

Final Memorandum

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Project: City of Alexandria, Virginia, Resource Recovery Division Strategic Plan Review

To: Michael Clem, Recycling Program Analyst

From: Christopher Koehler, Susan Raila and Annette Scotto, HDR

Subject: Task 1 / 2 - Current Operations Review and Benchmarking

Introduction

The City of Alexandria (City) retained HDR Engineering, Inc. (HDR) to provide consulting services with respect to solid waste and recycling programs offered to residents and commercial and business entities. The City is looking to examine how it currently manages its solid waste and recyclables and evaluate future long-term management strategies. Given the extended time frames required for any major changes, the City would like to analyze some of the broader questions and issues that lead up to making any major decisions. For example, the City is looking to evaluate the current solid waste management services provided to residents as compared to services provided by other communities of a similar size. The City also wants to evaluate if the suite and cost of services they provide is in line with communities with similar socioeconomic demographics. Lastly, the City wants to know if there are any other services, communication methods, or management techniques that they should adopt to provide their residents with quality services at a reasonable price.

This document covers the first two tasks of the project; Task 1 - Current Operations Review and Task 2 - Benchmarking. Where appropriate, and where data was available, observations about the City's programs were made with estimates for cost and performance.

Task 1 – Current Operations Review

HDR reviewed the City's Solid Waste Management Plan to determine if current solid waste management practices are aligned with the City's Eco-City Charter, the Environmental Action Plan, and if current practices meet the long standing objectives and goals of these guiding documents. Specifically, HDR reviewed:

- 1) The current recycling separation and collection requirements to confirm if the separation of recyclables and brush, leaf & yard waste remains the best way to manage these waste streams.
- 2) Current City staffing to determine if the most effective staff level and blend is being utilized (this will be addressed in Task 3).
- 3) The effectiveness of the existing Household Hazardous Waste (HHW) Collection Center and compared the level of collection with other similarly sized facilities in similarly sized cities.
- 4) The location and overall capacity of the existing processing facilities to determine if these facilities will be able to manage mid- and long-term needs.
- 5) The existing Solid Waste Management Plan (SWMP) to determine if the plan still meets the City's objective and goals.

Task 2 – Benchmarking

HDR compared the services and the cost of those services provided by the City to those provided in communities with similar characteristics as Alexandria. Specifically, HDR compared the City's current services to those in neighboring Arlington, VA and Montgomery County, MD and also with Cambridge, MA. Cambridge provided a comparison of a similar community that provides curbside collection of waste using public forces and also disposes of a portion of their waste at waste-to-energy facilities. Occasionally, when data from these three comparable communities were not available, HDR researched and utilized data from other similar municipalities. The comparison of services and costs addressed the following:

- 1) The quality, quantity and cost of solid waste services provided by the City.
- 2) The type and effectiveness of communication channels between the City and its customers.
- 3) The quality, quantity, and cost of services provided by the City in comparison to similar sized cities that also utilize waste-to-energy as a disposal method.

Population Growth and Solid Waste Volumes

Based upon the U.S. Census, the City's 2016 population is estimated to be 155,810 with 66,880 single and multi-family households. The average household size in 2015 was 2.21 people. As of 2010, about 60% of households were multi-family homes and approximately 40% were single family homes. In the 2004 Solid Waste Management Plan, the City of Alexandria projected the total number of households to increase to 74,290 by 2025. Of these households 33% would be single family and 67% would be multi-family. There was 11.3% growth in the population from the 2010 Census, and the current population exceeds that which was projected in the 2004 SWMP for the year 2025.

Because the City only provides collection services to residents of detached single-family homes and multi-family homes with less than four units, and the City has little open space that is zoned for this type of construction, it is unlikely that the City will experience a dramatic increase in the amount of waste it manages. While it is expected that more multi-family dwellings, including high-rise apartments and condominiums will be developed, waste from that sector will not be managed using City staff. Therefore the amount of waste managed by the City is expected to remain relatively constant over the extended planning period (to 2038).

Based on a 2015 Draper Aden Report, there are currently various options for solid waste transfer and disposal within the Commonwealth of Virginia. However, that same report indicates that disposal capacity is the 6th biggest concern amongst solid waste professionals. Predicting future disposal and management options is difficult, especially 20-years in advance. States like Connecticut and Massachusetts that have not increased disposal capacity in decades are becoming heavily dependent upon long-distance hauling of wastes to distant out-of-state landfills. If, in the future, Virginia decides not to continue to develop new landfills and/or WTE facilities, they may also become reliant on long-distance haul, which will likely raise costs, but will also likely provide options for long-term disposal.

Relevant Plans

There are two main plans that are relevant to the City's solid waste management services, the Solid Waste Management Plan (SWMP), published in 2004, and the more recent Environmental Action Plan. This guiding document, currently being updated, serves as a supplemental strategy to the

Commonwealth-mandated SWMP, and helps to lead the City towards overall environmental sustainability. These are both described below.

Solid Waste Management Plan

According to Virginia Administrative Code 9VAC20-130-110, Schedule for Plan Development, each solid waste planning unit is required to develop and maintain a SWMP. SWMPs must be updated every five years or if any major change to the solid waste system is enacted. While the City has provided the required updates, with the latest update letter submitted in 2015, the City has not undertaken any major changes in how they manage their solid wastes since the SWMP was developed. Items that would require an addendum to the SWMP might include shifts in the solid waste management hierarchy, changes in recycling program, unexpected changes in population and/or demographics, changes in the composition of waste, or unexpected changes in the amount of waste managed.

The SWMP's objective is to incorporate the current predicted needs for solid waste management for an on-going 20-year period, a description of the actions to be taken to meet those needs, as well as show an ability to provide for necessary funding and resources for meeting those future needs. By this metric, the original SWMP remains relevant today as the City's overall strategy has not changed dramatically since 2004. That said, the City is on the verge of making important decisions regarding the waste management strategy for the next 20-years. Once those decisions are made the SWMP must be revised to incorporate the predicted needs for solid waste management for an on-going 20-year time period, a description of the actions to be taken to meet those needs, and show an ability to provide the necessary funding and resources to meet those future needs.

Environmental Action Plan 2030

In 2009, the City implemented the Environmental Action Plan 2030 (EAP) to move towards a green economy, fight climate change, and reduce the City's ecological footprint. The EAP focuses on improving the management system to increase recycling and diversion rates through waste reduction and reuse. The EAP establishes five goals related to solid waste:

1. Exceed the City's goal of 35% diversion through increased waste reduction and reuse by 2020.
2. Reach a 50% recycling rate by 2020.
3. Increase diversion of compostable solid waste from disposal.
4. Develop educational outreach programs.
5. Maintain programs to ensure solid waste is managed in accordance with federal and state laws and regulations in a manner that protects health, safety and the environment.

The EAP makes a number of references to the SWMP in terms of incorporating some of the recommendations into the solid waste goals.

Task 1 - Current Operations Review

Trash

The City provides waste collection service to approximately 20,200 residential household units. For an annual Solid Waste User Fee of \$373 per household, the City provides once-a-week curbside collection of household trash, recycling, and leaf & yard waste to residential properties (four units or

less) and to approximately 250 small businesses operating within residential neighborhoods and approximately 20 commercial accounts that utilize a City-owned compactor room. The residential annual fee is attached to the property owner's municipal tax bill.

The City also provides trash and recycling collection services to approximately 65 schools and government buildings and 150 non-profit organizations.

Residents and small businesses are also provided free access to four recycling drop-off depots located throughout the City. The Colvin Street drop-off facility also contains a household hazardous waste (HHW) and electronics drop-off facility; this service is for residents only.

Trash Collection

In 2016, the City collected 21,199 tons of trash from residences, small businesses, schools and government buildings. Collection of trash is provided by the City using City forces. All residential properties fall into one of four waste sheds. Trash, recycling and yard waste collection occurs once per week for each waste shed. In addition, the City provides seasonal curbside leaf vacuuming (8-12 weeks, October to December).

The City owns and operates a fleet of rear loading and front loading packer trucks. Typically rear loading collection trucks, staffed with one driver and two laborers, collect and compact trash curbside and deliver the trash to the Covanta A/A Waste-to-Energy (WTE) facility on Eisenhower Avenue in Alexandria. It is estimated that the cost to manage the approximate 17,390 tons of residential waste is approximately \$150/ton (includes collection and disposal costs).⁽¹⁾

The City currently also provides curbside collection of waste to approximately 250 small businesses/commercial accounts and a small number of non-profit organizations that are located along residential collection routes. These small businesses can "opt-in" to City sponsored collection and their trash and recyclables are collected alongside their residential neighbors (non-profits are not charged for this service). The fees for these commercial accounts are based on a standard waste "unit." Each unit is the equivalent of one (1) 65-gallon tote or approximately 3 bags of trash per week and the fee for each unit is the same as the resident fee, \$373/year. The City can adjust any account's fee (the number of units charged) if the number of bags put out for collection each week increases or decreases. For estimating purposes, it is assumed that the average curbside commercial account pays for one (1) unit, therefore totaling 250 units.

Since the City collects a total of 627 units a year from the commercial sector, and if curbside commercial accounts total 250 units, the remaining 20 compactor room accounts make up the balance, or 377 commercial units (627 less 250). Most compactor room accounts purchase more than one unit; at least one purchases 50 units.

In 2016, the City collected approximately 1,050 tons of trash from commercial properties, and 2,760 tons from schools and government buildings at an estimated cost of \$84/ton for collection and \$43.16/ton for disposal for a total of \$127.16/ton.⁽²⁾ This total is offset by the fees paid by the commercial accounts (\$373/unit or \$59.78/ton) for a net commercial cost of \$67.38/ton. Note institutional accounts are not charged a fee. All other commercial properties are responsible for contracting with a private hauler for their solid waste and recycling needs.

According to the City's CY 2016 solid waste locality report, the City, overall, generated a total of 96,173 tons of waste. That year the City collected and delivered 21,199 tons to the A/A facility using municipal forces. The balance, or approximately 74,974 tons, was managed by the private sector. It is assumed that waste generation and collection rates have not changed significantly in the past 2-3 years.

The City holds an annual Spring Clean-Up Event for residents who receive trash collection. Crews collect materials such as metals, electronics, and furniture curbside on four Saturdays in the spring every year. Large appliances require a \$20 pickup fee. Ineligible materials include yard waste, construction and demolition waste (C&D), and HHW.⁽³⁾ The City managed 168 tons of trash at the last annual Spring Clean-up Event (FY17)⁽⁴⁾.

Trash Disposal

All trash collected by the City is delivered to the Covanta A/A facility (A/A facility) on Eisenhower Avenue in Alexandria. The A/A facility was developed by the City and Arlington County to handle the waste from the two jurisdictions and began operation in 1988. It is a mass-burn facility which processes unsorted waste, recovers ferrous metals, and generates approximately 21 megawatts of energy which is sold to the grid. It is owned and operated by Covanta and is located in an industrial area within the City on a parcel of land jointly owned by the City and County.

According to the terms of the Waste Disposal Service Agreement (WDSA) executed between the City and County with Covanta, the A/A facility will accept the City's residential trash for \$43.16/ton until 2025. The City has the opportunity each year to adjust the amount of waste delivered to the A/A Facility, within certain limits. The two jurisdictions may adjust the amount of waste up or down by a total of 5,000 tons each year. Also based on the agreement, after 2025 the tip fee for the City's residential waste will decrease to zero dollars per ton (\$0.00/ton) for a limited amount of residential trash (no less than 65,000 tons, nor more than 80,000 tons between the City and Arlington County, with further contractual adjustments in the years 2030 and 2035). This \$0.00/ton rate will continue until 2038. In 2038, ownership of the facility will transfer back to the City and the County. Prior to that point, the City and County will need to decide to either continue operation of the A/A facility, which should be returned in good working order, or to develop a different waste management disposal strategy.

OBSERVATIONS ON THE CITY'S TRASH COLLECTION AND DISPOSAL PROGRAM

Given the future zero (\$0.00/ton) tip fee, the City must also keep in mind that it may not be in its best interest to simply reduce residential fees to reflect this savings. The City may need to develop and fund a new disposal facility for the post-2038 era. The money saved on the tip fees can be deposited into an enterprise fund and used to potentially offset the costs of future long-term options. The future of the A/A facility and the site after 2038 will depend on many factors which cannot be predicted at the present time. According to the WDSA the facility (and its underlying property) must be returned to the City and County, "...free and clear of any claim, lien, option, charge or encumbrance of any nature whatsoever, in good order and condition, reasonable wear and tear of the improvements excepted." Whether the two jurisdictions decide to continue to utilize the facility as its primary means of disposal past 2038 will be dependent upon many factors including; plant maintenance, particularly in the later years, future regulatory requirements, and the potential for new technologies. The A/A facility can be maintained, upgraded, replaced, or decommissioned. Regardless of what the future holds, it is likely that a large investment will be required to manage the City's future solid wastes. The City will need to begin considering this eventuality and develop a plan to budget for future capital expenses.

Recycling, Yard Waste and Organics

Recycling Program

The following sections describe how recyclables are collected and processed as part of the City's solid waste management program.

Recycling Curbside Collection

The City's weekly curbside collection program for single stream recyclables is contracted to Bates Trucking and Trash Removal (Bates). Bates is currently in the last year of a 7 year contract to collect recyclables from approximately 20,200 single family homes and 250 small businesses at a cost of \$2.67/month per household/business. There is no limit to the amount of recyclables that can be placed curbside at one time. The City provides three different size recycling containers: an 18-gallon bin, a 35-gallon cart, and a 64-gallon cart. ⁽⁵⁾ Residents may request an additional container that is provided by the City at no additional cost to the resident. Recyclables are not permitted to be placed in plastic bags for pick-up, however, paper grocery bags or cardboard boxes can be used if the recycling cart is overflowing. ⁽⁶⁾

According to the City, in 2016, the City delivered a total of 7,580 tons of recyclables to the Merrifield Transfer Station which included 6,622 tons collected from residential properties by Bates, 508 tons collected by the City at the drop-off centers, and 450 tons collected by the City from schools and government facilities. The cost for residential curbside collection (not including processing fees or revenues) is estimated at \$98/ton [versus \$108/ton for trash collection [\$150/ton - \$43.16/ton]]. The \$98/ton is calculated by dividing the contractor costs by the tons of recyclables collected by Bates curbside ($\$2.67/\text{month} \times 20,200 \text{ households} \times 12 \text{ months/year}$ divided by 6,622 tons = \$98/ton). This estimate does not include City administration costs.

Bates and the City currently deliver all recyclables to the Merrifield Transfer Station (Merrifield) located approximately 11 miles from the City. Merrifield is owned and operated by Waste Management which accepts the materials under a separate contract with the City. Recyclables are then transferred and hauled to a regional single-stream material recovery facility in Manassas, VA owned and operated by Republic Services, Inc., where they are processed and sold.

The City contract with Bates that was set to expire on July 31, 2018 has been extended until January 31, 2019. The City's contract with Waste Management expires on December 15, 2018 with an additional renewal year at the City's discretion. Prior to the expiration of these contracts, the City will need to advertise and re-bid curbside collection and processing of recyclables. By extending the Bates contract, the City now has the option to combine the collection and processing contracts.

Recycling at Schools and Government Facilities

The City provides recycling services to 65 schools and government facilities and, in 2016, collected 450 tons of recyclables. Effective March 1, 2018, the City services these buildings with City owned front loader trucks. The City recently purchased 8 yd³ boxes for most of these locations. The City estimates it costs approximately \$38,000 annually to collect recyclables from schools and government facilities. Based on this estimate and the tons collected, collection costs are estimated at \$84/ton.⁽⁸⁾ This is calculated by dividing the annual cost of \$38,000/year by 450 tons; which is lower than Bates' collection costs of \$98/ton for residential recycling curbside collection. These costs do not include City administration costs.

Recycling Drop-Off Centers

The City also collects recyclables from four drop-off recycling centers, which are unmanned and operate 24 hours a day, 7 days a week. The drop-off centers are used by single and multi-family residents, as well as by some small businesses. In 2016, a total of 508 tons of recyclable material was collected at the four drop-off centers at an estimated cost of \$43,000 annually or \$85/ton (\$43,000 divided by 508 tons).⁽⁹⁾ This cost is for collection only, no administration costs are included.⁽¹⁰⁾ The City picks up the recyclable materials at the drop-off centers twice a week using a front loader. All materials from the Drop-off Centers (and schools and government buildings) are delivered to the Merrifield Transfer Station where they are managed as part of the overall recycling processing contract.⁽¹¹⁾

The following figure shows the location of the Recycling Drop-off Centers.

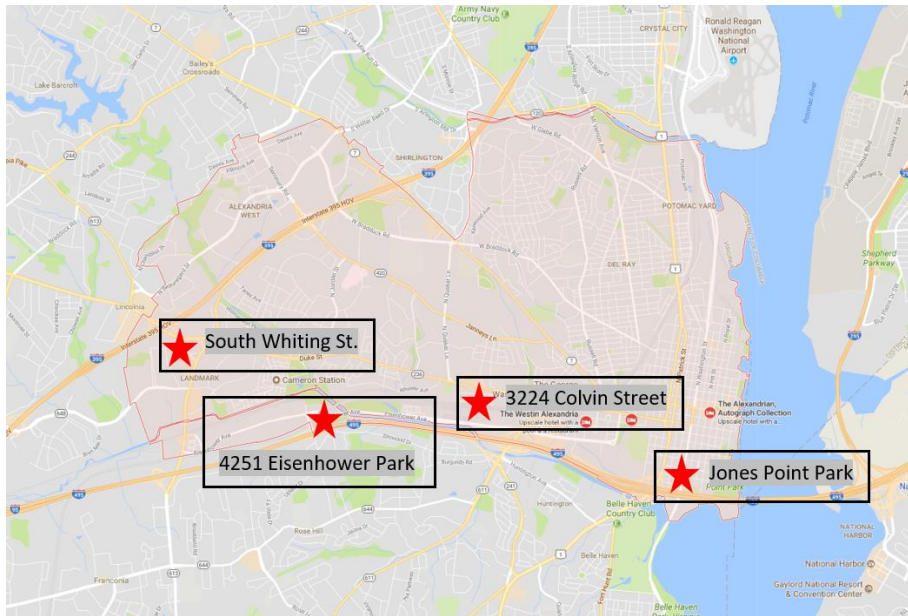


Figure 1: Map of Alexandria's Recycling Drop-Off Centers

Commercial Recycling

In general, the responsible party of commercial properties, condominiums, multi-family buildings, and Homeowners Associations are required to provide recycling to tenants/residents. They also must provide a Recycling Implementation Plan to the City which describes their recycling system for the two recyclable materials that comprise the largest portion of their waste stream. This form must be completed by all commercial properties and submitted to the Department of Transportation and Environmental Services. The commercial and multi-family sectors account for more than 70% of the City's solid waste stream.⁽¹²⁾

The City has several resources to help assist commercial and multi-family properties with finding recycling haulers. Site visits by the City are offered to help determine what materials are recyclable as well as suggesting different strategies for reducing waste and educating multi-family residents about recycling. A list of permitted Solid Waste Haulers is also available for reference.⁽¹³⁾

OBSERVATIONS ON THE CITY'S RECYCLING PROGRAM

The City collects a full range of recyclable materials from the curb and through their Recycling Drop-Off centers. Periodically, the City should evaluate the materials collected to ensure that the proper resources are being allocated.

China's recent National Sword Policy has increased uncertainties in the markets for recyclable commodities. It is expected that the markets will be highly variable over the next few years. In the short term, most recycling professionals, including HDR's professionals, recommend taking a "wait and see" approach to recycling contracts to allow the impacts of the National Sword program to be better understood. Fortunately, the City has until 2019 before needing to solicit a new recyclables processing and marketing contract. Unfortunately, under the current agreement, it is likely that, at least in the short term, prices for recyclables will be lower, and according to the revenue sharing agreement with Waste Management the City will likely pay Waste Management as opposed to receiving a monthly payment from them.

Under China's National Sword program, processors will be required to meet a 0.5% contamination rate within the processed recyclable commodity streams. This will drive up processing fees. If this standard is not met, much of the recyclable material may end up being disposed of in landfills or WTE facilities.

With respect to initiatives to increase the recycling rate per the Environmental Action Plan 2030, the City will need to look to both the residential and the commercial/multi-family sectors for increased participation. The City has enacted a mandatory recycling ordinance for both residential and commercial sectors. According to the City, approximately 65% of residential customers participate in the recycling program.⁽¹⁴⁾ The City estimates the commercial recycling rate is hovering at 10-15%, with paper and cardboard the major recyclable commodity.

The City could possibly increase their recycling rate through additional outreach and education programs for both residential and commercial entities, followed by enforcement if outreach programs are unsuccessful. According to a recent Solid Waste Association of North America (SWANA) on-line discussion, a typical annual budget for education campaigns is approximately \$2/per resident.

For the commercial/multi-family sector, the City has a requirement for a recycling implementation plan to be in place. Beyond the requirement for submitting a plan, the City does not actively monitor nor enforce recycling in the commercial sector, unless a complaint is lodged.

Although the Recycling Drop-off Centers do not collect substantial quantities of recyclables, they serve as a convenient method of diverting materials, particularly for multi-family residents and small commercial establishments. Many municipalities provide some type of outlet for recyclables beyond regular curbside collection.

Leaf and Yard Waste Programs

The City has two (2) programs for the collection of leaf and yard wastes: 1) Curbside Collection of Yard Waste Program, and 2) Leaf Vacuuming Program.

Yard Waste Collection Program

The Yard Waste Collection Program provides weekly, year round collection of yard waste from residential properties using rear-loading packer trucks operating on the same day as trash collection. Yard waste is only collected if it is set out in either a City provided 96 gallon container, a customer provided reusable container, or a paper yard waste bag. Any yard waste set out improperly or mixed



with regular trash is collected with trash and brought to the A/A Facility. Bulky or heavy yard waste (more than 18 inches long and 10 inches in diameter) is collected by appointment. Note, that in Alexandria, it is not mandatory to separate yard waste from trash.

In FY2016 the Yard Waste Collection Program used two (2) rear loading trucks each with an operator and one (1) laborer. In FY16 the program collected and hauled approximately 535 tons of yard waste to the Western Branch Composting Facility located in Prince Georges County, MD (approximately 25 miles away). Total collection, hauling, and processing costs for this program are estimated to be \$632/ton. This cost is based on collection and hauling costs of \$314,270 (\$587/ton) plus a composting fee of \$24,075 (\$45/ton). This cost was developed by estimating the cost for two (2) rear loading trucks with two (2) equipment operators (drivers) and two (2) refuse collectors (\$188,337); \$80,000/year in capital cost depreciation for the trucks; \$45,934/year in hauling costs; and the Western Branch Composting Facility charge of \$45/ton for processing. These costs total \$338,345, which are divided by 535 tons = \$632/ton or approximately \$17/HH.

Table 1: Costs for Curbside Collection of Yard Waste Program

Program Item	Cost/Description	Total Cost
2 Equipment Operators	\$56,833 (Average Salary)	\$113,665
2 Refuse Collectors*	\$37,336 (Average Salary)	\$74,672
Capital Depreciation on Collection Trucks	\$40,000 each	\$80,000
Annual Hauling Cost	\$2.20/mile @ 50 miles/day; 4 days/week; 52 weeks/year per truck	\$45,934
Administration Cost	Not Included	-----
Total Collection and Hauling Costs		\$314,270
Disposal Fees	\$45/ton @ 535 tons	\$24,075
Total Collection, Hauling, and Disposal Fees		\$338,345
Total Cost Per Ton	535 tons	\$632/ton
Total Cost Per Household	20,200 Households	\$17/HH

*Additional temporary worker salaries are not accounted for in this estimate.

Leaf Vacuuming Program

The Leaf Vacuuming Program requires residents to rake leaves to the curb where five (5) City operated vacuum trucks collect the materials over 8-12 weeks from October through December each year. In 2016, the City collected 8,245 tons of residential yard waste using vacuum trucks. The vacuum trucks deliver all materials to the City’s mulching facility on Eisenhower Avenue. The City turns yard waste into mulch using a City-owned tub grinder. It is estimated that the City’s Leaf Vacuuming Program costs approximately \$112/ton to collect and process leaves. The cost was calculated by taking the total program cost of \$923,741 and dividing by 8,245 tons of leaves collected. The City estimates that approximately 75% of the program cost is associated with collection (\$84/ton) and 25% of the cost is associated with grinding and processing (\$28/ton). The estimated cost of the Leaf Vacuuming Program is \$112/ton or approximately \$46/HH.

Table 2: Costs of Both Yard Waste Program and Leaf Vacuuming Program

Collection Program	Total Program Cost	% of Cost	Total Cost
Leaf Vacuuming Collection Costs	\$923,741	75%	\$692,806
Leaf Vacuuming Grinding/Processing Costs	\$923,741	25%	\$230,935
Total Leaf Vacuuming Program Cost*		100%	\$923,741
Total Cost Per Ton	8,245 tons		\$112/ton
Total Cost Per Household	20,200 Households		\$46/HH

*Revenues from selling mulch were ignored for this estimated.

The finished mulch is used by the City for municipal landscaping purposes and is provided to City residents for free during the spring and early summer months. There is also a mulch delivery service for City residents at a cost of \$50 for a six cubic yard load.

OBSERVATIONS ON THE CITY'S LEAF AND YARD WASTE PROGRAMS

The EPA estimates that yard trimmings make up 13.5% of the overall municipal solid waste (before recycling).⁽¹⁵⁾ Alexandria only diverted a total of 535 tons of yard waste from this program. There may be a substantial quantity of this material that remains in the residential trash stream. However, at \$632/ton for collection, hauling, and composting, the curbside collection system is not cost effective and should be eliminated or greatly improved. This material could be collected along with the City's curbside trash collection program at \$150/ton, saving \$482/ton.

In order to make the Yard Waste Collection Program the same cost as trash collection and disposal, the City would have to collect about 2,000 tons/year of yard waste using the same forces. This is about 70% of the total yard waste generated within the City. If the program is to continue, additional outreach and education should be conducted to promote awareness of the City's Yard Waste Collection Program and the benefits of composting this material over disposal. Additionally, the City should continue to educate residents about the voluntary program and the use of separate containers or paper yard waste bags for curbside collection. The City could also make the program mandatory via a local ordinance. This would likely require the same amount of education and outreach, but might be more effective in getting residents to participate.

It may be more cost effective to bid out the collection of yard wastes along with recyclables. The curbside collection contract with Bates will be expiring on January 31, 2019. It may be useful to include curbside collection of yard waste as an "add alternate" to that contract to get a range of what the private sector might charge for that service and compare that cost to the internal cost of providing this service.

The Leaf Vacuuming Program cost is only \$112/ton making it a cost effective program. The City should continue this program. The Leaf Storage Facility on Eisenhower Avenue should be evaluated for efficiencies and the equipment (tub-grinder) maintained. This facility may have additional capacity as a mulching facility but also provides an emergency storage area with grinding capacity for catastrophic events such as hurricanes and other natural disasters.

Food Waste/Organics

The City does not currently have a curbside food waste program but residents have an option to divert food waste at four (4) farmers markets: Old Town Farmer's Market; Del Ray Farmer's Market; Four Mile Run Farmer's Market; and West End Farmer's Market. Food wastes are accepted when the markets are open. The farmer's market food collection stations have been operational for four (4) years and cost approximately \$36,000/year, which includes staffing, supplies, hauling and processing.⁽¹⁶⁾ In general, quantities collected have doubled every year as residents have become more aware of the program. In 2014, 2015, and 2016 the stations collected 39, 65, 125 tons, respectively. The farmer's market staff provides information on how to compost food and yard waste at home and have home collection buckets available to purchase for \$5.00 each.⁽¹⁷⁾

Food waste collected at these locations is transferred to a central holding facility by City staff. Bates picks up food waste once a week from the central holding facility and hauls it to the Western Branch facility in Prince Georges County, MD. Bates charges the City \$10.00 for every 65 gallon cart hauled and processed. Hauling and processing costs totaled approximately \$9,080 (FY16) of the

program's total cost of \$36,000. In FY16, the cost to operate this program, including staff, supplies, hauling and processing were approximately \$288/ton (\$36,000 divided by 125 tons).

Food Waste Pilot

In 2016, the City launched a residential food waste recovery pilot program. The City invited 2,400 households to participate; approximately 400 households signed up (17%). All participants received a 5-gallon storage container (a pail with a lid), a kitchen container and liner bags, and instructions on the program and process.

Food waste (vegetative food waste only, no meat or dairy) was collected every week alongside regular trash for three months. Based on the results of this pilot program, the City estimated the costs for a City-wide food waste collection program (assuming only 20% of households participating) at about \$1.81 a household or \$450/ton for collection and disposal. Based on the results of this limited pilot program, the City decided not to initiate a curbside collection program due to the perceived limited environmental benefits, high costs, and operational issues. There is also currently a lack of a local processing facility that is willing to accept food waste.⁽¹⁸⁾

OBSERVATIONS ON THE CITY'S FOOD WASTE PROGRAM

The City has attempted to identify the feasibility of a curbside food waste collection program through a small pilot program. It should be noted that it is difficult to accurately determine how successful such a program could be given the low participation rate (17%) and short duration (three months) of the program. Pilot programs are typically designed with a longer duration to allow residents time to incorporate an additional waste management practice into their everyday routines, assess the impact on trash and recycling, and assess seasonal effects on behavior and tons diverted. Ideally residents on one entire collection route would be enrolled in the program to assess varying degrees of interest and participation, the amount of outreach required, and the impact on other waste streams being collected (e.g. trash). It is recommended that the City revisit the possibility of a curbside food waste collection program if/when other neighboring jurisdictions also consider implementing a similar program to provide continuity to residents at work and at home. There may be some economic advantages associated with ordering similar carts or collaborating on promotional and educational campaigns as well as procurement of processing capacity.

The cost per ton of the current farmer's market program makes it difficult to justify. However, it should be noted that the program's costs are trending downward on a cost/ton basis. The City could continue to provide food scraps collection at farmer's markets to maintain awareness of food waste and provide a way for those residents who are truly committed to composting to continue to do so.

In the mid-term and long-term, HDR recommends a "wait-and-see" approach and potentially collaborate with a neighboring municipality who endeavors to develop a food waste program, Food waste management could be a part of the long-term overall solid waste plan. Nationwide, as food waste programs become more prevalent, more data and experience will be available to tailor a program that fits the City's needs.

Household Hazardous Waste (HHW) and Electronics Recycling

The City currently has one permanent Hazardous Household Waste (HHW) and electronics recycling facility located at 3224 Colvin Street. The facility is adjacent to a residential drop-off facility and is open on Mondays and Saturdays from 7:30 am to 3:30 pm (except holidays), for exclusive use by City residents. Prior to 2012, the City conducted semi-annual HHW collection days. Small



businesses and commercial entities may not use the City’s HHW collection facility and must contract privately for a licensed hazardous waste disposal company. ⁽¹⁹⁾

The City contracts with Clean Venture Inc. (Clean Venture) to operate the drop-off facility and process the collected HHW materials. Clean Venture sends most of its hazardous waste to its sister company, Cycle Chem Inc. where it is stored, transferred, and treated or disposed. ⁽²⁰⁾

Table 3 presents the facility’s annual contracted operating cost, cost per ton collected and cost per participant. For FY17, not including administrative costs, the total cost to manage HHW was approximately \$1,265 per ton.

Table 3: HHW Annual Contracted Operating Costs and Tons Managed.

Year	Costs	Tons Collected	Cost per Ton	Cost per Participant
FY 13	\$218,000	117	\$1,863	\$25.85
FY 14	\$141,000	92	\$1,533	\$14.76
FY 15	\$144,000	86	\$1,674	\$13.77
FY 16	\$138,000	93	\$1,484	\$13.82
FY 17	\$148,000	117	\$1,265	Not Available

Electronics are also managed at this facility. The City contracts with Service Source Computer Recycling Program (Service Source) for handling the City’s e-waste. Components of e-waste are recycled to minimize disposal of these materials. Table 4 presents the tons managed and costs associated with private contractors operating the electronics collection program. For CY16, not including administrative costs, the cost to manage waste electronics was approximately \$324 per ton.

Table 4: Electronics Contracted Collection Costs and Tons Managed

Year	Tons	Costs	Cost per Ton
CY12	96	\$0*	\$0
CY13	112	\$0*	\$0
CY14	128	\$0*	\$0
CY15	119	\$35,000	\$294
CY16	108	\$35,000	\$324

*Collected for free until a new contract came into effect

OBSERVATIONS ON THE CITY’S HHW AND ELECTRONICS COLLECTION PROGRAM

The City is interested in knowing if some material currently accepted at the HHW facility could be more cost-efficiently managed through the residential trash program.

There are considerable environmental considerations related to incinerating HHW and electronics that must be considered. While the cost per ton appears to be high with respect to other waste streams, it should be noted that HHW accounts for only 1% of the waste stream, but accounts for 99% of waste contamination.

HHW is not regulated at the Federal or state levels as a hazardous waste, which is specifically considered an Unacceptable Waste under both the A/A Facility’s Title V permit and the WDSA. According to VaDEQ, HHW should not be disposed of in trash, when other options are available, and although not required, the USEPA recommends that HHW be treated as a hazardous waste in terms of its handling and ultimate disposal. Moreover, the WDSA specifically includes paints,

solvents, and a host of other materials which might be present in HHW, in its definition of Unacceptable Waste, i.e. waste that cannot be accepted at the A/A Facility. While the WDSA does not specifically address electronic waste, the components of many electronics contain hazardous materials, such as heavy metals including lead, silver, chromium and mercury, which are regulated, and should be handled separately.

Some materials such as latex paint and some regular household items such as cleaners could potentially be managed at the curb by the trash stream. The City would need to identify those materials that could be safely managed in a regular packer truck without posing a hazard to collection staff and that would not violate the definition of what constitutes Acceptable Waste in the WDSA.

The City could also examine current usage of the HHW facility to identify if changes could be made to the operating hours to make it more convenient to residents and to potentially reduce costs. It appears that two thirds of the participants visit the facility on Saturday compared to Monday and there are some seasonal variations in usage. The City could consider changing the available hours to include an afternoon/early evening timeslot instead of the Monday daytime hours to make it more convenient for users, and perhaps only remain open on Saturdays during the winter months.

Task 2 - Benchmarking

The following sections provide a comparison of the City's solid waste management programs with comparable communities with similar demographics.

Comparable Communities

The City's programs and services were benchmarked against the following communities:

- Arlington County, Virginia – This community located adjacent to the City of Alexandria, has similar demographics and is subject to the same Commonwealth regulations and requirements. This community jointly uses the same WTE facility for waste disposal.
- Montgomery County, Maryland – This community has a larger population and geographic area but shares some similar demographics in its urban areas and also utilizes WTE facilities.
- Cambridge, Massachusetts – This community has similar demographics, utilizes a combination of landfill and WTE disposal and has a similar mix of provision of public and private waste collection.

Comparison of Type and Quality of Services Provided

Arlington County, Virginia

Arlington County is located adjacent to the City of Alexandria with a slightly larger population of about 230,000, but with similar demographics and housing mix. Arlington County contracts with a private service provider for collection of all waste streams under an 8 year contract with 2 one-year optional extensions. Trash and recycling are collected weekly from Monday to Friday from approximately 33,133 residential properties of up to 2 units. The County provides one black 32 or 64 gallon cart for trash, one blue 35 or 65 gallon cart for recycling and one green 35 or 65 gallon cart for yard waste at no charge; additional carts are available for a fee. Residents can also use their own containers for trash, recycling and yard waste. In addition to curbside collection of recycling, the County operates two recycling drop-off centers and holds two recycling events annually for residents where materials such as HHW, bikes, small metal items, shoes and clothes are either recycled or properly disposed.

The County provides year round curbside collection of yard waste. HHW and waste electronics are accepted at the County's Household Hazardous Materials (HHM) Facility and Electronics Center. This facility is open every Saturday from 9-3 and by appointment from Monday to Friday. Electronics are also collected curbside. Arlington does not have a source-separated organics program but has a provision in their collection contract to allow for the collection of commingled organic waste (food waste, yard waste and food-soiled paper) once a suitable processing facility is available.

Arlington County's 2016 recycling rate was 46.8%.⁽²¹⁾

Montgomery County, Maryland

Montgomery County is located in Maryland, to the north of Alexandria, and shares a boundary with Washington DC. The population of Montgomery County is larger (1,020,000), and the geographic area of the County is also larger with a mix of urban and rural areas. Montgomery County provides a similar range of waste management services to its residents through contracted private service providers. Trash is collected weekly from approximately 91,500 units, primarily in the southern part of the County. Recyclables are collected weekly from approximately 216,000 residential properties

up to six units. The County does not provide carts for trash but does provide a 22 gallon blue box for containers and a 35 or 65 gallon wheeled cart for paper for their dual-stream recycling program.

The County provides year round collection of yard waste; residents must provide their own containers. Montgomery County has enacted legislation which requires the Montgomery County Department of Environmental Protection to develop a strategic plan for management of organics by January 1, 2018. It appears that Montgomery County had intended to issue an RFP for organics processing capacity in June 2017 but the status of developing this organics processing capacity is currently unknown.

HHW and electronic waste are managed at the County's Shady Grove Processing Facility and Transfer Station on a drop-off basis only. This facility is available to residents from Monday to Friday from 7 am to 8 pm, Saturdays from 7 am to 5 pm and Sundays from 9 am to 5 pm.

In 2014, Montgomery County reported a recycling rate of 55.7%.⁽²²⁾

Cambridge, Massachusetts

Although not located in close proximity to the City, this community of approximately 110,400 residents shares similar waste management services. The City of Cambridge (Cambridge) provides weekly trash collection (once per week) to 31,741 residential units, which includes all single family homes and approximately two-thirds of all multi-family buildings. This service is provided by Cambridge using seven (7), three-person rear packer trucks. At this time, Cambridge does not provide trash carts. Residents can set out their own containers (up to 50 gallons each) with a limit of three containers or 150 pounds. Cambridge is considering providing residents with standard trash carts in the next few years to encourage participation in diversion programs. Cambridge delivers its waste to a privately owned transfer station. Approximately 60% is disposed of at a WTE facility and 40% goes to a landfill.

Currently Cambridge also contracts with a private service provider for weekly recycling collection service to approximately 95% of the households (44,678 households, including both single and multi-family households). Residents are provided with 65 or 95 gallon carts which are collected by semi-automated collection using five (5) rear load packer trucks. The same private service provider is also under contract to provide weekly leaf and yard waste collection on a seasonal basis (April to mid-December) using one (1) rear load packer. Cambridge also operates a Recycling Center for residents and small businesses to divert scrap metal, recycling, cardboard, some food scraps, electronics, and small household items for reuse (e.g. books).

Currently, Cambridge does not provide any waste collection service to the commercial sector.

Electronics are collected at the curb and at the Recycling Center. Cambridge contracts with a private service provider to hold four (4) HHW collection events annually.

Cambridge has operated a pilot food scraps collection program since 2014. This program is open to all residents on the Monday collection route, and currently has approximately 5,100 residences in the program. Each residence is provided with a curbside collection container and a kitchen container. Cambridge contracts with a private service provider to collect material from each residence on a weekly basis. In 2016, 532 tons of food scraps were collected and composted at an outdoor windrow processing facility. Cambridge is planning on rolling out a full-scale program across the city, tentatively starting in 2018. The first phase will target single and multi-family units with up to 12 units and the second phase will target larger multi-family buildings. In part, this



program is intended to assist with meeting State and City waste reduction and greenhouse gas (GHG) targets, but is also reflective of Cambridge’s progressive nature.

Cambridge diverts approximately 42% of residential waste through recycling and organics management (food scraps and leaf and yard waste).

Comparison of Programs

The following sections present a comparison of waste management programs, and estimated costs as appropriate (based on available information) for Alexandria, Arlington County, Montgomery Co., and Cambridge. It is assumed that all costs do not include administrative costs, but it is difficult to ensure that the costs provided in the following sections do not include administrative costs, although the Alexandria costs shown do not include administrative cost.

Comparison of Trash Programs

Both Alexandria and Arlington utilize the same disposal facility so disposal costs should be similar on a per ton basis. Therefore the difference in the cost of overall waste management is related to collection costs. Alexandria provides collection with in-house staff whereas Arlington contracts this service out. It should be noted that Arlington’s costs also include cart maintenance. Cambridge also uses municipal forces. However, the difference in costs is likely attributed to a higher cost of living, higher disposal costs, and longer hauling distances to disposal sites. Montgomery also utilizes contracted staff to collect trash and has similar costs to Arlington on a per ton basis. Table 5 shows Alexandria’s trash program costs and

Table 6 provides a comparison of comparable communities.

Table 5: Trash Program Costs (Excluding Administrative Costs)

Collection Program	Total Program Cost	% of Cost	Total Cost
Residential Trash Collection	\$1,473,473	100%	\$1,473,473
Backup/Temporary Employees	\$778,962	50%	\$389,481
Total Cost	\$2,250,435		\$1,862,954

Table 6: Comparison of Trash Programs (FY17 - Excluding Administrative Costs)

	Alexandria	Arlington	Cambridge	Montgomery County
Number of Households Receiving Service	20,200	33,133	31,741	91,500
Frequency of Service Received	Once-a-week service, year round	Once-a-week service, year round	Once-a-week service, year round	Once-a-week service, year round
Service Provider	City Staff	Contracted Private Service Provider	City Staff	Contracted Private Service Provider
Collection & Disposal Costs per ton	\$150*	\$117	\$279	\$112
Collection & Disposal Costs per household	\$131*	\$96	\$145	\$86
Services included in Collection Costs	Curbside collection of trash and bulky waste. Carts provided.	Curbside collection of trash and bulky waste. Cost of collection includes bin maintenance/ replacement by contractor.	Curbside collection of trash, bulky waste, electronics. Carts not provided.	Curbside collection of trash and 5 bulky waste pickups a year. Carts not provided.



* Based on City reported salary and vehicle costs with the following allocation of salaries and vehicles to residential trash collection: 100% of Refuse Collection costs and 50% of Backup/Swing costs.

Arlington’s trash cost per household is calculated by adding the collection cost per household, the processing fee, and a cart maintenance fee per household. See Table 3 for breakdown.

Cambridge has a high cost per ton. Based on the data reviewed, Cambridge produced about 25% less trash while having about 33% more residential units than the City. One explanation is either that Cambridge residential units have fewer people living in each unit, and/or Cambridge residents produce less trash than the City residents. The later may be true due to the high percentage of students living within Cambridge.

Table 3: Arlington County Collection and Disposal Cost (Excluding Administrative Costs)

Program Item	Value	Total Cost/HH/Year
Number of Households	33,133 Households	
Tons of Trash Collected	27,027 Tons	
Disposal Fee (A/A Facility)	\$43.16/Ton	
Total Disposal Cost Per Household/Year		\$35.21/HH/Year
Cart Maintenance (Trash, Recycling, and Yard Waste)	\$191,616/Year	
Cart Maintenance for Trash Carts Only	1/3 Total Cost = \$63,872/Year	
Total Trash Cart Maintenance per Household/Year		\$1.93/HH/Year
Total Trash Collection Fees/Household	\$4.88/Month/HH	\$58.56/Year/HH
Total Trash Collection, Disposal and Cart Maintenance/Household		\$95.70/HH/Year

The major difference between the City and Arlington’s collection cost per is that the City’s costs reflect a higher level of staffing. A closer look into overall staffing will be presented in Task 3.

The City’s trash collection cost was calculated by adding 100% of the refuse collection cost and 50% of the backup/temporary workers costs.

Comparison of Recycling Programs

Based on information provided by the City, residential curbside recycling collection costs are slightly less expensive than Arlington’s on a per ton and per household basis (approximately \$98/ton vs. \$112/ton) and (approximately \$32/hhld vs. \$47/hhld).⁽²³⁾

All four communities contract with private service providers for recyclables collection. Arlington’s monthly collection contract rate is \$3.40 per month (which includes collection of scrap metal, electronic waste and recycling) compared to the City’s monthly contracted rate of \$2.67 per household for collection of single stream recyclables only. Montgomery County has privately contracted recycling collection but has a higher per ton and per household cost, which is likely due to the larger geographic area and to their dual-stream recycling program. Table provides an overview of the recycling programs provided by comparable communities.



Table 8: Comparison of Recycling Programs (FY17) (Excluding Administrative Costs)

	Alexandria	Arlington	Cambridge	Montgomery County
Number of Households Receiving Service	20,200	33,133	44,678**	216,000
Frequency of Service Received	1 day per week, year round	1 day per week, year round	1 day per week, year round	1 day per week, year round
Service Provider	Contracted Private Service Provider	Contracted Private Service Provider	Contracted Private Service Provider	Contracted Private Service Provider
Collection Costs per ton*	\$98	\$112	\$153	\$123
Collection Costs per household	\$32	\$47	\$33	\$55
Services included in Collection Costs	Curbside collection of single stream recyclables. Carts provided.	Curbside collection of single stream recyclables, scrap metal, electronics (extra fee for TVs and computer monitors by appointment). Cost of collection includes bin maintenance/replacement by contractor.	Curbside collection of single stream recyclables. Carts provided.	Curbside collection of two stream recyclables. Bins and carts provided.

* Does not include processing costs or revenue as it is unknown if processing/revenue costs are reported the same for all communities.

**More household are served by the recycling program than the trash program.

Comparison of Leaf and Yard Waste Programs

All communities except the City use a private service provider for collection of yard waste. The City’s cost to provide weekly, year round Yard Waste Collection is \$632/ton. This is due to the high costs of collection and low amount of yard waste collected, only 535 tons/year. The Yard Waste Collection Program costs more than the food waste collection pilot program on a per ton basis. However, the Leaf Vacuuming Program cost is only \$112/ton.

Currently the City’s Yard Waste Collection Program uses City forces (2 trucks with drivers and 2 refuse collectors, one on each truck). Many of the comparable communities bundle collection of yard waste with collections of one or more other streams, such as recyclables. Bundling collection contracts has the potential to obtain more favorable pricing from private service providers.

There are also differences in leaf and yard waste generation. For example residential properties in the City of Cambridge have little, if any yard space, resulting in low generation rates.

Arlington’s costs include year round collection, providing and maintaining carts, and collection of Christmas trees and brush.

Table 4 provides a comparison of the costs and services provided by comparable communities for management of leaf and yard waste.



Table 4: Comparison of Leaf and Yard Waste Programs (FY17) (Excluding Administrative Costs)

	Alexandria Yard Waste Program	Alexandria Leaf Vacuum Program	Arlington	Cambridge	Montgomery County
Number of Households Receiving Service	20,200	20,200	33,133	44,678	216,000
Frequency of Service Received	1 day per week, year round	8-12 weeks from Oct to Dec	1 day per week, year round	1 day per week from April to Mid-December	1 day per week, year round
Service Provider	City Staff	City Staff	Contracted Private Service Provider	Contracted Private Service Provider	Contracted Private Service Provider
Collection & Disposal Costs per ton	\$632	\$112	\$118	\$194	\$88
Collection & Disposal Costs per household	\$17	\$46	\$50	\$12	\$39
Services included in Collection Costs	Curbside collection of leaf and yard waste, Christmas tree collection. Bulky, heavy yard waste collected by appointment.	Curbside leaf vacuuming only	Curbside collection of leaf and yard waste, maintenance of carts, collection of Christmas trees and brush.	Curbside collection of leaf and yard waste, hauling and processing costs at a composting facility.	Curbside collection of leaf and yard waste, drop-off at transfer station. Leaves and grass are composted at the County's compost facility, and brush is ground into mulch available at no charge.

The City's Yard Waste Collection Program cost was estimated based upon two (2) rear loading collection trucks with one (1) driver and one (1) refuse collector on each truck with average salaries that totaled \$188,336; \$80,000/year in capital cost depreciation; \$45,934/year in hauling costs, and the Western Branch Composting Facility's charge of \$45/ton for processing. The annual cost totaled \$338,345. Dividing this cost by 535 tons yields approximately \$632/ton or \$17/household.

The City's Leaf Vacuuming Program cost for FY16 totaled \$923,741. The Leaf Vacuuming Program collected 8,245 tons which equates to approximately \$112/ton or \$46/household.

The City collected a total of 8,780 tons of leaf and yard waste. The majority of the leaf & yard waste collected (approximately 8,245 tons) was collected by the Leaf Vacuuming Program and processed at the City's leaf storage yard on Eisenhower Ave. The remaining 535 tons were collected by the Yard Waste Collection Program and hauled to the Western Branch Composting Facility for a processing fee of \$45 a ton.



Comparison of HHW and Electronics Programs

All communities except Cambridge operate drop-off programs only for HHW and electronics. The City of Cambridge collects electronics at the curb and also at their Recycling Center and additionally provides four (4) collection events annually for residents.

Metrics for HHW and electronics programs were more difficult to understand as most communities do not track (or make available) information on participants and tons of materials collected.

According to the City the annual HHW budget and staffing costs was \$278,785 and Montgomery’s was \$650,000.⁽²⁴⁾ The number of customers served at the City’s and Montgomery’s HHW drop off facility was 10,476 and 80,000, respectively. A cost per participants can be calculated by dividing the budget and staff costs by the annual participants. Based on this information, the City’s cost for HHW is approximately \$27 per participant vs. Montgomery County’s cost of \$8 per participant. This difference is likely due to economies of scale.

In terms of comparison of HHW permanent facilities and collection events, the City spends \$138,000 on contractor costs to operate a permanent facility compared to the Cambridge cost of approximately \$90,000 for four (4) HHW collection events.

Because available information regarding HHW costs was difficult to obtain, HDR researched costs for other communities to provide additional perspective. According to a 2005 study, the City of Denver provided a combination of HHW curbside collection along with HHW collection days, the program cost about \$150,000 and collected 72.2 tons of HHW; this equates to \$2,077/ton.⁽²⁵⁾

A 2014 study of municipalities in Vermont revealed the Chittenden Solid Waste District manages HHW for their 62,267 household region for about \$8/hhld or about \$47/participant.⁽²⁶⁾

Based on the information HDR reviewed, the City’s HHW facilities are operating at a reasonable cost in comparison with other municipal programs.

Table 5: Comparison of HHW and Electronics Programs (FY17)

	Alexandria	Arlington	Cambridge	Montgomery County
Electronics	Drop off at HHW/Electronics Facility.	Drop-off at HHM facility or collection of some larger items by appointment.	Curbside collection, larger items by appointment.	Drop-off at Transfer Station and 4 collection events.
HHW	Drop off at HHW/Electronics Facility.	Drop-off at HHW facility.	Collected at 4 collection events annually.	Drop- off at HHW facility.

Comparison of Organics Programs

Cambridge has been running a pilot curbside food waste collection program since 2014. Approximately 5,100 households participate in the program and receive collection on one day per week on the same day as the other waste streams are collected and are all located in one waste collection area (the Monday route). Cambridge diverts over 500 tons of food scraps annually.

The City’s pilot curbside collection program costs were approximately \$840/ton or \$78/hhld for collecting and processing food waste, and the City estimated that a citywide program would cost \$450/ton. The citywide curbside collection of food waste program did not move forward. However,



the City does manage some food waste through the Farmer’s Markets at a cost in the \$300/ton range.

At this time, it appears that high costs and a lack of sufficient organics processing capacity are the main factors for local municipalities choosing not to implement a source separated organics program. Some other municipalities, such as Arlington and Alexandria, are providing limited collection of food waste via drop-off locations. Arlington residents can drop off food waste at the Department of Environmental Services’ Solid Waste Bureau as part of a pilot program that started in August 2017. Material is processed at the County’s Earth Products Recycling Yard using an in-vessel composter.

Communication and Social Media Tools

All four (4) communities have websites to provide solid waste management information to residents. Based on visits to each website, Arlington and Montgomery County’s websites, in particular, are very well laid out and easy to navigate. Both Counties have a search function on their websites (aka “Waste Wizard”) which makes it easy for residents to learn how to dispose of certain specific wastes. The City’s website does not have a search tool and this may be a good addition to the site. Cambridge is in the process of revamping their website and introducing a similar search function. In general, other community websites appear to be more “mobile-friendly”; which is interesting because, as shown below, 54% of all traffic on the City’s website is by mobile users.

Table 6 below shows the website traffic for each municipality along with if the site was visited on a desktop or a mobile device.

Table 6: Website traffic for each municipality

County	Total Visits/Month	Population	Visits per Person	Desktop Traffic	Mobile Phone Traffic
Alexandria	170,000	155,810	1.09	46%	54%
Montgomery	1,050,000	1,020,000	1.03	44%	56%
Arlington	610,000	230,000	2.65	18%	82%
Cambridge, MA	350,000	110,400	3.17	66%	34%

Cambridge, Montgomery and Arlington all have dedicated Facebook and Twitter accounts for their Solid Waste Division/ Public Works Departments (as compared to using a larger corporate account, as is the case for Alexandria). Both Cambridge and Montgomery have developed YouTube videos specific to their waste management programs.

Montgomery utilizes the broadest scope of social media tactics, with the Department of Environmental Protection utilizing Facebook, Flickr, Instagram, Pinterest, Twitter, YouTube and a “My Green Montgomery” blog. In addition, Montgomery’s Solid Waste Services Department also utilizes Facebook, Flickr, Twitter, and YouTube and maintains its own “Talkin’ Trash” blog. Montgomery also sends a corresponding text message to residents when a “tweet” on Twitter is made.

A mobile app to check collection schedules or find recycling/disposal facilities does not appear to be offered by any of the four communities. However, Cambridge has a mobile app under development. Other municipalities have begun adopting mobile apps and the percentage of users that adopted the app can be seen below in Table 7. The communities shown below that have adopted mobile apps, Halifax and Vancouver, have similar age demographics. Durham has an older population, which supports the lower percent of mobile app users. Mobile apps are typically more attractive to younger users, and a mobile app would likely be a positive addition to Alexandria's social media tools.

Table 7: Percentage of people using solid waste mobile apps.

Municipality	Households	% of Users in First Year
Halifax	150,000	34%
Vancouver	160,000	32%
Durham	213,000	14%

Spokane, Washington, which has a slightly larger population, sends out e-mail alerts containing periodic newsletters and important notifications to their residents.

Arlington, Montgomery and Cambridge all offer the ability to translate content on their websites into other languages, although Arlington's selection appears to be limited to Spanish. The City's website does not offer any ability to translate content into any other language.

OBSERVATIONS ON COMMUNICATION AND SOCIAL MEDIA TOOLS

The City utilizes a combination of electronic communications media, including social media and traditional print materials that appeal to a variety of demographics. Developing and maintaining a social media strategy requires significant time and resources in order to ensure content is fresh, interesting and informative and often requires staff dedicated to developing content and responding to comments, tweets, etc. It is difficult to know how effective social media can be beyond using Google Analytics, number of followers, re-tweets etc. and whether the right demographics are being reached. It appears that some of the social media tools such as Flickr, blogs, and Pinterest have a very limited following and may not be accessed as readily as other tools such as Facebook and Twitter.

In general, the City is utilizing the more popular social media tools and should continue to use them as part of their outreach programs. The City should consider a refresh of their website to make it easier to find information and to make it more mobile friendly. The current website is very text-heavy with very few graphics and often uses multiple terms for the same word (e.g. trash vs. refuse). The use of the term "Resource Recovery" should be reconsidered as the average person is unlikely to understand what this term means when looking for information about trash and recycling. The City could also consider making their website more accessible, providing translation of content in one or more languages (e.g. Spanish since it is the most common non-English language spoken) to reach more people as it does not appear this is currently available.

Effects of WTE on Diversion

The following sections provide a short discussion on the impact of WTE on recycling and incentives to recycle that are used by jurisdictions in North America and Europe, some of which utilize WTE.



Impacts on Recycling

It is difficult to draw conclusions about how the use of a WTE facility for final disposal in a solid waste management system affects recycling. Many communities, regardless of their disposal method, follow the 5Rs hierarchy which places a higher value on Reduce, Reuse and Recycle over Recovery or Residuals. These communities invest significant time, effort and money in developing diversion programs in line with their selected hierarchy. The current trend towards “zero waste” and a circular economy places more emphasis on recycling as compared to disposal. WTE is more common in other countries, particularly in Europe where there are specific drivers which encourage WTE as a waste management solution, including EU regulatory requirements, lack of space, landfill disposal taxes, etc. In general, those communities that own their own landfill go to great lengths to minimize the amount of waste being landfilled in order to maximize landfill lifespan. Siting and permitting landfills is increasingly difficult. Communities with WTE facilities may not feel the same pressure to conserve capacity; however, some may still feel the same need to observe the waste hierarchy and minimize resources going to disposal, regardless of how much “recovery” is possible. A study that was updated most recently in 2014, which included information from 700 communities in 21 states, concluded that the means of disposal (whether WTE or landfilling) had no impact on the level of recycling within that community. ⁽²⁷⁾

There are many factors beyond use of WTE that can drive diversion including regulations, availability of disposal capacity, disposal costs compared to diversion costs, GHG and waste reduction targets and community values. Table 8 presents a comparison of recycling rates and disposal methods for the most recent year for which data was available for each of the four comparable communities. It is important to note that the inputs for these recycling rates are not all the same, with some including both commercial and residential waste, with others mainly representing residential waste. Some recycling rates consider diversion of different categories of materials and application of source reduction credits.

Table 8: Comparison of Recycling Rates and Disposal Methods (CY15)

Municipality	Recycling Rate (CY 2015)	Disposal Method
Alexandria, VA	48.6%	WTE
Arlington, VA	44.5%	WTE
Montgomery, MD	56%	WTE
Cambridge, MA	42% (City-managed recycling and yard waste only)	WTE and landfill

Impacts on Trash Disposal

In the U.S. and in Canada, there are a variety of tactics used to reduce the quantities of trash being disposed, irrespective of whether trash is disposed in a landfill or a WTE facility, including;

- Pay-as-you-throw (PAYT) programs (volume based, bag tags, specially marked bags)
- Clear bag programs for trash
- Provision of collection of divertible materials (recycling, organics, yard waste) at no charge (or at a lower cost than garbage)
- Standard size trash containers (typically a “right-sized” container)
- Mandatory recycling ordinances
- State regulated landfill bans
- Deposit systems on containers
- Less frequent trash collection compared to recycling collection (i.e. every other week trash collection, and weekly collection of recycling and/or organics)

Some communities on the West Coast that utilize WTE facilities also have mandatory diversion requirements or encourage participation in diversion programs through trash disincentives. As an example, the City of Spokane, WA (population 215,973) utilizes WTE but also has a PAYT volume-based trash system where residents pay a monthly fee according to the size of their trash carts. Three sizes of trash carts are available (32 gallons - \$16.62/month, 68 gallons - \$30.09/month, 95 gallons - \$43.93/month) and additional fees apply to overflow trash. Trash is collected weekly using fully automated vehicles. Recycling collection is also provided weekly with carts provided at no charge to residents. Commingled food waste and yard waste collection is available on a subscription basis (\$15.87/month) and provided from March to November. Some hazardous materials are accepted at the City's transfer stations or the WTE facility.

In general, of the comparator communities that were examined, currently Arlington County offers the greatest recycling incentives with the smallest trash bins provided, fees for extra trash carts, free recycling carts and mandatory participation in the County's waste management programs. Recycling in the City of Cambridge is supported by a number of State regulations including landfill bans, a Bottle Bill, and a municipal ordinance mandating recycling. Cambridge is currently considering provision of a "right-size" standard trash container and potentially every other week trash collection in the future once the impact of a full-scale, City-wide organics collection program can be evaluated.

OBSERVATIONS ON WASTE-TO-ENERGY COMMUNITIES

In general, it appears that owning or using a WTE facility for disposal does not adversely affect diversion efforts. Many communities are continually trying to increase diversion and minimize disposal. There are different drivers for waste management solutions which determine the design and implementation of diversion programs and choice of disposal options. These can include availability of local disposal options, local or state diversion goals, GHG emission targets, resources, local, state or federal regulations etc. Diversion programs can be less expensive than disposal and also provide other benefits such as job creation, reduction in GHG emissions and awareness of waste as a resource.

Summary and Recommendations

In general, the City provides a similar range of services to residents as do other comparable municipalities. It is difficult to compare the cost of providing waste management services with any degree of certainty without knowing what is included in all the reported costs. Also, there may be other differences by state or region related to costs, for example, wages, tipping fees, distance to disposal facilities, etc., which contribute to increases or decreases in collection and disposal/processing costs.

HDR reviewed the City's diversion techniques and efficiencies of the current system and believe that curbside collection of recyclables as single stream is working effectively. Given the current 49.3% diversion rate, incremental improvements above this level will take more effort, time and cost to implement.

One potential change that could be made that may increase the City's diversion rate is to make yard waste separation mandatory. This will require a City ordinance and additional education and enforcement expenses if it is to be effective. Financially, the City pays approximately \$632/ton for the yard waste collection program versus about \$112/ton for the leaf vacuuming program. In addition, at \$632/ton it would be more cost effective to allow yard waste to be hauled to the A/A facility at \$150/ton for disposal. In order to make yard waste collection as cost effective as the A/A facility, the City's yard waste collection program will need to collect over 2,000 tons per year. There is a question as to whether 2,000 tons is even present in the trash.

In order for the City to increase their recycling rate, greater participation from the commercial/multi-family sector will be needed which may require additional resources for education and enforcement. Other programs that can help reduce trash and increase recycling include; organics diversion, diversion of textiles, PAYT, and a reduction in trash setout limits.

Many communities, particularly on the West Coast, utilize pay-as-you-throw (PAYT) programs to encourage diversion which can be effective, but, depending on the program, can also be expensive to operate and administer. However, while these programs can have a positive effect on recycling rates, it can also increase contamination of the recycling stream.

One large cost saving mechanism may be to privatize curbside collection of wastes and recyclables. This will be the subject of the Task 3 memo.

The City utilizes a number of communication tactics ranging from print materials to social media. In general, the City's website regarding their solid waste management services is not as easy to navigate compared to websites managed in other communities. It is recommended that the City carefully consider how information is presented on their "Resource Recovery" webpage and update their website frequently to keep it fresh and interesting. Introducing a mobile application may also be an effective way to communicate information.

It is a common misconception that those communities who utilize WTE do not emphasize recycling and waste diversion, compared to waste disposal. The 2014 study entitled "[A Compatibility Study: Recycling and Waste-to-Energy Work in Concert](#)" by E. Berenyi, concluded that the means of a communities waste disposal (whether WTE or landfilling) had no impact on the level of recycling within that community.

Endnotes

- 1) Based on City reported salary and vehicle costs with the following allocation of salaries and vehicles to residential trash collection: 100% of Residential Trash Collection costs and 50% of Backup/Swing costs.
- 2) Based on City reported salary and vehicle costs with the following allocation of salaries and vehicles to commercial and institutional trash collection: 100% of Commercial Trash Collection costs.
- 3) City of Alexandria Website – Annual Spring Cleanup Page;
<https://www.alexandriava.gov/tes/solidwaste/info/default.aspx?id=84166>
- 4) Professional Correspondence with City of Alexandria Personnel - Information provided by email dated October 10, 2017.
- 5) Professional Agreement between the City of Alexandria and Bates Trucking and Trash Removal for Curbside Residential Single Stream Recycling Collection – Contract provided by the City of Alexandria
- 6) City of Alexandria Website – Recycling at Home Page
<https://www.alexandriava.gov/RecyclingAtHome>
- 7) Residential Recycling Data provided by the City of Alexandria
- 8) Professional Correspondence with City of Alexandria Personnel - Information provided by email dated October 10, 2017.
- 9) Drop-Off Facility Tonnage Data provided by the City of Alexandria
- 10) Professional Correspondence with City of Alexandria Personnel - Information provided by email dated October 13, 2017.
- 11) City of Alexandria Website – “Where do recyclables go?” Page
<https://www.alexandriava.gov/tes/solidwaste/info/default.aspx?id=19198>
- 12) City of Alexandria Website – Business & Multi-Family Recycling Requirements, Department Of Transportation & Environmental Services
<https://www.alexandriava.gov/uploadedFiles/tes/solidwaste/info/RIP%20form%20flyer%20revised%202013.pdf>
- 13) City of Alexandria Website – “Where do recyclables go?” Page
<https://www.alexandriava.gov/tes/solidwaste/info/default.aspx?id=19198>
- 14) PowerPoint presentation “Testing a New Service: Curbside Food Waste Collection” provided by the City of Alexandria.
- 15) United States Environmental Protection Agency Website; Wastes - Non-Hazardous Waste - Municipal Solid Waste Page; <https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/>
- 16) Professional Correspondence with City of Alexandria Personnel – Information provided via e-mail dated September 6, 2017
- 17) City of Alexandria Website – Yard Waste Recycling Page;
<https://www.alexandriava.gov/YardWaste>
- 18) City of Alexandria Food Waste Pilot Program Data, Information provided by City of Alexandria personnel
- 19) City of Alexandria Website – Household Hazardous Waste & Electronics Collection;
<https://www.alexandriava.gov/tes/solidwaste/info/default.aspx?id=19206>
- 20) City of Alexandria – HHW Price Sheet and Proposal; provided by City of Alexandria personnel
- 21) Arlington County’s reported 2016 recycling rate without source reduction credits is 41.8%.

- 22) Recycling rate calculations includes material recycled at County and non-County facilities, mulch, leaf and yard waste, composting residue, recovered ferrous material and recycled ash.
- 23) Note that the City of Alexandria's processing fee/recycling revenue has not been included as it is assumed the costs for the comparative communities only reflect collection costs, predominantly for the private service provider.
- 24) City of Alexandria - 2017 Master Table Waste Report provided by City of Alexandria personnel.
- 25) Evolution of municipal household hazardous waste collection programs; APWA Reporter; March 2005; Mary Chamberlain Environmental Analyst R. W. Beck, Inc. Minneapolis, Minnesota Presenter, 2005 APWA Congress
<http://www3.apwa.net/Resources/Reporter/Articles/2005/3/Evolution-of-municipal-household-hazardous-waste-collection-programs>
- 26) Upper Valley Solid Waste and Recycling Analysis; Presentation by: DSM Environmental Services, Inc.; FINAL REPORT; July 15, 2014; funded by: Greater Upper Valley Solid Waste Management District; Town of Hanover; Town of Hartford; City of Lebanon; Town of Norwich
- 27) A Compatibility Study: Recycling and Waste-to-Energy Work in Concert; Eileen Brettler Berenyi, Ph.D; Governmental Advisory Associates, Inc.; 599 Riverside Avenue, Suite 1 Westport, CT 06880; MAY 2014 <http://energyrecoverycouncil.org/wp-content/uploads/2016/03/ERC-2014-Berenyi-recycling-study.pdf>