anaerobic digestion when the project was initiated.

Potential Environmental Implications

	Food waste diverted per household (pounds/week)	Total number of households citywide	Current disposer adoption rate	Potential mass of food waste diverted (tons) per year	Current solid waste management system	Reduction of greenhouse gas emissions (MT of CO_2e per year)	Additional methane production (ML per year)
Philadelphia, Pennsylvania	1.4	580,017	49%	21,113	waste-to energy	290	2,332
Tacoma, Washington	1.9	78,447	67%	3,875	landfill	4,770	428
Milwaukee, Wisconsin	3.2	440,000	52%	36,608	landfill	10,600	4,040
Boston, Massachusetts	4.1	890,000	55%	94,874	33% landfill & 67% WTE	11,900	10,479
Chicago, Illinois	NA	1,028,746	34%	NA	landfill	NA	NA

InSinkErator has not determined if citywide use is feasible; potential adoption rates should be considered when reviewing this report.

Results – Social & Quality of Life Impacts

Assessments were made via surveys, phone calls and focus groups, in addition to conversations with community leaders, volunteers and block captains.

For disposers to be considered a valid "tool" for cities to use in managing food waste, the residents must accept using them and be willing to incorporate them into daily behaviors. We questioned participants – each of which receiving a complimentary disposer and installation – about their satisfaction with disposers and any changes within the household and neighborhood about waste and reduction in pests, rodents and smells. Participants were also asked if they would recommend a disposer to a friend or relative and how likely they were to replace it at the end of its useful life.

These **assessments were taken via surveys, phone interviews and focus groups,** in addition to conversations with community leaders, volunteers and block captains.

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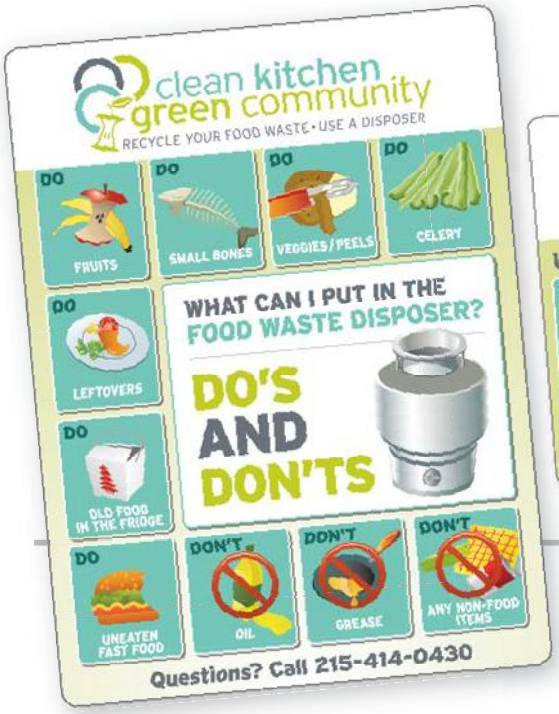
Outreach & Education

Outreach ran the gamut from letters to flyers to garbage truck wraps.

Residents needed to be informed how to use disposers and what to grind. The installing plumber initiated this education at the time of install. All residents were later sent educational materials a minimum of eight times over the course of the months following installation. InSinkErator® Customer Service also phoned the residents. Materials were delivered via U.S. mail or face-to-face via door-knocking or at neighborhood parties and get-togethers. In Philadelphia, a media campaign followed the initial announcement of the program at a press conference sponsored by the mayor's office, generating numerous news stories. Radio ads, and robo-calls from the mayor's office were other forms of outreach employed.



In their surveys, residents said that, after the plumber, the most effective educational outreach came through neighborhood groups and volunteers.

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Methodology

To establish a baseline, participants completed a survey assessing food waste habits at the beginning of the project, before disposer installation. A second survey was completed at the end of the study, a few months after installation. This timing was set to give residents opportunity to become familiar with the appliance and putting food waste down the drain.

Resident Populations Measured

A variety of populations were included in the study, ranging from a 48-unit apartment building of diverse, moderate income families in Boston to an urban, Hispanic neighborhood in Milwaukee.

Two focus group sessions were conducted in Philadelphia among project participants which provided additional insights beyond those revealed by the surveys.

A variety of populations were included. The neighborhoods were selected with the assistance of the city teams.

Survey Response Rates

Households Surveyed & Response Rates	Sent Survey	Returned Survey	Response Rate
Philadelphia, Pennsylvania	173	75	39%
Tacoma, Washington	63	41	68%
Milwaukee, Wisconsin	96	27	28%
Chicago, Illinois	52	19	37%

Boston not included due to insufficient data

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Evolution PRO Compact®

Disposer Installation

In order to facilitate confidence and satisfaction and to encourage participants to grind all their food waste, InSinkErator® installed advanced performing Evolution PRO Compact® models. The project was put out for bid through local chapters of Plumbing Heating Cooling Contractors (PHCC) national association, which ultimately referred plumbers to InSinkErator. In Philadelphia and Boston, two of the plumbers hired were referred by the community development organizations.

Participant Satisfaction and Quality of Life

Participants were overwhelmingly happy with the use of their complimentary disposers, reporting they reduced trash disposed, made kitchen clean up easier, reduced odors and smells in the house and neighborhood, and limited vectors and pests. Participants reported that disposer use had a very positive impact on their lives. Comments made about the program included, "It was a blessing to me" and "Once you have a disposer you can't live without one."

"Once you have a disposer you can't live without one."
- Project Participant

Satisfaction of Project Participants, "Are you satisfied with how the disposer works?"*

Responses by City	Philadelphia, Pennsylvania	Tacoma, Washington	Chicago, Illinois	Milwaukee, Wisconsin
Very Satisfied	92%	90%	79%	93%
Somewhat Satisfied	7%	10%	16%	4%
Somewhat Dissatisfied	1%	0%	11%	4%
Very Dissatisfied	0%	0%	5%	0%

*Participants received a free disposer and installation.

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The disposer also provided benefits beyond reduced trash: other benefits **included cleaner streets, less rodents and other animals going through trash, fewer bugs and pests and healthier kitchens. Residents also reported no longer needing to freeze their garbage until trash day, a common practice.**

Benefits of Disposer Use: "What was the best part of having a disposer?"*

Responses by City	Philadelphia, Pennsylvania	Tacoma, Washington	Chicago, Illinois
Less trash	68%	68%	68%
Cleaner kitchen	55%	65%	21%
Less smells in kitchen	62%	60%	47%
Fewer bugs or pests	42%	38%	5%
Got me to recycle more	30%	25%	42%
Improved value of my home	27%	35%	16%
None	0%	0%	5%
Other	4%	3%	0%

After their complimentary disposer was installed by InSinkErator, most **participants reported using the disposer for all or nearly all of the food scraps that were previously disposed of in the trash**. The majority of respondents reported that they almost always use the disposer when preparing meals or cleaning up after them.

Overall Disposer Impacts on Food Disposal: "How do you manage food waste at home?"*

Most food scraps were now going down the disposer.

Change in Food Scrap Diversion (%of Total)	Philadelphia, Pennsylvania	Tacoma, Washington	Milwaukee, Wisconsin
Put pretty much all food scraps in the disposer	74%	74%	33%
Put about half the food scraps in the disposer	14%	15%	56%
Put a little of the food scraps in the disposer	7%	5%	4%

*Participants received a free disposer and installation.

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The Food Waste Disposer as a Municipal Tool for Waste Diversion

Decrease in Trash Disposal:
"After you started using your disposer, which of the following applies?"*

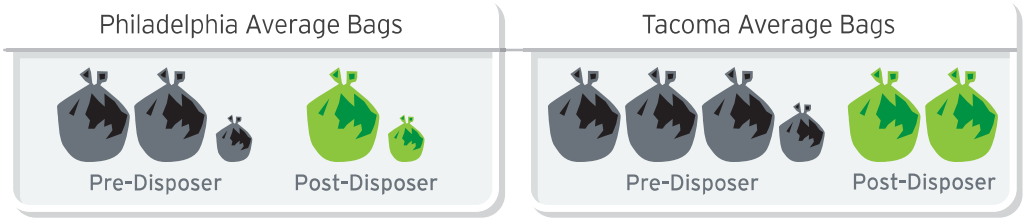
Responses by City	Philadelphia, Pennsylvania	Tacoma, Washington	Milwaukee, Wisconsin
Trash decreased a lot	58%	46%	56%
Trash decreased a little	29%	36%	33%
No difference in trash	12%	18%	4%
Trash increased a little	1%	0%	4%
Trash increased a lot	0%	0%	0%

30%

Approximate reduction in trash disposed.

Average number of bags set out Pre- vs. Post-Installation

Weekly Household Waste



*Participants received a free disposer and installation.

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80%

Approximate number of participants who would recommend a disposer to a friend or family member.

Perhaps the most significant measure of satisfaction with disposers as a kitchen tool was summed up by the willingness of participants to recommend one.

Willingness to make personal recommendation to friend or family member*

	Philadelphia, Pennsylvania	Tacoma, Washington
Yes, definitely would recommend to friend / family	80%	76%
Yes, probably would recommend to friend / family	18%	50%
No, would not recommend to friend / family	3%	22%

Additional Information Gathered

Participants reported that they now put all or nearly all of the acceptable food scraps down the disposer on a regular basis. They said they use the disposer for items such as peelings, fruits, vegetables, egg shells, grains, dairy and even for small bones, (fish and chicken) and seafood shells (shrimp and crab).

Structural barriers and property ownership present challenges. Focus group participants reported that one of the barriers faced by neighbors who wanted to participate in the study was the need for major plumbing work in order to install a disposal. Not being the property owner was cited as another barrier.

*Participants received a free disposer and installation.

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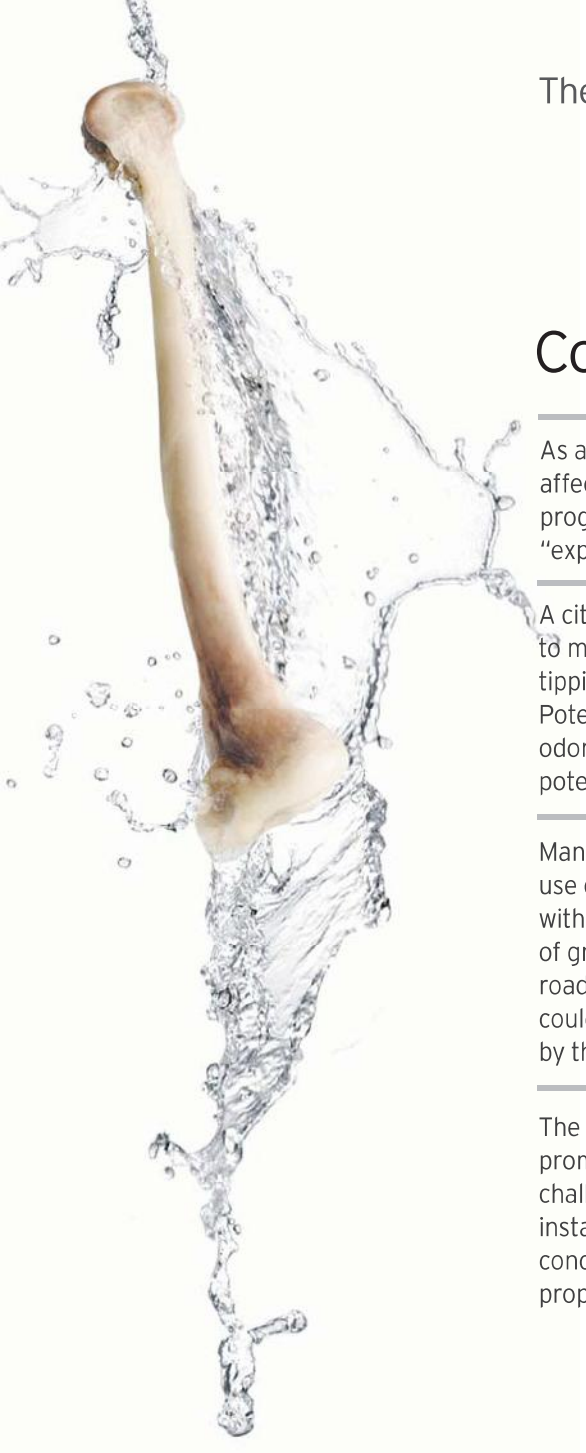

Conclusions and Outlook

As a result of the municipal partnerships described in this report, resident behavior was affected in ways resembling acceptance and compliance with recycling and composting programs.[2] But we believe disposers are capable of much greater diversion, and even "experienced" users tend to under-utilize them.

A city may be able to realize significant potential savings when its residents use a disposer to manage organic waste. These savings include – but are not limited to – transport and tipping fees and the potential for increased biogas generation at treatment plants. Potential non-monetary benefits include cleaner, more pleasant cities largely free of odorous, rotting organic waste and the pests it attracts to neighborhoods. There is also potential for decreased greenhouse gases due to less transported waste in landfills.

Many – if not most – of these savings can be estimated. As an example, in Milwaukee, the use of food waste disposers to divert 36,600 tons of food scraps to a wastewater plant with anaerobic digestion could result in the reduction of approximately 10,600 MT of CO_2e of greenhouse gas emissions and would be equivalent to removing 2,200 cars from the road for one year. The biogas produced from the anaerobic digestion of those food scraps could produce enough electricity to power 1,290 homes per year using GHG equivalencies by the USEPA.

The cost of first-time disposer installation in existing housing, some of which is electrical, prompted InSinkErator® to cover installation costs. To overcome the first-time installation challenges, discussions continue regarding building code changes to mandate disposer installation in new residential construction and city-owned housing. Following the project's conclusion in Philadelphia, disposers were included in a building code as one option for property owners to comply with solid waste management.[3]

[1] Skumatz and Freeman. 2011. "Best Management Practices in Food Scraps Programs." U.S. EPA. http://www.foodscrapsrecovery.com/epa_foodwastereport_ei_region5_v11_final.pdf

[2] U.S. EPA. 2015. "Advancing Sustainable Materials Management: 2013 Fact Sheet. http://www.epa.gov/osw/nonhaz/municipal/pubs/2013_advncng_smm_fs.pdf

[3] City of Philadelphia. 2015. The Philadelphia Code - PM-308.3.1 Garbage facilities. American Legal Publishing Corporation. http://www.amlegal.com/nxt/gateway.dll/Pennsylvania/philadelphia_pa/title4thephiladelphiabuildingconstructio/subcodepmthephiladelphiapropertymaintena/chapter3generalrequirements0?f= templates$fn=default.htm$3.0$vid= amlegal:philadelphia_pa$anc=JD_PM-308.3.1

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clean kitchen green community

RECYCLE YOUR FOOD WASTE • USE A DISPOSER

This publication is based on an InSinkErator-sponsored review of 432 households over a three year period and is provided for general informational and promotional purposes. Municipalities that are considering alternative waste diversion solutions are encouraged to consult with a qualified waste professional to analyze and consider all potential options.

Food waste disposers can provide an environmentally responsible alternative to transporting food waste to landfills. And they can help reduce greenhouse gas emissions. At capable wastewater treatment plants, food waste can be recycled into renewable energy. Additionally, capable wastewater treatment plants can process food waste into fertilizer. (Check the plant in your area.)

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PHILADELPHIA ORGANICS FEASIBILITY STUDY

PADEP SECTION 901 PLANNING GRANT

PROGRESS REPORT – THRU 6-30-2016

1 901 PADEP PLANNING GRANT SCOPE

The Philadelphia Organics Feasibility Study, Section 901 Planning Grant scope, has five tasks, namely:

- Task 1 – Project Initiation and Data Gathering – Review available information on the types and sources of organics generated in the City of Philadelphia, and create 10-20 year projections of quantities of organic materials that may be generated from sources within the City.
- Task 2 – Organics Marketplace Assessment – Identify organics processors within the region. Survey regional yard waste and organics processors, and assess capability and interest from these processors in accepting additional yard waste and/or organics from City sources.
- Task 3 – Assessment of Organics Processing Options – Including Fairmont Park, the Philadelphia Water Department, and other existing and potential options for accepting significant quantities of City organics.
- Task 4 – Organics Collection Analysis – Based on targeted sources of organics and available or potential processing options, perform a collection analysis for those targeted materials.
- Task 5 – Report – Prepare a draft report, and then finalize the project report in consideration of comments received.

2 ORGANICS STUDY PROGRESS STATUS AS OF 6-30-2016

Progress to date on the study, through 6-30-2016, is as follows:

2.1 TASK 1 – PROJECT INITIATION AND DATA GATHERING

The Consultant Team (TEAM) reviewed available sources of information from the ongoing Solid Waste Management Plan for the City, and conducted further data gathering, review and analysis of organics information. The Team prepared current estimates of organics tons generated from within the City, and made 20-year projections of expected changes in organics generation from City generators. These projections were updated in May 2016 to reflect 2014 historic data from the City.

A memorandum summarizing the organics tonnage estimates and projections are presented in Appendix 1 of this progress report.

2.2 TASK 2 – ORGANICS MARKETPLACE ASSESSMENT

The TEAM identified potential yard waste composters, organics processers, and large soil processors within a 25-50 mile radius of the center of the City of Philadelphia. The 25-mile hauling distance is considered a reasonable distance for direct hauling of yard waste materials and some other organics. A hauling distance of up to 50 miles or more may be reasonable for mixed organics and larger volumes of organics, especially if some kind of organics transfer haul operations is developed and utilized.

The TEAM developed a survey form, and conducted a series of phone and, as a followup where phone surveys were unsuccessful, e-mail surveys of existing sites within the "marketplace" region. **The survey template that was developed and used for these surveys is included in Appendix 2.**

A tabular summary of survey results from sites that participated in the mixed organics and the yard waste/soil processor surveys are presented in Appendix 3 and Appendix 4, respectively.

A geographic presentation of the 25 and 50-mile planning radius planning areas, along with the location of sites that did, and that did not, respond to the marketplace survey are presented in Appendix 5.

2.3 ORGANICS PROECSSING OPTIONS

The TEAM has been working with the City Streets Department to set up a site visit and review of the Fairmont Park site, operations and potential for further utilization. The TEAM has been trying since study inception, with City Streets Department assistance, to obtain information from the Philadelphia Water Department (PWD) on its anaerobic digesters, to help assess existing use, design capacity, and potential for future utilization to process additional sources of City organics. The initial PWD response to these requests was received on June 29. The PWD indicates that it is not capable of receiving organics such as food waste without preprocessing by others off-site. **The TEAM's current assessment of preprocessing options to prepare organics for anaerobic digestion is presented in Appendix 6.**

Some initial work has commenced on other sub-parts of this task.

2.4 ORGANICS COLLECTION ANALYSIS

A small initial effort has commenced on this task, as this work is dependent on the findings of other tasks that are still underway.

2.5 REPORT

Significant attachments (appendices) to the draft report have been prepared to date, and these are attached to this progress report.

APPENDIX #1

CITY ORGANICS TONNAGE ESTIMATES AND PROJECTIONS

Alternative Resources, Inc.

Corporate Headquarters

1732 Main Street
Concord, MA 01742
Tel (978) 371-2054

Memorandum

TO: Municipal Solid Waste Consultants

FROM: Alternative Resources, Inc.

DATE: November 23, 2015 (Updated May 26, 2016)

SUBJECT: Organics Feasibility Study Task 1; Estimates of the Quantity, Type, and Sources of Organic Waste Disposed from Philadelphia

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For purposes of Task 1 of the Organics Feasibility Study, ARI reviewed data and analyses previously compiled by the City, including: 2014 disposal data for the residential and commercial sectors; the 2009/2010 City of Philadelphia Residential Waste Characterization Study; and an October 2014 memorandum from the Philadelphia Recycling Office providing an internal briefing in association with the November 2014 City Council Organics Hearing. In addition, ARI has reviewed and relied on information from other published sources regarding organic waste generation, including information on types and sources of organic waste. Data and analyses are included in an Excel file "5-26-16 UPDATE TO 11-23-15 Estimate of Organics in Philadelphia MSW.xls" that is appended to this memorandum.

ARI estimates approximately 31% of the waste disposed from Philadelphia is organic/compostable waste, including food scraps, yard waste/clean woody waste, and soiled (compostable) paper that is not otherwise recyclable. In 2014, the commercial sector disposed of an estimated 274,700 tons of organic waste and the residential sector disposed of an estimated 132,633 tons or organic waste, for a combined total of more than 407,000 tons of organic waste. Table 1 presents a summary of the estimated composition of organic waste disposed; a more detailed version of Table 1, along with supporting information, is included in the attached Excel file.

Table 1. Estimated Tons of Organic Waste Disposed from Philadelphia (2014)

Description	Commercial	Residential	Total
Food Waste	186,960	53,649	240,609
Yard/Woody Waste	35,260	56,630	91,890
Compostable (Soiled) Paper	52,480	22,354	74,834
Total Organic Waste Disposed	**274,700**	**132,633**	**407,333**

The estimates presented in Table 1 represent organic waste that was disposed, and excludes any organics managed through existing organics recycling programs. The City operates Sanitation Convenience Centers (drop-off centers) for City residents, which accept recycling and various other materials including yard waste and Christmas

trees. The City also collects yard waste during annual Spring Cleanup events and leaves during an annual, six-week fall program. The City promotes event recycling, including the establishment of a program affiliated with the Philadelphia Marathon. During the 2014 Philadelphia Marathon, 88 percent of the 11 tons of waste generated was recycled or composted, with only 12 percent disposed. In addition to these City programs, there are some private and institutional organic management initiatives within the City, including a composting program implemented by the Philadelphia Prison System, a private composting facility serving the residential sector of University City (The Dirt Factory), and neighborhood-based initiatives. In 2014, an estimated 22,137 tons of wood waste, 3,519 tons of yard waste and 617 tons of food waste were recycled in the City. It is expected that certain commercial establishments and institutions may have implemented additional organics recycling that is not documented by the City.

Approximately two thirds of the estimated quantity of organic waste disposed from Philadelphia is generated by the commercial sector. ARI reviewed various websites and published studies presenting methodologies to identify major sources of organic waste from the commercial sector, including a website maintained by Recycling Works Massachusetts[1] and a feasibility study prepared by the National Renewable Energy Laboratory[2]. Based on that information, we have identified certain types of commercial establishments that are expected to generate organic waste, and using industry factors, have estimated the extent to which these generators may contribute to the overall quantity of organic waste generated by the Philadelphia commercial sector. While only an approximation, the methodology shows the types of commercial establishments likely generating the largest amounts of organic waste. Table 2 summarizes this information; Table 2 is also included in the attached Excel file along with supporting documentation.

Table 2. Estimated Sources of Philadelphia Commercial Organic Waste

Source	Percent of Total
Restaurants	16%
Grocery Stores	13%
Hospitals/Nursing Care Facilities	12%
Food Manufacturers/Wholesalers	8%
Colleges/Universities	5%
Hotels/Venues	2%
Philadelphia School District	1%
Other Commercial Sources	43%

Predictability of the future waste stream is difficult to estimate. However, using 2014 Philadelphia disposal data and the organic composition described herein, ARI has

[1] Recycling Works Massachusetts is a recycling assistance program funded by the Massachusetts Department of Environmental Protection. The website with various resources is available here: http://www.recyclingworksma.com/.

[2] National Renewable Energy Laboratory, Technical Report produced under the direction of the U.S. EPA, "Feasibility Study of Anaerobic Digestion of Food Waste in St. Bernard, Louisiana," NREL/TP-7A30-57082, January 2013.

calculated a per-person organic waste generation rate for the residential sector and a per-employee organic waste generation rate for the commercial sector. We have used these calculated generation rates, together with population projections and employment forecasts used in the Solid Waste Plan, to estimate future quantities of organic waste. Table 3 presents this information in summary format; additional detail and supporting calculations are provided in the attached Excel file.

Table 3. Projected Future Quantities of Philadelphia Organic Waste

Year	Commercial Organics (Tons)	Residential Organics (Tons)	Total Organics (Tons)
2015	274,928	138,251	413,179
2020	277,085	139,612	416,697
2025	280,927	141,511	422,438

APPENDIX #2

ORGANICS /YARD WASTE PROCESSOR SURVEY FORM

City of Philadelphia Organics Feasibility Study
Soil Processor and Compost Site Phone Survey

Name (site): _____

Name (person): _____

Phone: _____

Address: _____

_____

_____

Email: _____

Web Site: _____

Site Type: ☐ Private or ☐ Municipal

1) a) Do you have a compost site/facility? ☐ Yes ☐ No

   b) Do you have a soil blending/processing site/facility? ☐ Yes ☐ No

2) a) What is your current/permitted capacity?

_____
_____

   b) What permit(s) do you hold for your operation? ☐ Don't know

_____
_____
_____

3) What is your current available/remaining capacity?

_____
_____
_____
_____
_____

4) Do you have plans for increased capacity? ☐ Yes ☐ No Please describe.

_____
_____
_____

_____
_____

5) What material (s) do you accept/ process?

_____
_____
_____
_____
_____

6) How do you process materials (processing description)?

_____
_____
_____
_____
_____

7) Do you collect organic materials? ☐ Yes ☐ No. Please describe.

_____
_____
_____
_____
_____
_____

8) a) Do you receive organic materials from others? ☐ Yes ☐ No.

b) Do you accept material from municipal sources? ☐ Yes ☐ No.

c) Private firms? ☐ Yes ☐ No.

d) Self-haul? ☐ Yes ☐ No.

e) Do you have delivery or processing contracts? ☐ Yes ☐ No.

f) Delivery restrictions/specifications? ☐ Yes ☐ No. Please describe.

_____
_____
_____
_____
_____
_____

9) a) Is there a fee for drop-off or collection of organics? ☐ Yes ☐ No

b) What is your fee schedule?

10) Would you consider accepting large deliveries of organics? ☐ Yes ☐ No. Can you accept deliveries of large tractor trailer loads of organics? ☐ Yes ☐ No. Under what terms?

11) How do you distribute/market finished product?

12) How/what do you charge for the finished product(s)? What is your fee schedule?

13) Do you deliver finished product(s)? ☐ Yes ☐ No

14) What is your delivery area, and do you deliver to ☐ public, ☐ private, ☐ both, or ☐ N/A?

APPENDIX #3

MIXED ORGANICS PROCESSOR SURVEY RESPONSES - SUMMARY TABLE

Survey of Regional Marketplace Summary - Primarily Mixed Organics Segment

DRAFT 6-30-2016

Facility Name, Type and Contact Info					Permitting Information					Technology	Details of Materials Received and Terms of Receipt			Final Product Distribution			Opportunities for Philadelphia
Facility Type YW=yard waste SP = soil processor MO = mixed organics	**Name of Facility**	**Facility Location (town, state)**	**Approx. Driving Distance (miles) from Central Philadelphia (Mapquest)**	**Do You Own/ Operate A Compost Facility? (Y/N)**	**Do You Hold a Facility Permit? (Y/N) If yes, permit number/type**	**Current Permitted Capacity (or N/A)**	**Remaining Permitted Capacity (or N/A)**	**Materials Accepted (list)**	**Plans to Increase Capacity? (Y/N) If yes, describe**	**Processing/ Composting Description (brief)**	**Types of Material Accepted (list)**	**Charges for Materials Dropped Off or Received? (Y/N) If yes, please describe fee schedule**	**Delivery Restrictions/ Specs. on Material Received? (describe)**	**Final End-Product(s) Produced**	**Distribution of Finished Product (describe)**	**Charges for End-Product(s) Produced? (Y/N) If yes, please describe fee schedule**	**Would You Consider Accepting Large Quantities of New Organics Deliveries to Your Site? (Y/N) If yes, types and quantiles you could accept**
YW, SP, MO	**Linvilla Orchards (managed by Kitchen Harvest, Inc.)**	Media, PA	18.9	Y	Y WMG-M017	13,500 cubic yards maximum quantity of waste materials to be on site at any one time: 1,000 cu. yds. food scraps, 10,000 cu. yds. yard waste, 1500 cu. yds. wood chips, 500 cu. yds. manure, 500 cu. yds. mushroom soil	None. We are at full capacity.	Food scraps, yard waste, other organics products, wood chips, manure, mushroom soil	N We are at capacity for our permit and for the acreage the farm is willing to allocate for composting. We do hope, however, to increase capacity by replicating this successful composting model at another farm	Windrow Composting	Yard waste, other organics products, wood chips, manure, mushroom soil	Y Fees are customer specific.	Kitchen Harvest, Inc. is the only approved hauler of food scraps to the compost site. Yard waste, wood chips, manure, and mushroom soil, are all brought by multiple different customers.	Compost Garden Soil Mulch	Bulk by the cubic yard for pickup or delivery	Y 2016 Compost and Garden Soil (50/50 blend of compost/topsoil) plan to be $40 per cubic yard plus tax and delivery (if needed). Composting customers get at least 20% off depending on order volume	We are at capacity, however, we would entertain discussions to accept from a competitive vendor who could provide organics to meet our standards.
SP, MO	**Oregon Dairy Organics, LLC**	Lititz, PA	73.3	Y	Y GP025	Limited by material on site at any given time, NOT by incoming volume	5,000 tons per year	Food processing by-product, residual clean food waste, fruit/vegetable/bakery/pet feed. Material must contain ZERO plastics, glass, metals, contamination.	N We are at capacity for our permit and for the acreage the farm is willing to allocate for composting. We do hope, however, to increase capacity by replicating this successful composting model at another farm	Active windrow/covered	We work closely with several haulers and are open to new, mutually beneficial cooperative relationships.	Y $35-50 per ton depending on the material	Mon-Fr 7:00 - 4:30 or by arrangement; Clean matieral No plastic, glass or metal contamination.	Compost/soil amendment for use in athletic turf, golf course, landscaping, soil blending, certified construction soil blends	Wholesale distribution	Y Charge per cubic yard for large scale/wholesale distribution	Y Negotiable.
	Philly Compost		0	N Operates as a food waste hauler only. Kitchen Harvest, which operates from Linvilla Orchards and Organics Diversion, LLC took over Philly Compost contracts.													
YW, MO	**Four Springs Farm**	Kutztown, PA	65.2	Y	Y PA DEP GP17	3,000 cubic yards	None.	Source separated organics; food waste; yard waste; wood chips	Y No description provided	Blending; windrows; turning; screening	No description provided.	Y $40/ton food waste; others negotiable	Y No plastic etc.		word of mouth & used on our own farm fields; BIOCYCLE list	$30 / cu yd up to 3 yds; 3 or more cu yds $28/yd	Y No plastic, etc. As dry as possible (not currently)

YW	**Graywood Farms**		64.9	Y	This is an On-Farm facility and therefore does not currently have the DEP General Permit 025 that we would need to take the type of waste we're looking for at the volumes that would be needed. Our Oregon Dairy Organics location does have a DEP General Permit 025												
SP, MO	**Veteran Compost**	Aberdeen, MD	70.5	Y	Y, MD GP-CF01	Unlimited	60 tons per day	Clean food waste and compostable ware (cups, plates, etc.) and wood chips. NO yardwaste or biosolids	Y We have 2 other facilities available in Maryland. Permits for those facilities have been drafted and will now move forward because MD Department of the Environment released a new composting facility permit and regulations on 3/28/2016. These locations increase capacity to 60 tpd. We plan to put capacity out to bid later this year.	Positive Aerated Static Piles	Food waste, compostable ware, wood chips	Not applicable	We currently haul aull the matieral that we process, but we are open to disucssion about deliveries	Organic compost	We market our material to the agriculture industry, landscapers and home gardeners in bulk (some material is bagged). It can be picked up (even in tractor trailer quantities) or delivered.	$35/cu yd retail. Wholesale and ag prices are less	We are open to discussing large deliveries. We prefer to receive large quantities such as tractor trailer loads. We also prefer pre-consumer food waste from grocery stores and large food distribution centers
YW, MO	**Prince George's County Yard Waste Composting Facility**	Upper Marlboro, MD	140.2	Y	MDE CF Permit MD published compost facility regulations 3/28/206	Not sure 50,000 tons processed annually	Unknown	Grass clippings, leaves, brush, small tree limbs and Christmas trees. A food scrap composting pilot project collects food scraps	Unknown	Yard waste is processed in windrows; the food scrap pilot uses covered aerated static piles	yard waste; food scraps in a separate process	$45/ton for non-county contractors	Unknown	Final product is a dark humus marketed as Leafgro ™	Marketed by MES through a network of retailers. Revenue is returend to the County to offset the cost of the composting operation.	Unknown	Unkown
	Premier Food Waste Recycling	Ewing, NJ	33.7	N													Premier may be looking into opening a food waste processing facility in the future.

YW, SP, MO	**Howard County Pilot Composting Facility**	Marriotsville, MD	120			The County estimates that it takes in 5 tons of food scraps per week. Foodscraps are co-collected with residential yard trim from 3 collection routes totaling about 15,000 homes. Total tonnage a week is about 80 tons.											
YW, SP, MO	**Two Particular Acres**	Royersford, PA	33.3	Y	GP-17	5,000 tons per year	3,500 tons per year	Look it up.	No, not beyond the permitted capacity	Aerated static pile composting, soil blending and screening	yard waste, food waste, food processing waste, spoiled grains, some manure	Yes. $50/ton	Yes. Must be contaminant FREE	Screened compost, blends and custom blends	Deliver Pickup loads/bulk Bags (available for pickup) Weis Market sells bagged compost	$25/cubic yard bulk Bag prices fluctuate	Will accept large trailer loads and large delivers, but all material must be contaminant FREE. Large vehicle scale on site.
	FCS Partners, LLC: Pottstown Trap Rock Composting Facility	Douglassville, PA	43	Y	GP-45	30,000 tons per year	20,000 tons per year	Look it up.	Yes, under the right circumstances. Area is available	Aerated static pile composting, and grinding and screening	pre and post consumer food, yard waste, food processing waste, manure, and waxed cardboard	Yes. $50/ton Expected $5/ton increase by yearend	Yes. Must be contaminant FREE	Screened compost, blends and custom blends	Bulk and bags	$25/cubic yard bulk Bag prices fluctuate	Will accept large trailer loads and large delivers, but all material must be contaminant FREE. Large vehicle scale on site.
	FCS Partners, LLC: ABE Materials, Easton	Easton, PA	66.8	Y	GP-45	30,000 tons per year. 20% of the site is built. Expects to complete site for 100% usage by the end of 2016	80% when the site is completely build	Look it up.	No, not beyond the permitted capacity	Aerated static pile composting, and grinding, blending, and screening.	pre and post consumer food, waxed cardboard, and leaves. Leaves are from Allentown .	Yes. $50/ton	Yes. Must be contaminant FREE	Blends, custom blends, screened compost	Bulk and bags	$25/cubic yard bulk Bag prices fluctuate	Will accept large trailer loads and large delivers, but all material must be contaminant FREE. Large vehicle scale on site.
	FCS Partners, LLC: Hazelton Material Composting Facility	Weatherly, PA	92.9	Yes, but the site hasn't been constructed yet. Construction expected to begin before the end of 2016	GP-45	30,000 tons per year	All. Site has not been constructed yet. Construction expected to begin before the end of 2016										
	FCS Partners, LLC: ABE Materials, Allentown	S. Whitehall Twp., PA	58.8	Yes, but site is not operational. It's in reserve. No date for develoopment yet	GP-45	30,0000 tons per year	Unablet to open due to local opposition.										
	FCS Partners, LLC: Silver Hill Quarry	Narvon, PA	54.1									Yes. $50/ton	Yes. Must be contaminant FREE				

APPENDIX #4

YARD WASTE/SOIL PROCESSOR SURVEY RESPONSES - SUMMARY TABLE

Survey of Regional Marketplace Summary - Primarily Yard Waste Composting Segment

DRAFT 6-30-2016

Facility Name, Type and Contact Info					Permitting Information					Technology	Details of Materials Received and Terms of Receipt			Final Product Distribution			Opportunities for Philadelphia
Facility Type YW=yard waste SP = soil processor MO = mixed organics	**Name of Facility**	**Facility Location (town, state)**	**Approx. Driving Distance (miles) from Central Philadelphia (Mapquest)**	**Do You Own/ Operate A Compost Facility? (Y/N)**	**Do You Hold a Facility Permit? (Y/N) If yes, permit number/type**	**Current Permitted Capacity (or N/A)**	**Remaining Permitted Capacity (or N/A)**	**Materials Accepted (list)**	**Plans to Increase Capacity? (Y/N) If yes, describe**	**Processing/ Composting Description (brief)**	**Types of Material Accepted (list)**	**Charges for Materials Dropped Off or Received? (Y/N) If yes, please describe fee schedule**	**Delivery Restrictions/ Specs. on Material Received? (describe)**	**Final End-Product(s) Produced**	**Distribution of Finished Product (describe)**	**Charges for End-Product(s) Produced? (Y/N) If yes, please describe fee schedule**	**Would You Consider Accepting Large Quantities of New Organics Deliveries to Your Site? (Y/N) If yes, types and quantiles you could accept**
YW	**Cheltenham Township Compost Site**	Cheltenham, PA	9.4	Yes	Yes - Permit-by-rule	14,000 cubic yards	N/A	Leaves, grass, yard waste, brush	No	Grind materials windrow and turn	Leaves, grass, yard waste, brush	Yes, $15.00 for up to 10 yards and $25.00 for more than 10 yards	Only noted materials	Mulch	Available for pickup by residents and landscapers	No	No
YW	**Lower Merion Township Compost Site**	Ardmore, PA	9.4	Yes	Under transfer permit	3,895 tons	N/A	Brush, leaves,tree trimmings, Christmas trees, yard waste	No	Grind materials, windrow and turn	Brush, leaves, tree trimmings, Christmas trees, yard waste	Yes, Materials drop-off, commingled, brush and leaves, tip fee $.04 per pound, No fee for resident drop-off	No	Mulch	Self load for residents at transfer station	No fee, pick-up for transfer station	No
YW	**Abington Township Composting Site**	Abington, PA	12.9	Yes	Yes - Permit-by-rule	50,000 cubic yards	12,000 cubic yards	Brush, leaves,tree trimmings, Christmas trees	No	Grind- brush and tree trimmings, windrow & turn-leaves	Leaves, yard waste, brush and tree trimmings	No	Only noted materials	Compost and mulch	Available for pickup by residents and landscapers at four designated sites.	Yes, $2.50 per cubic yard	No
YW (grass and leaves, SP	**Gloucester Township Municipal Utilities Authority Compost**	Glendora, NJ	13.2	Yes	Yes- NJ #132029, Class C	126,800 cubic yards	N/A	Leaves, grass	No	Windrow and turn, soil blend with compost	Grass, leaves	Yes, Grass - $10. 00 per yard, one yard minimum Leaves - $5.00 per yard two yard minimum	Leaves and grass only	Compost and top soil	Purchase of products at site	COMPOST; TOPSOIL 3 cubic yards - $72.00; $84.00 5 cubic yards - $100.0; $120.00 7 cubic yards - $126.00; $154.00 30 cubic yards - $410.00; $530.00	Yes , Leaves and grass, quantities would be based on available capacity at time of request
YW	**Moorestown Compost**	Burlington, NJ	13.4	Yes	Yes, NJ #131966, Class C	N/A	N/A	Leaves, brush	No	Leaves-windrow and turn, brush (double grind)	Leaves and brush	No	Segregated leaves and brush	Compost and mulch	Pickup only	No	No
YW	**Upper Dublin Township Compost Site**	Upper Dublin, PA	14.7	Yes	Yes - Permit-by-rule	9,000 cubic yards	N/A	Leaves, brush and tree trimmings	No	Grind-brush and tree trimmings, windrow and turn-leaves	Leaves,yard waste, brush and tree trimmings	No	Only noted materials	Mulch	Available for pickup by residents and landscapers	No	No
YW	**Upper Moreland Township Compost Site**	Upper Moreland, PA	15.1	Yes	Yes - Permit-by-rule	6,000 cubic yards	N/A	Leaves, grass, yard waste, brush and tree trimmings	No	Grind- brush and tree trimmings, windrow and turn-leaves	Leaves,yard waste, brush and tree trimmings	No	Only noted materials	Mulch	Available for pickup by residents	No	No

MO	**Organic Diversion, LLC (Currently being developed)**	Gloucester City, Nj	15.4	Yes	Yes, NJ#563182 Class S&B	400 tpd	N/A, To be determined	Food waste and yard waste	N0, not at this time	Anerobic digestion	Food waste and yard waste	Yes, To be determined	Clean segregated feedstocks	Compost	To be determined	To be determined	Yes, To be determined
YW	**Conshohocken Borough Compost Site**	Conshohocken, PA	15.7	Yes	Yes - Permit-by-rule	385 tons	N/A	Leaves, grass, yard waste, Christmas trees, brush and tree trimmings	No	Windrow and turn-brush and tree trimmings, processed at Upper Merion Compost Facility under municipal agreement	Leaves, grass, yard waste, Christmas trees, brush and tree trimmings	No	Only noted materials	Compost and mulch	Available for pickup by residents and lanscapers	No	No
YW (Leaves only)	**Whitemarsh Township Compost Site**	Whitemarsh, PA	16.6	Yes	Yes - Permit by rule	N/A	N/A	Leaves	No	Windrow and turn-leaves	Leaves	No	Only leaves	Compost	Available for pickup by residents and deliver upon request	No	No
YW (Leaves only) , SP	**Wayne Carmint Landscaping, Inc**	King of Prussia, PA	16.8	Yes	Yes, Permit-by-rule	N/A	N/A	Leaves	No	Windrow and turn	Leaves	$30.00 to $75.00 per load depending on volume of material and quality of feedstocks	Clean uncomtaminated leaves	Compost and specially blended soils	Bulk delivery of compost and soils and pick-up by landscapers and contractors	Yes, No set fee, depends on volume of material and distance to customer and requirements and specifications for compost/soil blends	No

	County Conservation Co. LLC	Sewell, NJ	18.7														
YW, (Leaves only), SP	**Triboro Sand & Stone, Inc.**	Camden, NJ	19.2	Yes	Yes - NJ #584712 Class B&c	N/A	N/A	Leaves	Yes	Windrow and turn	Leaves	N/A	Only leaves	Compost	Used on site for mine reclamation	No, used on site	No
YW	**Nether Providence Township Recycling Center - Highway Yard**	Providence, PA	19.6	Yes	Yes - Permit by rule	6,000 cubic yards	N/A	Leaves, yard waste, brush, tree trimmings	No	Windrow and turn-brush, wood waste delivered to Mulch Express, Inc., Delaware County	Leaves	Yes, For end product only 2.5 cubic yards $65.00, 6 cubic yards $105.00 delivered. Self loading of material is free for residents	Only leaves	Compost	Self load to residents free, charge for delivery	Yes, 2.5 cubic yards 465.00, 6 cubic yards $105.00	No
YW, (Leaves only)	**East Norriton Twp. Norristown Farm Compost Site**	East Norristown, PA	19.8	Yes	Permit-by-rule	N/A	N/A	Leaves only	No	Windrow and turn		No	No delivery, just pickup	Compost	Pickup residents only	No	No
YW	**Upper Merion Township Compost Site**	Upper Merion, PA	20.2	Yes	Unknown	4,000 tons	N/A	Leaves, brush, tree trimmings, grass	No	Windrow and turn, grind brush and tree trimmings	Leaves, brush, tree trimmings , grass	$0.02 per pound Municipal $0.03 per pound Business	Only noted materials	Compost and mulch	Self load to residents free, charge	No	Undetermined
YW	**Plymouth Township Compost Site**	Plymouth, PA	20.5	Yes	Yes - Permit-by-rule	4,000 cubic yards	N/A	Leaves, brush, grass, tree trimmings	No	All materials processed using tub grinder and windrow and turn combined materials	Leaves, brush, grass, tree trimmings	Yes, mulch $30.00 pick up load	Only noted materials, no drop-off	Mulch	Self load is free to residents, $30.00 for up to five yards	Yes, $30.00 up to five yards, product free to contractors/landscapers if needed to clear site prior to fall collections	No
YW	**Springfield Township Compost Site**	Springfield, PA	20.7	Yes	Yes. Permit-by-rule	3,000 cubic yards	3,000 cubic yards	Leaves, brush	No	All materials processed using tub grinder and windrow and turn combined materials	Leaves, brush	No	No delivery	Mulch	Self load to residents	No	No
YW	**DCSWA Compost Farm**	Clifton Heights, PA	21.4	Yes	Yes - Permit-by rule	15,000 tons	10,000 tons	Leaves, yard waste, brush, tree trimmings	No	Windrow and turn, tub grinder for wood and brush	Leaves, yard waste, brush	Yes, drop off is municipal $32.00 per ton contractors $42.00 per ton, residents free	Only noted materials	Compost and mulch	Delivery for municipal, parks and gardens upon request. Municipalities pick-up material distribution at transfer station for residents free of charge	No	Yes, potential exists for delivery to transfer station
YW	**Valley Forge Fill Site**	Merion, PA	21.8	Yes	No, Processing facility only	N/A	Processor - grinding of material, fluctuates	Leaves, brush, tree limbs, stumps	No	Grind leaves, brush, tree limbs and stumps into mulch	Leaves, brush, tree limbs, stumps		Only noted materials	Mulch for soil amendment	Pickup at site by private and public sources		Yes
YW	**Radnor Township, Skunk Hollow site**	Radnor, PA	24.2	Yes	Yes, Permit-by-rule	8,000 cubic yards	N/A	Leaves, brush, tree trimmings	No	Windrow and turn leaves, grind brush and tree trimmings	Leaves, brush, tree trimmings	No	Only noted materials	Compost and mulch	Seven locations self-load compost, five locations self-load mulch	No	No

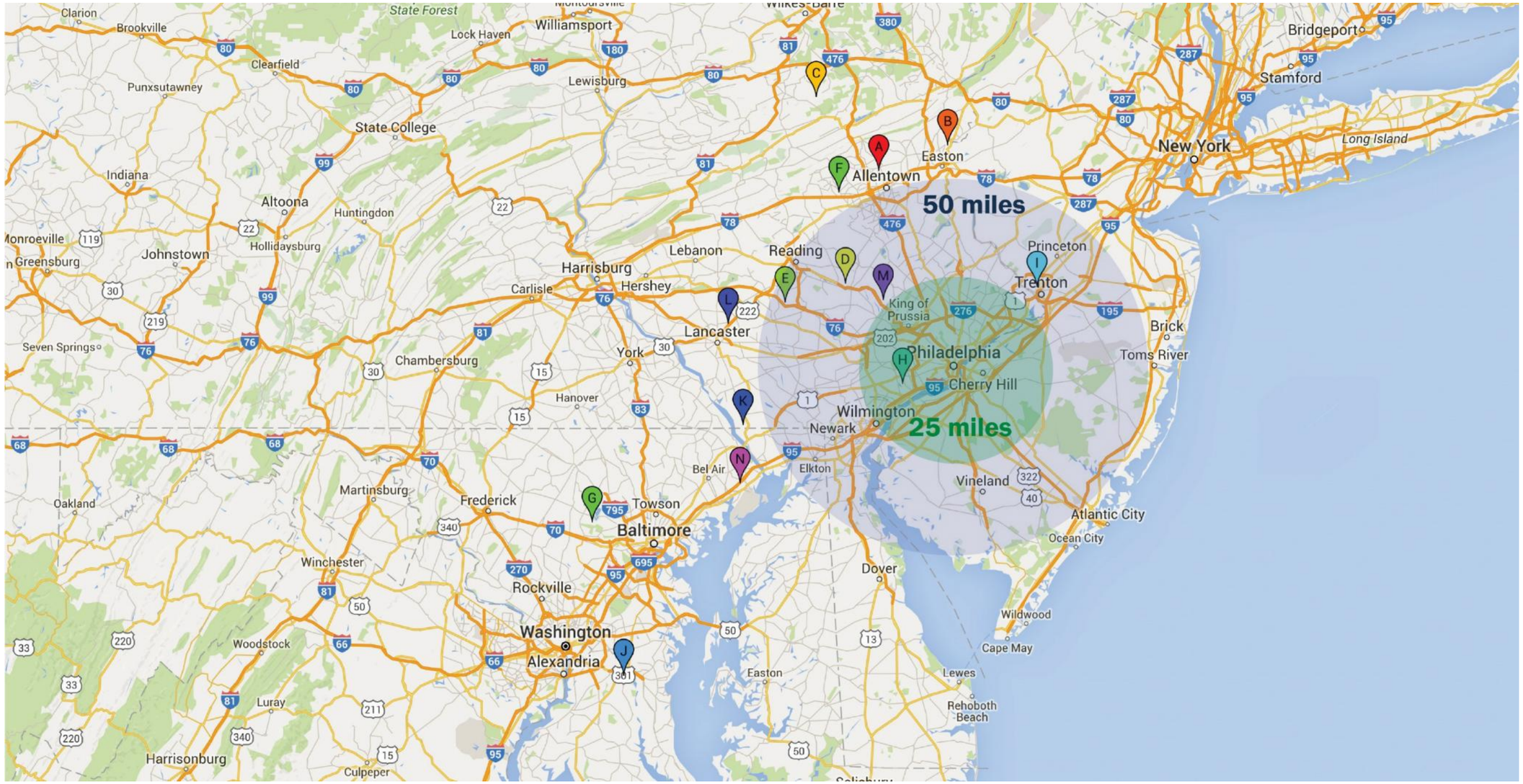
YW	**West Chester**	Chester, PA	24.8	Yes	Yes, Permit-by-rule	106 tons	N/A	Leaves, yard waste, brush tree trimmings and limited grass	No	Windrow and turn-leaves, grind brush and tree trimmings	Leaves, yard waste, brush tree trimmings and limited grass	No	No	Compost and mulch	Residents pickup/self-load , contracted compost site operator receives remaining product as per agreement	No	No
YW	**Warwick Green Grinders**	Warwick, PA	25.5	No	Unknown	N/A	Fluctuates - product in and out	Brush, tree trimmings, green wood waste	No	Processing, grind wood waste for production of mulch	Brush, tree trimmings and green wood waste	Yes - By vehicle size - 12 foot stake body - $20.00 Brush 14 foot - $25.00 16 foot - $30.00	No	Mulch used for decorative and soil amendment	Pickup at site	Natural mulch - $18.00 per yard, dried mulch $21.00 per yard	Yes, Brush , no quantities specified
YW, (Leaves only)	**Schuylkill Township Compost Site**	Schuylkill, PA	25.9	Yes	Yes, Permit-by-rule	N/A	N/A	Leaves	No	Windrow and turn leaves	Leaves	No	No, leaves only	Compost	Pickup at site, free to residents	No	No
WY	**Borough of Phoenixville**	Phoenixville , PA	26.7	Yes	Yes, Permit-by-rule	N/A	N/A	Leaves, brush	No	Grind leaves and brush. windrow and turn	Leaves, brush	No	Only noted materials	Mulch	Pickup at site, three yards of mulch free to residents	Yes, $16.00 per yard or to residents after initial 3 yards free	No
YW	**Lower Makefield Township Compost Site**	Lower Makefield, PA	28.3	Yes	Yes, Permit-by-rule	N/A	N/A	Leaves, Christmas trees	No	Grind leaves, windrow and turn	Leaves, Christmas trees	No	Leaves only	Mulch	Pickup only	No	No
YW	**Mascaro Composting**	Franconia, PA	28.5	Yes	Yes, Permit-by-rule	6,000 cubic yards	N/A	Leaves, yard waste, brush, tree trimmings	Not at present	Windrow and turn-leaves, grind-brush and tree trimmings	Leaves, yard waste, brush, tree trimmings	Not available	Only noted materials	Compost, mulch	By contracted operator	Yes, Fee schedule not available	Yes,Leaf and yard waste, depending on available capacity
YW	**Waste Management Warner East Compost**	Morrisville, PA	29.1	Yes	General permit	20,000 tons	N/A	Leaves, yard waste, grass (limited), tree trimmings, clean wood	possible-no timetable	Windrow and turn, horizontal grinders used for processing of green wood waste	Leaves, yard waste, grass (limited), tree trimmings, clean wood	Yes, Fee schedule was not provided	Only noted materials	Compost, mulch	Handled by contracted operator - L & S Contractors, materials sold at site and delivered	Yes, Fee schedule not provided	Yes, Leaf and yard waste depending on available capacity
YW	**East Pikeland Township Compost Site**	East Pikeland, PA	30.6	Yes	Yes, Permit-by-rule	2,500 cubic yards	N/A	Leaves, grass, brush, Christmas trees, tree trimmings	Yes	Windrow and turn	Leaves and grass, brush and tree trimmings	No	Only noted materials	Mulch	Pickup, self load for residents only, and delivery	Yes, Self load for residents - no charge, four yards of mulch, $50.00 for residents only	No
YW, SP	**Barnside Farm**	Schwenksvil le, PA	32.6	Yes	Yes, Permit-by-rule	10,000 cubic yards	5,000 cubic yards	Leaves, grass, sod, manure, yard waste, brush, tree trimmings and stumps	Yes, To the extent pratical, based on demand for services and products	Windrow and turn-leaves, grind-brush and tree trimmings	Leaves,grass, sod, manure, yard waste, tree trimmings and stumps	Yes, On site scale, per ton fee. Leaves - $24.00 ($10.00 minimum fee trucks, $5.00 car) Yard waste - $40.00 ($20.00 minimum fee) Mixed load - $40.00 ($25.00 minimum fee) Fill dirt - Pending truck size $55.00 - $75.00 per load Sod and top soil - Free with no red color Stumps - $100.00 per ton Mixed load (stumps and yard waste) -	Only noted materials	Compost, mulch, topsoil	Pickup at site or delivered	Yes, By the cubic yard Compost - $32.00 Mulch - $28.00 Top soil - .$30.00	Yes, Depending on available capacity

APPENDIX #5

REGIONAL MARKETPLACE EXHIBITS – STUDY AREA AND PROCESSOR CONTACT LOCATIONS

Regional Marketplace: Food Waste Facilities

Responsive Facilities



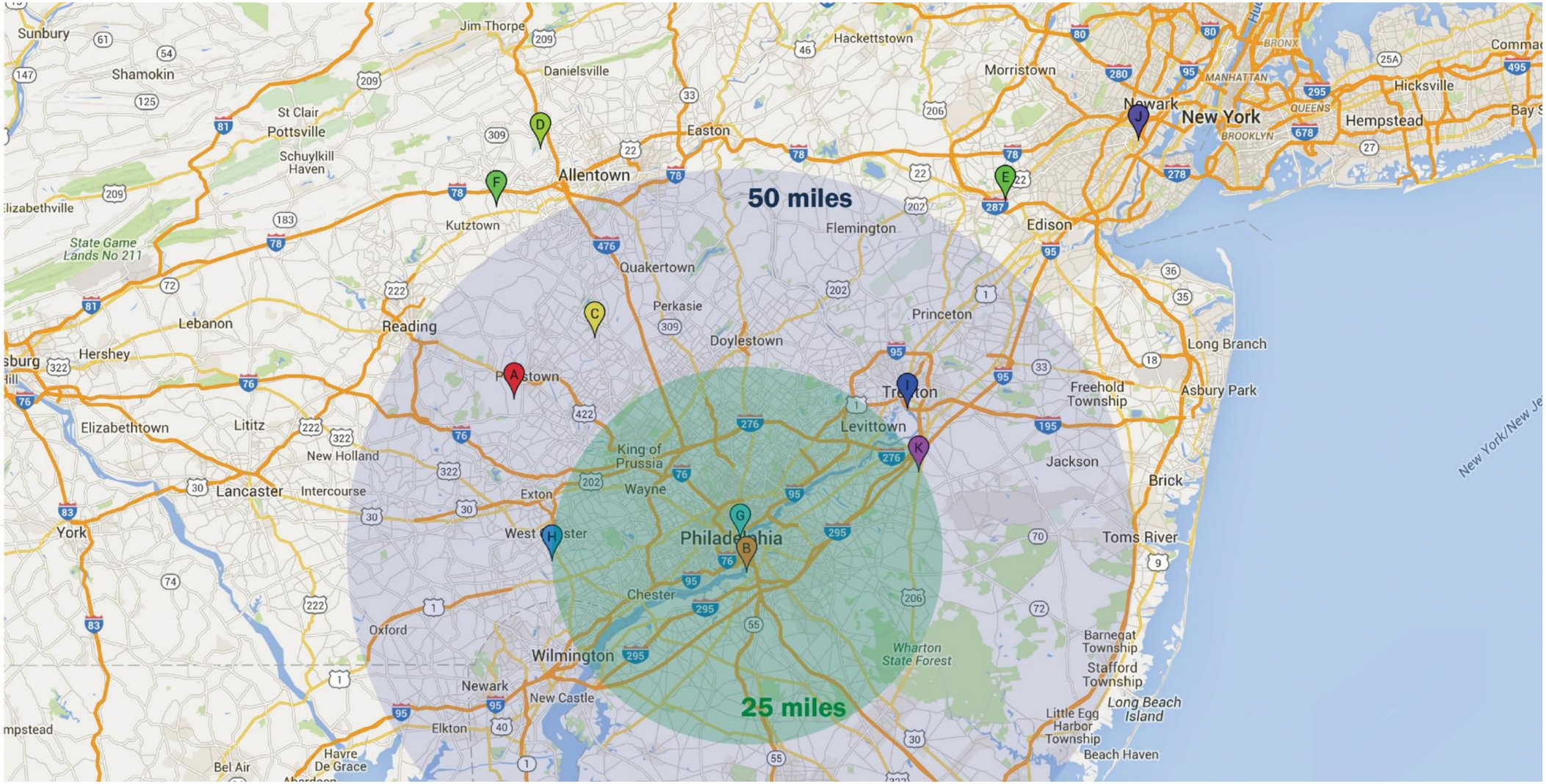
A: FCS Partners, LLC - Haines & Kibblehouse, Inc.: ABE Materials, Allentown
B: FCS Partners, LLC - Haines & Kibblehouse, Inc.: ABE Materials, Easton
C: FCS Partners, LLC - Hazleton Material Composting Facility
D: FCS Partners, LLC - Pottstown Trap Rock Composting Facility
E: FCS Partners, LLC - Silver Hill Quarry
F: Four Springs Farm
G: Howard County Pilot Composting Facility
H: Linvilla Orchards
I: Premier Food Waste Recycling
J: Prince Georges County Yard Waste Composting Facility
K: Terra-Gro: Graywood Farms
L: Terra-Gro: Oregon Dairy
M: Two Particular Acres
N: Veteran Compost

Identifying Information

MSW CONSULTANTS

Regional Marketplace: Food Waste Facilities

Unresponsive Facilities



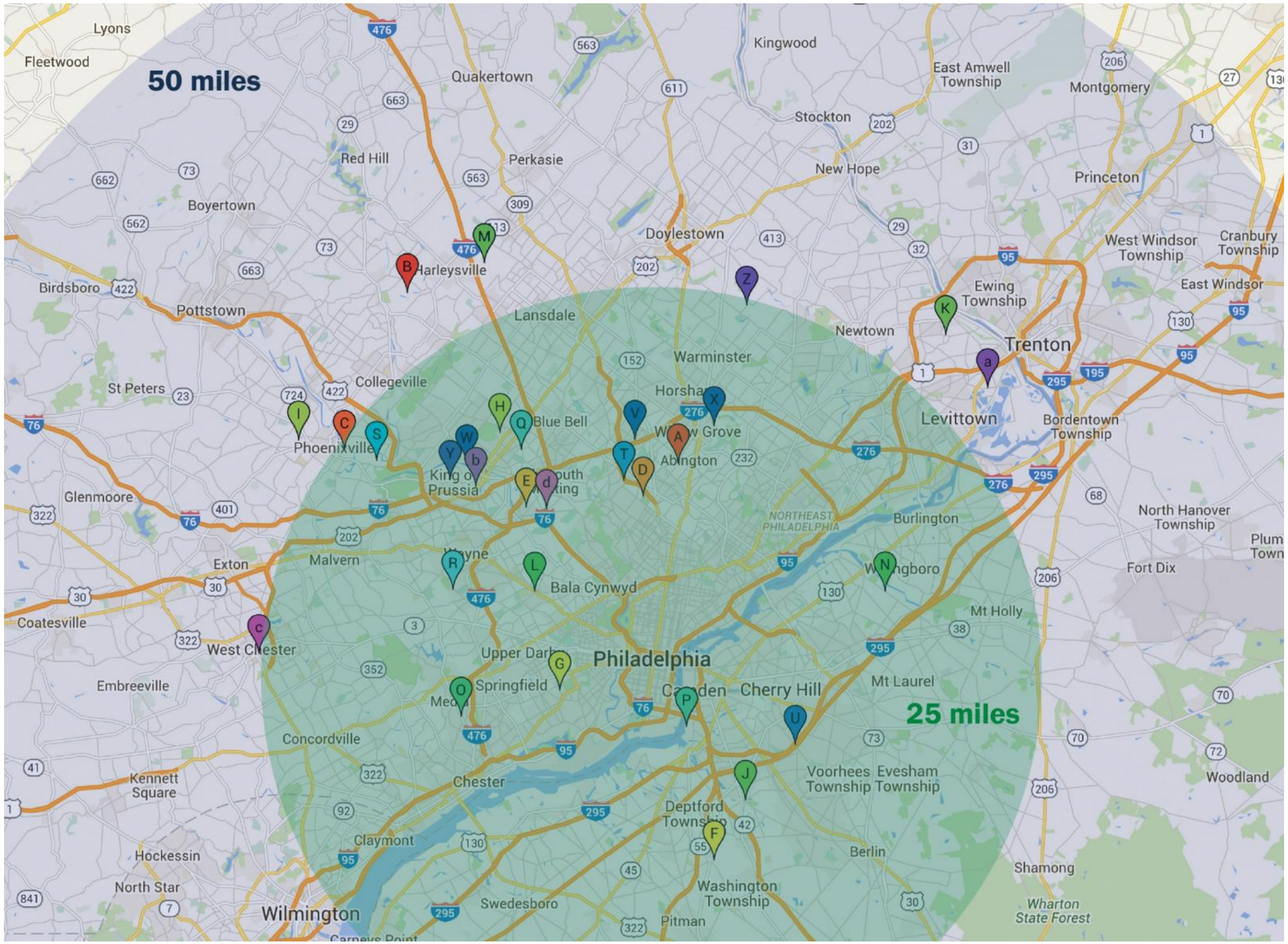
A: Arborganic Acres
B: Gloucester City Organic Recycling, LLC
C: Hidden Creek Stock Farm
D: Lehigh County Organics Recycling Facility
E: Republic Services of NJ, LLC d/b/a Midco Waste
: Rodale Institute
G: Save Some Green
H: Thornbury Farm
I: Trenton Biogass, LLC
J: Waste Management of New Jersey, Inc.
K: WeCare Organics Burlington Co. Co-Composting Facility

Identifying Information

MSW CONSULTANTS

Regional Marketplace: Yard Waste and Soil Processing Facilities

Responsive Facilities



A: Abington Township Composting Site
B: Barnside Farm
C: Borough of Phoenixville
D: Cheltenham Township Compost Site
E: Conshohocken Borough Compost Site
F: County Conservation Co. LLC
G: DCSWA Compost Farm
H: East Norriton Twp. Norristown Farm Compost Site
I: East Pikeland Township Compost Site
J: Gloucester Township Municipal Utilities Authority Compost
K: Lower Makefield Township Compost Site
L: Lower Merion Township Compost Site
M: Mascaro Composting
N: Moorestown Compost
O: Nether Providence Township Recycling Center/Highway Yard
P: Organic Diversion, LLC (Currently being developed)
Q: Plymouth Township Compost Site
R: Radnor Township, Skunk Hollow site
S: Schuylkill Township Compost Site
T: Springfield Township Compost Site
U: Triboro Sand & Stone, Inc.
V: Upper Dublin Township Compost Site
W: Upper Merion Township Compost Site
X: Upper Moreland Township Compost Site
Y: Valley Forge Fill Site
Z: Warwick Green Grinders
a: Waste Management Warner East Compost
b: Wayne Carmint Landscaping, Inc
c: West Chester
d: Whitemarsh Township Compost Site

APPENDIX #6

ORGANICS PREPROCESSING OPTIONS FOR ANAEROBIC DIGESTION TREATMENT

Alternative Resources, Inc.

Corporate Headquarters

1732 Main Street
Concord, MA 01742
Tel (978) 371-2054
Fax (978) 371-7269

www.alt-res.com

MEMORANDUM

1819 Task 2

TO: Municipal Solid Waste Consultants

FROM: Alternative Resources, Inc.

DATE: June 29, 2016

SUBJECT: Assessment of Food Waste Co-Digestion and Delivery Options

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ARI has prepared this memorandum to assess the City Water Department's ability to accept food waste at water pollution control plants (WPCP's) for processing in anaerobic digesters. The memorandum also provides additional analysis of potential food waste delivery options to the WPCP's by in-sink food grinders and by curbside or roll-off collection.

Co-Digestion at WPCP's

A 2014 report issued by the USEPA ("Food Waste to Energy: How Six Water Resource Recovery Facilities are Boosting Biogas Production and the Bottom Line") profiled the experience with co-digestion at the following WPCP's:

- Central Marin Sanitation Agency (San Rafael, California);
- East Bay Municipal Utilities Authority (San Francisco, California);
- Hill Canyon Wastewater Treatment Plant (Thousand Oaks, California);
- Sheboygan Regional Wastewater Treatment Plant (Wisconsin);
- West Lafayette Wastewater Treatment Utility (Indiana); and
- Janesville Wastewater Treatment Facility (Wisconsin).

Feedstock for the co-digestion process at these plants ranged from fats, oils, and grease (FOG), various sources of post-consumer commercial waste, and chocolate waste Pre-processing steps to prepare feedstock for anaerobic digestion varied among the plants and feedstock source including such activities as removal of large objects and metal, sorting, and grinding. The anaerobic digester capacity at these facilities ranges from 1 to 22 million gallons per day. Survey results provided by the facilities indicated that estimated pay-back periods ranged from 0-12 years considering required capital investment, revenue from tipping fees, energy-derived savings, and funding assistance. Overall, the report noted that

addition of food waste for co-digestion is receiving increased attention and is becoming more common.

The Philadelphia Water Department (PWD) operates three WPCP's in the City. Biosolids generated by the WPCP's are processed at a Biosolids Recycling Center (BRC). At the BRC, the biosolids are dewatered, dried and pelletized. The resulting product, Philadelphia Renewable Bio-Fuel (PRBF), is marketed as a fuel source for cement manufacturers and for agricultural uses.

Anaerobic digestion capacity is available at two of the WPCPs, Northeast and Southwest. AD capacity at the Northeast WPCP is equivalent to 16 million gallons of capacity. Gas containing 63% methane generated in the digesters is stored, purified (hydrogen sulfide removal), compressed, further purified (siloxane removal) and used to fuel four gas engine-generators each producing approximately 1.4 MW of electricity.

AD capacity at the Southwest WPCP is equivalent to 24 million gallons of capacity. Biogas generated at the Southwest WPCP is primarily used for space heating and to maintain temperature within the AD system. Excess digester gas is delivered by pipeline to the BRC for use in the drying process.

PWD has been accepting aircraft deicer fluid from the Philadelphia International Airport for co-digestion at the Southwest WPCP since 2008. PWD is now actively investigating anaerobic digestion of food waste at their existing WPCP's.

Food Waste Delivery Options

Food Grinders

In 2012 and 2013, the City of Philadelphia collaborated with InSinkErator® on a demonstration project to gather information on the use of garbage disposers in residential homes to reduce the amount of solid waste disposed and to increase the amount of organic waste sent to the City's WPCP's. The demonstration project involved the installation of food waste disposers in selected homes in two neighborhoods in Philadelphia. Community education events were conducted to encourage the residents to use the food waste disposers effectively.

In order to measure the reduction in food waste, conventional waste composition audits were conducted. Audits were conducted prior to the installation of the food waste disposers, and, for comparison purposes, approximately one year after the installation of the food waste disposers. A baseline audit was conducted of homes in the targeted neighborhoods and a final audit was conducted only for the homes with the food waste disposers installed.

At the completion of the study, a survey of the residents indicated that a significant majority reported a reduction in the amount of garbage thrown away on a weekly basis and use of

the food disposers for food scraps. The results of the waste composition audits revealed that the weight of the food waste in garbage was reduced by approximately one-third.

The study noted that in addition to increased biogas production by PWD, a reduction in disposal of residential food waste by 19,000 tons annually and a corresponding reduction in waste disposal fees of $1.1 million annually could be achieved if waste disposers were utilized in homes and apartments throughout the City similar to the target areas. In December 2015, the City enacted an ordinance amending the Philadelphia Building Code to require that in-sink food disposers be installed as part of issuance of building permits for new residential construction.

Curbside or Roll-off Collection

PWD indicates that space is not available at the WPCP's to locate pre-processing equipment for curbside or roll-off collection of food waste and this required step would need to be accomplished off-site for this delivery option. PWD has conducted a survey and preliminary analysis of a range of potential pre-processing systems.

Specialized and proprietary equipment and systems are becoming available for pre-processing source separated food waste including DODA technology, an organic extraction press (OREX™) and other technologies from Anaergia, and a Centralized Organic Recycling equipment (CORe®) process from Waste Management.

DODA

DODA offers organic waste solutions by manufacturing a variety of products for municipal solid waste and other applications. These products include bio-separators anaerobic digester mixers, rotary sludge thickeners, centrifugal chopper pumps, screw separators, and roller separators.

Anaergia

The Anaergia Organics Extraction (OREX) technology features a hydraulic press for separation of waste into biogenic and non-organic fractions and an organics polishing system for removal of plastic film and grit. Anaergia also offers retrofit technology (Omnivore™) consisting of high solids mixers and recuperative or pre-thickening systems for existing anaerobic digesters to increase capacity.

Waste Management

Waste Management's proprietary and patent pending Centralized Organic Recycling equipment (CORe®) process produces an Engineered BioSlurry A bioseparator separates organic source material from inorganic waste (plastic, packaging etc.)

A literature survey was performed but did not provide any publicly available information on the costs associated with pre-processing for co-digestion. Costs would depend on the characteristics of feedstock, types of contaminants, and contaminant levels, among other factors.

After preprocessing, slurry can be delivered to an existing WPCP by tanker truck. Receiving and, if necessary, storage provisions for the slurry would need to be made available at the WPCP site. An organics collection analysis will be performed as part of the Organics Feasibility Study to analyze infrastructure changes needed to facilitate organics collection in the City for the preferred processing system(s).

The Effect of Food Waste on Nitrogen Levels

The potential impact of increased nitrogen loading to WPCPs from food waste processing is being researched by PWD and is recognized as an important concept that requires further analysis.

PHILADELPHIA ORGANICS FEASIBILITY STUDY

PADEP SECTION 901 PLANNING GRANT

PROGRESS REPORT – 7-1-2016 THROUGH 6-30-2017

1 901 PADEP PLANNING GRANT SCOPE

The Philadelphia Organics Feasibility Study, Section 901 Planning Grant scope, as originally approved, has five tasks, namely:

- Task 1 – Project Initiation and Data Gathering – Review available information on the types and sources of organics generated in the City of Philadelphia, and create 10-20 year projections of quantities of organic materials that may be generated from sources within the City.
- Task 2 – Organics Marketplace Assessment – Identify organics processors within the region. Survey regional yard waste and organics processors, and assess capability and interest from these processors in accepting additional yard waste and/or organics from City sources.
- Task 3 – Assessment of Organics Processing Options – Including Fairmont Park, the Philadelphia Water Department, and other existing and potential options for accepting significant quantities of City organics.
- Task 4 – Organics Collection Analysis – Based on targeted sources of organics and available or potential processing options, perform a collection analysis for those targeted materials.
- Task 5 – Report – Prepare a draft report, and then finalize the project report in consideration of comments received.

During the period of work on this study through 6-30-2016 (called "Phase 1" of the organics study), it became evident that the existing regional private organics processing marketplace has neither the capacity nor the current interest in accepting an estimated 50,000 - 100,000 tons of segregated organics from the City of Philadelphia. This has resulted in restructuring and broadening this study to assess in further detail the prospects for expanding the current and potential capacity of the public infrastructure in the City to handle additional organics.

Recently, other large cities in the northeastern US, notably the cities of New York and Washington DC have advanced their own organics diversion and recycling programs, offering potential guidance and "lessons" for the City of Philadelphia to review and learn from. And the City itself has recently advanced new initiatives of its own for waste reduction and sustainability that impact the focus of this Organics Study.

The organics study was temporarily paused on July 1, 2016, allowing the City to eventually contract directly with MSW Consultants for completion of the study. During the period of July 1 2016 through April 2017, MSW Consultants continued to work with the City to help refine the direction and scope of the remainder of the study (now called "Phase 2"), in light of the findings of Phase 1 that occurred through June 30, 2016, as well as changing priorities and City directives noted above.

Phase 2 focuses more on possible public solutions for organics recovery that are targeted and practical, in light of the limited available private marketplace infrastructure options; also included is insights into ways to stimulate long-term private interest in growing the organics management infrastructure in the region.

While the focus of Phase 2 of this study has been restructured, we are still mindful of the original tasks of the 901 grant, and have worked to reemphasize certain tasks within this scope, refocusing project budget to address changing needs of the City (and, with an expanded City project budget, to address new identified needs of the study).

2 ORGANICS STUDY PROGRESS ACTIVITY 7-1-2016 THROUGH 6-30-2017

Progress to date on the study, from 7-1-2016 through 6-30-2017 (some of this activity reflecting new and refocused directives of the City), is as follows:

2.1 TASK 1 – PROJECT INITIATION AND DATA GATHERING

MSW Consultants (MSW) initiated its review of other regional organics programs, including the New York City, Washington DC and other programs. Also, MSW presented the organics projections developed under Phase 1 to the Organics Subcommittee of the SWRAC on 2/21/2017.

2.2 TASK 2 – ORGANICS MARKETPLACE ASSESSMENT

MSW has identified several key private regional infrastructure sites that may be important to this study, but that have been unresponsive or unavailable to give feedback date. Site visits to several sites are planned for late 2017.

2.3 TASK 3 - ORGANICS PROCESSING OPTIONS

MSW is pursuing public organics infrastructure options further, and conducted initial site visits to the Fairmont Park yard waste composting site, to the Pennypack Park/Krewstown Road brush management site, and to the Philadelphia Department of Corrections Aerated Static Pile composting site. Further assessment and evaluation of City sites for expanded organics processing under a restricted Phase 2 analysis is planned for fall of 2017.

The Philadelphia Water Department (PWD), with two anaerobic digesters (ADs) that may have significant capacity to accept pre-processed organics, and that may add significant public-sector organics processing capacity in the Philadelphia region, was generally unresponsive to information requests during most of Phase 1. Since then, the PWD has been advancing its own initiatives to solicit organics preprocessing capabilities, with organics to be delivered to the PWD AD facilities for processing and methane production (FRP issued by the PWD summer of 2017). MSW plans to visit the PWD AD sites in the fall of 2017, and to keep abreast of potentially significant organics processing infrastructure capacity additions from this public resource.

2.4 TASK 4 - ORGANICS COLLECTION ANALYSIS

A reduced-scale City collection system analysis is planned under this task (summer/fall 2017), focused primarily on yard waste collection system capacity and expansion needs. Some budget initially assigned to this task has been redirected to other tasks and subtasks with higher identified priorities in the Phase 2 study.

2.5 TASK 5 - REPORT

Minimal effort was expended on this task during the reporting time period.

2.6 PROJECT MANGEMENT AND COORDINATION

Effort here involved coordination with City representatives (calls and meetings), preparation and attendance at the 2/21/2017 Organics Subcommittee meeting to present Phase 1 findings and Phase 2 refocusing details, and project management related to the project.

MEETING NOTES: City of Philadelphia Solid Waste and Recycling Advisory Committee (SWRAC), ORGANICS RECYCLING SUBCOMMITEE

DATE: February 23, 2016

ATTENDEES:
Paul Kohl, PWD
Adam Hendricks, PWD
Emily Hill, PWD
Shante Mason, PWD
Laura Cassidy, Philadelphia Prisons System
Kendall Christiansen, Gaia Strategies
Nic Esposito, Philadelphia Parks and Recreation
Marisa Lau, Streets Department
Tim Bennett, Bennett Composting, Inc.
Mike Giuranna, US EPA Region 3
Michelle Feldman, Keep Philadelphia Beautiful
Fern Gookin, Revolution Recovery
Phil Bresee, Streets Department/Recycling Office
Terry Keene, MSW Consultants
Marc Wilken, Philadelphia Parks and Recreation

The meeting was called to order at approximately 9:00 a.m. It began with introductions and acceptance of last month's meeting notes with no changes, which will be forwarded to the large SWRAC.

Additional FWD Information:

- Paul began with a brief discussion of some calls he's received regarding the new FWD law.
  - NYC is reevaluating the use of FWD after a Citizen's Budget Commission report that showed high costs for food waste curbside collection (when compared to sink/FWD disposal). Multiple NYC agencies have contact PWD for our opinion.
  - Pittsburg also contacted PWD for feedback on the FWD law.

Update on Streets Feasibility Study:

- Terry Keene discussed the status of the study, providing an updated outline of the work plan.
- PADEP grant funding has been secured and grant is in final processing stages
- Streets and Terry are finalizing organics generation numbers and working out future projects based on estimated population and employee growth projections.
  - Organics (including food, woody debris, and soiled paper) is approximately 31% of the total waste stream.
  - This estimate is based on information from 2010 waste sorts for residential waste and comparative averages from similar municipalities for commercial waste.
  - This equates to approximately 400,000 tons/year of total compostable garbage, including:
    - 240,000 tons/year of food waste from all waste streams
    - 55,000 tons/year of food waste from the residential waste stream
    - 55,000 tons/year of yard/green waste from the residential waste stream

    - 25,000 tons/year of soiled paper from the residential waste stream
- Terry asked PWD if we have information on projections of FWD installations, past or present. A number of 3,000/year is estimated with the new law, but that is not certain. PWD will try to find more information on this if it is available.
- The next step in the feasibility study is a marketplace assessment for organics disposal. Terry circulated a draft list of 27 facilities they are conducting surveys with, and asked the group for additional feedback on the list.
- Parks & Rec asked Terry if he had any sources on composting invasive and weed seeds that would help to limit the spread of those materials. Terry said that the state general permit GP-30 has time and temperature recommendations for composting weed seeds. Parks is also concerned about green waste from vacant brownfield sites – potential for heavy metal contamination from soil. They are not sure if there are opportunities for composting that waste, but they are not including in their facility as of now.
- Parks & Rec also mentioned that they are evaluating their ability to expand composting at their Fairmount Park facility to include food waste from within the "captive area," which would include all facilities within park boundaries (art museum, Mann center, etc.). They are also interested in opportunities to expand organics recycling to rec centers and their summer foods programs.
- The surveys should be complete within the next month. It will potentially also include some market rates for organic recycling, if possible.
- Following the marketplace assessment, they will begin work on an assessment of processing options, including site visits and technological options. They will then conclude with research on collection opportunities for targeted market sectors.
- Draft report is anticipated in late summer, with a final version in the fall.

Wrap Up Information:

- PWD is currently researching food waste pre-processing technologies. Would like to present some findings at next month's meeting.
- Terry Keene will forward specific data request to team regarding food waste capacity at PWD.

Next month's meeting is scheduled for March 22 at 9 AM. It will be held at PWD offices located at 1101 Market Street, on the 3rd floor (Conference Room 3A).

MEETING NOTES: City of Philadelphia Solid Waste and Recycling Advisory Committee (SWRAC), ORGANICS RECYCLING SUBCOMMITEE

DATE: February 21, 2017

INIVITEES:
Adam Hendricks, PWD
Emily Hill, PWD
Paul Kohl, PWD
Fern Gookin, Revolution Recovery
Mike Giuranna, US EPA Region 3
Laura Cassidy, Philadelphia Prisons System
Nic Esposito, MDO
Kendall Christiansen, Gaia Strategies
Marisa Lau, Streets
Marc Wilken, Parks and Rec
Scott McGrath, Streets
Terry Keene, Keene Environmental Consulting LLC

The meeting was called to order at approximately 9:10 a.m.

Opening Remarks:

- Paul Kohl started off the meeting with a discussion of some existing anaerobic digestions issues across the nation.
  - New York Times recent article about new AD facility in New York: https://www.nytimes.com/2017/02/15/magazine/the-compost-king-of-new-york.html

Update on organics feasibility study

- Terry Keene provided the group with an update on the organics feasibility study.
- On June 30th 2016, a progress report was sent to the PADEP that summarized the work done to date.
- Terry passed around a summary sheet of the study, including some estimates of existing waste streams
  - There was a lot of discussion around the estimated amounts of organic wastes from different sectors, specifically questions regarding the soiled paper estimates and the residential yard/wood waste numbers
  - Another question regarded the commercial organic waste breakdown. More clarity was asked regarding the 43% number of "other commercial sources".
  - Terry mentioned he could share some of the background data that made up these tables, which might answer some of these questions more directly.
- Scott updated the group that the spring trash waste sort is currently underway, and a recycling waste sort was completed last month. A second waste sort will be conducted in the fall.
- These sorts could help firm up some of the projections of waste breakdowns in the city.
- Next Terry passed around a map of the regional facilities for yard waste and food waste that were contacted for this study. About 30 yard waste facilities and 14 food waste facilities were responsive.

- The response indicated that most facilities were maxed out on capacity (80-100% used) and did not have plans for expansion and much of their capacity was reserved for local municipalities. Even within this survey there was a very limited marketplace for food waste, opposed to leave and yard waste. PWD's plants are currently the largest opportunity for food waste disposal in the region.
- For the next part of the study, Terry will take a closer look at the Fairmount Park facility for expansion opportunities for additional yard waste and food waste composting. They would need additional resources however for any expansion.
- A brief discussion broke out on the technical mechanics of food waste composting, or what is the ideal recipe for mixing food and yard waste into compost.
- Next, a brief discussion on NYC's efforts was had. Waste management is having difficulty sourcing food waste; they are more expensive than other composting facilities in the region. Waste management also does not collected refuse in NYC.
- NYC's residential collection efforts has expanded to 500k households, but can cost over $1,000/ton for collection as they only end up with 1-2 tons per truck.
- Additional potential sites for future composting opportunities in Philadelphia were explored:
    - A site near the north entrance of the Navy Yard
    - A site near Bartram's Gardens (owned by PIDC)
    - A site up on Krewstown Road
- Terry will look into these sites with assistance from Marisa and Nic
- Beyond that, Terry is finishing up the re-scoping of the study. He is hoping to have a finished report by the end of the calendar year.

Concluding Remarks:

- Marc mentioned that he has been meeting with the PADEP regarding the Fairmount Park facility
    - He had a good meeting with the Norristown division
    - Fairmount is moving toward a capture permit
    - DEP has stated they are fine with this move as long as there are no odor/vector complaints.

Next month's meeting will be March 14th from 9:00-10:00 AM. We will now meet on Tuesdays the week before the SWRAC meeting to work with a conflicting meeting. It will be held at PWD offices located at 1101 Market Street, on the 3rd floor (Conference Room 3A). [Meeting notes addition, this meeting was canceled by snow day]

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