

An Analysis of the University Park Pilot Composting Program

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Executive Summary

The Department of Public Works of the Town of University Park has asked that our group of six University of Maryland Environmental Science and Policy students undertake this project to assess its pilot composting program. The University Park composting program was started in 2011 and provides its participants with composting materials, such as bins and bags, and picks up the food waste once a week from participants' homes. A truck then drops off this waste at the Western Branch facility in Prince George's county where it is broken down and transformed into a reusable soil. This program currently has 225 current members who participate at different rates. Since its start, the town has not had the time or resources to assess the program's rate of participation, the efficiency of their resources, or whether there is a capacity to expand further. At the start of our project our objectives were: to assess the current program, identify and determine the costs of alternatives, and recommend a course of action based on our findings.

Our first objective was to assess the composting program University Park currently has in place. We designed and conducted two surveys; one aimed to assess the current participants of the compost program and the other assessed the non-participants in the town. Additionally, we conducted an interview with David Brosch, a council member of University Park, to gain knowledge of the program since its inception and to solidify the data that was found in our two surveys.

Our second objective was to identify and determine the costs of alternatives. Our methodology to complete this objective was to conduct a full cost-benefit analysis. We looked at the costs and benefits of all factors in the pilot program and what could be changed to improve efficiency. These results gave us important information to base our final recommendation.

Our last objective was to recommend a course of action based on our findings. Based on our research, our group recommends that the compost program switch venders of their bags and buckets. We also recommend that the program offer a second bucket to larger families on a need-basis. Additionally, we recommend that the program does not immediately switch to meat and dairy at this time but may choose to do so in the near future due to high citizen approval. Also, we do not believe that switching to a mandatory program is economically feasible at this time. Lastly, we recommend that the program increase the advertising materials provided to participants. We have provided these materials to increase awareness of the compost process and the program as a whole.

After months of analysis, interviews, and survey collection, we believe these recommendations are the best next steps for the University Park Pilot Composting Program. We believe this will allow the program to expand and grow in a logical manner consistent with the town's wants and estimated projections for future participation.

Introduction

Throughout our history, human ingenuity has led the world into an era of advanced technology. This progress has allowed for the rapid human growth we see today, with the global human population growing exponentially since the mid-1700's (Grigg, 1980). As the population continues to rise, so too does our use of resources and production of waste. Among many other environmental consequences that have arisen from human advancement is the amount of food waste that is produced each day. Over 97% of food waste in the United States is predicted to end up in landfills (Levis, Barlaz, Themelis & Ulloa, 2010). Food waste causes an excess consumption of freshwater and fossil fuels while simultaneously emitting both methane and carbon dioxide into the atmosphere, which are known to exacerbate global warming and climate change (Hall, Guo, Dore, & Chow, 2009; Prather & Holmes, 2017, Solomon, Plattner, Knutti, & Friedlingstein, 2009). Due to these catastrophic impacts on the environment (and, subsequently, our society), it is important to develop strategies to mitigate the amount of food waste that is buried in landfills.

Food scraps undergo different processes depending on the environment they are in. When food waste is “composted”, it is placed in an environment that includes oxygen and organisms—especially microorganisms. The microorganisms feed on the organic matter (food scraps), consume oxygen in the process, and excrete nutrients vital to plant growth such as nitrogen, phosphorus, and magnesium. This generates heat while simultaneously releasing enough carbon dioxide and water vapor into the air to amount to a reduction in the volume of the final product (Pace, Miller, & Farrell-Poe, 1995). This process converts the food into a medium that is rich in nutrients available for plants to take up, thus diverting it away from landfills and allowing for a more closed-loop management to food waste. Food scraps in landfills go through a different process. Food that has been enclosed in a garbage bag and piled into mounds at the landfill do not have access to oxygen like food being composted. The organic matter therefore goes through anaerobic digestion, releasing methane as a by-product, which we now know contributes to climate change more than carbon dioxide (Prather & Holmes, 2017).

In Maryland, approximately 2.32 million tons of compostable material and 998,630 tons of food waste are generated each year, with only 127,348 tons of that food waste being composted (Maryland Department of Energy, n.d.). With food waste having such a great impact on environmental health, developing food recycling programs (like composting programs) can be one relatively simple solution to a multi-faceted problem. Composting programs help to reduce our greenhouse gas emissions while simultaneously providing community members with a better idea of what happens to their food once they are finished with it. There are currently approximately 4,713 composting facilities in the United States, with over 57% of these facilities dedicated to yard trimmings and 13% that process “multiple organics” (where food waste falls) (Goldstein, 2017). Food waste composting is not as developed as yard waste composting, but there has been considerable interest in furthering food waste composting programs and reducing the amount of food waste in landfills (Levis, Barlaz, Themelis & Ulloa, 2010). As more regions begin

implementing residential compost programs, the negative environmental impacts of anaerobic decomposition will be reduced while simultaneously providing a learning opportunity that can help foster an appreciation of the complexity of our consumption and generate interest in addressing environmental issues.

The Town of University Park, Maryland started a pilot compost program in the fall of 2011 serviced by the Public Works Department. This voluntary program currently provides curbside compost collection for 225 out of 919 residences. Eligible pick-up items include fruit and vegetable scraps, eggshells, nutshells, nuts, items made from flour, grains, coffee grounds, and tea bags. The program does not include any meat, dairy, oils, or cardboard cartons of any kind. The participants are provided with a countertop bin, a 5-gallon collection bucket with a lid, and compostable liners. One worker with one truck picks up the curbside compost once per week. For the 2018 year thus far, 33,540 pounds of compost have been picked up in total, with an average of 970 pounds of compost picked up weekly and a range of 200- 1420 pounds of compost picked up per week (a wide range of weekly compost amounts is expected due to seasonal changes and holidays). The total amount of compost picked up yearly increased from 2013- 2015, with 62,380 pounds of compost picked up in 2015 (the highest annual amount to date). Since 2015, however, the total amount of compost collected each year has been decreasing.

The pilot program has not been assessed since its establishment. University Park government members expressed concern over low participation from current members of the program, as well as interest in identifying ways to change the program that could increase town-wide participation and possibly cut costs. Having a strong, effective program can benefit the local community and set a strong example for other neighboring areas to follow suit. Here, we will assess the University Park pilot composting program to determine any inefficiencies and provide a cost-benefit analysis of the current program. We have also established alternative program options and completed a cost-benefit analysis on each. Our alternative program options include continuing the current program with alternative vendors, the current program but including meat and dairy, and making the program mandatory (meat and dairy not included). We will also provide recommendations for what we think will be the best plan of action for the program moving forward, given the data we have compiled. This analysis will ultimately find the most environmentally-friendly, economically-efficient way to improve upon the University Park composting program that meets the wants and needs of the townspeople.

Goals and Objectives

We had a variety of goals and objectives for this project. Our first objective was to assess the current program. We did this by completing a cost-benefit analysis of the program, which included the equipment used, the trucks and transportation, pickup cost and labor costs. In addition, we assessed current participation in the program by creating and implementing a survey asking questions on participants' overall satisfaction with the program. We also created and distributed a survey for residents not currently participating in the program to determine what could help increase participation. These responses have helped us determine the best course of action for improving the program.

Our second objective was to identify and determine costs of alternative compost programs. We first determined three alternative ways of running the program: continuing the current program using more cost-efficient materials, adding meat and dairy to the current program, and implementing a mandatory composting program. We then conducted a cost-benefit analysis on each of these methods to determine whether or not they would be viable options for the Town of University Park.

Our third and final objective was to recommend the best course of action moving forward with the program based on the cost-benefit analyses and survey results. We used all of the data collected to determine what we deem to be the best plan for both the program and the participants. Additionally, we have created graphic documents which detail best composting practices for participants, since current participants mentioned that this was needed.

Methodology and Research Approach

Survey #1 and Survey #2 Methods

We chose to complete two surveys to assess the current program and evaluate the next steps for University Park. The first survey targeted current participants of the pilot food program in the town and the second targeted those living in University Park that do not participate in the program. The aim was to solicit feedback about the program to establish the best means of improving the program. We intended to use feedback from the surveys in conjunction with the cost-benefit analysis to formulate the recommended changes. The first survey was developed using Google Forms and was distributed through the email list to participants in the program. The survey was open from October 20th - November 8th. We closed the survey for analysis on November 8th. We received 142 responses, which represents 63% of the 225 program participants. Survey questions were chosen to gauge particular aspects of the program that participants want to be improved as well as to obtain knowledge of factors motivating participants to participate in composting. Please see Annex A for a complete list of survey #1 questions. The second survey was also developed using Google Forms and was distributed by Mayor Carey via a pre-existing email list. The survey questions were written to collect information on those not currently in the program, motivation for non-participation, and opinions on future changes to the program. This survey was open on November 6th, 2018 and was closed on December 3rd, 2018 for analysis. We received 104 responses, which represented 15% of the 675 non-participating households in University Park. Please see Annex B for a complete list of survey #2 questions.

Interview Methods

David Brosch is a council member in University Park and expressed an interest in this project from the start. We decided to interview David due to his particular dedication to the program and knowledge of how it was run from the beginning. First, we reached out to David, asked for a personal interview, and found an adequate meeting space and time. It was decided to meet at the Starbucks in the College Park shopping center at 2:00 pm on Wednesday, November 7th. Before meeting for the interview, we drafted and edited relevant questions to ask our interviewee. We wanted to ask about his involvement in the program, improvements to the current program, and how to increase participation within the town. It was decided to make the interview short and concise, since our interviewee was taking the time out of his day to meet with us. Therefore, we kept our interview to 7 relevant questions. We drafted our questions on a shared google document and both recorded David's responses as he answered. Please see Annex C for a complete list of interview questions.

Cost-Benefit Analysis Methods

We conducted a full cost-benefit analysis for the University Park composting program in order to evaluate the factors that were costing the program and ways the program could increase efficiency. First, we looked at the program's current costs of labor and compost materials provided to the participants. Labor and materials account for the two main sources of cost for the compost program. In order to quantify the labor costs, we directly contacted our client for assistance. Our client provided us with data pertaining to both the cost of paying crew members and renting a truck. Additionally, we were given figures on the costs of tipping at local facilities, and the costs of ordering buckets, lids, and bags. After we received this data, research was done online to assess the benefits of alternative options for materials and ways costs could be reduced. Cost, as well as longevity of materials, were considered in this process. Lastly, we conducted research on alternative programs in order to assess if a pick-up system was most effective. Limited research was done for alternative programs from towns of similar size. Due to the wide variety and quantity of data offered to us by our client, we prioritized quantifying already existing options. Using figures given to us, we estimated the cost of adding meat and dairy, as well as making establishing a town-wide mandatory program. Figures of tipping fees, labor costs, and truck costs allowed us to make total cost estimations.

Informational Graphics Methods

In order to come up with the best possible methods for the composting program, we researched what makes a good information graphic. After compiling information on how to do so, we discussed what we wanted to be included in the graphics based on what information we thought was lacking in the current program. It was determined that a "What to Compost", a "What not to Compost", a "Why Should I Compost?", and a "University Park Composting Cycle" graphic was what we needed to provide the participants of the program. By creating graphics for each of these topics, the participant would know why composting is so important, and exactly how to compost in the University Park program.

We then sketched multiple draft ideas of the graphics to determine just how we wanted them to look. After coming up with multiple drafts for each graphic, we determined which ones we liked the most. Once we decided which ones we wanted, we created the graphics using Adobe Illustrator. Each piece of fruit and every aspect of each graphic was completely hand drawn and original. After finishing the graphics, each graphic was run by all group members to ensure everyone was happy with the outcome. Please see appendix D for complete graphics.

Frequently Asked Questions Methods

After analyzing the current program, we determined that the participants needed to be provided with more information on composting and the program itself. After deciding to create

graphics, we also decided that a Frequently Asked Questions section would help fill the gaps that the graphics were unable to fill. As a team, we then worked to come up with frequently asked questions that participants in the program would likely ask. In addition to this, after receiving the results from the survey for current participants we were able to come up with several topics that were mentioned multiple times and create questions regarding those topics. We then came up with answers to each question and compiled all the questions together to create a page of information that could be provided to the participants to help answer some of their questions. Please see appendix E for complete graphics.

Findings

Survey #1 Results

Our online survey has received 142 responses. The age of respondents varies fairly equitably across 6 listed age categories from 18-60+ years of age, with the highest percentage of respondents (38%) being over age 60. 50% of respondents come from households with 1-2 people, 44% of respondents are members of households with 3-4 people, and the remaining 5% of respondents come from households with over 5 people.

A large majority of respondents (76%) claim to actively participate each week. This number is slightly larger than the average of 67% of member households who participate each week according to collection data taken by the University Park Public Works Department (Beall, 2018). We estimate that this number may be slightly skewed by response bias, meaning that people are likely to overreport their participation because they know someone else is reading the survey. 10% of respondents report mostly participating each week, 9% of respondents report participating 1-2 times per month and the remaining respondents participate every few months or report not being signed up for the program (although the survey was distributed to program participants). Several respondents report forgetting as the primary reason they don't participate every week. Other respondents cite problems with bags disintegrated and ants as reasons they do not participate each week.

We anticipated that educational materials would be helpful for participants and the survey data confirms this. Of the survey respondents, 56% stated that they would like to receive more educational materials about how to compost (see Figure #1). We have developed educational materials based on this response. The most popular type of educational material requested was an email with 52% of respondents, but a flyer, website information, newsletter, and FAQ materials were also highly requested (see Figure #2). We have developed several graphics and an FAQ fact sheet to be distributed via email and to be displayed on the website if desired based on this feedback (see Appendix D).

7. Would you like to receive more educational materials on how and what to compost?
141 responses

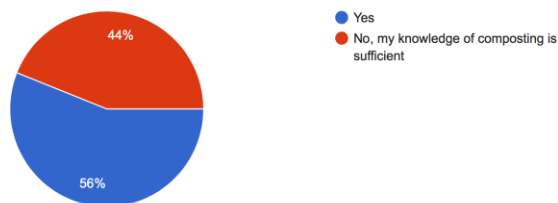


Figure #1: Question 7 of Survey 1

8. If yes, which materials would be the most useful for you?

91 responses

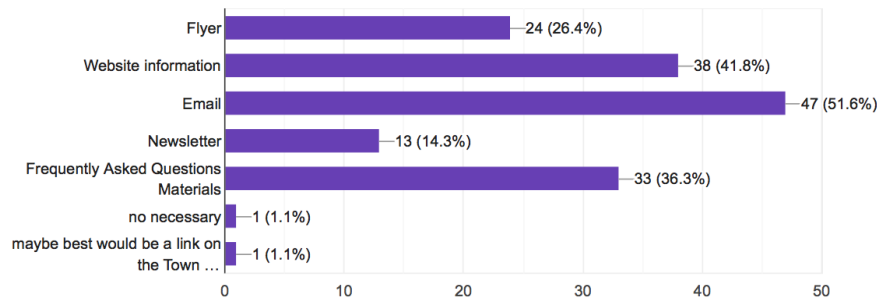


Figure #2: Question 8 of Survey 1

100% of respondents cited environmental reasons as an important factor motivating their participating in the composting program. Forty-eight percent cited convenience as a motivating factor, while 43% cited contribution to the town as a primary motivating factor. (See Figure #3).

9. How important are the following factors in motivating your participation in the UP composting program?

142 responses

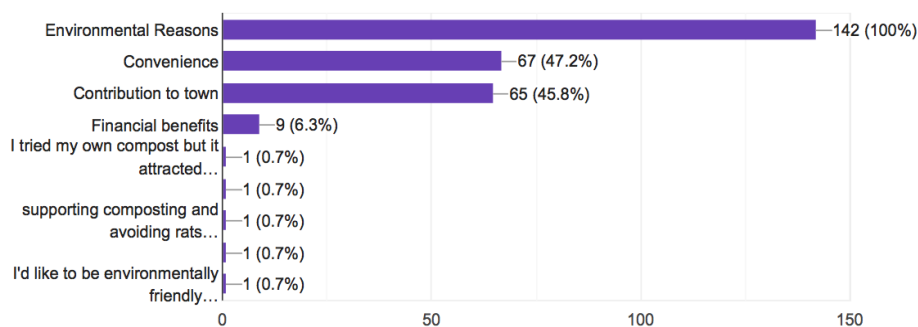


Figure #3: Question 9 of Survey 1

Ninety-one percent of respondents have not had any problems with collection (see Figure #4). The respondents who did have problems with collection nearly unanimously claimed that their compost was not picked up one or more weeks.

11. Have you had any problems with collection?

139 responses

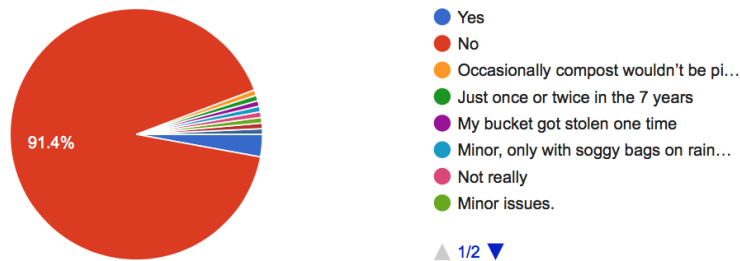


Figure #4: Question 11 of Survey 1

A majority of respondents, 62%, would like to be able to compost meat and dairy; 26% of respondents would not like to be able to compost meat and dairy (see Figure #5).

13. Would you like to be able to compost meat and dairy products?

139 responses

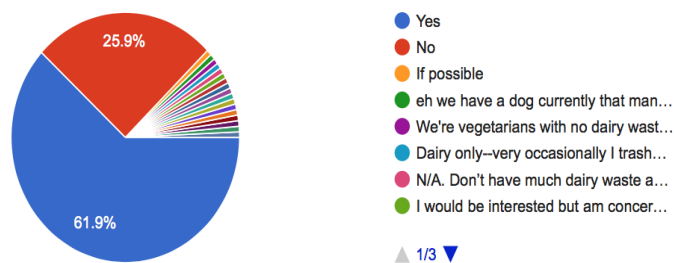


Figure #5: Question 13 of Survey 1

A large majority, 75%, of respondents were comfortable with composting messy food items while 19% were indifferent, and only 6% were not comfortable (see Figure #6). These results combined with respondents' overwhelming support of composting meat and dairy suggest that meat and dairy could become part of the program, as the primary critique of composting meat and dairy is mess.

14. How comfortable are you with composting messy food items?

138 responses

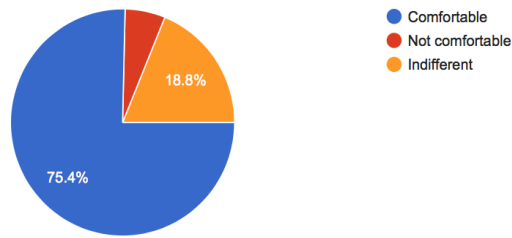


Figure #6: Question 14 of Survey 1

Only 44/130 respondents expressed specific concerns about compost storage and collection when prompted; many of these concerns were with messiness and water collection within and around the bins. One respondent requested a list of compostable items, which will be addressed by our graphic. Three respondents cited pests - ants, rats, and mosquitos - as a collection problem, and two respondents requested that compost be collected more than once a week in the summer months.

Precisely half of respondents first learned about the program through the University Park newsletter. This data suggests that regular advertisement through the newsletter may be the best way to increase program membership. 28% of respondents heard about the program from a neighbor, which suggests that as more community members choose to join the program, a snowball effect will occur in which participation will grow at an increasing rate. (See Figure #7).

16. How did you hear about this program?

141 responses

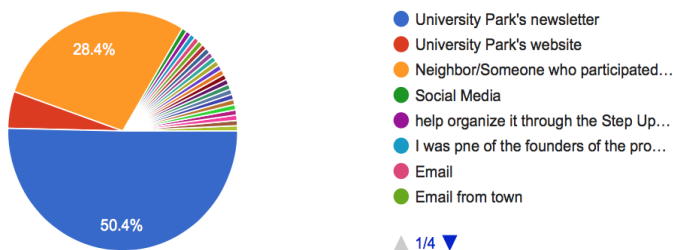


Figure #7: Question 16 of Survey 1

Respondents nearly unanimously (97%) find the provided composting supplies suitable and easy to use. Forty-one percent of respondents would be less likely to participate in the program if they needed to pay to participate. For 58% program cost would not affect their choice to participate (see Figure #8). This data suggests that the program would garner the most participants if it were to continue to be free, but that a small cost in participation may not dissuade the majority of members from participating.

18. If you had to pay to participate in the program (e.g.: to purchase liners or other supplies) would that affect your participation?

141 responses

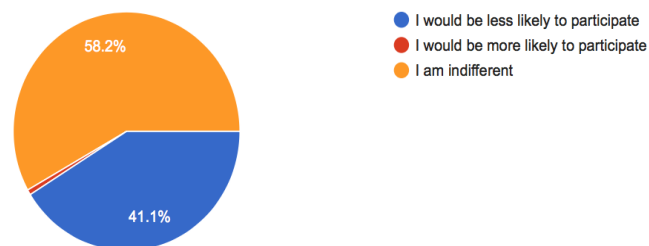


Figure #8: Question 18 of Survey 1

When asked what they like about the program, respondents overwhelmingly cited environmental benefit as their favorite aspect of the program. Many respondents also claimed that the program was easy, convenient, and free to participate in.

The majority of participants thought that the program was well-run as is. 6 respondents requested that more items be included in compost (i.e. meat and dairy products), 14 respondents claimed that bags used were messy and broke easily, 2 respondents claimed that the collection time on Tuesdays was too early in the morning, 8 participants requested access to the soil or mature compost produced from the program for their home gardens, and 5 respondents suggested that the program be expanded to the entire town.

Survey #2 Results

Our second survey received 104 responses from the citizens of University Park that do not already participate in the composting program. The ages of the respondents varied among the 6 age groups that we provided. Forty-five percent are between the ages of 18-25, 21% are between the ages of 50-59, 20% are between the ages of 40-49, and 15% are between the ages of 30-39. This shows which group of citizens to target when advertising for the program. Another demographic question that we asked was about household size. According to the survey, 59% of people live in houses of 1-2 people, 36% live in a household of 3-4, and the remaining live in a household of more than 4 people.

One question that we asked that is very beneficial to assessing the non-participant's experience with composting was: do you currently compost your kitchen waste. This survey found that 40% have never composted their food waste, 37% already compost on their own, and 16.7% have composted in the past (see Figure #9.) This shows that a large portion of the respondents have never composted and that is a reason they are not participating in the program. It also shows that some citizens of the town are not participating because they already do so on their own.

3. Do you currently compost your kitchen waste?

102 responses

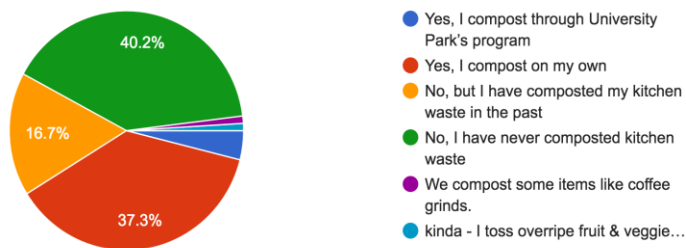


Figure #9: Question 3 of Survey 2

Next, we asked about the respondent's knowledge of composting from a scale of 1-5. One indicated that they were "novices" when it came to compost and 5 indicated that they were "experts." According to the results, 42.2% indicated a level of "4", 25.5% indicated a level of "3", 14.7% indicated a level of 1, and 8.8% indicated a level of "2" and "5" (see Figure #10.) This exhibited that many respondents have a high level of composting, but there is a group that the pilot program is not reaching. If this group is educated about how to compost, then they might be more likely to sign up for the program.

4. On a scale of 1-5, please indicate your level of knowledge of composting:

102 responses

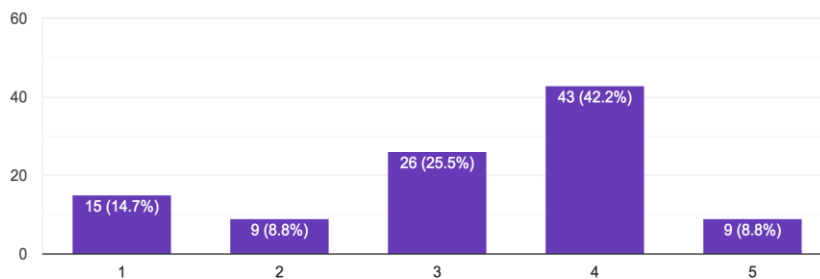


Figure #10: Question 4 of Survey 2

Next, we decided to ask the respondents about their awareness of the University Park's food waste composting program. Forty nine percent of respondents said they were aware of the program but did not want to participate, 29.4% stated that they were aware and want to participate, and 3.9% answered that they were not aware of the program and now want to participate (see Figure #11.) This data tells us a lot about the knowledge of the composting program around the town. It also gives insight to if people are not participating because of a lack of awareness or because of disinterest. A large percent of the respondents answered that they were disinterested in the program. But, at least 29.4% showed interest in participating, but are not signed up.

5. Are you aware of the current University Park Composting Program?

102 responses

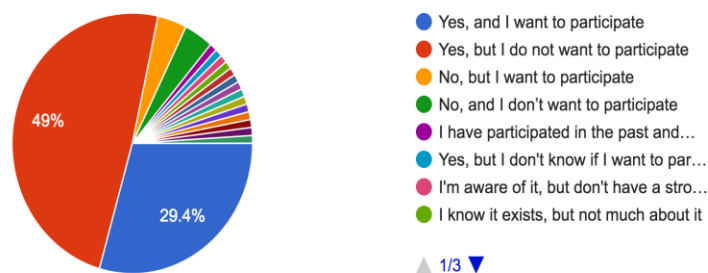


Figure #11: Question 5 of Survey 2

The next important question we asked was the reasoning behind non-participation. We asked this question because we wanted to understand the motivations behind not signing up for the composting program so that we can gauge future participation. This question listed multiple expected reasons why people were not interest, and also included an open-ended section so people could explain their reasonings. This showed that 39% of people were not participating because they already compost on their own, 20% do not participate because of the inconvenience, 15% do not compost because of the mess and smell, 12% are unfamiliar with how to compost, 10%, have not heard about the program, and 4% do not participate because they have a disinterest in composting. A large percentage already compost on their own, and therefore do not want to participate in the program. This explains a large percentage of disinterest in the program and also might explain a lack of participation. A large number of respondents also answered that they were not participating due to a lack of knowledge, inconvenience, or mess of the process. This is a problem that may be solved with an increase in education about composting in the town which may influence this group to sign up for the composing program. Next, we asked a few questions on the future of the compost program to inform our final recommendations. As a group, we explored the option to change the program from free to a small fee for participants. When we asked this in the second survey, 70% of respondents were not in favor of this change, 20% were

indifferent, and 11% answered yes (see Figure #12.) This informed our group's decision not to move in this direction.

8. If it were necessary to pay to participate in University Park's composting program, would you participate?

102 responses

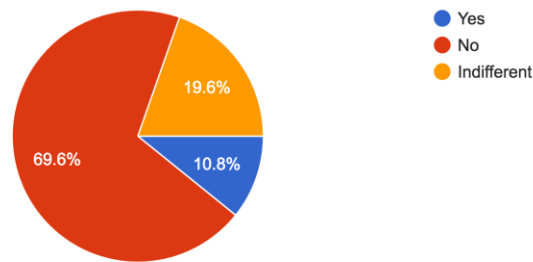


Figure #12: Question 8 of Survey 2

Additionally, we asked a question on changing to a mandatory town-wide composting program to gauge opinions from this group of non-participants. Forty nine percent of people said they would participate if the program was mandatory, 32% said they would not participate, and 23% said they would consider participating (see Figure #13.) This data influenced our decision not to immediately move in this direction.

10. If University Park were to adopt a mandatory town-wide composting program, would you participate in it?

101 responses

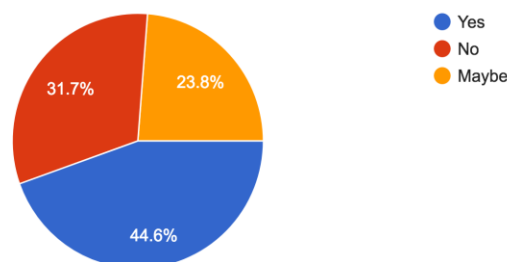


Figure #13: Question 10 of Survey 2

Lastly, we asked an open-ended question about suggestions for how to engage people in the town to participate in the compost program. We received a wide variety of responses and used them to determine our final recommendations for the program. We will also provide our clients access to both of the surveys in order to evaluate this data on their own if desired.

Interview Results

The interview with David Brosch was very beneficial for our overall project. We used David as a vital resource to provide us with a background of the pilot program from its beginning and used his responses to solidify the final recommendations we were already leaning toward. For example, when we asked David about changing the program to composting meat and dairy, a factor in the first survey that the participants wanted to change, he said that he would be in favor. In our first survey, the majority of respondents were in favor of this, but our cost-benefit analysis determined it would increase the cost of this program. All of these factors went into determining our final recommendation. Secondly, we asked David about our idea to provide larger families a second bucket if they have a need to compost more food items each week. David answered that he would be in support of this after learning that some families are in need of more room in their buckets. Additionally, we asked David about advertising within the composting program and the current participants level of knowledge about the process. He answered that he believed people were aware of how to compost but providing participants with informational materials when they sign up for the program would be beneficial. Likewise, he answered that enhancing the current website information would be ideal because it would increase advertising and, as a result, participation as a whole. This answer validated our original thought on this matter and gave us specific information about what types of graphics would be useful for the program.

Cost-benefit analysis

The findings of the cost-benefit analysis consider the complete costs of each composting program discussed in this paper. This includes the current composting pilot program, alternative programs, and keeping the pilot program but modifying some of the equipment that is used. The costs and benefits of the current pilot program will be used as a reference point for all other composting program options, and as such will be discussed first.

The total cost of the program is comprised of the cost of labor and the truck, the cost of the materials, and the tipping fee of compost at the Western Branch Facility. All these program options will share a tipping fee, at a rate of \$25/ton of compost (M. Beall, personal communication, September 18, 2018). This fee is to tip the compost at the Western Branch Facility in Upper Marlboro, Maryland. This is the closest facility to University Park and will be a constant for these findings across all the composting programs discussed. The current food scrap composting pilot program in University Park utilizes buckets, gamma seal lids, countertop composting containers, and biobags. It requires a one-man crew and single truck to operate, once per week for 8 hours. Firstly, labor and equipment in this program equal \$49/ hour, comprised of \$30/ hour to operate the truck and \$19/hour in labor fees (M. Beall, personal communication, October 10, 2018).

The equipment for this program also comes at a cost. The outdoor buckets and lids in the current program last roughly five years, creating an annual cost of \$2.29 per household on outdoor

equipment (M. Beall, personal communication, September 18, 2018). Indoor equipment costs consist of biobags and indoor composting containers. If each household is using 3-6 biobags per week, a case of biobags (300 bags) should last each household in the program roughly a year, adding another \$37.32 in costs per year. Finally, the indoor composting containers have yet to show signs of breaking, making the annual cost harder to represent. To be cautious, it will be assumed that these indoor containers should last twice as long when compared to their outdoor counterparts, contributing another \$0.62 per household, annually. To summarize, with 225 households currently enrolled in the pilot program, the annual cost of equipment for the Town is \$9031.5. This number added to the annual tipping fees of \$607 (M. Beall, personal communication, September 18, 2018) and labor fees gives us a yearly cost of \$30,022.5 for the current composting pilot program (Table 1).

Slight alterations can be made to the current composting pilot program to reduce costs further. By changing the vendor of the outdoor equipment to the Cary Company, annual costs can be brought down on outdoor equipment from \$2.29 annually per household to \$1.39 when purchased in bulk (Packaging and Containers). This price reduction stems mostly from bulk ordering, but single units from this vendor are also lower in cost than current vendors. The outdoor equipment used would stay much the same, with slight changes to the types of lids used. Changing from a plastic bucket and lid to a steel rust resistant could further reduce annual costs. While the upfront cost of rust resistant steel buckets and lids are rather high, when purchased in bulk a single steel bucket and lid costs \$7.82 with shipping (Packaging and Containers). The lifespan on these buckets and lids are currently unknown, but if they last twice as long as their plastic counterparts, the annual cost per household using steel buckets would be \$0.72. This could reduce the total cost of the pilot program (see table below).

Changes to the composting program, such as including meat and dairy or making the program mandatory will change the labor costs drastically, while still utilizing the same figures for household equipment costs. If the town wants to include meat and dairy in the composting program, labor costs will increase to \$42/hour, and the cost of the truck will increase to \$48.50/hour, or \$90.50 in labor and equipment per hour (M. Beall, personal communication, October 10, 2018). Tipping fees would still equate to \$25/ ton, but the increase in compostable product is hard to estimate. Meat and dairy are heavier than many other food scraps, so a doubling in weight of compostable product would be expected, if not more. Tipping fees would add minimum another \$1214 in this type of composting program, due to the increased weight of meat and dairy food scraps. When combined, this composting program would present a final minimum cost to the town of \$47893.5.

Finally, creating a town wide mandatory composting program is another option that we considered in our analysis. This would be the most expensive option. This change would require two separate crews and two trucks. Each crew would cost \$63 per hour in labor costs and \$48.5 per hour for the cost of the truck (M. Beall, personal communication, October 10, 2018). This

would create an annual cost of \$92,768 per year in labor and equipment costs, plus \$40.14 per residence annually in curbside equipment costs. Based on 2010 census data, showing 919 residences, this would be an annual cost to the town of \$36,888.67 in curbside equipment (Data Access and Dissemination Systems). This type of program would cost the town \$129,656.67 plus tipping fees. An estimation of said tipping fees could be four times the current tipping fees, as the number of residences in the pilot program currently are 225. This would equate to an estimated \$2,428 in tipping fees, bringing the grand total of this type of composting program to \$134,512.67. Complete costs for each type of composting program have been listed in Table One below, to give an accurate idea on the annual cost for each composting pilot.

Annual Composting Costs by Program

Composting Program	Current Composting Pilot Program	Composting Pilot, alternative Plastic Buckets	Composting Pilot, Steel Buckets	Meat and Dairy Volunteer Composting	Town wide Mandatory Composting
Participants	225	225	225	225	919
Tipping Fee (Total Annual Estimation)	\$607	\$607	\$607	\$1214	\$2,428
Curbside equipment (Annual)	\$515.25	\$312.75	\$162.00	\$515.25	\$2,104.51
Indoor Equipment (Annual)	\$8,536.50	\$8,536.50	\$8,536.50	\$8,536.50	\$34,866.86
Labor/ Transportation (Annual)	\$20,384.00	\$20,384.00	\$20,384.00	\$37,648.00	\$92,768.00
Total estimated annual Cost	\$30,022.50	\$29,820.00	\$29,669.25	\$47,893.50	\$134,512.67

Table #1

For direct benefits, there are considerable savings associated with composting instead of dumping trash. Trash is being processed at a tipping rate of \$59/ton (M. Beall, personal communication, September 18, 2018), while compost tipping rates are as low as \$25/ton. The current pilot program has been saving \$825.52 annually on tipping fees. Getting rid of the composting program would add 24 tons of trash to process, costing the town \$1,432.52 in tipping fees as opposed to only \$607 in the current program. The alternative programs would have an even further benefit, with the meat & dairy option cutting \$1,651, and the town-wide option cutting \$3,302 in tipping fees from trash. If the potential compost of the meat & dairy program were processed as trash instead of compost, it would cost the town \$2,865. If the potential compost from the town-wide mandatory program were processed as trash instead of compost, it would cost the town \$5,730. These benefits are significant, however in the grand scheme of costs they will be outweighed heavily by the increases in labor/equipment costs. According to data provided to us by Mickey Beall, trash typically costs the town \$42,000-\$44,000 a year in tipping fees (M. Beall, personal communication, September 18, 2018). The past 5 years have consistently processed 700-740 tons of trash annually at a rate of \$59/ton. As mentioned earlier, the current pilot program is benefitting the town by saving \$825.52 annually strictly in compost tipping fees instead of trash. To gain some reference for other tipping fees; yard waste is processed at a rate of \$25/ton and leaves at \$13.57/ton. Over the past 5 years, yard waste costs the town anywhere from \$7,000 to \$12,000, usually hovering around \$8,000. In the same 5 years, leaves have cost the town around \$5,000 to process annually.

Conclusions

Main Recommendations

Our goal in this assessment was to determine the best course of action for the Town of University Park pilot composting program. Based on our data, we have determined that, at a minimum, changing vendors of the materials used for the program will benefit the town. There will be a high upfront cost, but we believe the long-term benefits outweigh this initial cost. The current facility being used for drop-off and the pick-up day are sufficient and should not be changed. We do recommend, however, that the pick-up day be enforced, as many residents stated their compost was skipped over one or more times. Additionally, we believe it would be beneficial to provide a second bucket to households as needed, as some families have mentioned that they fill their bin before the pick-up date.

Including meat and dairy in the composting pick-up will drastically increase costs of the program, however, based on the results of the initial survey, interest in including meat and dairy is high. Interest in paying for the program or continuing participation if the program had a fee, however, is low. Therefore, we do not recommend including meat and dairy in the program at this time; however, if University Park leaders find that there is funding to be allocated to the increased cost from including meat and dairy, or if the residents start warming up to the idea of paying a small fee in order to compost meat and dairy, this could still be a viable inclusion in the future. We do not recommend implementation of a mandatory composting program at this time due to the determined costs.

Lastly, we recommend increasing the composting advertising and educational materials within the town. We believe this will increase participants' knowledge of the compost process and will increase participation in the town as a whole. Based on our two surveys, 57% of respondents wanted to receive educational materials. Several respondents also used a short answer question to suggest that educational materials be provided on a yearly basis. Based on this feedback, we recommend distributing our FAQ page and graphic to participants on a yearly basis.

Further Survey Recommendations

Respondents cited forgetting as an obstacle to actively participating each week and many respondents find Mickey's weekly emails helpful and informative. This suggests that weekly emails are effective and should be continued. The survey also shows that the pick-up days and consistency should remain the same. Therefore, we recommend maintaining the current pick-up time of Tuesday's at 7:00 am. Additionally, the greatest complaint that participants had about the program was the messiness of bags. We recommend distributing the FAQ page (see Appendix E) that will address participant concerns and questions about the messiness of bags. Lastly, in a short answer section of our first survey, many participants answered that they needed more room in their

bucket to compost. Based on this data, we recommend allowing the participants the option to request a second compost bucket on a need-basis. This will allow the larger households to compost all of their food scraps without the need to change to a larger bucket for all participants.

Future Research

Our research entailed background research, a cost-benefit analysis, development and distribution of two surveys, and conduction of one interview. We recommend that future research include a greater number of interviews as well as research into the composting programs of other municipalities. This research report primarily focuses on University Park's pilot program and draws from resources within University Park by soliciting resident responses to surveys, using materials costs provided by the town, and interviewing Council Member David Brosch. If given more time we would move on to conduct a comparative analysis of University Park's program and other town composting programs. We recommend that future research consist of interviews with compost leaders in nearby municipalities such as Falls Church, Virginia; College Park, Maryland; and Takoma Park, Maryland.

A second recommendation for future research would involve quantifying the indirect benefits from the composting program. Being able to represent the environmental benefits from composting would greatly help the complete cost benefit analysis. Assigning a dollar value to benefits such as reduced methane production, decreased energy use for disposing of waste, air quality improvements, and the value of the generated soil from the compost could all be useful. Researching these topics and other potential environmental upsides would be ideal for creating a completely accurate cost benefit analysis and is strongly recommended as a future course of action.

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Appendices

Appendix A: Survey #1 Questions

1. When did you join the University Park Composting program? (Select date)
2. How old are you?
 - a. 1-24
 - b. 25-29
 - c. 30-39
 - d. 40-49
 - e. 50-59
 - f. 60+
3. How many people live in your household?
 - a. 1-2
 - b. 3-4
 - c. 5-6
 - d. 6+
4. Please describe your current participation in the University Park pilot composting program:
 - a. I signed up for the program and actively participate every week
 - b. I signed up for the program and mostly participate once a week
 - c. I signed up for the program and participate 1-2 times per month
 - d. I signed up for the program and participate every 2-3 months
 - e. I signed up for this program and participate a few times a year
 - f. I am not signed up for this program
 - g. Other_____
5. If you signed up for the program but do not compost food waste each week, what inhibits your participation? (Long answer question)
6. On a scale of 1-5 please rate your knowledge on composting. (Scale 1-5)
7. Would you like to receive more educational materials on how and what to compost?
 - a. Yes
 - b. No, my knowledge of composting is sufficient
8. If yes, which materials would be the most useful for you? (Check boxes)
 - a. Flyer
 - b. Website Information
 - c. Email
 - d. Newsletter
 - e. Frequently Asked Questions Materials
9. How important are the following factors in motivating your participation in the UP composting program? (Check boxes)
 - a. Environmental Reasons
 - b. Convenience
 - c. Contribution to town
 - d. Financial benefits
 - e. Other_____

10. Is the current pick-up day suitable for you?
 - a. Yes
 - b. No
 - c. Other_____
11. Have you had any problems with collection?
 - a. Yes
 - b. No
 - c. Other_____
12. If yes, please describe. (Long answer question)
13. Would you like to be able to compost meat and dairy products?
 - a. Yes
 - b. No
 - c. Other_____
14. How comfortable are you with composting messy food items?
 - a. Comfortable
 - b. Not Comfortable
 - c. Indifferent
15. Do you have any specific concerns about compost storage and collection that have not been addressed? (Long Answer Question)
16. How did you hear about this program?
 - a. University Park's newsletter
 - b. University Park's website
 - c. Neighbor/Someone who participated in the program
 - d. Social Media
 - e. Other_____
17. Do you find the provided composting supplies suitable and easy to use?
 - a. Yes
 - b. No
18. If you had to pay to participate in the program (e.g.: to purchase liners or other supplies) would that affect your participation?
 - a. I would be less likely to participate
 - b. I would be more likely to participate
 - c. I am indifferent
19. What do you like about the program? (Long answer question)
20. What parts of the program do you think could be improved? (Long answer question.)

Appendix B: Survey #2 Questions

1. How old are you?
 - a. 18-24
 - b. 25-30
 - c. 31-39
 - d. 40-49
 - e. 50-59

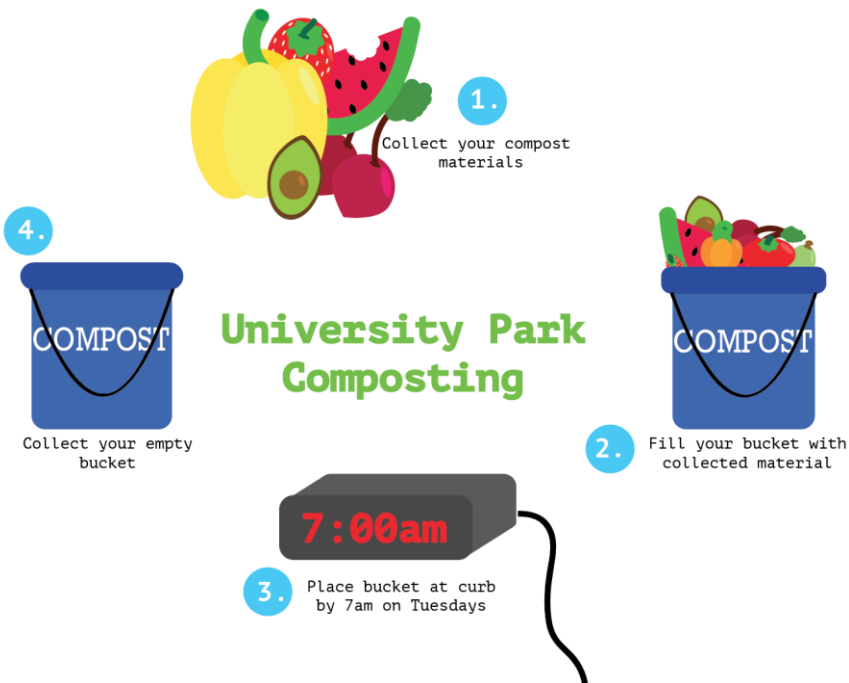
- f. 60+
 - g. Other_____
2. How many people currently live in your household?
 - a. 1-2 people
 - b. 3-4 people
 - c. 5-6 people
 - d. 7+
 3. Do you currently compost your kitchen waste?
 - a. Yes, I compost through University Park's program
 - b. Yes, I compost on my own
 - c. No, but I have composted my kitchen waste in the past
 - d. No, I have never composted kitchen waste
 - e. Other_____
 4. On a scale of 1-5, please indicate your level of knowledge of composting with 1 being "novice" and 5 being "expert" (Scale 1-5)
 5. Are you aware of the current University Park Composting Program?
 - a. Yes, and I want to participate
 - b. Yes, but I do not want to participate
 - c. No, but I want participate
 - d. No, and I don't want to participate
 6. What is inhibiting your participation in the University Park compost program? (Check boxes)
 - a. I did not know about the program
 - b. Unfamiliarity with the process of composting
 - c. Mess/smell of compost
 - d. Inconvenience
 - e. I already compost on my own
 - f. Other_____
 7. What would motivate you to begin participating in this program? (Check Boxes)
 - a. Environmental reasons
 - b. Convenience
 - c. Contribution to town
 - d. Financial benefits
 - e. Other_____
 8. If it were necessary to pay to participate in University Park's composting program, would you participate?
 - a. Yes
 - b. No
 - c. Indifferent
 9. How much money would you be willing to pay to participate in a curbside composting pickup program?
 - a. \$0 per month
 - b. \$0-5 per month
 - c. \$5-10 per month
 - d. \$10-20 per month
 - e. Over \$20 per month

10. If University were to adopt a mandatory town-wide composting program, would you participate in it?
 - a. Yes
 - b. No
 - c. Maybe
11. Do you have any suggestions for how to engage people in University Park to participate?
(Long answer question)

Appendix C: Interview Questions with David Brosch

- a. What is your background with the current pilot composting program?
- b. What is your ideal composting program for University Park?
- c. What are some things you think this program does right?
- d. What are some ways you think this program can improve?
- e. How do you think we can motivate people to participate/Why do you think people have not signed up?
- f. Do you think it is advisable to begin composting dairy and meat?
- g. About 10 people responded to the survey saying that their house is occasionally missed for weekly pickup. Why do you think this is and how can the town fix it?

Appendix D: Informational Graphics



What to Compost:

- Fruit scraps
- Vegetable scraps
- Coffee grounds
- Eggshells
- Shredded newspaper



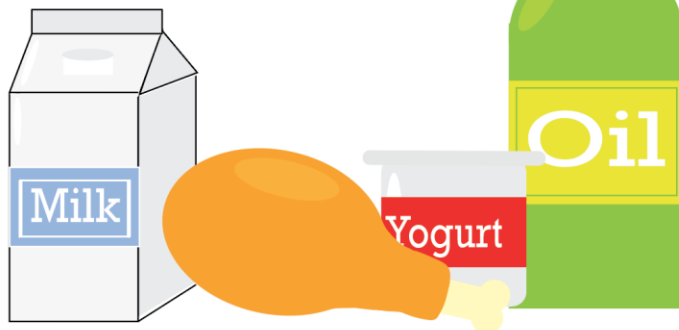
Why Should I Compost?

- Reduce waste going to landfill
 - $\frac{1}{4}$ of landfill waste could have been composted
- Creates nutrient rich soil
 - Can boost production of plants
 - Improve overall soil quality
- Reduce green house gases
 - EPA estimates that landfills are the biggest emitters of methane
 - By reducing the waste that goes to landfills, we reduce the amount of methane that the land fill puts out
- Improve overall air quality
 - Rather than burning this waste it is composted and turned into nutrient rich soil
 - The burning of this waste can release toxins into the air
 - Can lead to asthma, allergic reactions etc.



What NOT to Compost:

- Anything containing meat, oil, fat, or grease
- Diseased plant materials
- Dog or cat feces
- Dairy products



Appendix E: Frequently Asked Questions

How can I reduce pests in my indoor compost bin?

There are a few different steps you could take to avoid pests in your indoor compost bin.

- Make sure the lid shut tight
- Empty your compost into the curbside bin regularly
- If you have space, place your indoor bin or a small container in the back of your fridge to collect scraps in until you can empty it

Where is my compost going?

The compost is taken to Western Branch Composting Facility in Upper Marlboro, MD.

Why should I compost?

Composting reduces the amount of waste in landfills

- ¼ of waste currently in landfills could have been composted.

Compost creates nutrient rich soil

- Compost can boost production of plants which can lead to more efficient farming.
- Compost can improve overall soil quality.
- Compost adds valuable nutrients to the soil making it a higher quality.

Composting reduces greenhouse gases

- According to the EPA, landfills are the biggest emitters of methane.
- Composting involves the disposal of organic waste (i.e. food waste) which will emit methane if left in a landfill. By composting your organic waste rather than throwing it out, you are mitigating climate change!

Composting improves overall air quality

- Waste in landfills is often incinerated.
 - Burning the waste can release toxins into the air.
 - Release of these toxins can lead to asthma and allergic reactions.

Why are my compost bags falling apart?

Composting bags must be made of materials that can break down with the rest of the compost. Food scraps that contain a lot of moisture tend to break down the bags faster. Keeping your food scraps in a container in the fridge and regularly emptying your indoor compost bin can help prolong the life of the bag when indoors.

Can I request an extra composting bin?

Yes! Please contact Michael Beall at mbeall@upmd.org to request a second bin.

What should I do if there was a problem with the pick-up of my compost?

If your compost was not picked up, please contact Michael Beall at mbeall@upmd.org

How can I minimize the mess involved in composting?

- Empty your kitchen bin into your outdoor bin frequently.
- If you frequently compost liquid-like materials (i.e. fruits, etc.) consider double-lining your compost bin if leaking has become a problem.

Can exchange food scraps for prepared compost for personal use?

There is not currently a program for exchanging food scraps for ready-to-use compost, however, it is something we are looking into for the future.

When are pick up days?

Compost will be picked up on a weekly basis on Tuesdays at 7am.

How do I sign up for this program?

If you would like to join the program, please contact Michael Beall at mbeall@upmd.org

How often should I empty my indoor compost?

Compost is picked up once per week. We recommend emptying your indoor compost as often as possible, or whenever your indoor bin becomes full.