Improving Solid Waste Practices in the City of College Park

Three-Year Plan (2015- 2018)

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An initiative of the National Center for Smart Growth

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Executive Summary

Introduction

The scope of this Capstone project at the University of Maryland involves analyzing current solid waste practices in the city of College Park and recommending improvements. The results of our research are summarized in a three-year plan that will be presented to the city for future implementation. We developed this three-year plan in cooperation with the Partnership for Action Learning in Sustainability (PALS) for the city to follow in reaching a waste reduction goal.

Current Situation

Maryland residents generate more municipal solid waste (MSW) than the average American. While the average American generated about 4.4 pounds of MSW per person per day in 2012, Maryland residents generated approximately 6.11 pounds of MSW per person per day. Appendix A outlines the 2011 Municipal Solid Waste (MSW) composition in the United States. Because Maryland is densely populated, current MSW collections are rapidly approaching maximum landfill capacities (MDE 2009).

Our project analyzes current operations in the city of College Park to reduce the amount of waste entering the local landfill located in Prince George's (P.G.) County. According to the 2014 Maryland Zero Waste Plan, the P.G. County Brown Station Road Landfill has space for about 3,648,161 tons of waste. If waste generation remains constant, it is projected that the county will reach landfill capacity by 2021. A solution must therefore be found to reduce the amount of trash that is stored in this landfill. Otherwise, the city of College Park will have to look for alternative options for storing their waste.

College Park is different from most cities because there are more resident students from September to May, as opposed to June through August. However, this does not make any notable changes to the amount of waste the city collects throughout the year. Instead, the waste fluctuates monthly, resulting in seasonally-run Department of Public Works (DPW) composting operations.

The waste is currently collected by the DPW and is sent out to the Waste Management Recycle America recycling center or the P.G. County landfill to either be processed or dumped. The city also has a moderately sized, 4-acre composting operation at the DPW facility that primarily uses yard waste and leaves. The compost is then sold to residents and businesses, generating revenue that offsets tipping fees. These tipping fees are costs the city pays for each trash truck that unloads at the landfill, so sending fewer trucks to the landfill equates to overall savings.

The Zero Waste Approach

As stated in the Zero Waste Maryland document, "*Zero waste is an ambitious, long-term goal to eliminate the need for disposal of solid waste…, it involves looking at solid waste and wastewater and finding ways to incorporate different products and designs to ensure that no waste is produced.*"

Achieving zero waste requires significant changes to occur both legislatively and behaviorally. For this reason, zero waste objectives are typically mid- to long-term goals that tend to cover 10 to 40 year periods. In 2014, the state of Maryland established long-term goals to achieve 80% of recycling and 85% of waste diversion by 2040.

The City of College Park and Maryland's Zero Waste Strategic Plan

With a population of about 31,000, the city of College Park is on target to meet the Maryland Zero Waste Plan waste diversion and recycling percentages for areas with populations under 150,000. Our plan envisions that College Park should be on target to meet Maryland's Zero Waste Plan goals by achieving 7 to 8% reduction in net MSW generation, and 7 to 8% increase in recycling rates by the end of the three years.

For the state to reach its goal, it has to funnel down its efforts to the local city level. As such, the city of College Park has embarked on this endeavor to begin a short-term plan initiative to achieve zero waste by 2040. Long-range waste reduction policies are a logical, economically viable, and important alternative to help free the city of College Park from its current dependence on Brown Station Landfill. But this requires time and effort to change, and in order to be effective, it is vital to undertake this endeavor with careful planning. Moreover, these policies must be phased in slowly to provide businesses, residents, and students at the University of Maryland adequate time to adjust to any implemented changes.

Our three-year plan focuses on improvements regarding education, outreach, and composting. More specifically, this plan details a short-term timeline to analyze the city's current composting and mulching operations to reduce waste and help train permanent and temporary residents of College Park properly recycle and compost.

Challenges Regarding Zero Waste Adoption

Adopting Maryland's Zero Waste Plan on a city-wide scale presents several challenges. The key to successful implementation involves educating residents about waste reduction and effectively reinforcing related policies. Educating a constantly changing population of residents is an issue that must be addressed, along with the associated financial and time costs inherent in policymaking and enforcement.

Improving Solid Waste Practices in the City of College Park Three-Year Plan (2015 – 2018)

1. Introduction

1.1 What is Zero Waste?

"Zero Waste is a philosophy that encourages the redesign of resource life cycles; is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use (Zero Waste Alliance, 2015)."

The Zero waste plan is an ambitious, long-term goal to eliminate the need for solid waste disposal (Maryland Zero Waste Plan 2014). This involves looking at the life cycle of products and redesigning, or finding, new ways to reuse or recycle them once they are no longer in use. It also looks at how items are disposed, whether that be through composting, recycling, or direct landfill disposal.

1.2 The Hierarchy of Zero Waste

Reducing trash generation at the source of production is the most effective way to achieve "zero waste." The effectiveness of waste reduction at production makes it the highest priority in the zero waste hierarchy. As such, the city should target how items are produced, and further inform consumers of proper recycling, composting, and disposal techniques. If producers become more sustainable by using less resources during the production phase, ensure that a greater percentage of their products are recyclable, and participate in effective backyard composting practices, then they can effectively reduce the amount of waste that must be disposed.

Consumers also play a vital role in source reduction. They choose the products they purchase for use and have the power to change how companies produce their goods in response to consumer preference. By purchasing products that use less materials or packaging, and items with more recyclable components, consumers are preventing a significant amount of waste from

immediately ending up in an incinerator or a landfill. They also change the way that production companies produce materials since the demand for more sustainable products is increased.

The next step of importance in the zero waste hierarchy is reuse. By reusing certain items instead of purchasing new ones, the need for increased production is reduced. Less production equates to less produced waste, and reusing a product means that even more material is diverted out of the waste stream. Reuse also extends the lifetime of certain products, reducing the need to purchase new material.

Some items are, however, a one-time use product. Because not everything can be reused, the next components down in the zero waste hierarchy are recycling and composting. By taking a product and recycling it, material is reused as a new product. Composting is a different form of recycling that involves separates items into their natural, more degradable elements. A majority of food waste and paper products can be composted and turned into nutrient-rich soil that can then be used in community gardens or local lawns.

Waste reduction may also be achieved through energy recovery. This is typically through processes such as anaerobic digestion, gasification, or landfill gas capture (U.S. Environmental Protection Agency 2013). Using an energy recovery process allows for the energy that initially went into producing the product to be used in other processes, thereby reducing total energy use in product development.

Finally, if none of the previous options are suitable, the waste must be disposed of in a landfill. This option is the last resort for waste disposal since little energy can be recovered once the waste is at the landfill. However, landfill space is rapidly decreasing and constructing new landfills is not an effective use of land and does not solve the long-term issue of waste disposal.

2. Background Analysis

2.1 How Much Waste is Produced in College Park, MD?

In 2014, the total amount of waste collected by the City of College Park Public Works was 9,700 tons, including trash, special trash, single stream recycling, yard waste and in small amounts e-cycling, scrap metal and tires. Detailed data of the collection, by month can be found in Appendix B.

2.2 Where Does College Park's Waste Come From?

The city of College Park collects waste from 4,400 units comprised of single-family homes and townhouses, and 53 units at 2 condominium complexes. Additionally, waste is also collected from 33 businesses, 7 of which are churches.

Because the city can accommodate a surplus of leaves, College Park accepts leaf litter from other municipalities for their composting operation. In addition to their residents, College Park, in 2014 collected 2,118 tons of yard waste from Berwyn Heights, Cottage City, Edmonston, Laurel, Mt. Rainier, New Carrollton, Riverdale Park, The University of Maryland, and University Park. Brentwood, Colmar Manor did not drop their yard waste last year.

2.3 Where Does College Park's Waste Go?

The waste, once collected, is sent to the Brown Station Landfill in Upper Marlboro, MD. This landfill is the only landfill in P.G. County. Any collected leaves and yard waste remain on-site at the Department of Public Works. This material is either composted or ground up into wood chips that are later sold to residents or businesses. The city pays a tipping fee expenses of approximately $59 per ton of waste sent to the landfill.

2.4 What can be improved in the MSW management in the city?

We had access to results of two surveys that help us to define the priorities for the 3-year plan, the Resident Satisfaction Survey that was prepared by the city of College Park and a survey to the students of the 8th grade from the College Park Academy:

2.4.1 Resident Satisfaction Survey (Appendix D)

Recycling

In the Resident Satisfaction Survey, two questions were asked to estimate the percentage of their household trash volume that is currently recycled, and to estimate the percentage that could be recycled (five options, each with a percentage range). The responses were similar, with 81% of respondents choosing categories indicating that they believed that 26% to 100% of their trash was recycled and 78% of respondents stating the same range could be recycled. "Unsure of what can be recycled" was the option most frequently cited as a barrier to recycling, with almost 50% of respondents reporting that that was a minor to major barrier.

Communication

According to the responses, the most frequently cited preferred methods for receiving information about the City were email (64%), website (46%), newspaper (25%), and postal mail (21%), which were similar to popular communication preferences in the 2012 Resident Satisfaction Survey. Social media was cited by 17% of respondents as a preferable means of communication in 2014, an increase from 10% in 2012.

Public Works

Residents were asked to rate services provided by the Department of Public Works. The only issue was that for the Composting/SMARTLEAF® program, 48.6% of respondents answered "I don't know," indicating that they were unfamiliar with the program and how it operates.

2.4.2 Student Respondents Survey (Appendix E)

A survey was distributed to 47 students from the 8th grade at the College Park Academy on April 13, 2015. The goal of the survey was to determine the general thoughts of youth, by seeing if the students can differentiate between recyclable and non-recyclable items, and to know their thoughts about where the students believe their trash goes. The survey showed that the students have around of 90% certainty of things that go in the recycle bin that belong there (recyclable items) and only around 40% certainty if non-recyclable item can be recycled or not.

The answers helped us to establish a baseline of student perceptions regarding recycling and disposal.

2.4.3 Cost-Benefit Analysis of Composting Facility (Appendix G)

We prepared a cost-benefit analysis (CBA) for the ongoing composting and mulching operations at the city of College Park for the year 2014. Given the available data, we found that the composting and mulching operations in city of College Park cost $159,440, it generates a revenue of $301,392 saving a net total of $141,952 per year by diverting a portion of the incoming waste into their local composting and mulching operations.

3. The 3-year plan for the city of College Park

To measure each goal and outcome, we used the LogFrame approach (LFA) to help design initiatives for the 3 year period and achieve measurable results. This tool is useful for both managers and evaluators at every stage of the plan, and is a vehicle for organizing a large amount of information in a coherent and concise manner. It assists with the design, implementation, and evaluation of each step in the process.

The LogFrame approach, as represented in our Logical Framework Matrices (Appendix C), will inform College Park officials about the project goals, proposed activities for implementation, any required means, resources, and inputs, and how the progress and ultimate success of the plan will be measured and evaluated.

3.1 Zero Waste Strategic Plan Purpose and Objectives

What we are proposing is that by the end of the third year, the city of College Park should reduce 7 to 8% of MSW generated in College Park by working with 10% of the permanent residents, a majority of the renters, and both elementary schools in the city to improve education, outreach, and composting.

3.2 Stakeholders Involvement with the 3-Year Plan

In our plan, the main stakeholders are the residents living within the College Park community. This includes the permanent residents, a large number of temporary residents (largely comprised of student renters), and government officials. Community members will be the initial recipients of the educational materials, and the project then relies on them to learn the content and put that information into practice. The city will be in charge of making the necessary

adjustments to their current composting operations based on the results of annual cost-benefit analysis (CBA). Monitoring the success of the project each year is vital to ensure that the goals of this plan are being met.

The city benefits the most from the implementation of this plan. With the residents sorting their waste properly and participating in backyard composting, the city effectively lowers the amount of tipping fees paid for sending MSW to the landfill. The city also has the opportunity to adapt their current composting operations to make it more cost-effective, resulting in fewer expenses and generating net profits on their operation sales.

3.3 Definition of Priorities for the 3-Year Plan

Our plan relies on the community stakeholders to participate by reducing their waste, and increasing their recycling rates. For the community to participate, they must be educated on how to make smarter consumer choices, and how to properly dispose of waste and recycling. Our plan's success also relies on schools implementing the program developed at the College Park Academy and educating the students on why waste is an important issue. Reinforcement of proper waste disposal will help the children make smart waste disposal decisions both inside and outside of the home.

A large component of the waste stream is food waste, which makes up approximately 15% of the total waste produced in the United States (Maryland Zero Waste Plan 2014). Our project aims to educate College Park residents on how to begin composting in their own backyards. This benefits the residents in that they have nutrient-rich compost they can use in their gardens, and it benefits the city as it is reducing net collected waste and therefore saves the city money in tipping fees.

The city also already has its own compost operation for yard waste and leaves. One of the largest issues revealed in the resident survey distributed last year by the city with the aid of the University of Maryland Office of Community Engagement is that residents were not aware that the local composting program existed. They understood that the city collected leaves and yard waste, but they did not know where it was taken or what it was used for.

The yard waste composting program at the Department of Public Works composts the materials and sells it back to businesses, residents, and other municipalities who have also sent in yard waste. However, the issue with this operation is that the city of College Park does not generate enough revenue to balance out the costs incurred running the compost program. The operation helps the city avoid tipping fees, but there is potential to make their current operations more cost-efficient.

4. Recommendations

4.1 Three-Year Goal

Based on the analyzed 'resident satisfaction' and 'student respondent' surveys, and the composting operations cost/benefit analysis, we identify two main areas that can be implemented to help the city of College Park remain on track with Maryland Zero Waste Plan goals to reduce the amount of net generated MSW and achieve an increase in recycling rates: 1) Education and Outreach 2) Recycling and Composting.

4.2 Objectives and Strategies

The overarching goal of our 3-year plan is to reduce the amount of waste entering the Prince George's County Brown Station Landfill by increasing recycling rates and making current composting operations at the Department of Public Works more economically and environmentally efficient. Achieving 7-8% reduction in net waste disposal, as well as a 7-8% increase in recycling rates, will focus on education, outreach, and composting improvements as detailed in our Logical Framework Matrices (Appendix C).

4.3 Education and Outreach

The first component of our project is education and outreach to promote source reduction and proper waste sorting among permanent residents and students. Our goal for this section is to pursue a change in *knowledge, attitudes, and practices* of the residents and students in College Park. Once the residents are aware of the problems that exist with landfill use and improper recycling practices, they may be more likely to make more environmentally-conscious consumer and waste removal choices. More specifically, our goal aims to improve the residents' recycling practices, reduce the amount of waste that they produces, and engage the residents in starting their own backyard compost programs.

We broke our plan down to focus on two categories: permanent residents and schools. Each category has steps in a three-year plan

4.3.1 Permanent Residents

Year one involves a series of planning activities for permanent residents. The first activity is to conduct a waste audit to establish a baseline for waste generation. This will be the standard that can be used for comparison when gauging annual progress throughout the three-year plan. The next activity in the first year involves drafting and adapting materials about recycling and composting for distribution to the residents the following year. These materials will address how to sort recyclable from non-recyclable items, how to start a backyard compost pile, and how to make more environmentally-friendly consumer choices. These educational materials can either be drafted from scratch or adapted from currently available samples, such as those provided by Howard County to their residents (Appendix F). The last activity in year one is to develop an educational compost workshop where the residents can come and learn first-hand what items are compostable and how to begin their own backyard composting operations.

The second year involves distributing the materials compiled in the first year. This will be a one time distribution in the Spring. Based on the Resident Satisfaction Survey results, the best means of communicating with residents are through email, the city website, newspaper, and regular mail. Of the total surveyed respondents, 64% prefer communicating through email, and nearly half depend on the city website for news. Therefore, to best reach residents, the materials should be sent via email and regular mail to ensure that the residents have both a hard copy and electronic copy of updates. The materials can also be posted on the city's website for anyone who may want to refer to them. The newspaper can be used to advertise about the composting workshop with an article explaining what the city is doing and how the residents can participate.

After the third year, another waste audit should be done to compare any reductions in the waste stream, specifically in recyclable materials and food waste. The city should also look at how many trucks are being sent to the landfill based on tipping fee expenditures. Assuming that our plan was effective, the city should see a 7-8% reduction in waste and a 7-8% increase in recycling based on the Maryland Zero Waste Plan goals and projections.

4.3.2 Schools

When it comes to education, children are the focus. The concept is that exposing students to proper recycling and composting techniques early on, they will be better equipped to apply the practices that they have learned in the future. In effect, their learning will be brought into their own homes and may encourage other family members to use efficient sorting and disposal practices.

Each educational component of our three-year plan will have detailed activities for implementation each year to improve education and outreach based on the data collected from the College Park Academy 8th grade survey. That is to say, educational materials and related classes on the proper sorting of recyclable from non-recyclable items and how to begin backyard composting will be taught to students. For the three year plan, we propose to follow the "Trash Free Schools" program as a model.

Incorporate the "Trash Free Schools" Program

The first year of this component involves developing materials that can be taught and distributed within schools. There will also be research into grants or partnerships to make the implementation of the materials easier in the coming years in terms of production, distribution, and staff training. During year one, a baseline of student attitudes and perceptions of recycling will be established, and the College Park Academy 8th grade students will serve as part of the first year pilot program since the program began this academic year.

In year two, the materials developed in year one will be implemented in all grades at the College Park Academy. In addition, the program will expand to include one of the two middle schools specifically located in College Park. Only 25 students at the College Park Academy currently live in the city of College Park, so incorporating local schools into the plan allows for

more accurate data collection to determine measurable recycling rate improvements in the city. Research into grants and partnerships will also continue to support the growing program.

In year three, the program will be implemented at the remaining middle school in the city. In order to reach the zero waste target, all of the school systems within the city will need to participate into the program. Data on the experiences and results collected from the first two years will be used to improve incompleted points by year three.

4.4 Recycling and Composting

A 2013 food waste audit was conducted in Montgomery County, and based on the recommendations of the Director of Public Works and the city Manager, due to similar population sizes, assumptions were made that their waste composition is similar to that of College Park.

The environmental engineering and construction firm, SCS Engineers, concluded from the 2013 Montgomery food waste audit that 22.8% of the 40.8% total organic waste was food waste. According to the SCS Engineers, this food waste includes putrescible organic materials, which are the byproducts of activities connected with the growing, preparation, cooking, processing, or consumption of food by human beings or domesticated animals. By reducing that 22.8% of food waste through composting, the city of College Park can add a few more years to the landfill's remaining capacity while saving money in tipping fee expenses.

By 2040, Maryland's population is projected to grow by one million people, and the per capita income is projected to increase by 30% (Maryland Zero Waste Plan 2014). This equates to more waste and consumption from the residents of Maryland, so it is imperative to establish efficient waste reduction practices that can reduce the effect that a growing population will have on waste production.

4.4.1 Public Works Compost Operation

The plan for the first year of composting at the Department of Public Works will focus on improving the data collection for future CBAs. Currently available data is spread out among several sources and listed under bulk values because of the data filing system. For example, labor salaries and hour worked operating specific tasks were not logged. Therefore, we suggest collecting more data to itemize composting costs separately from other costs, and centralizing it for streamlined retrieval by city officials.

Our goal for year one is to have the office of Public Works begin recording labor costs for yard waste collection and composting machine operation, and fuel costs associated with the trucks loaders and dump trucks. This data will be compiled in a central database for the CBA that will be run in the second year. Having all of the data for composting operations in one place will greatly reduce the amount of time DPW spends searching for each value in multiple locations. Furthermore, having each cost and value appropriately itemized ensures that more comprehensive CBAs may be run in the future to assess progress.

The food waste audit mentioned in the educational component of our plan will also be useful for the composting operation since more analyses can be run concerning the specific organic generation breakdown of College Park residents. As mentioned in the permanent resident section, conducting this College Park food waste analysis will establish a baseline in the first year for the city to use in the future when assessing annual solid waste reductions.

In year two, another CBA will be conducted with the new data. Once all of the data is in a centralized location, the analysis will be more detailed and accurate. After the analysis is complete, feasible changes may be suggested to make composting more cost-efficient.

Year three will involve the implementation and adaptation of these changes based on the performance of the operation. If there are net costs, it will be easier to identify the areas incurring the most expenses and target those operations for future improvement. If there are net savings, the excess revenue may then be used towards another cause, such as purchasing compost bins for residents or assisting in the continued development of education and outreach campaigns.

4.4.2 Backyard Composting

A large component of the waste stream is comprised of food waste and promoting home composting in the city of College Park to reduce the amount of solid waste that goes to the landfill is important. By educating the residents on how to start compost piles in their own backyards, the city can reduce the amount of food waste that ends up disposed in a landfill. However, implementation of home composting would ideally occur for all residents with access to space in their yards.

The waste audit data from the permanent residents sector of our three-year plan will serve as the baseline for average food waste that residents put into landfills that might otherwise have been composted.

Similar programs have been successfully implemented in Montgomery and Howard counties. Montgomery County supplied compost bins for the residents to use so that they would not need to build or purchase their own. In Howard County, information was disseminated in a packet form to teach residents how to set up compost piles in their own yards.

The educational material for backyard composting was created by the Howard County Bureau of Environmental Services in conjunction with The University of Maryland Cooperative Extension “Master Gardener Program”. This compost guide provides background on what compost is and the benefits that compost can provide for the soil and the environment. The pamphlet also describes how compost is made and what some of the design considerations are for backyard compost piles, such as what to do in different light amounts. Finally, the sample describes how to start backyard composting, what residents should and should not place in their compost piles, and how to maintain them.

During the first year, development/adapt educational materials of backyard should begin, followed by a composting workshop with the distribution of educational materials and hands-on training to residents in the Spring. Some materials may be adapted from samples used by other municipalities, such as Howard County (Appendix F). The residents would have the option to use a bin provided by the city, or construct their own compost bin or pile. To assist residents in obtaining these bins, acquisition of a compost bin budget for the purchase and distribution of composting bins can take place in year one. Applying for grants or partnering with potential donor organizations, which can help cover initial bin purchasing costs. Another alternative is to make the most of Howard County's current composting bin contract and continue obtaining bins in this manner since their city currently distributes free bins to any resident interested in backyard composting. The city of College Park in cooperation with the UMD extension service, the office of Community Engagement and the Master gardeners should provide demonstrations throughout the rest of the year on how to use and properly maintain composting operations at home.

Year two involves promoting and hosting composting workshops throughout the year, with more emphasis in the Spring since that is when the breakdown of compost is at its highest. Workshop notices will be sent out to the residents via email, mail, and newspaper advertisements. These materials will primarily be sent to the local residents who live in single-family units or townhomes because they likely have the available backyards space to begin composting.

Year three looks at ways to use the excess compost in a community garden or on residential lawns as fertilizer. We suggest that another workshop about composting and backyard gardening be run during this time. A comparison using first and second year waste audit data must also be done to evaluate the efficiency of resident composting practices and measure the accompanying changes in food waste found in the waste stream.

4.5 Major Issues and Events Impacting the 3-Year Plan

With this project there are many barriers that might hinder its implementation. One of the issues is the timely creation of policies that the project requires. Policy creation and implementation takes time and resources. There is also the potential for backlash from residents who feel that city policies are unfair to particular groups, or who believe that the resources necessary for program implementation are better used in other programs. Another major issue is the funding that is required to develop and implement successful programs. Someone has to be responsible for the programs to ensure there are available materials.

APPENDICES

Appendix A – Waste Generation Study Data

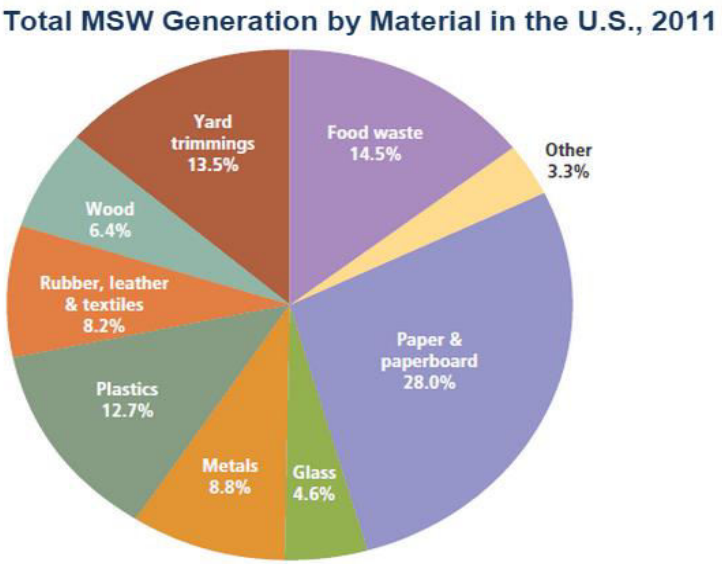

Figure 1. Total 2011 US MSW Generation

The above figure outlines the 2011 percentages of waste composition entering landfills in the United States. The graphic is from the 2014 Maryland Zero Waste Plan.

Appendix B - 2013 and 2014 College Park Trash and Recycling Data

Year 2013

Month	Recycling	Concrete	Electronics	Yard Waste	Brush	Leaf Collection	Tires	Scrap Metal	Total Recycling	Trash	Special Trash	Total Trash
Jan	121.18	0.00	2.29	7.42	0.00	140.00	1.22	1.41	**273.52**	339.19	53.08	**392.27**
Feb	103.88	0.00	0.00	10.62	0.00	0.00	0.00	1.13	**115.63**	283.73	46.52	**330.25**
Mar	104.18	0.00	0.00	24.70	23.85	0.00	0.00	3.06	**155.79**	284.10	26.32	**310.42**
Apr	128.94	0.00	3.84	104.60	72.20	0.00	0.00	0.00	**309.58**	387.61	65.88	**453.49**
May	125.56	0.00	2.25	102.86	77.20	0.00	0.00	4.46	**312.33**	381.51	65.01	**446.52**
June	111.38	30.00	5.20	71.70	71.35	0.00	2.07	0.79	**292.49**	341.64	155.91	**497.55**
July	134.22	0.00	0.00	94.46	75.20	0.00	0.00	1.23	**305.11**	431.34	66.65	**497.99**
Aug	108.23	0.00	0.00	58.54	104.70	0.00	0.00	0.98	**272.45**	344.68	90.63	**435.31**
Sept	125.54	0.00	1.88	59.94	76.30	0.00	0.00	0.00	**263.66**	358.31	38.85	**397.16**
Oct	128.14	0.00	1.60	55.56	67.70	0.00	0.00	2.48	**255.48**	363.20	73.96	**437.16**
Nov	107.17	0.00	2.31	0.00	35.43	1,238.13	0.00	0.00	**1,383.03**	292.59	26.45	**319.04**
Dec	133.66	0.00	0.00	0.00	52.85	903.44	0.00	0.00	**1,089.95**	339.44	26.08	**365.52**
Total	**1,432.08**	**30.00**	**19.37**	**590.40**	**656.77**	**2,281.56**	**3.29**	**15.54**	**5,029.02**	**4,147.34**	**735.34**	**4,882.68**

Table 1. 2013 CP Trash and Recycling Data

Year 2014

Month	Recycling	Concrete	Electronics	Yard Waste	Brush	Leaf Collection	Tires	Scrap Metal	Total Recycling	Trash	Special Trash	Total Trash
Jan	110.59	0.00	2.15	5.69	56.65	52.50	0.00	1.24	**228.82**	305.70	28.84	**334.54**
Feb	107.94	0.00	0.00	7.98	27.28	0.00	0.00	1.90	**145.11**	282.55	25.15	**307.70**
Mar	106.15	0.00	0.00	17.23	40.75	0.00	0.00	0.00	**164.13**	295.59	38.83	**334.42**
Apr	130.41	0.00	2.48	83.52	92.31	0.00	0.00	1.34	**310.06**	386.18	44.29	**430.47**
May	124.84	0.00	0.00	51.19	70.83	0.00	0.00	0.00	**246.86**	376.37	87.28	**463.65**
June	119.43	0.00	1.59	73.94	74.25	0.00	1.54	2.75	**273.50**	385.20	96.54	**481.74**
July	120.76	0.00	2.67	52.68	99.25	0.00	0.00	0.00	**275.36**	406.93	58.28	**465.21**
Aug	108.40	0.00	0.00	43.84	68.70	0.00	0.00	2.39	**223.33**	343.01	98.02	**441.03**
Sept	139.49	0.00	1.50	43.93	41.45	0.00	0.00	1.20	**227.57**	383.99	41.47	**425.46**
Oct	114.17	0.00	0.00	34.13	71.55	0.00	0.00	2.86	**222.71**	341.30	42.07	**383.37**
Nov	104.32	0.00	0.00	0.00	25.30	1,030.31	0.00	0.00	**1,159.93**	305.32	22.45	**327.77**
Dec	136.98	0.00	0.00	0.00	44.55	1,251.25	0.00	0.69	**1,433.47**	373.08	20.40	**393.48**
Total	**1,423.48**	**0.00**	**10.39**	**414.11**	**712.88**	**2,334.06**	**1.54**	**14.37**	**4,910.83**	**4,185.22**	**603.62**	**4,788.84**

Table 2. 2014 CP Trash and Recycling Data

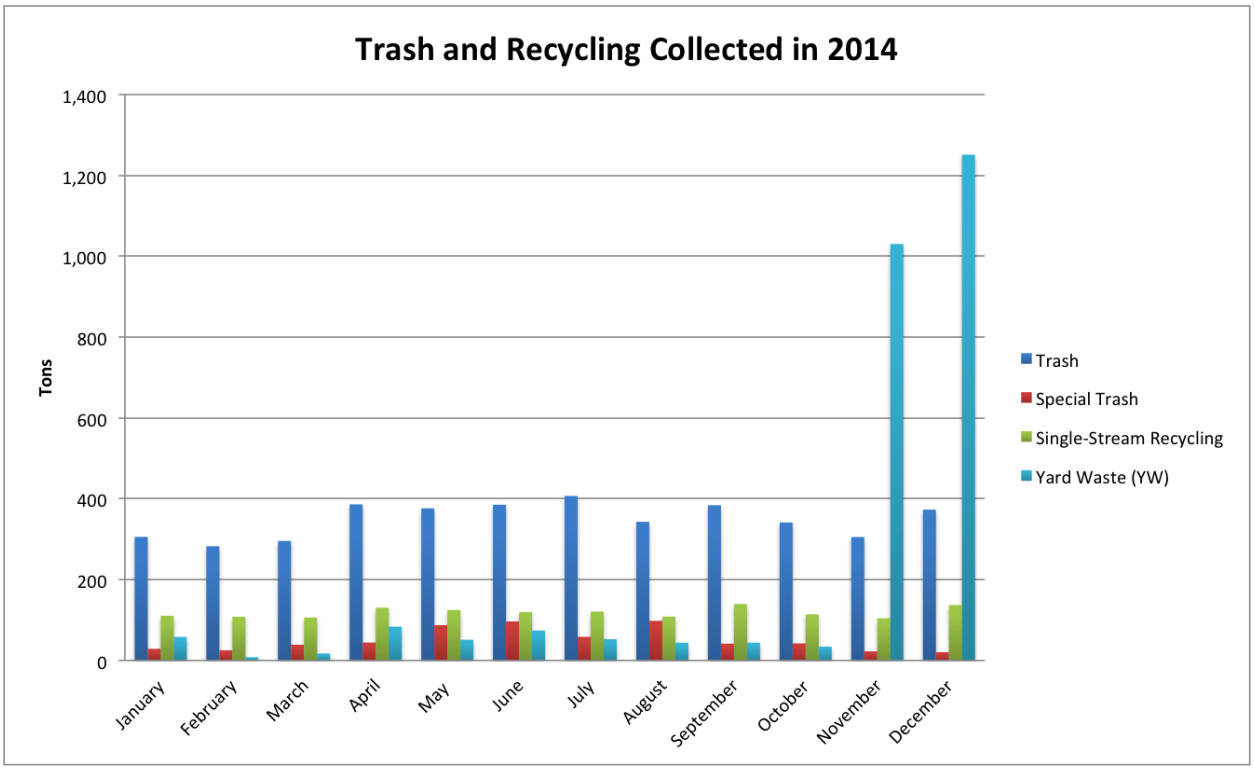

Figure 2. Trash, Recycling and Yard Waste Collected in the City of College Park in 2014

Appendix C – Logical Framework Matrices

Intervention Logic	Objectively Verifiable Indicators	Sources and Means of Verification	Assumptions
COMPONENT 1: Education and Outreach			
Goals: Reduce the amount of waste the City of College Park produces	College Park notices a 7% waste reduction by 2018 and a 7% increase in recycling (Based on MD Zero Waste Plan goals for 2040)	- Compile all waste data to be compared to current data - Track how many trucks go to the recycling center versus landfill	Recycling improves approximately 7-8% each year and waste decreases approximately 7-8% each year
Purpose: To reduce the amount of waste the residents of College Park produce and increase the amount that is recycled	- Residents are requesting for the larger recycling bins - The bins themselves are more full - Trash bins are less full	- Check records of bin requests - Check recycling truck routes to see if they are getting full and need to have other trucks - Check trash trucks and see if they have leftover space before going to the landfill	**Purpose to Goals** - All residents in the city are taking part in waste reducing behaviors
Outputs: 1. Residents in College Park have read the pamphlet 2. Schools learn how to incorporate solid-waste education into their school	1. Every resident has received and read the pamphlet/opened the email	1. Email tracking, the other aspect would be hard to track	**Outputs to Purpose** 1. The residents put the practices into effect and require more recycling storage (larger bins) 2. The school will annually engage in the program
Inputs: Activities and Types of Resources 1. Residents receive the materials educating about recycling, being responsible consumers, and composting 2. The schools accept to implement a program similar to the one at CPA	**Resources/Budget** 1. Pamphlet/flyer to be distributed to residents (Budget is whatever it costs to print and distribute) 2. Volunteers to help the school implement the program	1. The pamphlets were mailed/emailed out 2. The schools have set dates to implement the program	**Inputs to Outputs** 1. The residents are able and willing to receive information from the city 2. There is a desire and cooperation by the school to implement the program

Table 3. Logical Framework Matrix - Education and Outreach

Intervention Logic	Objectively Verifiable Indicators	Sources and Means of Verification	Assumptions
COMPONENT 2: Composting Operation Framework			
Goals: To reduce the amount of solid waste the City of College Park produces	College Park notices a food waste pick-up reduction by 2018	- Compile all waste data to be compared to current data	-There is potential to make composting operations more cost-effective -Available recording systems are reliable
Purpose: To increase the amount of compost coming in and to make the composting operation economically and environmentally efficient	-Operation becoming profitable -Increase in number of people home composting	-Examine the money flow coming in -Explore selling by the bag versus selling in bulk to increase profit.	-Residents continue recycling yard clippings -Amount of customers buying mulch is consistent -Continue encouraging home composting throughout the city
Outputs: Less waste being taken to the landfill by the residents of College Park	-Less trash going to the landfill -More residents home composting	-Number of customers -Number of residents home composting -Reduced tipping fees	-Residents spread their composting knowledge to neighbors
Inputs: Activities and Types of Resources -Develop a cost-benefit analysis for the composting operation -Promote home composting -Develop a possible food waste program	-Data on the operation like transportation costs, operating expenses, staffing costs, price of bag vs bulk -Survey results about residents home composting	-More money coming into operation -More residents wanting to home compost	-Ensure the residents of College Park are onboard with the idea of home composting and backyard gardening

Table 4. Logical Framework Matrix - Composting

Appendix D – Community Survey Results

Barriers to Recycling

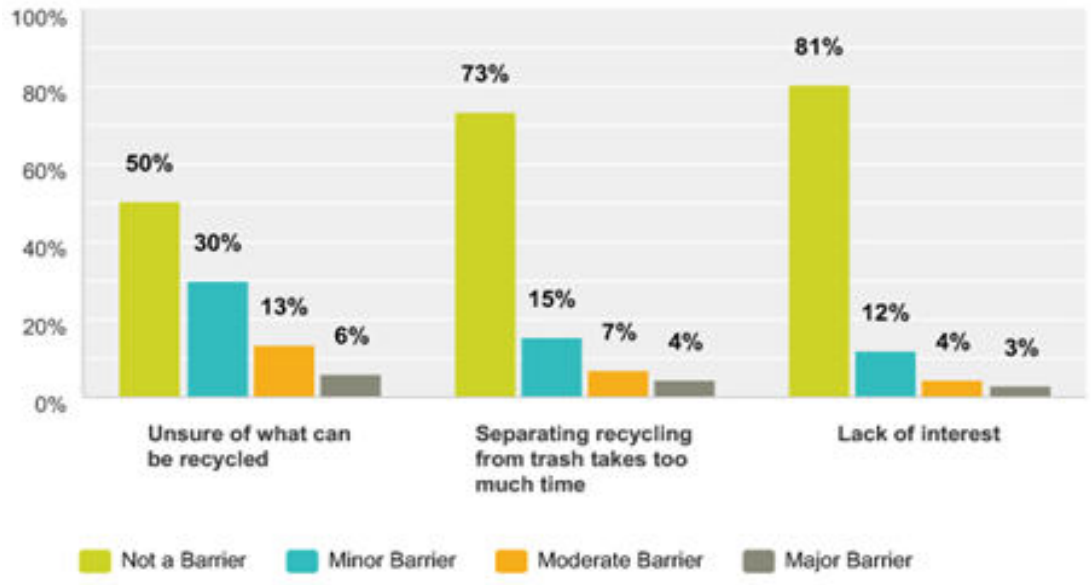

Figure 3. Residents' responses to the recycling barrier question

Greatest Barrier: "Unsure of what can be recycled"

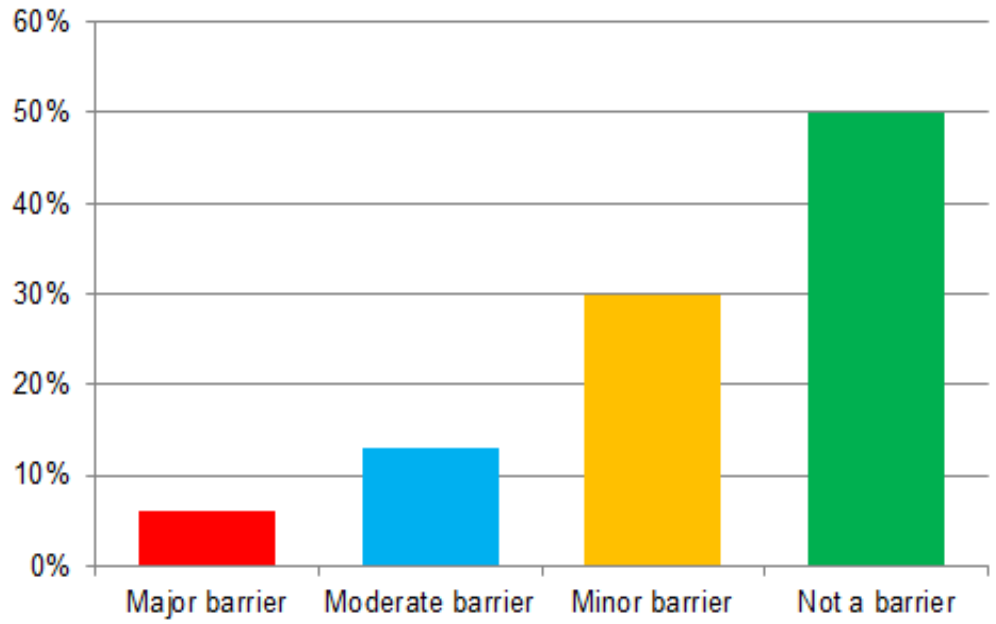

Figure 4. Barrier Breakdown of Residents Being Unsure of What Can Be Recycled

Public Works

	Excellent (1)	Good (2)	Neutral (3)	Fair (4)	Poor (5)	Don't Know	Total
Regular trash collection	**59.87%** 458.0	**28.24%** 216.0	**3.01%** 23.0	**1.83%** 14.0	**0.39%** 3.0	**6.67%** 51.0	765
Bulk and/or special trash collection	**47.25%** 361.0	**25.79%** 197.0	**6.54%** 50.0	**2.09%** 16.0	**2.49%** 19.0	**15.84%** 121.0	764
Single-stream recycling collection	**55.15%** 418.0	**25.99%** 197.0	**4.49%** 34.0	**1.85%** 14.0	**2.24%** 17.0	**10.29%** 78.0	758
Grass, brush & tree limb collection	**35.74%** 272.0	**32.98%** 251.0	**7.49%** 57.0	**5.39%** 41.0	**1.84%** 14.0	**16.56%** 126.0	761
Curbside leaf collection (Nov-Dec)	**34.34%** 262.0	**34.99%** 267.0	**7.99%** 61.0	**4.98%** 38.0	**1.97%** 15.0	**15.73%** 120.0	763
Snow removal	**31.85%** 243.0	**34.73%** 265.0	**10.22%** 78.0	**7.34%** 56.0	**4.33%** 33.0	**11.53%** 88.0	763
Compost program/SMARTLEAF®	**21.30%** 160.0	**17.84%** 134.0	**8.39%** 63.0	**1.86%** 14.0	**2.00%** 15.0	**48.60%** 365.0	751

Figure 5. Department of Public Works Service Ratings

Appendix E – School Survey Results and Analyses

April 2015

Introduction

A survey was distributed to 47 8th grade students at the College Park Academy on Monday, April 13, 2015. The part was an activity asking respondents to circle recyclable items, and in the second activity asked respondents to provide their thoughts on given scenarios with a question to determine where the students believe their trash goes. The goal of the survey was to determine the general thoughts of youth on the issues and establish a baseline based on the survey answers. The results were then separately graded and analyzed to establish a baseline of student perceptions regarding recycling and disposal.

The Survey

The first page of the survey consisted of 12 different objects that the students were instructed to circle if they thought the objects were recyclable. The objects were chosen based on the informative guide that residents of College Park receive each year from the city.

On the other side of the recycling survey, there were three pictures; one with someone littering out a window, one with polar bears walking around a field of trash searching for food, and a litter-filled scene of Baltimore Harbor. The students were asked to comment on what was going on in each picture and then what they thought should be done to prevent each particular scenario from happening in the future.

Results

What can you recycle?

For identifying recyclable items, the students averaged nearly 90 percent, with all of the students correctly identifying aluminum cans and green glass bottles as recyclable. The items that students incorrectly thought were not recyclable were plastic ketchup bottles and aluminum foil. For non-recyclable item identification, the students correctly identified about 40 percent of the items, such as plastic cutlery and greasy McDonald's food containers.

Where does the trash go?

For the first picture of someone tossing trash out of a car window, most of the students recognized an incidence of littering. Some suggestions for prevention included throwing trash in trash cans or recycle bins when reaching destinations, having a bag in the car for trash, and applying littering fines that support clean-up projects.

The second scenario was of polar bears looking for food in the trash area. Students commented that proper recycling, reduced production of landfill waste, improved public awareness of polar bear protection, and enhanced animal protection efforts would help to protect the polar bears and the environment.

The third picture was met with observations by the students that the stream or bay area was covered with trash that was polluting the water. To prevent this scenario from happening in the future, they suggested increasing anti-litter signage in the area, providing more trash and recycle bins, and encouraging community clean-up efforts.

Results and Analysis of College Park Academy 8th grader responses

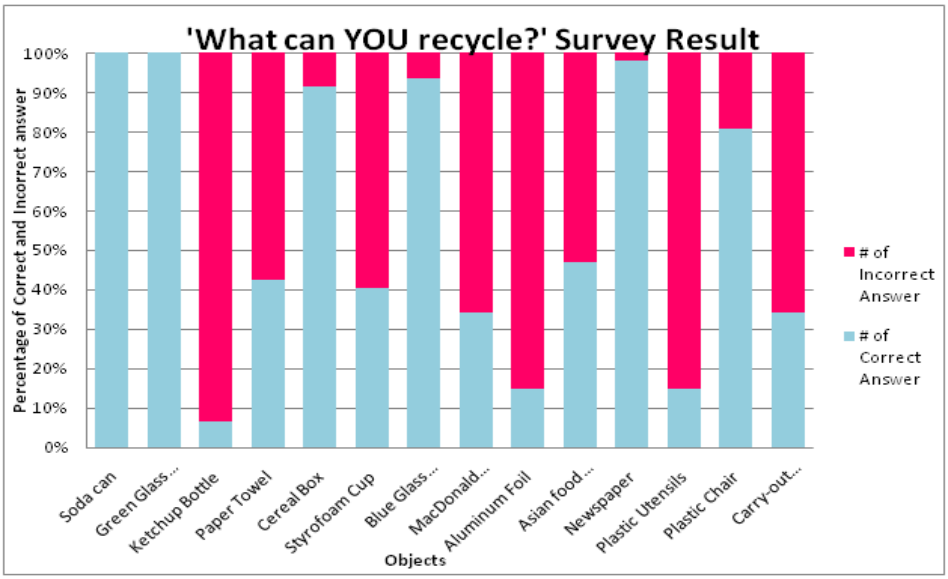

Figure 6. Page One Survey Results given to CPA 8th Graders

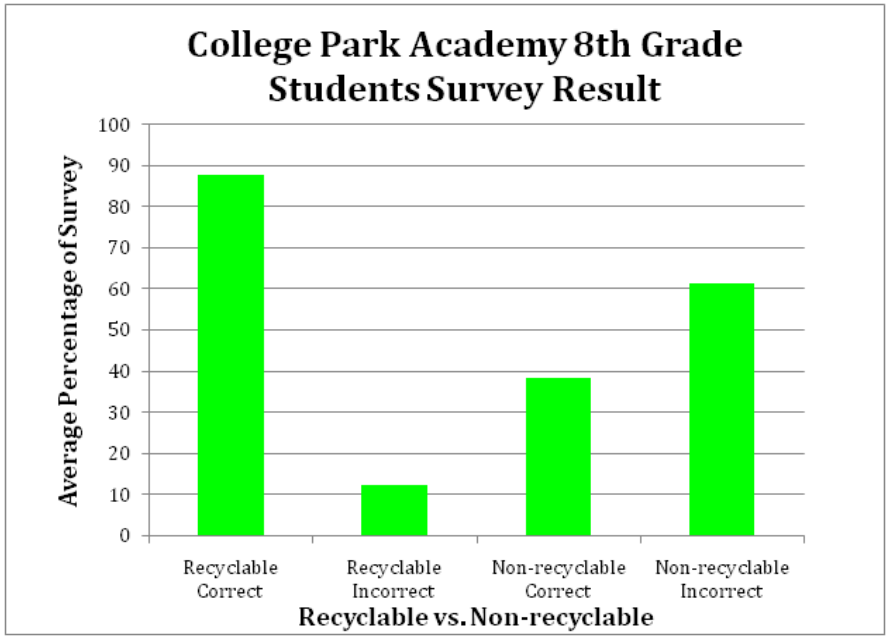

Figure 7. Percentage of Students Correctly and Incorrectly Identifying Recyclable and Non-Recyclable Items

Figure 8. Front page of survey sample

	**How could you prevent this from happening in the future?**
	**What is going on in this picture?** **How could you prevent this from happening in the future?**
	**What is going on in this picture?** **How could you prevent this from happening in the future?**

Where does waste from the school go?

Figure 9. Back page of survey sample

Appendix F - Howard County Home Composting Guide

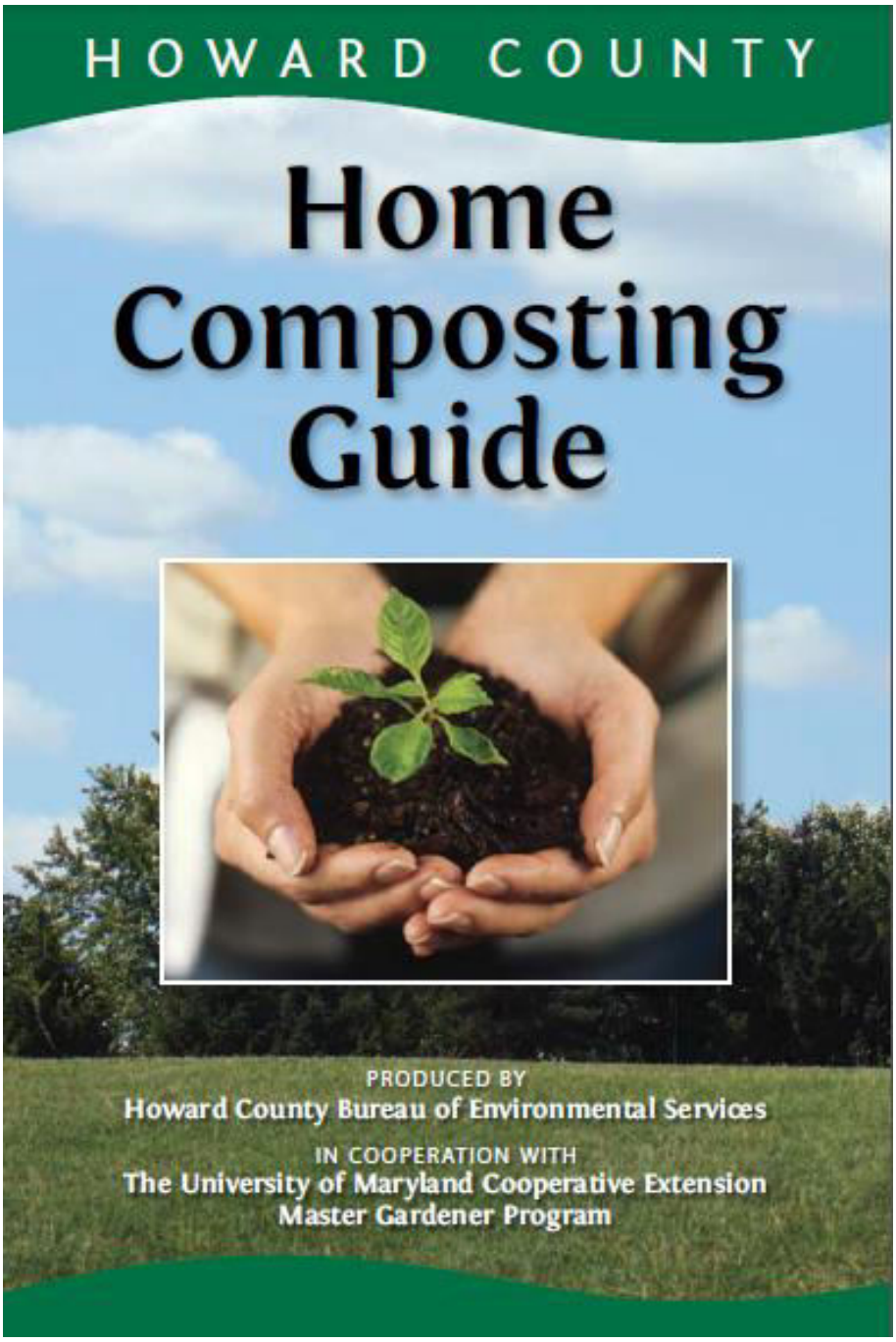

Figure 10. Composting Sample From the Howard County Bureau of Environmental Services

How is Compost Made?

Compost is created by layering green and brown wastes such as grass, wood chips, and leaves shown in the photograph into piles, rows, or in a bin. Green materials provide nitrogen and brown materials provide carbon, essential compost elements. The layered pile is watered and turned as needed, allowing the material to fully decompose and mature into finished compost.

Let's Get Started

A bin is not needed to compost successfully at home. However, a bin presents a neater appearance than an open pile and is useful for controlling pests. Howard County residents can obtain a free bin similar to the black plastic bins that are depicted in this guide. For more details on how to obtain a bin, please call 410-313-6444.

Before you begin composting you will need to pick the proper spot for your composting bin.

Sun or Shade: Your Choice

Sun or Shade?	Pros and Cons	Special Considerations
PARTIAL SHADE	Best choice, keeps the compost from drying out too quick or overheating.	None needed.
FULL SHADE	Good choice, might need additional monitoring to make sure that the compost doesn't get too cold, killing soil organisms.	Add extra greens or manure when necessary to increase the heat of the pile. Bags of leaves, straw or shredded paper piled around the outside of the bin can also help to keep the pile warm.
FULL SUN	Good choice, might need additional monitoring to make sure that the compost doesn't dry out	May need to be watered frequently.

2

Figure 11. Sample Howard County Composting Guide addressing bin obtainment and composting options

Appendix G - Cost-Benefit Analysis of Composting and Mulching of Yard-Trimming Operations

City of College Park, Maryland

May 2015

Introduction

As part of a three-year plan for Improving Solid Waste Practices in the City of College Park, our Capstone group prepared a cost-benefit analysis (CBA) for the ongoing composting and mulching operations at the city of College Park. Knowing that CBAs for composting operations are widely used by local government and private companies to determine the cost-effectiveness and feasibility of their operations, we analyzed the SMARTLEAF® brand compost and mulch that is produced at the Department of Public Works (DPW) in College Park, Maryland.

Background

The DWP compost facility at the city of College Park were established in the 90's. They operate in a 4-acre lot owned by the College Park School District. The majority of the available area is occupied by the compost windrows, and there is no room for expansion.

The compost/mulch facility is also equipped with most of the vehicles and equipment needed to carry out their operations, however several of these machines are old and will require replacing in the future.

The DPW's SMARTLEAF® product refers to screened compost, which means the particles sizes are no larger than ½", making it suitable for use as a top grade dressing. Laboratory testing ensures quality control where the compost pH lies between 7.4 and 8.0 (SMARTLEAF 2015).

Methodology

To determine the economics of composting and mulching operations, we followed the EPA's 1994 Composting of Yard Trimmings and Municipal Solid Waste document using FY 2014 data provided by College Park's DPW.

Initially, we attempted to categorize the data to determine Site Preparation and Land Improvement costs, including payment for permits required, Capital Costs associated with vehicle and equipment procurement, and Operating and Maintenance costs (including collection costs, labor costs, fuel, parts and supplies). However, due to the nature of the information, we considered the costs as they were detailed in the city of College Park's Expenditure Budget Worksheet as actual FY 2014 expenses for Division 5050, Compost and Yard Operations. This section of the Budget accounts for the following:

- Payroll-Wages
- Fringe Benefits
- Travel and Training
- Overhead
- Special Services
- Rental
- Supplies
- Postage

We also considered information regarding the amount of leaf and brush material collected at the City's DPW, the amount of drop-off material and tipping fees received from other municipalities, avoided tipping fees for not taking material to the county's landfill, and possible revenues generated from composting and mulching sales. Once all values were accounted for, the total net costs or savings were calculated by subtracting between the total costs and total benefits.

Costs

For the purposes of College Park's particular CBA, we chose to begin accounting for the total costs during the 2014 Fiscal Year of operations. The site is already well-established, so our analysis does not consider the capital costs incurred from the exact start-up date. The DPW does not pay a lease for the land and is exempt from paying taxes, so the expenditures associated with the site establishment sector (Site Establishment and Site Leasing) amount to zero.

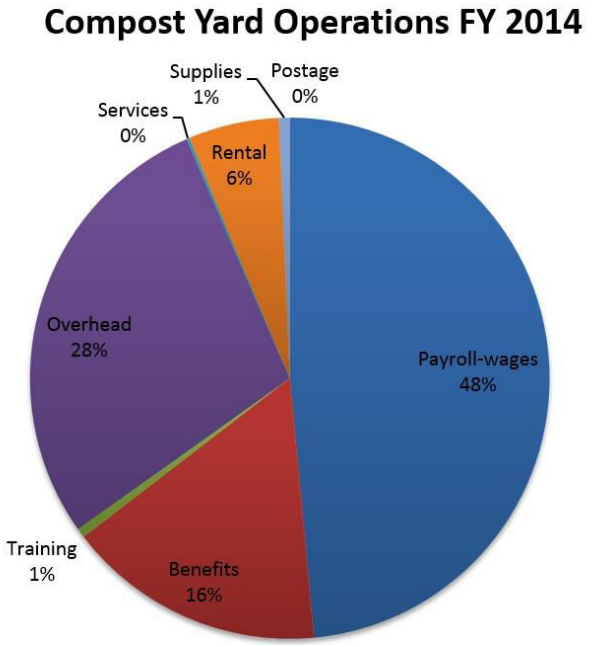

Figure 12. 2014 College Park Compost and Mulch Production Costs

The aggregated composting and mulching operational costs considered were:

Payroll-wages	$77,356.00
Benefits	$25,623.00
Training	$920.00
Overhead	$45,169.00
Services	$287.00
Rental	$9,000.00
Supplies	$1,066.00
Postage	$19.00
SUBTOTAL	$159,440.00

Table 5. Operational Costs for FY 2014

Benefits From Composting

Avoided Costs

The city avoids paying landfill tipping fees at approximately $59 per ton when an appropriate portion of waste material is diverted for use as compost and mulch. Soil amendment purchases are also avoided since compost to replace this material is made on site. According to our CBA, the city saved $204,351.95 in avoided costs during 2014.

Revenues

The City of College Park earns by selling compost and mulch at fairly low fees. Composting may be sold unscreened for $12.00 per cubic yard, or as SMARTLEAF® compost for $25.00 per cubic yard with tax. Mulching operations on the site are made from leaf and wood collected by the city. Wood mulch is sold for $10.00 per cubic yard with tax. Delivery is an additional fee charged to other municipalities.

According to the data provided, the city generated $68,288.38 in sales. In 2014, these profits amounted to $51,540.50 for SMARTLEAF® compost, $88.75 for unscreened compost, $1,600.00 for leaf mulch, and $15,059.13 for wood mulch.

TOTAL BENEFITS		**$301,392.08**
Avoidance Costs		
E.	Avoided disposal cost/yr:	$204,201.95
F.	Avoided purchases of soil amendment/yr:	$150.00
	SUBTOTAL	**$204,351.95**
Overall Sales		
G.	SMARTLEAF®	$51,540.50
H.	Unscreened	$88.75
I.	Leaf Mulch	$1,600.00
J.	Wood Mulch	$15,059.13
	SUBTOTAL	**$68,288.38**
Leaves Coming into DPW from other municipalities		
	Berwyn Heights	$5,823.50
	Cottage City	$855.00
	Edmonston	$133.00
	Laurel	$3,348.75
	Mt. Rainier	$1,615.00
	New Carrollton	$5,861.50
	Riverdale Park	$3,553.00
	UMD	$1,900.00
	University Park	$5,662.00
K.	**SUBTOTAL**	**$28,751.75**

Table 6. Breakdown of Total CP Composting and Mulching Revenue for FY 2014

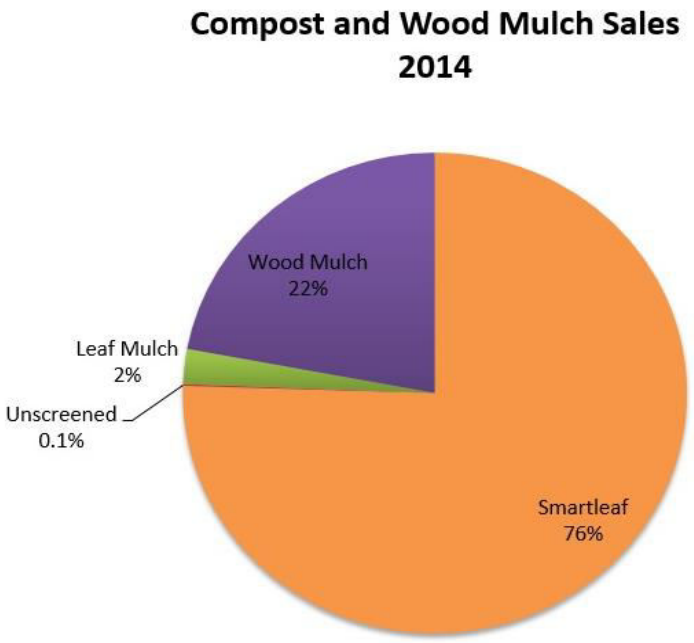

Figure 13. 2014 College Park Compost and Mulch Sales

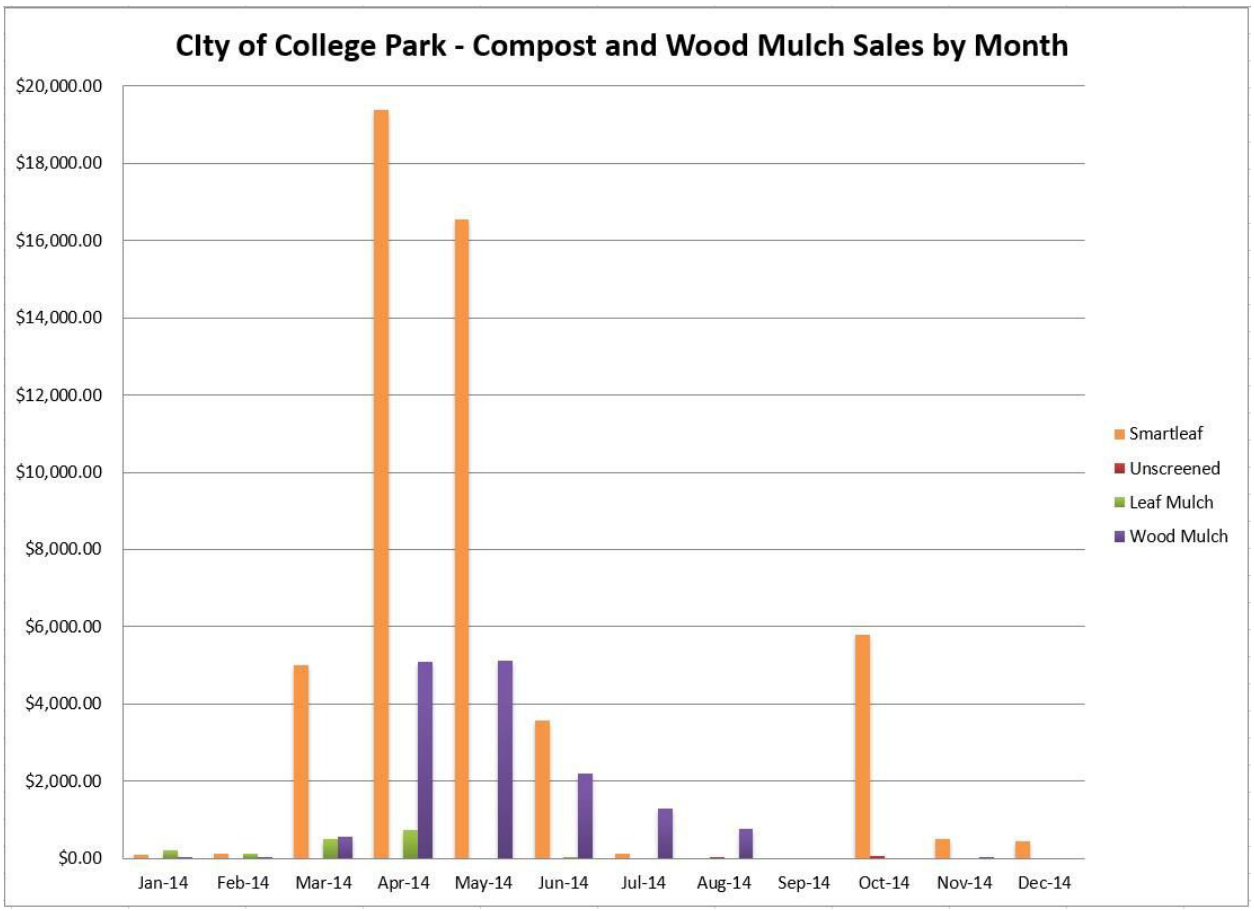

Figure 14. 2014 Monthly Compost and Mulch Sales in College Park

Results

Expenses:	$159,440.00
Revenue:	$301,392.08
Net Savings:	$141,952.08

Given the available data, our CBA confirms that the city of College Park saved a net total of $141,952.08 in 2014 by diverting a portion of the incoming waste into their local composting and mulching operations. For details, see table below.

Improving Solid Waste Practices in the City of College Park
Cost-Benefit Analysis of Composting and Mulching of Yard Trimmings operations

General Data FY 2014
Composting area size 4 acres

I. SITE START-UP AND MAINTENANCE COSTS		**COSTS**	**NOTES**
Site Establishment			
	Engineering Design	$0.00	
	Site clearing	$0.00	Site has been established in the year ....
	Grading	$0.00	Hence, these costs are not considered in
	Drainage	$0.00	this analysis.
	Pad Material	$0.00	
Site Leasing			
	Yearly Cost of Lease	$0.00	
	Taxes	$0.00	DPW does not pay a lease and is exempt of taxes
	Other Costs	$0.00	
Site Maintenance			
	Site Cleaning	$0.00	
	Drainage Cleaning	$0.00	
	Other Costs	$0.00	

TOTAL ONE-TIME START-UP & MAINTENANCE COSTS: $0.00
TOTAL MAINTENANCE COSTS/YR: $0.00

II. COLLECTION COSTS
Amortized price of Equipment, Related Labor and O&M

Curb Collection

	EQUIPMENT	**LABOR**	**O & M**	**NOTES**
Leaf and Grass Collection	$0.00	$0.00	$0.00	
Leaf and Grass Collection	$0.00	$0.00	$0.00	
Brush Collection	$0.00	$0.00	$0.00	
SUBTOTAL	$0.00	$0.00	$0.00	

Related Collection Costs

	EQUIPMENT	**LABOR**	**O & M**
Monitoring incoming materials and (	$0.00	$0.00	$0.00
SUBTOTAL	$0.00	$0.00	$0.00

TOTAL ESTIMATED COLLECTION COSTS/YR: $0.00

III. AGGREGATED COMPOSTING OPERATIONAL COSTS

Payroll-wages	$77,356.00
Benefits	$25,623.00
Training	$920.00
Overhead	$45,169.00
Services	$287.00
Rental	$9,000.00
Supplies	$1,066.00
Postage	$19.00
SUBTOTAL	$159,440.00

TOTAL ESTIMATED OPERATIONAL COSTS/YR: $159,440.00

IV. COST/BENEFIT ANALYSIS: COMPOSTING VS. CURRENT DISPOSAL		**NOTES**
TOTAL COSTS		
A. Total site start-up/maintenance costs	$0.00	"A.Total amortized start-up costs/yr:"; Scope of project begins with more current year instead of all-time
B. Total collection costs/yr:	$0.00	"B. Total operational costs/yr:"; "D.Total optional collection costs/yr:"
C. Total operational costs/yr:	$159,440.00	"C. Total optional operational costs/yr: $"
D. Total Costs/Yr (A+B+C):	$159,440.00	"E. Total Costs/Yr (A+B+C+D):"; Not categorized in project scope

TOTAL BENEFITS

Table 7. Cost/benefit analysis worksheet for Composting Operation year 2014 (Page 1)

Avoidance Costs			
	E. Avoided disposal cost/yr:	$204,201.95	"F. Avoided disposal cost/yr:"; Landfill "G. Avoided purchases of soil amendment/yr:" July 15, 2014 Meeting Agenda (or 14-R-22) p121
	F. Avoided purchases of soil amendmer	$150.00	
	SUBTOTAL	$204,351.95	
Overall Sales	*(Breakdown provided below)*		
	G. Smartleaf	$51,540.50	Each category includes Material sales, Sales tax, Delivery and Fuel surcharge
	H. Unscreened	$88.75	
	I. Leaf Mulch	$1,600.00	
	J. Wood Mulch	$15,059.13	
	SUBTOTAL	$68,288.38	
Other Income	*Leaves Coming into DPW from other municipalities*		Total Price Charged to other Municipalities = $4.75/yd^3
	Berwyn Heights	$5,823.50	
	Cottage City	$855.00	
	Edmonston	$133.00	
	Laurel	$3,348.75	
	Mt. Rainier	$1,615.00	
	New Carrollton	$5,861.50	
	Riverdale Park	$3,553.00	
	UMD	$1,900.00	
	University Park	$5,662.00	
K.	**SUBTOTAL**	$28,751.75	
Total Sales Breakdown	(Reference for Overall Sales)		
SmartLeaf Compost	Amount	$39,327.90	
	Delivery	$8,957.49	
	Tax	$2,050.12	
	Fuel Surcharge	$1,205.00	
	Other (adjustment)	-$0.01	
	G. Income from SmartLeaf Compost Sa	$51,540.50	"H. Projected income from sale of compost/yr:"
Unscreened Compost	Amount	$64.87	
	Delivery	$20.00	
	Tax	$3.88	
	Fuel Surcharge	$0.00	
	H. Income from Unscreened Compost S	$88.75	
Leaf Mulch	Amount	$1,556.60	Typically grouped with "unscreened compost" since available only by request
	Delivery	$0.00	
	Tax	$93.40	
	Fuel Surcharge	$0.00	
	Other (adjustment)	-$50.00	
	I. Income from Leaf Mulch Sales/yr:	$1,600.00	
Wood Mulch	Amount	$9,513.53	
	Delivery	$4,300.00	
	Tax	$538.75	
	Fuel Surcharge	$625.00	
	Other (adjustment)	$81.85	
	J. Income from Wood Mulch Sales/yr:	$15,059.13	
	SUBTOTAL CHECK	$68,288.38	
	L. Total Benefits/Year (E+F+G+H+I+J	$301,392.08	
TOTAL NET SAVINGS OR COST			
	M. Net Savings Year (L - D if L > D):	**$141,952.08**	
	N. Net Cost/Year (D - L if D > L):		

Table 7. Cost/benefit analysis worksheet for Composting Operation year 2014 (Page 2)

Recommendations

Missing Data

Throughout the duration of our Capstone Project, we determined that it was challenging to obtain data on current composting or mulching operations. While working with the Department of Public Works, we discovered that the necessary data was either spread out among multiple sources, non-itemized enough, or non-existent. The issue could in part be attributed to the recording systems that experienced a recent program upgrade, so there were some noticeable differences in the newly collected information that had to be adjusted to compensate. To properly analyze future progress, we suggest centralizing all data relating to composting and mulching operations in one location and itemizing costs to identify composting costs from other operational expenses.

The data should include capital costs associated with facilities and equipment, operation and maintenance expenses, and expenditures associated with collection, transportation, processing, administration, and marketing so that the College Park DPW can obtain accurate values to evaluate total costs for each step of processing, and determine revenue from compost and mulch production and sales. Having all of this data in one location separated into their respective parts will make it easier to conduct comprehensive analyses and make specific recommendations once the year two CBA in our zero waste plan is run. The following "suggested template" contains the main items that should be considered in a more comprehensive cost/benefit analysis.

Each of the sections in the template are described as follows:

I. Site Maintenance

Site maintenance encompasses site preparation costs along with related land improvement expenses. If the city plans on acquiring the leased land, it should be included a n item "site acquisition" as the capital cost that must be paid by the city to obtain the land.

Associated land costs generally follow local real estate costs whenever possible. If necessary, "land improvements" should be incorporated and include labor costs for engineers working on design and construction. If this is the case, site size, ease of grading, and the cost of installing minimal infrastructure (such as roads and drainage systems) may also impact final expenses.

II. Collection Costs

The City of College Park collects a variety of materials throughout the year. For the purposes of this CBA, expenses for the collection of leaf and grass, and brush collection should be itemized while considering the amortized prices of equipment, Labor costs, and Operation and Maintenance expenses.

III. Operational Costs

Ideally, this section encompasses the costs of each step during the composting/mulching process. It might include renting equipment, hiring laborers to run and maintain composting and mulching operations, fuel and supply expenditures, and the costs of outreach and marketing.

The ***Amortized Price of Equipment*** section refers to paying off the debt of newly acquired equipment with a fixed repayment schedule in regular installments over a period of time.

Labor costs are incurred from hiring and training staff to ensure operations run smoothly at the composting and mulching site. In the CBA, labor fees are categorized under Collection and Operational Costs.

Operations and Maintenance (O&M) *Costs* result from running and managing site operations. This includes operating various machines in the field during the separation, processing, and transportation of compost and mulch.

Suggested template to collect data for a cost benefit analysis of composting operations:

Improving Solid Waste Practices in the City of College Park

Cost-Benefit Analysis of Composting and Mulching of Yard Trimmings operations

YEAR: YYYY

Composting area size N Acres

I. SITE START-UP AND MAINTENANCE COSTS

Site Maintenance	**COSTS**	**NOTES**
Site Cleaning	$0.00	
Drainage Cleaning	$0.00	
Registration/Inspection Fee	$0.00	
Other Costs	$0.00	
Total Maintenance Costs/YR:	**$0.00**	

II. COLLECTION COSTS

Curb Collection

	AMORTIZED PRICE OF EQUIPMENT	LABOR	O & M	NOTES
Leaf and Grass Collection	$0.00	$0.00	$0.00	
Leaf and Grass Collection	$0.00	$0.00	$0.00	
Brush collection	$0.00	$0.00	$0.00	
SUBTOTAL	**$0.00**	**$0.00**	**$0.00**	

Related Collection Costs

	AMORTIZED PRICE OF EQUIPMENT	LABOR	O & M	NOTES
Directing Incoming vehicles	$0.00	$0.00	$0.00	
SUBTOTAL	**$0.00**	**$0.00**	**$0.00**	

Total Collection Costs/YR:	**$0.00**

III. OPERATIONAL COSTS

	AMORTIZED PRICE OF EQUIPMENT	LABOR	O & M	NOTES
Forming windrows (Front loader)	$0.00	$0.00	$0.00	
Moving windrows	$0.00	$0.00	$0.00	
Turning windrows	$0.00	$0.00	$0.00	
Watering windrows	$0.00	$0.00	$0.00	
Temperature monitoring	$0.00	$0.00	$0.00	
Lab analysis of Compost in Maine	$0.00	$0.00	$0.00	
In-house testing supplies	$0.00	$0.00	$0.00	
Compost screening	$0.00	$0.00	$0.00	
Mulch shredding (Tub Grinder)	$0.00	$0.00	$0.00	
Administrative costs	$0.00	$0.00	$0.00	
Marketing and distribution	$0.00	$0.00	$0.00	
Public education	$0.00	$0.00	$0.00	
SUBTOTAL	**$0.00**	**$0.00**	**$0.00**	

Total Operational Costs/YR	**$0.00**

IV. COST/BENEFIT ANALYSIS: COMPOSTING VS. CURRENT DISPOSAL

TOTAL COSTS		**NOTES**
A. Total site maintenance costs/yr:	$0.00	

Table 8. Suggested CBA Template (Page 1)

B.	Total collection costs/yr:	$0.00
C.	Total operational costs/yr:	$0.00
D.	**Total Costs/Yr (A+B+C):**	**$0.00**

TOTAL BENEFITS			**NOTES**
Avoidance Costs			
E.	Avoided disposal cost/yr:	$0.00	
F.	Avoided purchases of soil amendment/yr:	$0.00	
	SUBTOTAL	**$0.00**	
Overall Sales *(Breakdown provided below)*			
G.	**Smartleaf**	**$0.00**	
H.	**Unscreened**	**$0.00**	
I.	**Leaf Mulch**	**$0.00**	
J.	**Wood Mulch**	**$0.00**	
	SUBTOTAL	**$0.00**	
Total Sales Breakdown			
SmartLeaf Compost (SL)			
	Amount	$0.00	
	Delivery	$0.00	
	Tax	$0.00	
	Fuel Surcharge	$0.00	
	Other (adjustment)	$0.00	
G.	Income from SL Sales/yr:	$0.00	
Unscreened Compost (UC)			
	Amount	$0.00	
	Delivery	$0.00	
	Tax	$0.00	
	Fuel Surcharge	$0.00	
H.	Income from UC Sales/yr:	$0.00	
Leaf Mulch (LM)			
	Amount	$0.00	
	Delivery	$0.00	
	Tax	$0.00	
	Fuel Surcharge	$0.00	
	Other (adjustment)	$0.00	
I.	Income from LM Sales/yr:	$0.00	
Wood Mulch (WM)			
	Amount	$0.00	
	Delivery	$0.00	
	Tax	$0.00	
	Fuel Surcharge	$0.00	
	Other (adjustment)	$0.00	
J.	Income from WM Sales/yr:	$0.00	
K.	**Total Benefits/Year (E+F+G+H+I+J):**	**$0.00**	

TOTAL NET SAVINGS OR COST		
L.	**Net Savings Year (K - D if K > D):**	**$0.00**
M.	**Net Cost/Year (D - K if D > K):**	

Table 8. Suggested CBA Template (Page 2)

Works Cited

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