2013

Financing Feasibility Study for Stormwater Management in the City of Bowie, MD

Prepared for the City of Bowie, Maryland

Prepared by the Environmental Finance Center (EFC) for the Maryland Department of Natural Resources

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This report was prepared by the Environmental Finance Center's Stormwater Financing & Outreach Unit for the Department of Natural Resources.

The Environmental Finance Center (EFC) at the University of Maryland is one of ten University-based centers across the country providing communities with the tools and information necessary to manage change for a healthy environment and an enhanced quality of life. EFC believes that environmental finance can be used to develop a shared community vision. Our focus is protecting natural resources and watersheds by strengthening the capacity of local decision-makers to analyze environmental problems, develop innovative and effective methods of financing environmental efforts and educate communities about the role of finance and economic development in the protection of the environment. The Stormwater Financing and Outreach Unit was created to address a community's stormwater financing questions and help craft a strategy that best meets local needs.

For more information on the EFC's Stormwater Financing and Outreach Unit and the Environmental Finance Center at the University of Maryland, please visit:

http://www.efc.umd.edu/

http://efc.umd.edu/stormwater.html

Table of Contents

Executive Summary

Background – In May 2012, the Environmental Finance Center (EFC) at the University of Maryland was contacted by the City of Bowie for assistance with understanding the costs associated with stormwater management and knowing the resources necessary to better manage stormwater in the future in order to maintain their current management standards. Through the support of the Chesapeake and Coastal Service of Maryland's Department of Natural Resources (DNR), EFC was able to conduct a stormwater financing feasibility study in 2013. The current funding mechanism for stormwater management in Bowie is to draw funds on an as-needed basis from the general fund. Reliance on the general fund can leave gaps in local stormwater programs, particularly when funds are limited and other community priorities often take precedence over stormwater. Therefore, the goal of the stormwater financing feasibility study is to recommend a long-term dedicated funding stream that is equitable and effective in generating sufficient revenue for the City to maintain a comprehensive stormwater program. Such a financing mechanism is necessary to address the specific control measures that the City must implement in order to meet its NPDES MS4 permit requirements that come with significant costs.

Process and Analysis – The year-long study incorporated information from various sources including City staff, officials, stakeholder and community groups, and the City of Bowie Environmental Advisory Committee (EAC). Information was collected on the City's stormwater management needs and current stormwater activities, other taxes and fees charged to City businesses and residents, budget allocations, and the monetary costs of improving the stormwater program. Throughout the project period, the Project Team also engaged citizens through a series of public meetings, presentations to key stakeholders, and by having a local presence at community events. Promotional materials such as flyers and a fact sheet were developed and distributed at these events.

As part of the study, the Project Team evaluated a series of funding options in terms of what would best fit Bowie's needs for a fair, equitable, dedicated, and sustainable revenue source to support a comprehensive stormwater management program. Based on the unique characteristics of the City, the Project Team narrowed the field of potential financing mechanisms to three options: collecting a stormwater fee as a line item charge on property bills, outsourcing stormwater management to Prince George's County, and establishing a stormwater utility. At the end of this evaluation, the Project Team found a stormwater utility to be the most appropriate approach for the City of Bowie.

As part of the project, the Project Team performed a detailed financial analysis and developed an estimated planning level budget for future stormwater costs. The Project Team estimates that the City of Bowie will need to spend approximately $1.8 million per year over the next eleven years for improvements to their stormwater system. In addition, it is important to note that as the stormwater program unfolds, it will be necessary for City of Bowie to continue to evaluate and refine program costs and project timing. The $1.8 million per year represents current best estimates. The estimates were developed with excel based decision models so that Bowie can make future adjustments to estimates as project costs are refined and as part of a stormwater asset management program

Recommendations – This report recommends distributing the costs associated with paying for repairs and improvements in proportion to the types of land uses that are contributing to stormwater runoff. Just as a building owner or tenant is responsible for paying for their share to process the wastewater and potable water it uses, or to provide the electricity it consumes, the Project Team recommends that building owners and tenants recognize and be accountable for their contribution to stormwater and the overall costs of managing it.

Several funding mechanisms were evaluated in order to generate funds needed to maintain and make necessary improvements to the stormwater program. Based on the analysis of various funding streams,

the Project Team recommends that the City of Bowie adopt a stormwater utility to develop a dedicated source of revenue to ensure implementation of the recommended improvements.

The Project Team came up with a rate structure that attempts to balances administrative resource requirements with a fee system that attempts to be both fair and equitable. It includes a tiered system based on zoning designations for residential properties and system based on impervious surface cover for nonresidential properties. Additionally the structure will enable the use of credits and other incentives.

Conclusion – By implementing a tiered fee for residential properties and an impervious surface cover fee for nonresidential properties, a stormwater utility in the City of Bowie is estimated to generate the necessary $1.8 million per year needed to implement the recommended Best Management Practices (BMPs) outlined in this report to enhance and maintain the City's stormwater system.

Chapter 1: Introduction

Background

Effectively managing stormwater is one of the greatest resource management challenges currently being faced by communities throughout the Chesapeake Bay region. Like all infrastructure, stormwater management systems can have significant upfront capital cost and require long-term management and maintenance to function effectively. As communities struggle with how to best allocate their limited resources, stormwater management systems are frequently overlooked until an emergency occurs, costing millions in damages and repairs, or until a mandate forces a community to take action.

While most communities rely on general funds for stormwater management activities, this means stormwater programs compete for dollars with other critical community priorities like schools, safety, emergency services, and roads. Having a dedicated resource for a stormwater program with a dedicated revenue stream that is specifically set aside for maintenance and upgrades is critical to the effective management of stormwater systems.

The significance of properly managing stormwater looms even larger as Chesapeake Bay communities must deal with Total Maximum Daily Load (TMDL) requirements and Watershed Implementation Plans (WIPs). Although often an effective driver, these federal and state mandates are not always accompanied by the type of technical assistance, information, and resources needed to successfully guide the development and implementation of sustainable stormwater management plans. These factors led the Environmental Finance Center (EFC) located at the University of Maryland, with support from the Chesapeake and Coastal Service of Maryland's Department of Natural Resources (DNR), to develop a Stormwater Financing and Outreach Unit. The goal of this unit is to help communities identify sustainable stormwater financing strategies that meet local priorities.

Because of differences in geography, hydrology, community priorities, regulatory requirements, and political climates, each stormwater financing strategy is as unique as the location it serves, and financing recommendations must be specifically designed to reflect the nature and characteristics of a jurisdiction as well. This report chronicles the Stormwater Unit's work with the City of Bowie, identifies the needed level of service for a comprehensive stormwater program for the City, and recommends a structure for generating the revenue needed to support enhanced stormwater programming.

Project Goals

The goal of EFC's stormwater efforts in the City of Bowie is to enhance the existing program, thus raising the level of service in a way that helps the City meet its permit requirements more thoroughly, address community water quality priorities, and prepare for future nutrient reduction expectations.

Although the City's new permit has yet to be issued, the pending 2013 NPDES (National Pollutant Discharge Elimination System) MS4 Phase II General Permits are anticipated to require a greater level of activity and more stringent regulatory compliance. It is imperative that the City of Bowie enhance its existing stormwater management program to position the City to properly maintain their system and to meet all state and federal requirements. A stormwater program of this nature will require the support of a more robust and reliable funding stream than current practices provide.

Project Approach

The Project Team took a detailed and robust approach in helping the City of Bowie plan for a sustainable stormwater management program. This approach included both technical and public outreach processes, and the following summarizes each.

The technical process began with an assessment of the City of Bowie's current stormwater program. The Project Team gathered all relevant data from appropriate City staff and consultants. The Project Team worked with municipal staff to evaluate the existing program structure, determine current capacity, and identify trends in funding levels. These meetings also provided the Project Team with documents to review such as the Comprehensive Budget and Capital Improvement Plan, the Comprehensive Annual Financial Report, the State of the Environment Report, the Environmental Infrastructure Action Strategy Plan, the Watershed Implementation Plan, and engineering reports. Once the Project Team evaluated the current program, they worked with representatives from the City's Planning and Economic Development Department, the Finance Department, Community Services, the City Office, and consultants to develop a desired level of service and a revenue source for the costs associated with a comprehensive stormwater management program. Parcel data provided by municipal staff was used by the Project Team to conduct a rate structure analysis and estimate the revenue needed to support the enhanced level of service. The final recommendations reflect the estimated revenue needed to sustain a comprehensive stormwater management program for the City of Bowie as well as analysis tools for the further refinement of costs and revenue estimates as engineered project costs are finalized and developed in 2014 and beyond.

An integral part of this process is to provide residents the opportunity to understand and have a voice in the development of the stormwater program and inform the final recommendations. The outreach process in the City of Bowie began with a meeting with the Environmental Advisory Committee (EAC), an existing group whose mission is to advise City Council on policies and programs relating to the environment, public education, and outreach[1]. The EAC provided guidance and assistance necessary to move forward with public outreach and their input was used to craft an outreach and marketing plan that defined what audiences to engage, when, and how. Once the timeline was finalized (see Appendix A), the Project Team worked with appropriate community groups and staff to develop outreach materials and spread the word of the City's stormwater challenges and proposed recommendations at local events. See Chapter 2 for more details on specific outreach activities conducted throughout the study.

Project Funding

The EFC Stormwater Financing and Outreach Unit's work in the City of Bowie was made possible by funding from the Maryland Department of Natural Resources Chesapeake Bay Implementation Grant, which provides direct technical assistance that facilitates the development of stormwater financing strategies in Maryland communities[2]. The EFC intends to use the experiences of working in the City of Bowie as a model for other interested communities in Maryland and eventually throughout the Mid-Atlantic region.

Information Gathering Process

Information was gathered for this feasibility study through a series of meetings and interviews conducted with City staff from the Finance Department, Public Works Department, Planning and Economic Development Department, Parks and Grounds within the Community Services Department, City Council, and community groups such as the Environmental Advisory Committee. In addition, information was gathered through a series of public meetings, presentations, and events. Homeowners Associations, the Bowie Interfaith Council, and the Bowie Gardens for Wildlife Habitat were amongst those whom provided essential feedback integral to the study. Finally, the Project Team gathered

[1] The Environmental Advisory Committee; City of Bowie, http://www.cityofbowie.org/index.aspx?NID=483.
[2] The Chesapeake Bay Implementation Grant; Maryland Department of Natural Resources, http://www.dnr.state.md.us/ccp/funding/cbig.asp.

information through a comprehensive literature review of City documents including but not limited to the Comprehensive Budget and Capital Improvement Plan, the Comprehensive Annual Financial Report, the State of the Environment Report, the Environmental Infrastructure Action Strategy Plan, Watershed Implementation Plan, and engineering reports.

Chapter 2: Public Outreach

An important way to achieve a more thorough understanding of stormwater concerns, gain community investment and support, and effectively develop a comprehensive stormwater management plan is to engage local community groups, businesses, and residents throughout the process. This is accomplished by having a well thought out plan to collect feedback, educate the public, and incorporate their ideas into the final recommendations. Often times, community members are not aware of the impact that stormwater has on their daily lives and this process helps to open the dialogue. This process also allows local decision-makers to develop a comprehensive long-term stormwater management plan that is in the best interest of knowledgeable citizens and businesses. The public education and outreach component is so important, in fact, that it comprises two of the six minimum control measures listed in the NPDES Phase II Municipal Separate Storm Sewer System (MS4) permit. Typically, recommendations that do not take into account significant input from the community will have little chance of success in gaining support from elected officials.

Knowing the importance of engaging the community made public outreach a significant component of this feasibility study, both for the purposes of information-gathering and for the purposes of keeping the public informed about the progress of the study. In the case of the City of Bowie, citizen engagement was sought in many ways. The Bowie Interfaith Council and local Homeowners Associations were contacted and asked to attend a discussion facilitated by the Project Team to learn about the goals of the project and provide feedback on the subject. In order to inform the community periodically and keep residents up-to-date of our outreach activities and progress, local press coverage was essential. See Appendix B for a list of the local press coverage throughout the study. The Project Team also attended two community events, the Bowie Green Expo and Bowiefest, to discuss the project with the public.

The goal of outreach was to make certain that stakeholders in the community had accurate information about the City's stormwater management program and financing challenges, enabling them and local decision-makers to make informed choices on how to address these issues. Based on work conducted with other communities, successful public outreach usually relies on establishing a stormwater-working group. However, in the City of Bowie, the Environmental Advisory Committee (EAC), a group focused on policies and programs relating to the environment, public education, and outreach already existed. Therefore, the EAC and members of City Staff were utilized to share input on what the outreach plan should include, provide feedback on outreach materials, and inform the community on the study's progress.

The Project Team began its public outreach component of the study by creating an outreach marketing strategy to span from August 2012 to September 2013. The intended audience included citizens, community groups, and elected officials. See Appendix A for the Outreach and Marketing Strategy used for this project. See Appendix C for a timeline of all events and presentations and

Appendix D for flyers and promotional materials created to hand out at local events.

Storm Drain Art Contest

The outreach and marketing strategy for the City of Bowie called for a series of meetings with stakeholders across many sectors of the community. Thus, the Project Team gathered a list of names, organizations, and events recommended by City Staff, the EAC, and other knowledgeable associations and organizations. Through the dialogue with these groups opportunities to engage the public on a broader scale were discussed and one idea in particular, the Storm Drain Art Contest, was well received by City Council.

To facilitate the Storm Drain Art Contest registration forms, flyers, and other promotional materials were developed and provided at public at events, in City Hall, and via the City of Bowie website. See these materials in Appendix E. The contest was also publicized in the May-June 2013 Bowie Spotlight, the official newsletter of the City of Bowie (see Appendix B).

From April 13th to June 1st 2013, residents were invited to submit designs for the contest. Designs were submitted in-person to staff at City Hall and winners were announced on the City of Bowie website. Overall nine entries were received and the City of Bowie Arts Committee chose six winning designs, first and second place in each of the three age groups (8-12 years old, 13-17 years old, and adult). The winning designs can be seen in Appendix E. Winners won a cash prize and after the winning designs were selected, City Staff worked with an art student from Bowie State University to paint the designs on predetermined storm drains in the City.

Presentations

Environmental Advisory Committee

On November 7th, 2012 EFC staff attended an Environmental Advisory Committee (EAC) Meeting to inform the group of the stormwater feasibility study, emphasizing the importance of the outreach component of the project, and asking the group to be the primary contact in the outreach effort. Eight committee members attended the meeting and suggested several groups to contact such as the Bowie Gardens for Wildlife Habitat, the Bowie Green Team, the Bowie Interfaith Recreational Council, Homeowners Associations, and Boy and Girl Scout Troops. The EAC also provided venues and events through which to reach the public such as the Bowie Green Expo, Bowiefest, and the City's annual Rain Garden Workshop.

City Council

EFC staff made two presentations to the Bowie City Council. On February 4, the presentation included information on stormwater management, and outreach efforts. On November 25, 2013 the presentation included the findings and recommendations of EFC.

Bowie Interfaith Recreational Council

On May 20th, 2013, an EFC staff representative spoke with the Bowie Interfaith Recreational Council at the City of Bowie Gymnasium. The purpose of the meeting was to make a connection with the Bowie interfaith community and to get input on their stormwater related concerns. The EFC representative spoke with the council members about the ongoing stormwater feasibility study and potential impacts on the City of Bowie. Of particular importance was advertising the upcoming Homeowner's Association meeting as an opportunity to share with their congregations.

Homeowner's Association Meeting

On June 5th, 2013 the EFC Project Team gave a presentation to residents on the City of Bowie's stormwater management program and explained the need to dedicate a specific revenue source to maintain critical infrastructure. Following the presentation, the EFC representatives facilitated a discussion with participants to collect feedback and answer questions. The predominant themes of resident questions were how a fee would be billed, the cost of a fee, and how revenue generated by a fee would be used. This meeting also drew EFC attention to specific locations in the community where flooding and erosion frequently occur.

Economic Development Committee

On July 10th, 2013, EFC made a presentation to discuss stormwater management with the Bowie Economic Development Committee. The presentation was seen as an opportunity to share initial findings and to confirm the interest and support from Bowie's business sector. The meeting was also seen as a way to raise awareness on effectively managing stormwater and how that will impact the commercial districts.

Events

Bowie Green Expo

On April 13th, 2013 the EFC Project Team participated in the third annual Bowie Green Expo – a community-wide, family-oriented event featuring local environmental agencies, nonprofits, and businesses offering green products or services to teach residents about a greener lifestyle. The EFC took this opportunity to educate the public on stormwater and more specifically, the stormwater study, and solicit feedback. A stormwater model was used to engage the public. Also available at the event were registration forms for the Storm Drain Art Contest (see Appendix E), a factsheet on stormwater in the City of Bowie (see Appendix F), and large maps of Bowie's watersheds and stormwater infrastructure. At the event the EFC was able to speak with several families about the importance of stormwater management in their community.

Bowiefest

On Saturday, June 1st, 2013, two EFC representatives manned a table at Bowiefest – one of the largest annual events in the City of Bowie. The purpose of the meeting was to educate and conduct outreach with the community. The stormwater model used during the Bowie Green Expo was on display and was entertaining and educational for the young and old alike. With the help of the model, the EFC had a chance to speak with over 50 people about the importance of stormwater in their community. Also available were large maps of Bowie's watersheds and stormwater infrastructure (i.e., outfalls and inlets) as well as advertisements for upcoming events such as the Bowie Homeowner's Association meeting. Rain Garden Workshop

Rain Garden Workshop

On August 8th, 2013 EFC participated in the Annual Rain Garden Workshop put on by the Bowie Gardens for Wildlife Habitat Team. This workshop educates City residents on the benefits of rain gardens and

teaches them how to install and maintain one on their own property. An EFC representative explained with participants how rain gardens help treat stormwater, how installing these gardens support City goals to increase water quality, and how in the future the gardens could be used as a credit to offset utility fees. After the presentation questions from participants were answered and an on-site rain garden was visited to apply the information just learned.

Chapter 3: City of Bowie's Current Stormwater Management Program

What is Stormwater?

Stormwater runoff is defined by the Environmental Protection Agency (EPA) as,

> "…Precipitation from rain and snowmelt events that flows over land or impervious surfaces and does not percolate into the ground. As the runoff flows over the land or impervious surfaces (paved streets, parking lots, and building rooftops), it accumulates debris, chemicals, sediment or other pollutants that could adversely affect water quality if the runoff is discharged untreated."[3]

Stormwater, unlike the wastewater that enters the sewer system via sinks, toilets, etc. generally does not go to a wastewater treatment plant. Instead, it flows underground and then is discharged into the nearest body of water.

Urban and suburban development has magnified the impact of stormwater runoff. The increase in acreage covered by impervious surfaces including roads, parking lots, houses, swimming pools, buildings, compacted soil (including many lawns) and sidewalks has changed the land's ability to naturally absorb stormwater. Until recent stormwater legislation was passed requiring best management practices (BMPs) in the management of stormwater, developers built simple stormwater management systems, generally underground, to drain rooftops, parking lots, driveways, etc. in order to protect property and public safety. The stormwater eventually dumped from an exit pipe into a river, stream, bay, or ocean taking with it any pollutant it had picked up along the way. Storm sewer systems concentrate stormwater into straight channels, increasing the rate of flow as it travels underground. Besides concerns about pollutant loads, the excessive volume leads to streamside erosion, sedimentation, and often, warmer-than-usual water temperatures, all of which impact natural systems.[4]

Why is Stormwater Management a Concern in the City of Bowie?

Whether a community calls it stormwater, urban runoff, precipitation, or just simply rain, too much can cause significant damage including flooding, erosion, and water quality impairment. The City of Bowie is responsible for collecting, treating, storing, conveying, and discharging stormwater in a manner that is safe for the public and not harmful to the environment.

Adding to the City's responsibilities to treat stormwater is the fact that Governor Martin O'Malley signed House Bill 987, the Stormwater Management Watershed Protection and Restoration Program, into law on May 2nd, 2012. The law requires counties and municipalities with a federal Municipal Separate Storm Sewer System ("MS4") Phase I permit to establish a local Watershed Protection and Restoration Program, including a stormwater fee to fund its operations, by July 1st, 2013.

In 2013, Prince George's County enacted the Clean Water Act Fee, which was passed in response to 2012's House Bill 987, (the Watershed Protection and Restoration Program). The County's Clean Water Act Fee imposes and collects a stormwater fee on properties in the County.[5]

The City of Bowie is a Phase II community making it exempt from House Bill 987, however, the City is expecting a new permit to come out in late 2013 or early 2014 with stricter pollution reduction requirements similar to those required of Phase I communities. The new NPDES MS4 permit will include

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[3] National Pollutant Discharge Elimination System (NPDES); U.S. Environmental Protection Agency, http://cfpub.epa.gov/npdes/home.cfm?program_id=6.

[4] Protecting Water Quality from Urban Runoff, EPA 841-F-03-003, February 2003, http://www.epa.gov/npdes/pubs/nps_urban-facts_final.pdf.

[5] Further detail on The Prince George's County Clean Water Act Fee can be found in Chapter 5.

six Minimum Control Measures (MCMs) consistent with those found in the old permit. These include Public Education and Outreach, Public Participation and Involvement, Illicit Discharge Detection and Elimination (IDD&E), Construction Site Runoff Control, Post Construction Runoff Control, and Pollution Prevention/Good Housekeeping. To prepare for the stricter Total Maximum Daily Load (TMDL) requirements, the City of Bowie has completed a Best Management Practices (BMP) Inventory and is waiting for the results of a study that will identify potential stormwater management retrofits. This study is scheduled for completion in December 2013.

Like most communities, allocating funding toward the management, upgrades, and operations and maintenance of the City's stormwater system is a challenge for the City but remains a pressing issue. Because of the City's size, Bowie has a Phase II National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (NPDES MS4) permit that defines how the City is required to address its stormwater runoff and there are costs associated with compliance, which are likely to increase with the new permit issued in late 2013 or early 2014. Continuing to treat runoff, improve water quality, and control water quantity must remain a high priority for the City of Bowie.

City of Bowie's Current Stormwater Management System

Division of Responsibilities

Stormwater management activities in the City of Bowie are currently divided across three departments. See Appendix G for the organizational structure and division of labor for stormwater in the City of Bowie. The Parks and Grounds Division of the Community Services Department maintains stormwater infrastructure. Their stormwater crew keeps a detailed Stormwater Maintenance Daily Work Record with the date, location, and action performed. Actions include inspection and trash removal, mowing, fence repair, riprap repair, riser structure cleaning, and tree removal.[6]

The Department of Planning and Economic Development is responsible for stormwater planning. Although the City of Bowie does not have land use or zoning control, it does have its own stormwater authority and can therefore prioritize stormwater projects over county initiatives if it so chooses. Planning responsibilities include updating and implementing the City's Environmental Infrastructure Plan and developing State of the Environment Reports. The Department of Planning also works closely with the City of Bowie Environmental Advisory Committee, whose primary function is to recommend policies and programs to City Council relating to the environment, and the Bowie Green Team Executive Committee, whose primary function is to develop initiatives supporting sustainable local government practices.

The Department of Public Works (DPW) is responsible for the City's National Pollutant Discharge Elimination System (NPDES) permit, which is administered by the Maryland Department of the Environment (MDE) and covers six minimum control measures. (For a detailed discussion of these requirements refer to Chapter 5 of this report). The DPW is also subject to state erosion sediment control audits every three years, which they have always passed.

Through interviews and other background analyses it is evident that the City of Bowie has a highly effective stormwater management program. However, with stormwater responsibilities divided amongst several departments whom work independently, there is room for improvement in terms of internal communication and information sharing.

[6] Source: 2012 City of Bowie Parks and Grounds Stormwater Maintenance Daily Work Record

Chapter 4: Level of Service Analysis

In order to accurately assess the City of Bowie's stormwater management program, the Project Team conducted a thorough analysis of the level of service that Bowie provides on stormwater management activities. Technical data was gathered from various sources and compiled into a single document called a *Level of Service* document, which is outlined in more detail below. This comprehensive review was done on all current and future stormwater needs in order to meet state and federal regulations. This analysis also revealed several opportunities to increase the effectiveness and efficiency of the current stormwater program. The document is divided in six sections that reflect the six Minimum Control Measures (MCMs) required by the City's NPDES Phase II Municipal Separate Storm Sewer System (MS4) permit. Within each MCM, there are recommended best management practices (BMPs) derived by the U.S. Environmental Protection Agency and the Maryland Department of the Environment. The Project Team carefully reviewed all available documentation to derive our findings. This included extensive review of all meeting notes, budgets, reports and studies. The Project Team also aligned its analysis with current proposed plans in order to determine all proposed actions the City will undertake and addressed areas where there was room for improvement to more effectively improve water quality at the least cost to the city.

Minimum Control Measure 1: Public Education and Outreach

The intention of MCM 1 is to implement a public education program that will distribute educational materials to the city and conduct outreach activities showing the impacts of stormwater. Best management practices (BMPs) recommended by state and federal regulatory agencies include the following requirements:

- Develop, implement, and maintain a written Public Education and Outreach Plan (PEOP).
- Implement a public education program to distribute educational materials to the community.
- Distribute stormwater educational materials and/or information to the target audiences using a variety of distribution methods.

Based on the Project Team's analysis, the City of Bowie has been effective at using available media such as their website and newsletter to inform citizens of stormwater management activities. Bowie has also utilized their school system, youth groups, and the Environmental Advisory Council to educate and inform the public and help distribute material about all public outreach activities.

Based on the current level of service for activities required under MCM 1, Bowie would be considered as providing a ***medium*** level of service. To enhance their current level of service in anticipation of more stringent requirements anticipated in the new NPDES MS4 Permit, the Project Team recommends writing a PEOP and developing a target audience.

It is estimated that any additional actions will have a one-time expense of approximately **$1,400**. For information on how this figure was determined refer to Table H- 1 in Appendix H.

Minimum Control Measure 2: Public Involvement and Participation

The intention of MCM 2 is to implement a public involvement and participation program for stormwater. BMPs recommended by state and federal regulatory agencies include the following:

- Include the public in developing, implementing, and reviewing your stormwater management program and make efforts to reach out and engage all economic and ethnic groups.
- Comply with state and local public notice requirements when implementing public involvement/participation program.

Based on the Project Team's analysis, the City of Bowie is performing several notable activities under MCM 2 including holding an annual Rain Barrel/Garden Workshop, performing stream cleaning events each year, creating a Green Team Executive Committee, planning a poster campaign, holding a public hearing to discuss the City's Environmental Infrastructure Plan, and working with the Girl Scouts to build a rain garden at Kenilworth Elementary School.

Based on the current level of service for activities required under MCM 2, Bowie would be considered as providing a ***medium*** level of service. To enhance the current level of service in anticipation of more stringent requirements anticipated in the new NPDES MS4 Permit, the Project Team recommends the following:

- A written Public Involvement and Participation Plan (PIPP) be developed
- All citizen complaints relating to water quality and stormwater management be recorded and tracked through a database system
- The proposed poster campaign be implemented
- Volunteer groups should be trained to screen stormwater outfalls.

It is estimated that these additional actions will have a one-time expense of about **$6,800** and recurring annual operating cost of about **$3,100**. For additional information on how this figure was determined refer to Table H- 2 in Appendix H.

Minimum Control Measure 3: Illicit Discharge Detection and Elimination (IDD&E)

The intention of MCM 3 is to develop, implement, and enforce a program to detect and eliminate illicit discharges that go into the municipal storm drain system. BMPs recommended by state and federal regulatory agencies include the following:

- Develop and implement a written program for the detection, elimination, and prevention of illicit discharges into regulated MS4s.
- Develop and maintain a map of your regulated MS4.
- Enact a stormwater management ordinance to implement and enforce a stormwater management program.
- Provide educational outreach to public employees, business owners and employees, property owners, the general public and elected officials about the program to detect and eliminate illicit discharges.

Based on past experiences in other communities, the EFC also recommends the following BMP:

- Establish priority areas, conduct screening/sampling and take appropriate actions as needed.

Based on the Project Team's analysis, the City of Bowie is currently performing several notable activities under MCM 3 including maintaining 396 miles of storm sewers, 104 acres of basins, outfalls, and drainage areas, conducting a yearly inspection of 73 ponds and 40 outfalls, and mapping all outfalls and a significant portion of storm drainpipe connections in GIS.

Based on the current level of service for activities required under MCM3, City of Bowie would be considered as providing a ***medium*** level of service. To enhance the current level of service in anticipation of more stringent requirements anticipated in the new NPDES MS4 Permit, the Project Team further recommends the following activities be added to the program.

- Map any new outfalls and storm drain pipe connections as they come online and update the 2012 GIS map to reflect the additions
- A database be developed to coordinate the current tracking and documentation of illicit discharges and citizen complaints
- An IDD&E ordinance be developed
- IDD&E specific education materials be disseminated via website, newsletter and other mediums.

It is estimated that these additional actions will have a one-time expense of approximately **$5,200**, and recurring annual operating cost estimated at **$1,750.** For additional information on how this figure was determined refer to Table H- 3 in Appendix H.

Minimum Control Measure 4: Construction Site Stormwater Runoff Control

The intention of MCM 4 is to develop, implement, and enforce a program to reduce pollutants in any stormwater runoff from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of stormwater discharges from construction activity disturbing less than one acre must be included in your program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more. BMPs recommended by state and federal regulatory agencies include the following requirements:

- Develop, implement, and enforce program consisting of all procedures necessary to reduce pollutants in any stormwater runoff to your small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of stormwater discharges from construction activity disturbing less than one acre must be included in your program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more.
- Choose to either apply to the state of Maryland Department of the Environment (MDE) for delegation of erosion and sediment (E&S) control authority, make a legal agreement with the surrounding County to conduct an erosion and sediment control program in your town, or have MDE enforce erosion and sediment requirements in your town.

Based on past experiences in other communities, the EFC also recommends the following BMPs:

- Implement procedures for review and enforcement of E&S Control Plans.
- Provide education and outreach for developers and builders.
- Implement procedures for receipt and consideration of information submitted by the public.

Based on the Project Team's analysis, the City of Bowie is performing several notable activities under MCM 4 including adopting a Stormwater Management Control Ordinance, requiring construction site operators to control waste at the construction site, and performing inspections at construction sites.

Based on the current level of service for activities required under MCM 4, the City of Bowie would be considered as providing a ***medium*** level of service. To enhance the current level of service in anticipation of more stringent requirements anticipated in the new NPDES MS4 Permit, the Project Team further recommends the following activities be added to the program:

- Create a database to document information submitted by the public that can be shared among all of the departments in the City of Bowie to ensure better accuracy, communication and enhanced compliance to further ensure meeting MCM 4.

It is estimated that this additional action will have a first year expense of approximately **$2,400** and additional recurring annual operating costs estimated at **$800.** For additional information on how this figure was determined refer to Table H- 4 in Appendix H.

Minimum Control Measure 5:Post-Construction Stormwater Management in New Development & Redevelopment

The intention of MCM 5 is to develop, implement, and enforce a program to address stormwater runoff from new development and redevelopment once the construction phase is complete. Stormwater management should be provided for projects that develop greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development for sale, that discharge into your municipal storm drain. The program must ensure that controls are in place that would prevent or minimize water quality impacts. BMPs recommended by state and federal regulatory agencies include the following requirements:

- Implement and enforce ordinance to satisfy MCM.
- Ensure all post-construction stormwater management BMPs in new or redevelopment areas is built as designed and operated and maintained properly.

Based on the Project Team's analysis, the City of Bowie is performing all required activities under MCM 5. Based on the current level of service for activities required under MCM 5, Bowie would be considered as providing a ***medium*** to ***high*** level of service. To enhance the current level of service in anticipation of more stringent requirements anticipated in the new NPDES MS4 Permit, the Project Team recommends that post construction BMP inspections be coordinated and recorded into a technology database accessible to multiple staff.

It is estimated that this additional action will have a one-time first year expense of approximately **$1,500.** For additional information on how this figure was determined refer to Table H- 5 in Appendix H.

Minimum Control Measure 6: Pollution Prevention/ Good Housekeeping for Municipal Operators

The intention of MCM 6 is to develop an operation and maintenance program for reducing pollutant runoff from municipal operations and use all available training materials. The stormwater program must include employee training to reduce stormwater pollution from activities such as fleet and building maintenance and park and open space.

BMPs recommended by state and federal regulatory agencies include the following requirements:

- Develop and implement a written operation and maintenance (O&M) program to prevent or reduce pollutant runoff from municipal operations.
- Map all municipal property on the same map that shows outfalls and water resources. Develop pollution prevention options (inventory pollutant sources, provide personnel training, increase vegetative buffers around streams, etc.) for all municipal property not covered by "industrial" general permit.
- Conduct training for other BMPs for appropriate municipal employees.

Based on past experiences in other communities, the EFC also recommends the following BMPs:

- Maintain, inspect, and evaluate the effectiveness of BMPs owned or maintained by the City, as well as those that are privately owned.

- Develop and fund a program to clean inlets, ditches, drains, and BMPs on a regularly scheduled basis.
- Develop and fund an Asset Management Program for the storm sewer infrastructure program.
- Manage a street sweeping program.
- Design and construct projects to address flood hazards, mitigation, and other water quality issues.
- Establish on-the-ground green infrastructure strategies to be implemented within the City.
- Develop and fund design and construction of stormwater projects (large-scale capital improvements).
- Coordinate staff training opportunities to ensure all staff can adequately manage the City's stormwater program.

Based on the Project Team's analysis, the City of Bowie is performing all necessary activities under MCM 6. Based on the current level of service for activities required under MCM 6, Bowie would be considered as providing a ***medium*** to ***high*** level of service depending on the specific activity.

Bowie's program has a ***high*** level of service in the area of street sweeping as all streets are swept twice annually. The City of Bowie is also currently cleaning inlets, ditches and drains at least once every two years.

The City of Bowie's program would be considered at a ***medium*** level of service in the area of green infrastructure since it has partnered effectively with non-profit organizations to implement stormwater BMPs including rain gardens, voluntary nutrient management plans and streamside plantings.

The City of Bowie's program is at a ***medium*** to ***high*** level of service in the development and funding of the design and construction of stormwater projects and large-scale capital improvements. The exact cost to Bowie for this program remains unclear to the Project Team until such time that the retrofit project is completed.

To enhance the current level of service in anticipation of more stringent requirements anticipated in the new NPDES MS4 Permit, the Project Team recommends the following additional activities for the City of Bowie:

- Double current spending on the design and construction of stormwater projects to approximately $192,000 annually in order to address flood hazards, mitigation, and other water quality issues. The current Capital Improvement Program (CIP) budget level is estimated at $96,000 annually.
- Continue to encourage the installation of five green roofs as called for in the State of the Environment Report. No additional cost contemplated as this activity is part of current budgeted operations.
- Conduct ongoing training for staff to ensure knowledge of local, state, federal, and organizational requirements of stormwater activities. Anticipated cost is $1,400 annually.
- Develop and expand pollution prevention options for all municipal property not covered under by an industrial general permit. This would entail identification of potential sources and training for personnel. Anticipated cost is $1,700 annually.

- Expand and integrate current reporting and tracking of stormwater projects into a computer database accessible by multiple users who are charged with stormwater responsibilities or who need to access stormwater project information as part of operations. Anticipated cost is $1,500 in IT staff work.
- Develop and fund the design and construction of Watershed Implementation Plan (WIP) stormwater projects and existing BMP retrofits. The development of this plan is currently in progress and the final results will not be known until after the issuance of this report.[7] Estimated annual recurring capital costs are approximately $1,600,000 per year. [8]
- Develop and fund a Stormwater Asset Management Program for storm sewer infrastructure to proactively inspect, repair, or replace stormwater capital asset investments. This will consist of equipment and staff to manage as well as inspect and maintain assets. It is estimated that the Asset Management program operation costs will be about 12.5% of the estimated capital program ($1,400,000) and will necessitate 2 FTE to manage the projects and inspect the projects and will necessitate additional operating costs of approximately $175,000.
- Develop a dedicated or separate funding mechanism after the completion of project costs are known in order to ensure the continuation of the level of service currently provided in the area of stormwater capital project design, construction and maintenance.

It is estimated that the above recommendations will have approximately **$180,000** of additional operating costs in the first year of implementation of which approximately **$177,000** of that amount will be recurring annual costs. There will also be an estimated **$1,600,000** in recurring capital project costs per year. The total costs (operations and capital) for these recommended actions is estimated at **$1,796,973**. For additional information on how these figures were estimated, please refer to Table H- 6 in Appendix H and Appendix I.

[7] The total costs of these capital projects could be significant and are difficult to estimate in the absence of engineered plans. The project team made a planning level estimate of possible capital program costs using the Maryland 2025 MAST WIP and applying a watershed cost estimate as outlined in Appendix M.

[8] These are variable planning level estimates. Further detail on this estimate is contained in Appendix M.

Chapter 5: Funding Options

Assessment of Possible Revenue Sources and Funding Methods

The Project Team recognizes that the current method of funding stormwater through General Fund appropriations often competes with other community priorities requiring alternative sources of revenue and funding to be explored. The following options were considered (see Table 1 below):

- Federal and state funding opportunities (grants);
- Maryland loan programs;
- Bond financing;
- General fund appropriation;
- Permit inspection and fees;
- Public-private partnerships; and
- Stormwater utility fees.

As the table below shows, only the use of general funds, public private partnerships, and stormwater utility fees are the best funding mechanisms that will cover capital improvements as well as operations and maintenance. Since it is clear that using general funds as the sole revenue source for stormwater in Bowie has not adequately addressed the current program needs and there is no private partnership available with which to partner with at the present time in Bowie, the only remaining option that will meet all current and future stormwater costs are through a stormwater utility.

Table 1: Funding Sources, Coverage of Costs, and Features

Funding Source	Coverage of Cost		Features
	Capital Improvements	Operations and Maintenance	
Grants	Yes	No	Not guaranteed, highly competitive, not sustainable in the long-term
Maryland Loan Programs	Yes	No	Not guaranteed, highly competitive, must repay often with interest
Bond Financing	Yes	No	Dependent on fiscal capacity, can utilize for large, long-term expenditures, must repay with interest
General Fund	Yes	Yes	Not equitable, competes with other community priorities, changes from year-to-year
Permit & Inspection Fees	No	No	Not significant revenue, may deter development
Public Private Partnership	Yes	Yes	Efficiency, transfer of risk, capital access
Stormwater Utility Fees	Yes	Yes	Generates ample revenue, sustainable, dependable, Equitable, requires significant public dialogue

How a Stormwater Utility Fee Works

The basic premise behind a community's stormwater program is that all property owners receive some benefit from the system being maintained and therefore all properties should be required to participate in the cost of maintaining that service. Most stormwater utility fee rates are therefore based on the size, or footprint, of the structural part of the property. This physical part of the property is known as impervious surface and includes all of the hard surfaces of a property such as a roof, patio, paved area, or sidewalk. The reason behind basing a fee on impervious surface is that a hard surface does not allow water to infiltrate into the ground, thereby increasing the volume and flow of stormwater that a community must manage.

Effective stormwater utilities make a direct connection between anticipated expenses to properly manage the system and the revenue to be generated. In other words, the fee should be determined by the level of revenue needed to deliver stormwater management services to the community, with some allowance for the level that a property contributes to runoff.

There are several ways to calculate a stormwater utility rate. The most simple, fair, and common method is based on a parcel's amount of impervious surface – the extent to which a parcel contributes to runoff. When implemented, the fee may take the form of a flat or tiered rate structure, or some combination of both. An Equivalent Residential Unit (ERU) is a unit of measure based on the average single-family dwelling. A specific fee level is attached to an ERU, and the number of ERUs on a given property often serves as the basis for the stormwater charge.

In many cases for residential properties, a flat fee is often recommended over exact parcel based measurements due to the level of program development and administrative burden that would be involved. However, based on the precedent set by Prince George's County, the City of Bowie has the option of using residential zoning designations to create a tiered fee system that better incorporates the scale of a property's contribution to runoff into revenue generation.

Determining the Rate

While residential parcels are typically charged a flat annual fee, non-residential rates are often determined by the number of average residential parcels that exists on a given property, also called an equivalent residential unit, or ERU.

Example:

Impervious surface of an average size single-family dwelling is calculated to be 2,000 square feet. The ERU is set at $40 for one year. Residents pay $40 a year as a stormwater fee. A commercial building that has 10,000 square feet of impervious surface must pay 5 ERUs ($10{,}000ft^2/2{,}000=5$). The bill for 5 ERUs is therefore $200 for a year.

Determining the fee for commercial properties, or non-residential parcels, is typically done by calculating the exact amount of impervious surface on the site and then dividing the amount of impervious surface that was calculated for residential properties are used to determine the number of ERUs for a particular property. The property is then charged a rate (often the same as the residential flat rate) per ERU.

Implementing a stormwater utility fee is a national trend on the increase in the United States, primarily because these fee structures, if designed correctly, will collect a sufficient amount of revenue to support program costs in the most equitable manner possible. Also, utility-based stormwater programs tend to be more efficient, as the responsibility for managing stormwater is coordinated in one program rather than piecemeal across several departments. In the case of the City of Bowie, a utility would create an adequate and stable source of funding dedicated solely to stormwater and allow for a comprehensive program, consistent in funding from year to year, and help to meet all regulatory requirements, nutrient reduction needs, and community goals.

An Overview of Prince George's County Stormwater Utility Structure

In 2013, Prince Georges County enacted the Clean Water Act Fee, which was passed in response to 2012's House Bill 987, (the Watershed Protection and Restoration Program). The county's Clean Water Act Fee is imposed and collected pursuant to Subtitle 10, Division 20 of the Prince George's County Code. Pursuant to Section 10-302 of the Code, the Fee for subject properties shall be calculated:

An Equivalent Service Unit (ESU) is equal to 2,465 square feet of Impervious Area, as defined in Section 32-171 of the Prince George's County Code;

- The Flat Fee Rate is $20.58 per tax account per year; and
- The Impervious Area Fee Rate is $20.90 per Equivalent Service Unit (ESU) per year.

Rates for residential properties are determined by using the parcel's zoning designation and are categorized into different tiers. Tier one consists primarily of properties that are zoned single family attached. Tier two consists primarily of properties that are zoned single family detached. Tier three consists primarily of properties that are zoned as large single family parcels. Each property is charged one flat fee per tax account. In addition to the flat fee, each property is also charged an amount equal to the impervious area fee rate multiplied by the corresponding ESU value for the tier of the property. Tier one is 0.6 ESU, Tier 2 is 1.0 ESU and Tier 3 is 2.0 ESU.

Condominiums are first charged one flat fee per dwelling unit. Then an impervious area basis fee is charged. The total impervious area, which consists of the dwelling units and common areas, are divided by the ESU unit area. The resulting number of ESU is multiplied by the Impervious Area Fee Rate to determine the total impervious area fee for the condominium development. The total impervious area fee is then divided by the number of dwelling units, and that amount is changed to each dwelling unit.

Properties zoned as industrial, commercial, institutional and multi-family are first charged one flat fee per tax account. The impervious area fee is then charged. The impervious area of the parcel is divided by the ESU unit area and the resulting number of ESU is multiplied by the impervious area flat rate to derive the impervious area fee.

Prince George's County will use the revenue from the Clean Water Act Fee to treat 8,000 acres of uncontrolled impervious surfaces by 2025 at a cost of approximately $1.2 billion.[9]

[9] Watershed Protection and Restoration Program (The Clean Water Act Fee) Green Jobs for Clean Waters; Prince George's County, http://www.princegeorgescountymd.gov/sites/StormwaterManagement/CleanWaterActFees/FAQ/Documents/watershed%20infographic%20and%20faq_v.2.pdf

Table 2: Prince Georges County Stormwater Utility Structure

Equivalent Service Unit (ESU) = 2,465 square feet of impervious Area
Flat Fee Rate accessed on each parcel = $20.48 per tax account per year
Impervious Area Fee Rate = $20.90 per ESU per year

RESIDENTIAL, SINGLE FAMILY (BASED ON PARCEL ZONING)

Tier / Zoning	Flat Fee Basis	Impervious Area Fee Basis (Equivalent Service Units, ESU)
Tier One: RT, R20, R35, RU	One (1) Flat Fee per tax account	0.6 ESU
Tier Two: R55, RS, R80, RR, RM		1.0 ESU
Tier Three: RE, ROS, RA, OS, RL		2.0 ESU

OTHER LAND USES (BASED ON ZONING)

Zoning	Flat Fee Basis	Impervious Area Fee Basis
Industrial:	One (1) Flat Fee per tax account	Impervious area on the parcel is divided by the ESU unit area. The resulting number of ESU is multiplied by the Impervious Area Fee Rate.
Commercial:		
Institutional:		
Multi-Family:		
Condominium:	One (1) Flat Fee per dwelling unit	Total impervious area on the combined parcels (dwelling units and common areas) for the condominium development is divided by the ESU unit area. The resulting number of ESU is multiplied by the Impervious Area Fee Rate to determine the total Impervious Area Fee for the condominium development. That total Impervious Area Fee is divided by the number of dwelling units, and that amount is charged to each dwelling unit.

Legal Basis in Maryland for Allowing a Stormwater Utility Fee

Having a dedicated funding source devoted to providing stormwater management programs to the public is at a critical point in Maryland. Enabled by Maryland Statute 4-204 (Annotated Code of Maryland), a system of charges can be adopted to fund the implementation of stormwater management programs, and communities, such as Takoma Park, Montgomery County, and Rockville have made it easier for others to follow their lead in effectively setting up a dedicated source of revenue for stormwater. Statute 4-204 sets the following parameters:

"(d) System of charges. –

1. Each governing body of a county or municipality may adopt a system of charges to fund the implementation of stormwater manager programs, including the following:
    (i) Reviewing stormwater management plans;
    (ii) Inspection and enforcement activities;
    (iii) Watershed planning;
    (iv) Planning, design, land acquisition, and construction of stormwater management systems and structures;

(v) Retrofitting developed areas for pollution control;
(vi) Water quality monitoring and water quality programs;
(vii) Operation and maintenance of facilities; and
(viii) Program development of these activities."[10]

In some communities, like Washington DC and Montgomery County, federal buildings account for a significant portion of impervious surface. Senate Bill 3481, which was enacted in January 2011, provides jurisdictions the legal right to charge the federal government a stormwater utility fee.

In the 2012 Maryland legislative session, House Bill 987 was enacted and requires that all Phase I NPDES stormwater permitted communities implement a stormwater watershed and restoration program by July 2013. This program must include a stormwater remediation fee and a local watershed protection and restoration fund. This legislation has changed the landscape of how Maryland communities pay for stormwater and it is anticipated that it will likely influence future actions of Phase II NPDES MS4 Permit communities similar to the City of Bowie.

Funding Options for Consideration by City of Bowie

Of the options cited above in Table 1, the Project Team believes that Bowie has three feasible stormwater financing options for consideration:

- Collecting a fee for stormwater as a line item and change on property tax bills;
- Outsourcing stormwater operations to Prince George's County; or
- Establishing a stormwater utility to provide dedicated revenue for a stormwater program.

Collect a stormwater fee as a line item and charge on property tax bill

An estimated $1.8 million in annual stormwater costs equates to a rate of 0.0304 per $100 of 2014 estimated assessed property value base of $5.91 billion. See Table J- 1 in Appendix J. Bowie has an operational history and a unique institutional strength in collecting, budgeting, and administering special fees and special taxing districts. Currently within Bowie there are approximately 10 special taxing districts. Properties within these districts are accessed a special tax which is separately accounted for, budgeted, and reserved within the Bowie budgets. In general the special taxing districts were established by an ordinance approved by Council for the construction, finance, and maintenance of infrastructure related to new areas of development.

The benefits of collecting a stormwater revenue as a separate fee and creating separate budget funds and reserves is that the internal operating billing system would not need significant changes and the department that collects revenue and special fees is already in place. Additionally, a stormwater fee billed in this manner on the property tax bill would initially be easier to understand.

The downside of collecting revenues for stormwater through the property tax bill is that sometimes there is a significant difference between the rate of property value assessment and the actual stormwater impact that a property has. Revenue based on property values can fluctuate based on changes in factors that are not related to actual stormwater costs. For instance, real estate assessment values can fluctuate over time due to factors such as demand, supply, and interest rates, while the stormwater impact of properties can remain unchanged due to other factors such as actual impervious area on a property. Additionally, many properties, which impact stormwater and increase the costs of the stormwater program, may be exempt from paying taxes. Finally, in some communities, a greater share of stormwater costs may fall on residential properties rather than those properties that are the

[10] Section 4-204(d), Environmental Article, of the Annotated Code of Maryland.

largest contributors to stormwater. In other words, value does not always match stormwater impact. Another downside is that monies collected for stormwater could go to other priorities if not separated through a utility.

Outsource stormwater to Prince George's County

As discussed above, Prince George's County has established a Clean Water Act Fee for the purposes of charging for stormwater and for paying for stormwater projects in the county.

Possible benefits of Prince George's County managing stormwater within the City of Bowie is that it could result in economies of scale in larger stormwater projects; help to meet pollution reduction targets; and remove some duplicate programmatic, administrative, and management functions. There is also the possibility of transferring operational costs from the City of Bowie to Prince George's County.

A possible downside is that Bowie could see this option as a loss in control of stormwater revenue and overall program management. Additionally, there is the potential for unfunded future obligations and certain liabilities that could arise from stormwater obligations accruing to the City of Bowie's permits. These obligations are not seen as evenly matched compared to the revenue shared under a county managed program. Finally, the level of Bowie's stormwater management is considered to be at a medium to a high level. By outsourcing stormwater to the county, there could be a drop in the level of service and management of stormwater within the City of Bowie.

Table K- 3 in Appendix K provides an estimate of revenue generated from the County Clean Water Act Stormwater Fee from property within the City of Bowie based on parcel data received from City of Bowie staff. Based on this data, it is estimated that residential properties within the City of Bowie would pay approximately $765,000 per year, and non-residential properties would pay about $165,000 per year. In total, under the Prince George's County fee structure, the City of Bowie properties would pay an estimated $932,000. This estimate represents roughly half of what is needed per year by Bowie to manage their stormwater program.

Establish a stormwater utility

The benefits of implementing a stormwater utility for the City of Bowie are that it is a source of revenue that is stable, adequate, flexible, and equitable. Stability is achieved by the creation of a dedicated revenue stream and is a dedicated separate program consistent over time. It is adequate in that revenue requirements match actual stormwater costs. It is flexible because the rates can be changed to meet stormwater program requirements. It is equitable because charges are matched to the costs of managing stormwater. There is also the ability within a utility fee to match stormwater program costs to a property's actual stormwater impact and impervious area. Additionally it is possible to create incentives for properties owners to reduce fees and reduce stormwater impact through a utility fee rather than through other methods.

As with any program, there are also some downsides to consider. With the establishment of any utility program come start-up costs to get the utility running properly. There would also be an increase in the administrative burden of managing a separate program as well as a new billing method to account for. There can also be a perceived downside in that a stormwater utility is a new program that may not be familiar to citizens and will necessitate increased communication and education. The programmatic management of a utility requires that a high level of GIS competence be in place and requires GIS analysis in order to accurately analyze the impervious area of the community. Additionally, issues could be encountered if a utility fee structure is based on zoning categories and the zoning designation does not accurately match the property's current land use.

Recommendation

Any of the three options listed above are appropriate for Bowie to consider. Each option has some merit and value to the City of Bowie. After careful analysis made to each option, the Project Team recommends developing a separate stormwater utility as the most appropriate funding mechanism because it provides a separate dedicated program and revenue stream that best matches the needs of managing stormwater within the City of Bowie.

Chapter 6: City of Bowie Parcel Data Analysis and Stormwater Utility Fee Structure Analysis

Based on data received from City of Bowie staff, there are an estimated 20,130 property parcels within the City of Bowie, of which there are 19,806 parcels with a residential land use and there are 324 parcels with a non-residential land use. Non-residential is any land use that is not single family residential and includes multi-family, commercial, industrial, institutional, parks, and transportation.[11]

Together, the non-residential parcels have approximately 19.65 million square feet of impervious cover. For the purposes of this analysis, and in light of the Prince George's County Clean Water Act Fee, we chose 2,465 square feet to equal one equivalent service unit (ESU). Using the same square footage as the ESU in the County Clean Water Act fee provides consistency, a unit for comparison, reduces any confusion that may exist between the county and Bowie, and is based on an accurate countywide analysis.

When choosing a rate structure that would be most appropriate for the City of Bowie, there were several options to consider:

1. A flat fee for each parcel
2. A tiered structure in which properties are placed into categories based on size and then a rate assigned to the tier
3. A rate based on actual impervious area of a property

1. Consideration for Using a Flat Fee for Each Parcel

An estimate of the ESU under a *flat fee per parcel structure* needed to be to fund the estimated annual costs of $1,800,000, can be found in Table K- 1 in Appendix K. Under this scenario, the ESU fee for each parcel would need to be set at $89 annually. Under a flat fee structure, each parcel, without regard to size or actual impervious area pays the same rate. A single-family townhouse, for example, would pay the same rate as an estate home or as a commercial building parcel if using a flat fee for every property regardless of size.

2. Consideration for Using a Tiered Structure

Table K- 2 in Appendix K provides an estimate of what the ESU fee would need to be in order to fund $1,800,000 annually under a fee structure that is based on a *residential parcel tiered system* and a *non-residential parcel impervious area system*. Under this scenario, residential parcels are divided into three tiers based on land use, which closely matches size.

Residential Tier Structure[12]

- **Tier 1**: This tier would consist of primarily townhomes and single family attached properties and is based on an ESU rate of .60
- **Tier 2**: The second tier is primarily single-family detached structures and based on an ESU rate of 1.0

[11] Table K- 4 in Appendix K contains more detail and a breakdown of the 324 non-residential parcels.

[12] The County Clean Water Act Fee is based on a tiered system for residential. The tier structure in Table K- 2 is similar to the County Clean Water Act fee; however a difference is that the tier structure in Table K- 2 is based on land use, while the County fee is based on zoning.

- **Tier 3**: The third tier would be comprised primarily of larger residential and single-family parcels.

Non-Residential Rate Structure

- **Non-Residential Parcels**: Non-residential properties would be charged a fee based on actual impervious surface area on the parcel[13]. Non-residential parcels would pay a fee that is in proportion to the amount of impervious area on the parcel. The actual fee would differ between properties depending on actual impervious area.[14]

Under this scenario, based on City of Bowie land use parcel data, a fee of $68 per ESU is needed to fund $1,800,000. The total fee for residential parcels would range from $41 to $136, depending on the tier of the residential parcel. The total fee for non-residential properties would have a wide range and would depend on the amount of impervious area on the property.[15] Further information is contained in Table K-2 in Appendix K.

Another option under consideration was to establish a tiered system for non-residential parcels. Insufficient data from the City of Bowie was received in order to make this a precise determination. The presence of some large outliers also made it questionable as to equitability of a structure a tiered system due to the inequities of non-residential parcel distributions.

3. Consideration of Using a Rate Based on Actual Impervious Surface

Another option under consideration is to establish a fee structure based on the actual impervious area for all residential parcels. After discussion with the City of Bowie staff, the Project Team felt this scenario would create significant administrative burden. In addition, the parcel data is not considered to be sufficient enough to accurately gauge the amount of impervious area per residential parcel thus leaving room for errors and miscalculation. Consequently estimates would have to be made and could necessitate an individual review and meeting for each of the 19,000 plus residential parcels.

[13] Impervious surface on a parcel includes asphalt, gravel, buildings, pavement, patio, concrete, pools, bridges, and other impervious surfaces. The base ESU rate is calculated on 2,465 square feet of impervious area, and a parcel's total fee is the impervious square footage on the parcel divided by 2,465 square feet multiplied by the ESU fee. Table K- 2 in Appendix K provides an estimate of an ESU fee that is needed to fund $1,800,000 annually under this scenario.

[14] As an example, a property with 24,650 square feet would be charged 10 times the ESU base fee. (24,650 divided by 2,465 is 10). 10 times base ESU is the property total fee. This impervious area structure for non-residential parcels is similar to the non-residential structure contained in the County Clean Water Act Fee. A difference is that the Bowie structure is based on land use and the County structure is based on zoning designation.

[15] Using the example in footnote 14 above, a property with 24,650 square feet of impervious area would be charged 10 ESU for a total fee of $680 ($68 x 10 ESU).

Chapter 7: Summary of Recommendations

This report recommends distributing the costs associated with paying for repairs and improvements in proportion to the types of land uses that are contributing to stormwater runoff. Just as a building owner or tenant is responsible for paying for their share to process the wastewater and potable water it uses, or to provide the electricity it consumes, the Project Team recommends that building owners and tenants recognize and be accountable for their contribution to stormwater and the overall costs of managing it.

Several funding mechanisms were evaluated in order to generate funds needed to maintain and make necessary improvements to the stormwater program. Based on the analysis of various funding streams, the Project Team recommends that the City of Bowie adopt a stormwater utility to develop a dedicated source of revenue to ensure implementation of the recommended improvements.

The Project Team came up with a rate structure that attempts to balances administrative resource requirements with a fee system that attempts to be both fair and equitable. It includes a tiered system based on land use designations for residential properties and a rate system based on impervious surface cover for nonresidential properties. Additionally the structure will enable the use of credits and other incentives.

By implementing a tiered fee for residential properties and an impervious surface cover fee for nonresidential properties, a stormwater utility in the City of Bowie is estimated to generate the necessary $1.8 million per year needed to implement the recommended best management practices outlined in this report to enhance and maintain the City's stormwater system.

In addition, it is important to note that as the stormwater program unfolds, it will be necessary for City of Bowie to continue to evaluate and refine program costs and project timing. The $1.8 million per year represents current best estimates. The estimates were developed with excel based decision models so that Bowie can make future adjustments to estimates as the project costs, the project timing, and the funding rate structure are further refined next year and in the future as part of a stormwater asset management program.

Project Team

Joanne Throwe, Director – jthrowe@umd.edu Hired in 2005 as the EFC's Agricultural Program Leader, Joanne Throwe became Assistant Director in 2007, Associate Director in 2008, and Director in 2009. In addition, she completed an 18-month assignment working with USDA/CSREES as shared-faculty to assist in the coordination of special agriculture projects. Ms. Throwe works with communities in the Mid-Atlantic region implementing innovative financing solutions for environmental protection. Her work experience includes extensive knowledge about agriculture, green infrastructure, biofuels, ecosystem services and solid waste management. Prior to joining the EFC, Ms. Throwe spent several years as a Development Resource Specialist at USDA's Foreign Agriculture Service and two years as an Agriculture Extension Agent for Peace Corps in the South Pacific. She holds a M.A. in Public Policy and Private Enterprise from the University of Maryland.

Eric Reed, Research Associate – ereed1@umd.edu Eric's focus is on financial analysis to support the development of efficient, effective, and sustainable financing strategies for addressing resource management issues. He is involved with the development of a cohesive water infrastructure financing program that supports and expands the capacity of the EFC's Stormwater Financing and Outreach Unit and EFC's Water Systems Financing Unit. Eric also supports projects in which analysis can improve infrastructure asset management and the return on investments in sustainable projects. Eric holds an M.B.A. in Finance from The Robert H. Smith School of Business at The University of Maryland and a B.A. in Social & Behavioral Sciences from The Johns Hopkins University. Prior to joining EFC, Eric's professional experience includes work in Environmental Insurance Risk Management, Real Estate Development Finance, Environmental Finance and International Human Rights. He has experience performing financial analysis of green infrastructure projects; developing environmental market accounting standards; performing financial and community impact analysis of real estate developments; structuring development and infrastructure project financing; underwriting environmental insurance; managing environmental pollution remediation projects; and work at the European Commission of Human Rights.

Natalia Sanchez – Ms. Sanchez received her Bachelor of Science from Virginia Tech in Environmental Policy and Planning in May of 2011. She was hired by the EFC in August 2012 and completed her Masters of Community Planning in May of 2013. As a Project Assistant in the Stormwater Financing and Outreach Unit she has worked with local community groups to engage residents, created education materials to educate citizens on stormwater management financing, and served as a liaison between EFC staff, city officials, and community residents.

Acknowledgements

Special thanks to **Joe Meinert,** Director of Planning and Economic Development for the City of Bowie for his continued support and guidance throughout the project.

Special thanks to **Rob Patrick,** director of Finance for the City of Bowie.

Special thanks to **Tifanny Wright,** Watershed Specialist with the City of Bowie for providing the Project Team with critical information and support.

Special thanks to the **City of Bowie** staff who helped on providing technical information and data.

Special thanks to our EFC colleagues, **Monica Billig, Jill Jefferson, Sean Williamson,** and **Lisa Lincoln**, who provided their time and expertise throughout this project.

Appendix A: Outreach and Marketing Strategy

City of Bowie Stormwater Financing Initiative

Outreach and Marketing Strategy: Timeline

December 4, 2012

Where: City of Bowie, Maryland

When: August 1st 2012 – August 31st, 2013

Partners: UMD Environmental Finance Center, City of Bowie, Bowie Environmental Advisory Committee

What: A public outreach, education, and marketing plan that communicates stormwater issues in a collaborative manner, including water quality/quantity, infrastructure problems, and solutions for sustainable financing.

Why: To improve stormwater and water quality conditions, comply with Municipal Separate Storm Sewer Systems (MS4) permit and create a dedicated, reliable funding source for infrastructure, operations, maintenance, and compliance needs.

Audience: Citizens, businesses, elected officials

Ongoing Activities

- Marketing activities listed below may be on-going throughout the project as appropriate or opportunities arise:
  - TV, radio, newspaper ads or announcements
  - Include stormwater project and information on the city's website and/or other web-based media
  - Presentations to HOAs, nonprofits, and other groups
  - Highlight projects spanning the City of Bowie
  - Maintain presence at Environmental Advisory Committee's monthly meetings as appropriate – present all updated materials
  - Provide fliers or other information on stormwater at library, town meetings, and other appropriate locations

August 2012

- Have initial kickoff meeting where the Environmental Finance Center introduces itself to city staff, discusses the objectives of the stormwater feasibility study, and collects contact information

September - December 2012

- Create factsheet to distribute at outreach events
- November 7th - Meet with the Environmental Advisory Committee and discuss outreach strategies for stormwater financing

- Develop overall outreach and education messaging and marketing strategy for the public and events
- Submit brief article for Bowie Spotlight, the community newsletter, to get published in the January/February edition
- Develop finalized list of key stakeholders in the community

January – May 2013

- Forward factsheet on stormwater and Environmental Finance Center's work with the city to HOA list with offer to speak if of interest to their community
- Present stormwater project to key community groups
    - February 4th - City Council
    - May 20th - Bowie Interfaith Council
- Brief city staff on progress and outreach efforts as appropriate
- Have presence at local events – disseminate outreach materials, educate community about stormwater project and general issues
    - April 13th - Bowie Green Expo

June 2013

- June 1st – Host a table at Bowiefest festival (at Allen Pond Park) and discuss stormwater financing with the public
- June 5th – Meet with HOAs to present stormwater project to community residents
- Update city staff, Environmental Advisory Committee, and city Council on our efforts as appropriate

July 2013

- July 10th – Present report findings to date to the Economic Development Committee
- Send draft recommendations to stakeholders for review

Appendix B: Local Press Coverage

Bowie Spotlight

http://www.cityofbowie.org/Archive.aspx?AMID=38

November-December 2012 issue, page 10, "Bowie Green Team off to a Great Start"

Bowie Green Team Off to a Great Start

In June 2012, City Council approved the formation of the Bowie Green Team to create and implement a plan under the new Sustainable Maryland Certified (SMC) program, a new initiative from the University of Maryland Environmental Finance Center (EFC). SMC is a program that helps all of Maryland's municipalities identify cost-effective ways to rejuvenate their communities and protect natural resources.

Community resources such as water, energy, land, health, food, and economy are targeted by the program, and municipalities earn points toward becoming certified. A key part of the SMC program is the local government/community partnership. To that end, the first step in the program was to create a Green Team. The new Green Team created a Three-Year Action Plan with various activities and programs that will increase the City's sustainability across the following areas: Natural Resources, Local Economies, Food/Health/Wellness, and Energy/Greenhouse Gas. These activities reach across sectors to government, schools, businesses, civic groups and places of worship.

In addition to the activities required and/or recommended by SMC such as a climate action plan, a workplace wellness program, and greening local businesses, the Team suggested new ideas like promoting plastic bag alternatives, conducting water conservation outreach, and assessing the opportunity for community gardens. Of these programs, 26 are scheduled for review and kick-off in Year 1.

Earlier this month, the group presented the Action Plan to the City Council which approved it unanimously. Now the application is ready to be submitted to the University of Maryland to designate Bowie as a Sustainable Community. As the three-year plan progresses, EFC will provide tools, training, case studies and other resources to help the City meet its sustainability goals.

Visit the City's website, *www.cityofbowie.org*, for more information on the Green Team. Their meetings are held at 7:30 p.m. on the third Monday of every month at City Hall in Room 243 and are open to the public.

January-February 2013 issue, page 10, "University of Maryland Stormwater Program Study"

Stream Cleanup Number Ten Is In the Books

On Saturday, October 13, 2012, 123 volunteers entered eight streams across the City to collect trash and recycling from neighborhood streams. These dedicated volunteers removed 900 pounds of trash and 1,225 pounds of recycling. This brings the total trash and recycling removed for all ten cleanups to 15,370 and 14,000 pounds, respectively. Approximately 10,000 pounds of bulk items including several dozen tires, a lawn mower, a sofa, a couple mattresses and several large pieces of an old BMW (hood, trunk lid, and doors) have also been removed. Thank you to each and every volunteer that has helped us over the last five years!! Without you, all of this debris would have the potential to move downstream into the Patuxent River and even the Chesapeake Bay. It is nice to see Bowie residents take pride in their community and streams.

Interested in joining us? We would love to have you and your church group, civic association, homeowners' association, or class join us. We will provide cleanup supplies and just ask that you bring your family and friends and have fun!

If you want to work as a volunteer in April for our next cleanup, contact Tiffany Wright, the City's Watershed Manager at 301-809-3043 or *twright@cityofbowie.org*. Prince George's County public school students can receive service learning hours for participating. Scouts who participate will receive a Green Bowie patch or year bar.

University of Maryland Stormwater Program Study

In August 2012, the Environmental Finance Center (EFC) at the University of Maryland began a stormwater financing feasibility study for the City of Bowie. The project is funded through support of the Maryland Department of Natural Resources Watershed Assistance Collaborative. The goal of this project is to provide recommendations to the City on ways to finance and better manage stormwater protection activities over the long term.

The EFC will also conduct stormwater related outreach and educational activities targeted to the general public, community leaders, and elected officials. The project will conclude in August 2013 with a set of financing recommendations that best fit the City of Bowie's needs for a fair, equitable, dedicated, and sustainable revenue source to pay for all future stormwater management activities.

For more information, please contact Tiffany Wright, the City's Watershed Manager at 301-809-3043 or *twright@cityofbowie.org*.

GREEN BOWIE

May-June 2013 issue, page 4, "Storm Drain Art Contest"

Storm Drain Art Contest

Have you ever wanted to leave your artistic mark on the streets of Bowie? Well, this is your chance! The City is holding a contest to find designs to paint on a few storm drains to raise awareness of the impacts of stormwater runoff. The contest is for ages 8 and up. Details and the entry form are at *www.cityofbowie.org/GreenBowie* or can be requested from Tiffany Wright at *twright@cityofbowie.org*. Prizes include four tickets to a Bowie Baysox game.

Gazette.net

http://www.gazette.net/article/20130607/NEWS/130609431/0/gazette&template=gazette

Alan J. McCombs, *Bowie Begins Planning for New Stormwater Rules*, June 07, 2013

Appendix C: Timeline of Events, Presentations, and Interviews

Date	Event/Interviewee
3/5/12	Bowie Green Team Kickoff Meeting
9/26/12	Joe Meinert, City of Bowie's Planning Director
9/26/12	Bruce Beasman, Consultant Engineer with
9/26/12	Tiffany Wright, City of Bowie's Watershed Manager
10/3/12	Mike Schramm, Engineer in the Department of Public Works
10/3/12	Jim Henrikson, Director of the Department of Public Works
10/3/12	Alan Forney, Engineer in the Department of Public Works
11/7/12	Environmental Advisory Committee Meeting
11/14/12	Ed Hall, City of Bowie Parks Superintendent
1/15/13	Robert Patrick, Director of the City of Bowie's Finance Department
2/4/13	City Council
4/10/13	Bowie Senior Center CCC
4/13/13	Bowie Green Expo
4/25/13	Follow-up with Tiffany Wright
5/20/13	Bowie Interfaith Council
6/1/13	Bowiefest
6/5/13	HOA Meeting
7/10/13	Economic Development Committee
8/8/13	Rain Garden Workshop
9/5/13	Presentation of Preliminary Findings to City Staff
9/19/13	Meeting with City Staff
10/7/13	Meeting with City Staff
11/25/13	Presentation to Town Council

Appendix D: Flyers and Promotional Materials

Homeowners Association Meeting Flyer

Please join us!
Wednesday, June 5th, 2013
Kenhill Center – 7:00pm
2614 Kenhill Drive
Bowie, MD 20715

Bowie Homeowners Association Meeting

Stormwater Run-off Discussion

Photo Source: http://www.cityofbowie.org/index.aspx?NID=582

Please join us for an open discussion about water quality and flooding in the City of Bowie. We want to hear from you about how we can improve and fund infrastructure & keep our city green and clean!

Please contact Lisa Lincoln with any questions:
lisa.l.lincoln@umd.edu

EFC

City of Bowie and the
University of MD Environmental Finance Center

Rain Garden Workshop Flyer

STORMWATER IN THE CITY OF BOWIE

Stormwater *is water runoff generated when rain and snowmelt events flow over land, structures or other impervious surfaces and does not percolate into the ground.*

Why does stormwater matter?

- **Because local waterways and the Bay matter.**

The natural beauty of the Patuxent River and the Chesapeake Bay are highly valued in Bowie. Stormwater pollutes our waterways and Bay when chemicals on the ground are picked-up in the runoff. Stormwater also causes erosion and flooding and can damage property and habitats.

- **Stormwater management systems require long-term maintenance.**

The City's infrastructure is regularly in need of upgrades. New infrastructure will need to be developed to meet forthcoming regulatory requirements. When stormwater systems are overlooked, emergencies repairs or regulatory fines can cost the City millions.

What is the City doing about this?

Coordinating, planning, and implementing projects that improve local stormwater management.

- Prioritizing projects that address stormwater management needs in the City's Capital Improvements Program.
- Implementing the practices outlined in the City's stormwater permit, Bowie's Environmental Infrastructure Action Strategy Plan, and the Prince George's County Watershed Implementation Plan.
- Tapping into the knowledge and passion of community stakeholders such as the Bowie Stream Teams, the Green Team, and the Environmental Advisory Committee.

What can WE do?

Limit the amount of solid surfaces – parking lots, large buildings, and roadways – or use permeable materials that allow rain to naturally soak into the ground. Allow buffers of vegetation alongside waterways to filter and slow runoff, and plant native trees and shrubs to absorb rainwater. Consider a rain garden or rain harvesting to manage runoff from your property.

To Learn More Contact:

Sean Williamson
U of MD, Environmental Finance Center
T: 802-578-5399
E: srw46@umd.edu

RAIN GARDEN WORKSHOP

August 8th at 7pm

All Saints Lutheran Church,
6510 Mt. Oak Rd., Bowie

The Bowie Gardens for Wildlife Habitat Team and UMD invite you to come and learn why and how to build and install a low-maintenance rain garden that:

- Beautifies your property
- Helps filter stormwater runoff
- Provides habitat and preserves biodiversity

Amanda Rockler, Regional Watershed Restoration Specialist with UMD's Sea Grant Extension Program, will present information and conduct a site walk to help you apply the information on your property.

Questions?
Email: bowiegardens4wildlife@yahoo.com

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Appendix E: Stormwater Art Contest Flyer, Registration Form, and Design Entries

Art Contest Flyer

BOWIE STORMDRAIN ART CONTEST

Winners will be announced at Bowie Fest on June 1st

Deadline for entries is May 1st
Entry form picked and dropped off at Town Hall.

Rules:

- Design must not restrict water flow into the stormdrain
- People under 18 must have an adult mentor and it is recommended they enter as a group
- Art must be tasteful and original. The art can extend onto the sidewalk, the vertical face of the curb, and out onto the street (as the storm drain location allows) but please keep the art from extending more than 4 feet in any one direction from the storm drain.
- Please draw directly on the storm drain template provided in the application.
- No three-dimensional art or moving/removable parts allowed.

Winners from three age categories will be selected to win a prize: 8-12, 13-18, 18+.

Top overall prize gets to throw the opening pitch at the game!

All winners will receive a pair of tickets to a Bowie Baysox game!

Created by Brazilian artists Anderson Augusto and Leonardo Delafuente, these fun painted storm drains have now turned the streets of São Paulo into popular tourist attractions.
Source:
http://themodernartist.wordpress.com/2010/04/

After the winning designs are chosen, each will be assigned a storm drain.

The designs will be painted by an art student from Bowie State University using temporary paint.

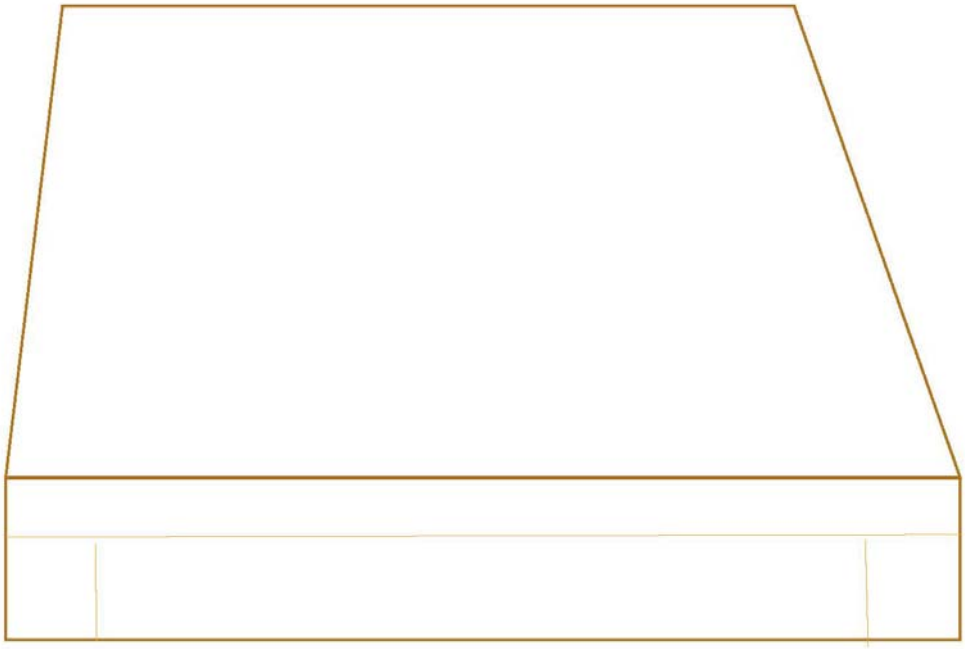
Storm drains lead to rivers. A misconception is that the storm drains are "sewers" that lead to the wastewater treatment plant. With this misconception, the storm drains are misused as people dispose of oil, trash, and other pollutants. Water acts like a magnet and picks up everything in its path such as litter, grease, oil, brake dust, anti-freeze, fertilizer, and pet waste. When it rains, stormwater flows over parking lots, streets, lawns and other surfaces. The water collects pollutants, which enter the storm drains and accumulate in our local streams. The Bowie Stormdrain Art Contest is designed as a public education project to remind the community of the connection the storm drains have with our waterways.

Sponsored by the City of Bowie, the University of Maryland Environmental Finance Center, the Bowie Arts Committee, the Bowie Green Team Executive Committee.

Art Contest Registration Form

Bowie Stormdrain Art Contest

Please draw your design on the stormdrain below and submit this application to the Town Hall by May 1st



Name _____

School _____

Grade Level or Scout Troop or Adult _____

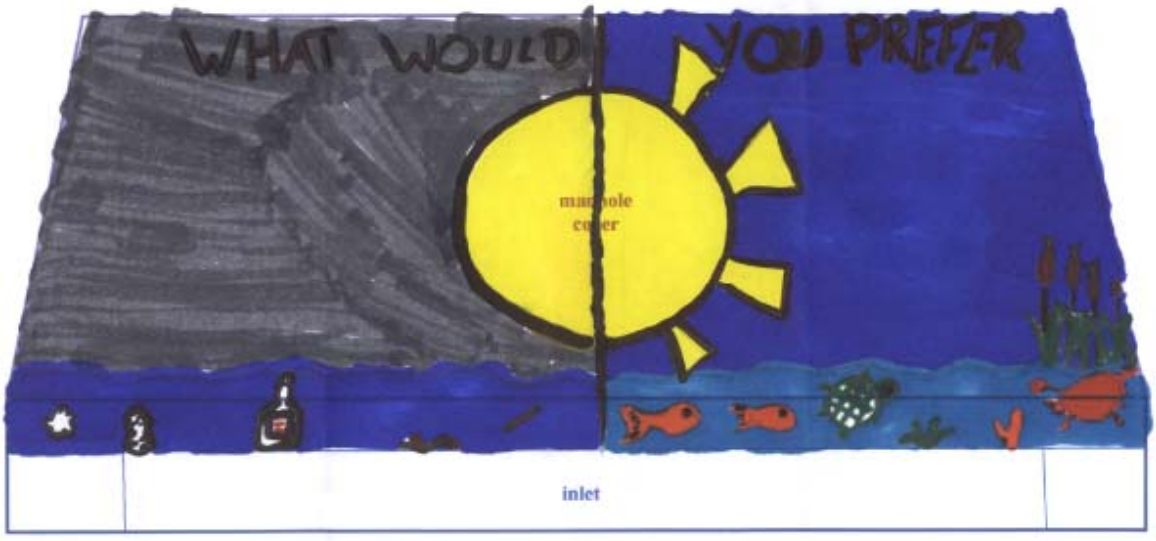
Address _____

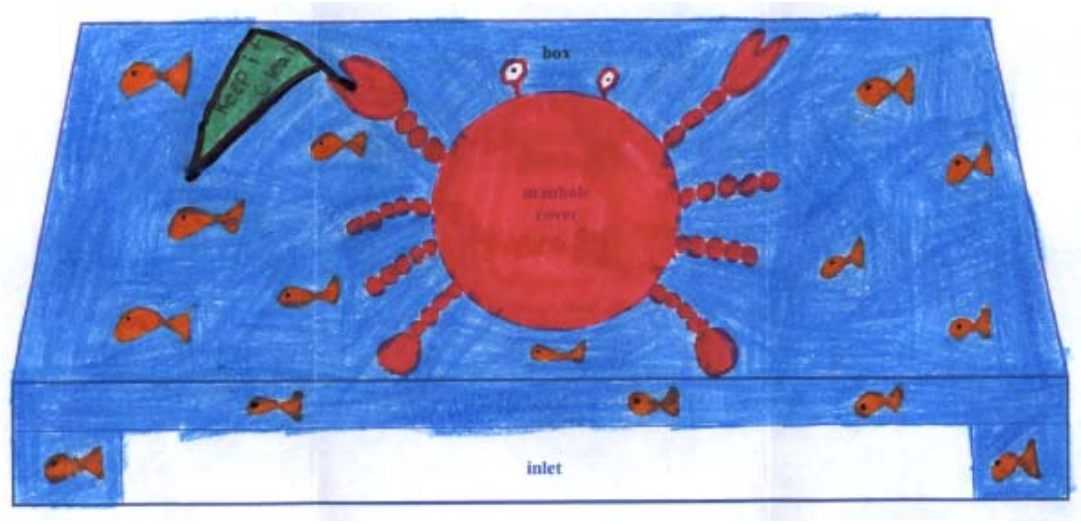
Email address _____

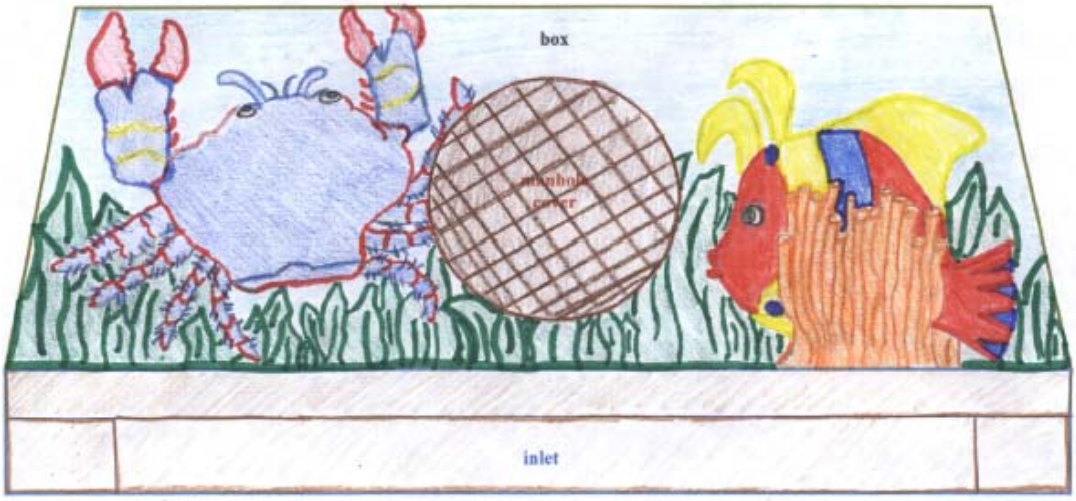
Phone number _____

Art Contest Design Entries

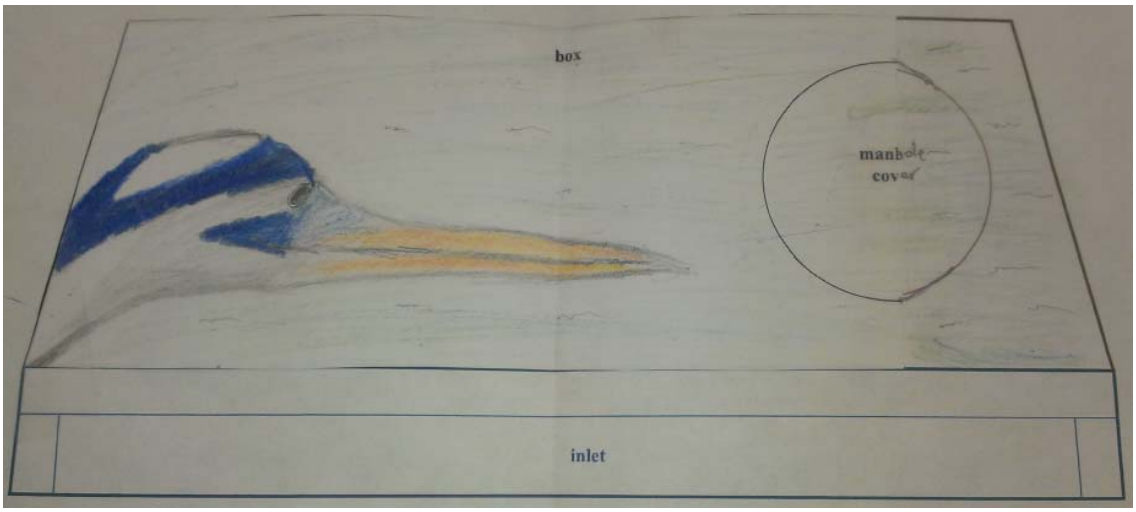
8-12 Years Age Group



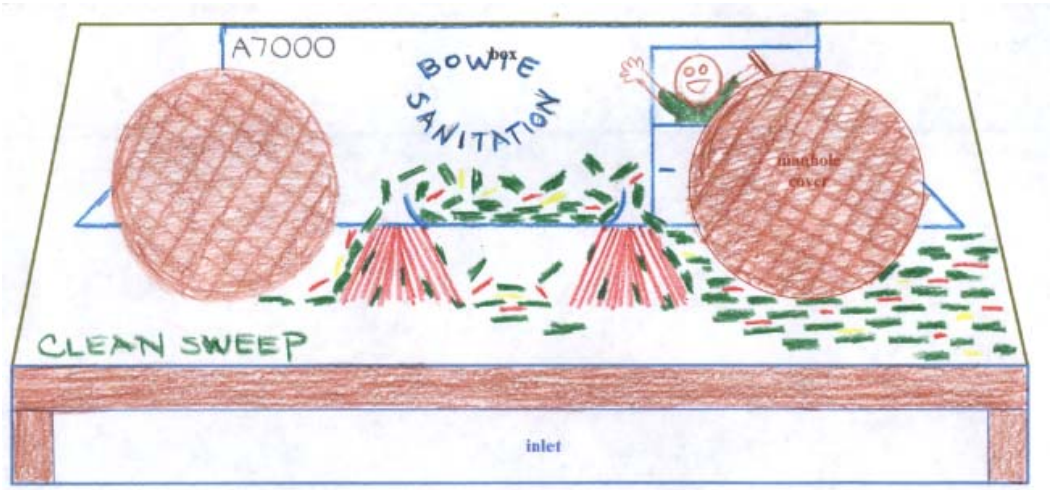

box
manhole cover
inlet

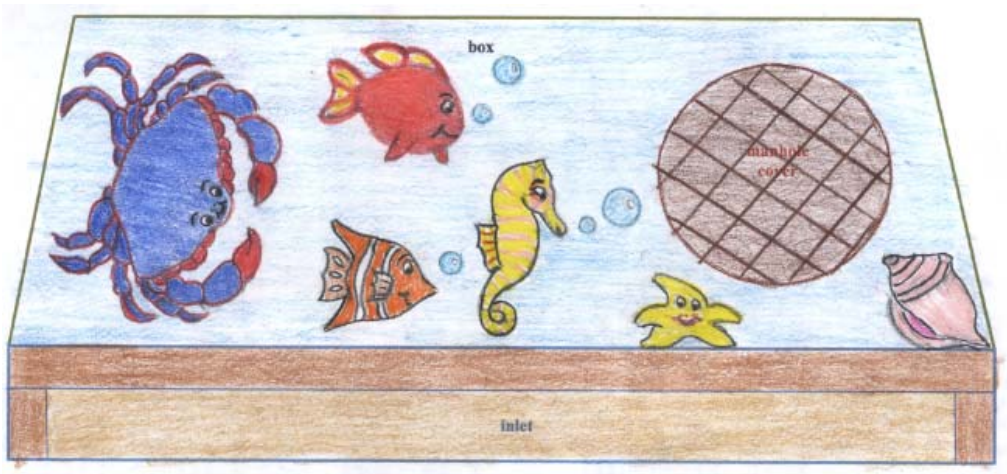

box
manhole cover
inlet

13-17 Years Age Group



Adult Age Group





Appendix F: Stormwater in the City of Bowie Factsheet

STORMWATER IN THE CITY OF BOWIE

Stormwater *is water runoff generated when rain and snowmelt events flow over land or impervious surfaces and does not percolate into the ground.*

Why does stormwater matter?

- **Because local waterways and the Bay matter.**
  - The natural beauty of the Patuxent River and the Chesapeake Bay are highly valued in Bowie. Stormwater can pollute our waterways and Bay, cause erosion and flooding, and damage property and habitats.
- **Stormwater systems require long-term management and maintenance.**
  - The City's infrastructure is regularly in need of upgrades and maintenance to mitigate heavy rainfall, manage runoff, and meet regulatory requirements.
  - New infrastructure will need to be developed to meet forthcoming regulatory requirements.
- **Stormwater systems are overlooked.**
  - Neglecting stormwater systems can cost the City millions in damages and repairs if an emergency strikes or fines if regulations are not met.
  - Stormwater in Bowie can create public health, safety, and economic concerns.

Stormwater pond at Northridge

What is the City doing about this?

- **Coordinating, planning, and implementing projects that improve local stormwater management.**
  - Prioritizing projects that address stormwater management needs in the City's Capital Improvement Plan.
  - Implementing the practices outlined in the City's stormwater permit, Bowie's Environmental Infrastructure Action Strategy Plan, and the Prince George's County Watershed Implementation Plan.
  - Tapping into the knowledge and passion of community stakeholders such as the Bowie Stream Teams, the Green Team, and the Environmental Advisory Committee.
  - Working with an engineering firm to conduct an inventory of existing stormwater infrastructure as a first step towards prioritizing future upgrades and enhancements.

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What can WE do?

- **Encourage activities that minimize stormwater runoff.**
  - Limit the amount of hard surfaces – parking lots, large buildings, and roadways – or use permeable materials that allow rain to naturally soak into the ground.
  - Allow buffers of vegetation alongside waterways to filter and slow runoff, and plant native trees, shrubs and groundcover to absorb rainwater. Consider a rain barrel or rain garden to manage runoff from your property.
  - Find ways to reduce the amount of litter, sediment, and other debris entering waterways through the stormwater drainage system.
  - Use natural alternatives to traditional fertilizers and pesticides to reduce the amount of chemicals being discharged into streams via a storm event.

How do we pay for all of this?

- **A sustainable stormwater financing strategy helps cover costs.**
  - Most communities simply rely on the local budget to pay for stormwater, where these needs must compete for limited resources.
  - Setting aside funds for maintenance and upgrades is critical to the effective management of stormwater systems.
  - Many communities use a minimal utility fee, so there are dedicated funds solely to finance stormwater management.
- **The City of Bowie and other stakeholders are working with the University of Maryland Environmental Finance Center (EFC) to find long-term solutions to managing stormwater in the City.**
  - The EFC is talking to the residential, business, and other sectors of the community to learn more about how stormwater impacts them and determine viable solutions.
  - The EFC is working with City staff to ensure the stormwater program addresses local infrastructure and regulatory needs in a long-term and sustainable manner.
  - The EFC will provide financing recommendations designed to support stormwater program needs in a way that reflects the nature and characteristics of the City.

Want to learn more or share your thoughts on stormwater in the City of Bowie?

Stormwater outfall at Racetrack Road

Contact:

Lisa Lincoln
Environmental Finance Center
University of Maryland
1208 Preinkert Field House, Bldg 054
College Park, MD 20742
301-405-5495
lisa.l.lincoln@gmail.com

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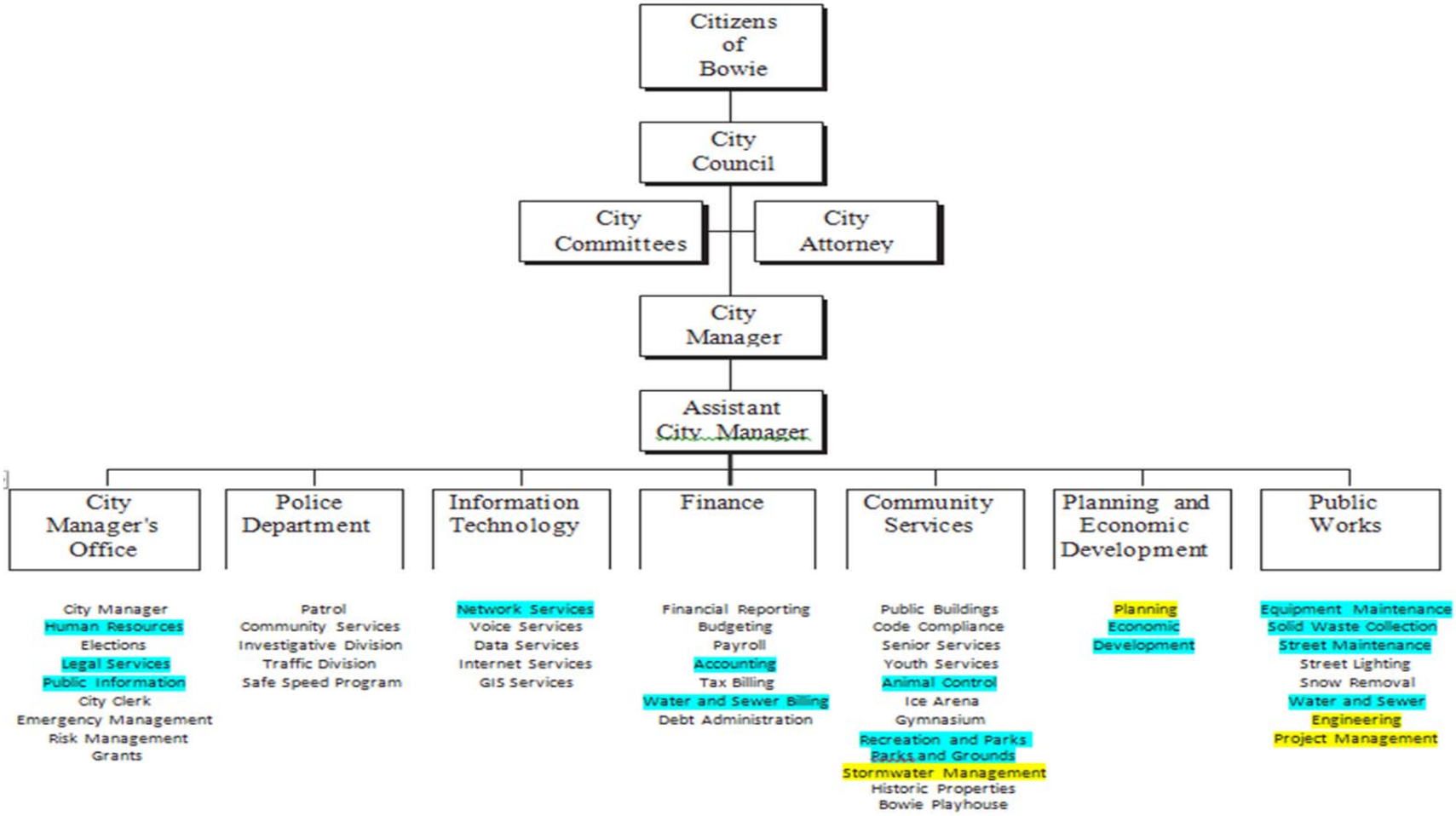
Appendix G: Division of Stormwater Responsibilities in the City of Bowie

Yellow = Direct Stormwater

Blue = Incidental, Administrative, Financial Management, Operational Support, or Oversight



Source: Adopted FY 2014 Budget and FY 2014-2019 CIP

Appendix H: Level of Service Analysis and Cost Budget

Table H- 1: MCM #1 Public Education and Outreach

Costs of Recommendations	Year 1 Costs	Recurring Years	FTE to Establish	FTE Recurring
Labor	$1,397.40		0.02	

Activity	Current/Recommended	Position or Staff	Labor Rate	Cost	FTE
Apply storm drain markers	Recommended (Completed in Pointer Ridge)	Volunteers	$0.00	$0.00	0
Develop target audience	Recommended	Watershed Manager	$33.59	$1,397.40	0.02
Run MAST from RFP	Current				
10% of (watershed manager) cost input for MCMs 1 & 2	Current				
Webpage	Current				
Bi-Monthly Bowie Spotlight Newsletter Article	Current				
Watershed Manager presentations to elementary schools	Current				
Rain gardens, eco-roofs, and green parking lots tours	Current				
Appoint one staff personnel (i.e. the watershed manager) to take primary responsibility of determining the target audience. Invite all sectors of City gov't (Planning & Econ. Dev., Comm. Services, Parks & Rec, DPW, etc.) to provide feedback.	Current				

Table H- 2: MCM #2 Public Involvement and Participation

Costs of Recommendations	Year 1 Costs	Recurring Years	FTE to Establish	FTE Recurring
Labor	$6,812.10	$3,113.40	0.03	0.04

Activity	Current/Recommended	Position or Staff	Labor Rate	Cost	FTE	Recurring
Create/train a team of volunteers per sub watershed to screen outfalls	Recommended	Volunteers	$0.00	$0.00	0	Yes
Poster campaign	Planned	Watershed Manager	$33.59	698.7	0.01	
Track and document citizen complaints about water quality/stormwater	Recommended	Public Works	$41.25	$1,716.00	0.02	Yes
Write PIP Plan	Recommended	Contractor	$75.00	$3,000.00	-	
Measure performance of plan	Recommended	Watershed Manager	$33.59	$1,397.40	0.02	Yes
Register participants in the rain barrel program	Current					
Rain barrel workshops (one per year)	Current					
Five stream cleanings per year (minimum of 10 miles)	Current					
Respond and act to HOA concerns over pond maintenance (City sends HOA a bill)	Current					
Notify and solicit public input/involvement (public hearings/meetings, flyers and promotional materials)	Current					

Table H- 3: MCM #3 Illicit Discharge Detection & Elimination (IDD&E)

Costs of Recommendations	Year 1 Contracted	Year 1 Costs	Recurring Years	FTE to Establish	FTE Recurring
Labor	$1,200.00	$5,228.18	$1,746.75	0.06	0.04

Activity	Current/Recommended	Position or Staff	Labor Rate	Cost	FTE	Recurring
Collect samples downstream of discharge locations	Recommended (Current at Bowie Gateway Center)	Contract / Volunteer				
Update 2012 GIS map as new outfalls and storm drain pipe connections come online in new developments	Recommended	Watershed	$33.59	$174.68	0.0025	
Coordinate the current tracking and documentation of illicit discharges and citizen complaints	Increase level of coordination across organization and across database	Watershed / CS	$33.59	$1,746.75	0.025	Yes
Enhancements to tracking database		IT	$75.00	$1,560.00	0.01	Yes
Establish priority areas	Current					
Write an IDD&E ordinance	Recommended	Legal	$150.00	$1,200.00	-	
Create and disseminate IDD&E specific educational material (via website, newsletters, etc.)	Recommended	Watershed	$33.59	$1,746.75	0.025	
Maintain City's storm sewers, basins, outfalls, drainage areas, and ponds	Current					
Yearly inspection by Public Works of stormwater infrastructure	Current					

Table H- 4: MCM #4 Construction Site Stormwater Runoff Control

Costs of Recommendations	Year 1 Costs	Recurring Years	FTE to Establish	FTE Recurring
Labor	$2,412.80	$852.80	0.00	0.01

Activity	Current/Recommended	Position or Staff	Labor Rate	Cost	FTE	Recurring
Inspect construction sites	Current					
File and keep record of state audits (MDE)	Current					
Update and disseminate education materials for developers and builders (website, pamphlets, etc.)	Current					
Coordinate the current tracking and documenting of citizen information submitted by public and disseminating of the information across departments	Recommended	PW Staff	$41.00	$852.80	0.01	Yes
Enhancements to tracking database	Recommended	IT	$75.00	$1,560.00	0.01	

Table H- 5: MCM #5 Post Construction Site Management

Costs of Recommendations	Year 1 Costs	Recurring Years	FTE to Establish	FTE Recurring
Labor	$1,560.00	$0.00	0.00	0.00

Activity	Current/Recommended	Position or Staff	Cost	FTE	Recurring
Reporting and BMP post construction inspections.	Current				
Coordinate and Integrate reporting and BMP post construction inspections into technology database	Recommended	IT	$1,560.00	0.01	No
Implement and enforce ordinance	Current				
Ensure all post - construction SW management BMP's in new or redevelopment areas are built as designed and operated and maintained properly	Current				

Table H- 6: MCM #6 Pollution Prevention/Good Housekeeping for Municipal Operators

Costs of Recommendations	Year 1 Costs	Recurring Years	FTE to Establish	FTE Recurring
Labor	$180,363.40	$177,147.40	2.04	2.02
Capital	$1,598,000.00	$1,598,000.00		

Activity	Current/ Recommended	Notes	Multiyear Cost	Position or Staff	Labor Rate	Time	Cost	FTE	Recurring
Establish on the ground green infrastructure strategies to be implemented within the City	Current								
Manage a street sweeping program	Current								
Maintain, inspect, and evaluate the effectiveness of BMPs owned or maintained by the City, as well as those that are privately owned.	Current								
Map all municipal property on the same map that shows outfalls and water resources. Develop pollution prevention options (inventory pollutant sources, provide personnel training, increase vegetative buffers around streams, etc.) for all municipal property not	Current								

Costs of Recommendations	Year 1 Costs	Recurring Years	FTE to Establish	FTE Recurring
Labor	$180,363.40	$177,147.40	2.04	2.02
Capital	$1,598,000.00	$1,598,000.00		

Activity	Current/ Recommended	Notes	Multiyear Cost	Position or Staff	Labor Rate	Time	Cost	FTE	Recurring
covered by “industrial” general permit.									
Develop and implement a written operation and maintenance (O&M) program to prevent or reduce pollutant runoff from municipal operations	Current								
Develop and fund a program to clean inlets, ditches, and drains on a regularly scheduled basis	Current								
Integrate current reporting and tracking into database accessible across organization	Recommended			IT	75	$20	$1,500		No
Develop pollution prevention options (inventory pollutant sources, provide personnel Training, increase vegetative buffers around	Recommended			Staff	41.25	42	$1,716	0.02	No

Costs of Recommendations	Year 1 Costs	Recurring Years	FTE to Establish	FTE Recurring
Labor	$180,363.40	$177,147.40	2.04	2.02
Capital	$1,598,000.00	$1,598,000.00		

Activity	Current/ Recommended	Notes	Multiyear Cost	Position or Staff	Labor Rate	Time	Cost	FTE	Recurring
streams, etc.) for all municipal property not covered by “industrial” general permit.									
Coordinate staff training opportunities to ensure all staff can adequately manage activities under the City’s stormwater program.	Recommended			Watershed	$33.59	42	$1,397.40	0.02	Yes
Develop and fund Asset Management Program for storm sewer infrastructure program	Recommended	Training, 2 staff, equipment, recurring					$175,750	2.00	Yes
Develop and fund design and construction of stormwater projects and retro fit of existing BMPs (See Appendix I - MCM 6 Capital Cost Estimate of Further Details)	Recommended		$11,681,000				$1,406,000		Yes
Design and construct projects to address flood hazards, mitigation and other water quality issues.	Recommended medium	Double current CIP SW spending levels of $96,000 per year					$192,000		Yes

Table H- 7: Summary of Estimated Costs from LOS MCM Analysis

	Costs of Recommendations	Year 1 Costs	Recurring Years	FTE to Establish	FTE Recurring
MCM 1	Labor	$1,397		0.02	-
MCM 2	Labor	$6,812	$3,113	0.03	0.04
MCM 3	Labor	$5,228	$1,747	0.06	0.04
MCM 3	Contracted Services	$1,200		-	-
MCM 4	Labor	$2,413	$853	0.02	0.01
MCM 5	Labor	$1,560		0.01	-
MCM 6	Labor	$180,363	$177,147	2.04	2.02
MCM 6	Capital	$1,598,000	$1,598,000	-	-
Category Totals	Labor	$197,773	$182,860	2.18	2.11
	Contracted Services	$1,200		-	-
	Capital	$1,598,000	$1,598,000	-	-
Total	**Total**	**$1,796,973**	**$1,780,860**	**2.18**	**2.11**

Table H- 8: Five-Year Budget Estimate

Year	1	2	3	4	5
Labor/Contracted positions					
Recommended Increase	$198,973	$182,860	$182,860	$182,860	$182,860
FTE	2.18	2.11	2.11	2.11	2.11
Annual Capital Project Outlay	$1,598,000	$1,598,000	$1,598,000	$1,598,000	$1,598,000
Total Estimated Outlays	**$1,796,973**	**$1,780,860**	**$1,780,860**	**$1,780,860**	**$1,780,860**

Appendix I: MCM #6 Capital Cost Estimate

This Appendix provides detail on the process used to estimate MCM6 capital costs.

The Maryland Assessment Scenario Tool (MAST) found at www.mastonline.org, was developed as a web-based nutrient and sediment load estimator tool to streamline and facilitate Watershed Implementation Plan and Milestone preparation consistent with the Chesapeake Bay Total Maximum Daily Load (TMDL). The purpose of the tool is to simplify the process for building scenarios and to provide initial estimates of load reductions using a variety of BMP implementation practices. [16] The tool is used in the development of Watershed Implementation Plans.

A MAST analysis for Bowie's WIP is currently being developed and is part of the ongoing engineering and BMP assessment work. The MAST data for Prince George's County is not public and not accessible via the public website. However, the State of Maryland 2025 Statewide WIP Implementation Public Scenario created with the Maryland Assessment Scenario Tool (MAST) on April 17, 2012, using source year 2012, was public and viewable and was downloaded.[17]

The downloaded excel file data was filtered and sorted to isolate the estimate of planned BMPs within the Chesapeake Bay Segment and watersheds in which Bowie is located. Based on information received from staff, Bowie is located within the Western Branch watershed and the Upper Patuxent watershed. Both watersheds are within the Patuxent major basin and are part of the Upper Patuxent River Tidal Fresh Chesapeake Bay Segment–Shed.[18] The BMPs planned for these watersheds were then isolated. A sample of the data from the original download is contained in Table I-2.[19]

The next step was to apply a cost per acre treated estimate to the selected BMP. For the purposes of this estimate the BMP construction costs per acre treated were selected and are reflected in Table I-1.[20]In order to derive an estimate of capital project costs, no costs were assigned to operational items such as Erosion and Sediment Control Program, Forrest Conservation Program, Stormwater Management Program, Urban Nutrient Management Program. An assumption was made that these operational costs will be examined in a program level of service operational cost analysis.

Using a vlookup table, the BMP costs from Table I-1 were then matched with the corresponding BMP in Table I-2. Then for each planned individual BMP, a total cost for 100% implementation was derived, as well as an estimated cost for the 2025 percentage implemented amount. These were then summed to a watershed total BMP and a total 2025 implemented BMP cost. These totals are reflected in Table I-3. For the purposes of this estimate, an assumption was made that each BMP in table I-2 is independent of other BMPs and that there are no efficiencies or economies of scale. Such efficiencies and economies of scale could result in a lower cost estimate. Such modeling was beyond the scope of this estimate.

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[16] Page 8. Maryland Assessment and Scenario Tool General Features. Devereux, Olivia. Interstate Commission on the Potomac River Basin. November 2011.

[17] http://www.mastonline.org/ScenarioSummary.aspx 2025 Statewide WIP Scenario, Source year 2012, created April 17, 2012, accessed May 22, 2013

[18] http://msa.maryland.gov/megafile/msa/speccol/sc5300/sc5339/000113/013000/013158/unrestricted/20101064e-005.pdf Appendix B2 Maps of Maryland Chesapeake Bay Watershed - Major Allocation Basins, Bay Water Quality Segment-Sheds, Counties & Segment-Sheds, 8-Digit Watersheds & Segment-Sheds)

[19] The entire data set contained in Table 1-2 is extremely but can be made available for review by request.

[20] Costs include capital labor, material and overhead costs, but not land costs. Page ii. Costs of Stormwater Management Practices in Maryland Counties. Draft Final Report. King and Hagen. October 10, 2011.

The total watershed BMP cost estimate and the implemented watershed BMP were then adjusted by an estimate of the percentage of Bowie's area within the watershed. Based on information received from staff, Bowie comprises about 6.0% of the area of the Western Branch watershed and about 13.8% of the Upper Patuxent watershed. In Table I-3, these watershed area estimates were then applied to the estimated total watershed costs to derive an estimate for Bowie's share of implemented BMP costs. This estimate is $11,681,000. When annualized over 11 years (which is a reflection of the time between 2014 and 2025) and using a cost of capital of 5%[21], the annualized cost estimate is $1,406,000 per year. If a 20 year time frame is chosen with a 5% cost of capital, the annualized cost estimate is $937,000[22]

Table I- 1: BMPs and Corresponding BMP Cost Per Acre Treated

BMP Type	Cost
Bioretention (Retrofit - Highly Urban)	$131,250
Bioretention/raingardens - A/B soils, underdrain	$37,500
Bioswale	$30,000
Detention Pond (New)	$30,000
Dry Detention Ponds and Hydrodynamic Structures	$45,000
Dry Extended Detention Ponds (Retrofit)	$45,000
Erosion and Sediment Control	$0
Erosion and Sediment Control on Extractive, excess applied to all other pervious urban	$0
Filtering Practices (Above)	$41,750
Forest Conservation	$0
Impervious Urban Surface Reduction	$87,500
MS4 Permit-Required Stormwater Retrofit	$45,000
Stormwater Management by Era 1985 to 2002 MD	$0
Street Sweeping Pounds	$6,049
Urban Filtering Practices	$43,750
Urban Forest Buffers	$30,000
Urban Infiltration Practices w/ Sand, Veg. - A/B soils, no underdrain	$41,750
Urban Infiltration Practices w/o Sand, Veg. - A/B soils, no underdrain	$43,750
Urban Nutrient Management	$0
Urban Stream Restoration	$43,000
Urban Tree Planting; Urban Tree Canopy	$30,000
Vegetated Open Channels - A/B soils, no underdrain	$20,000
Wet Ponds and Wetlands	$18,550
Wet Ponds and Wetlands (Retrofit)	$42,665

[21] Page 67, City of Bowie, Maryland, Notes to Basic Financial Statements. Comprehensive Annual Financial Report. June 30, 2012. Interest rates vary from 2% to 5% per annum on 2009 Public Improvement Bonds. The City of Bowie bonds carry favorable ratings of AAA from Standard & Poor's and other rating agencies. Current bond market yields on AAA rated Municipal Bonds are from 2.5% on 10 year maturity notes to 4.25% on 30 year maturity notes. (https://www.fmsbonds.com/Market_Yields/index.asp accessed December 8, 2013)

[22] The annualized formula follows the excel PMT formula. It assumes beginning of period payments.

Table I- 2: Application of BMP per acre costs to selected Chesapeake Bay Segment Watersheds under County 2025 Public State of Maryland 2025 WIP Implementation MAST Scenario

CBSE G	Major Bas	HUC8	HUC8 Name	County	Feder a	Land River Segment	Sector	Landuse	BMP Type	Cost Per Acre	Calculated BMP Amount f	Calculated/ Credited Unit	Percent Implementati on	Total BMP Implementatio n Cost	Cost of Percentage Implemented
PAXTF	Patuxent	2E+06	Patuxent River middle	Prince Georges, MD	N	A24033XL3_4711_0000	Urban	County Phase I/II MS4 Pervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	42.11	acres treated	7.49	$1,579,125	$118,276
PAXTF	Patuxent	2E+06	Patuxent River middle	Prince Georges, MD	N	A24033XL3_4711_0000	Urban	SHA Phase I/II MS4 Impervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	0.02	acres treated	0.12	$750	$1
PAXTF	Patuxent	2E+06	Western Branch	Prince Georges, MD	N	A24033XL1_4691_0000	Urban	SHA Phase I/II MS4 Impervious	Dry Detention Ponds and Hydrodynamic Structures	$45,000	2.82	acres treated	4.88	$126,900	$6,193
PAXTF	F					A24033XL1_4691_0000	Urban	SHA Phase I/II MS4 Impervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	0.07	acres treated	0.12	$2,625	$3
PAXTF	F					A24033XL3_4711_0000	Urban	County Phase I/II MS4 Impervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	5.31	acres treated	3.62	$199,125	$7,208
PAXTF	F					A24033XL1_4691_0000	Urban	SHA Phase I/II MS4 Pervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	0.14	acres treated	0.16	$5,250	$8
PAXTF	F					A24033XL1_4691_0000	Urban	Municipal Phase II MS4 Impervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	0	acres treated	0	$0	$0
PAXTF	F					A24033XU2_4480_4650	Urban	nonregulated pervious developed	Bioretention/raingardens - A/B soils, underdrain	$37,500	10.59	acres treated	7.73	$397,125	$30,698
PAXTF	F					A24033XU3_4650_0001	Urban	nonregulated pervious developed	Bioretention/raingardens - A/B soils, underdrain	$37,500	3.4	acres treated	7.73	$127,500	$9,856
PAXTF	F					A24033XL3_4710_0000	Urban	Municipal Phase II MS4 Pervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	40.49	acres treated	3.52	$1,518,375	$53,447
PAXTF	F					A24033XL3_4712_0000	Urban	SHA Phase I/II MS4 Impervious	Bioswale	$30,000	0.13	acres treated	1.83	$3,900	$71
PAXTF	F					A24033XU2_4480_4650	Urban	SHA Phase I/II MS4 Impervious	Bioswale	$30,000	4.44	acres treated	1.83	$133,200	$2,438
PAXTF	F					A24033XL1_4691_0000	Urban	SHA Phase I/II MS4 Pervious	Bioswale	$30,000	1.81	acres treated	2.05	$54,300	$1,113
PAXTF	F					A24033XL3_4712_0000	Urban	SHA Phase I/II MS4 Pervious	Bioswale	$30,000	0.43	acres treated	2.05	$12,900	$264
PAXTF	F					A24033XL3_4711_0000	Urban	Municipal Phase II MS4 Pervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	0	acres treated	0	$0	$0
PAXTF	F					A24033XL3_4712_0000	Urban	Municipal Phase II MS4 Pervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	0	acres treated	0	$0	$0
PAXTF	F					A24033XL3_4713_0000	Urban	County Phase I/II MS4 Impervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	4.3	acres treated	3.62	$161,250	$5,837
PAXTF	F					A24033XL3_4711_0000	Urban	nonregulated impervious developed	Bioretention/raingardens - A/B soils, underdrain	$37,500	0.31	acres treated	13.79	$11,625	$1,603
PAXTF	F					A24033XL3_4712_0000	Urban	nonregulated impervious developed	Bioretention/raingardens - A/B soils, underdrain	$37,500	0.1	acres treated	13.79	$3,750	$517
PAXTF	F					A24033XU3_4650_0001	Urban	nonregulated impervious developed	Bioretention/raingardens - A/B soils, underdrain	$37,500	0.18	acres treated	13.79	$6,750	$931
PAXTF	F					A24033XL1_4691_0000	Urban	SHA Phase I/II MS4 Impervious	Bioswale	$30,000	1.06	acres treated	1.83	$31,800	$582
PAXTF	Patuxent	2E+06	Patuxent River upper	Prince Georges, MD	N	A24033XL3_4710_0000	Urban	SHA Phase I/II MS4 Impervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	0.14	acres treated	0.12	$5,250	$6
PAXTF	Patuxent	2E+06	Patuxent River middle	Prince Georges, MD	N	A24033XL3_4713_0000	Urban	Municipal Phase II MS4 Impervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	0	acres treated	0	$0	$0
PAXTF	Patuxent	2E+06	Western Branch	Prince Georges, MD	N	A24033XL1_4691_0000	Urban	nonregulated pervious developed	Bioretention/raingardens - A/B soils, underdrain	$37,500	40.13	acres treated	7.73	$1,504,875	$116,327
PAXTF	Patuxent	2E+06	Patuxent River upper	Prince Georges, MD	N	A24033XU3_4650_0001	Urban	SHA Phase I/II MS4 Impervious	Bioswale	$30,000	1.26	acres treated	1.83	$37,800	$692
PAXTF	Patuxent	2E+06	Patuxent River upper	Prince Georges, MD	N	A24033XU2_4480_4650	Urban	Municipal Phase II MS4 Impervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	42.83	acres treated	2.78	$1,606,125	$44,650
PAXTF	Patuxent	2E+06	Patuxent River middle	Prince Georges, MD	N	A24033XL3_4713_0000	Urban	nonregulated pervious developed	Bioretention/raingardens - A/B soils, underdrain	$37,500	57.16	acres treated	7.73	$2,143,500	$165,693
PAXTF	Patuxent	2E+06	Patuxent River upper	Prince Georges, MD	N	A24033XU3_4650_0001	Urban	SHA Phase I/II MS4 Pervious	Bioswale	$30,000	2.49	acres treated	2.05	$74,700	$1,531
PAXTF	Patuxent	2E+06	Patuxent River middle	Prince Georges, MD	N	A24033XL3_4711_0000	Urban	Municipal Phase II MS4 Impervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	0	acres treated	0	$0	$0
PAXTF	Patuxent	2E+06	Patuxent River middle	Prince Georges, MD	N	A24033XL3_4712_0000	Urban	SHA Phase I/II MS4 Pervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	0.03	acres treated	0.16	$1,125	$2
PAXTF	Patuxent	2E+06	Patuxent River upper	Prince Georges, MD	N	A24033XL3_4710_0000	Urban	nonregulated pervious developed	Bioretention/raingardens - A/B soils, underdrain	$37,500	16.98	acres treated	7.73	$636,750	$49,221
PAXTF	Patuxent	2E+06	Patuxent River upper	Prince Georges, MD	N	A24033XU3_4650_0001	Urban	Municipal Phase II MS4 Impervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	8.31	acres treated	2.78	$311,625	$8,663
PAXTF	Patuxent	2E+06	Patuxent River upper	Prince Georges, MD	N	A24033XU2_4480_4650	Urban	Municipal Phase II MS4 Pervious	Bioretention/raingardens - A/B soils, underdrain	$37,500	138.11	acres treated	3.52	$5,179,125	$182,305
PAXTF	Patuxent	2E+06	Patuxent River upper	Prince Georges, MD	N	A24033XU2_4480_4650	Urban	nonregulated impervious developed	Bioretention/raingardens - A/B soils, underdrain	$37,500	0.57	acres treated	13.79	$21,375	$2,948
PAXTF	Patuxent	2E+06	Patuxent River upper	Prince Georges, MD	N	A24033XL3_4710_0000	Urban	SHA Phase I/II MS4 Impervious	Dry Detention Ponds and Hydrodynamic Structures	$45,000	5.52	acres treated	4.88	$248,400	$12,122
PAXTF	Patuxent	2E+06	Patuxent River middle	Prince Georges, MD	N	A24033XL3_4712_0000	Urban	SHA Phase I/II MS4 Pervious	Dry Detention Ponds and Hydrodynamic Structures	$45,000	1.34	acres treated	6.34	$60,300	$3,823

Column 1 - Chesapeake Bay Segment-Shed.
Column 2 – Major Basin Name
Column 3 – The 8 Digit Watershed Number
Column 4 – The Watershed Name
Column 5 – Maryland County
Column 6 – N selected for "Not Federal Land"
Column 7 – Land River Segment Number
Column 8 – Sector – Urban Selected
Column 9 – Land Use
Column 10 – Type of BMP selected for implementation in MAST
Column 11 – Corresponding BMP cost per acre treated from Table
Column 12 – The calculated units of the BMP for CBP model input.
Column 13 – The BMP units (acres treated)
Column 14 – The percentage of total BMP implementation by 2025 under the MAST scenario
Column 15 – Applies the BMP cost per acre treated in column 11 to the calculated amount of BMP units (total acres of treatment) in Column 12.
Column 16 – Applies the percentage of implementation to the total cost derived in Column 15 to derive a cost of the BMP implemented percentage.

Table I- 3: Estimation of the City of Bowie's BMP Implementation Capital Costs Derived from State of Maryland 2025 WIP Implementation MAST Scenario Using a Percentage of Watershed Estimation Method

	1	2	3	4	5	6	9	10	11
1	**Maryland County**	**Chesapeake Bay Segment (CBSEG)**	**Watershed Name**	**Bowie's Estimated Percentage of Segment Watershed**	**Total**	**Implemented**	**Bowie Estimated Percentage Share Implemented Total**	**Per year cost annualized over 11 years 5% cost of capital**	**Per Year cost Annualized over 20 years, 5% cost of capital**
2	Prince Georges, MD	PAXTF	Middle	0.0%	$297,061,558	$13,962,382	$0	$0	$0
3	Prince Georges, MD	PAXTF	Upper	13.8%	$1,736,643,757	$76,885,658	$10,610,221	$1,277,352.73	$851,391.57
5	Prince Georges, MD	PAXTF	Western Branch	6.0%	$445,376,946	$17,851,620	$1,071,097	$128,948.20	$85,947.61
6			**Total Sum of Watersheds**		**$2,479,082,261**	**$108,699,661**	**$11,681,318**	**$1,406,301**	**$937,339**

Column 1 - The county in Maryland
Column 2 - The Chesapeake Bay Segment-Shed. PAXTF is the Upper Patuxent River Tidal Fresh
(Source http://msa.maryland.gov/megafile/msa/speccol/sc5300/sc5339/000113/013000/013158/unrestricted/20101064e-005.pdf Appendix B2 Maps of Maryland Chesapeake Bay Watershed - Major Allocation Basins, Bay Water Quality Segment-Sheds, Counties & Segment-Sheds, 8-Digit Watersheds & Segment-Sheds)
Column 3 - The Watershed name.
(Source http://msa.maryland.gov/megafile/msa/speccol/sc5300/sc5339/000113/013000/013158/unrestricted/20101064e-005.pdf)
Column 4 - The estimated percentage of area within the watershed which encompasses Bowie as provided by Bowie staff.
Column 5 - Total BMP cost per segment watershed from Table I-2
Column 6 - Total Implemented BMP cost per segment watershed from Table I-2
Column 7 - Applies the estimated Bowie watershed segment area % in column D to the total implement cost in column F to derive an estimated implemented total cost within the area of Bowie.
Column 8 - Annualizes the cost in Column 7 across 11 years at a 5% cost of capital using the excel PMT formula. For the formula it is assumed that Column 7 costs are at the beginning of the period and annual payments in Column 8 are beginning of period payments.
Column 9 - Annualizes the costs in Column 7 using the same method as Column 9, but changes the animalization period from 11 years to 20 years.
Row 6 - Total amounts from the individual watershed segment rows to arrive at a total for Bowie's estimated total watershed area.

Appendix J: Cost of recommended stormwater actions expressed in terms of certain Bowie metrics

Table J- 1

2014 Population	56,014	*Page 11, City of Bowie, Maryland - Adopted Budget Fiscal Year 2014 and Capital Improvements Program Fiscal Years 2014 - 2019 of Budget*
June 30, 2014 Est. Assessed Value	$5,915,606,000	*Page 30, City of Bowie, Maryland - Adopted Budget Fiscal Year 2014 and Capital Improvements Program Fiscal Years 2014 - 2019 of Budget*
2014 Est. Revenues	$59,400,000	*Page 15, City of Bowie, Maryland - Adopted Budget Fiscal Year 2014 and Capital Improvements Program Fiscal Years 2014 - 2019 of Budget*
2014 Est. Property Tax Revenue	$25,700,000	*Page 15, City of Bowie, Maryland - Adopted Budget Fiscal Year 2014 and Capital Improvements Program Fiscal Years 2014 - 2019 of Budget*
2014 CIP	$5,350,000	*Page 168, City of Bowie, Maryland - Adopted Budget Fiscal Year 2014 and Capital Improvements Program Fiscal Years 2014 - 2019 of Budget*
Estimated Additional Annual Stormwater Costs	$1,800,000	
As a rate per $100 of assessed property values	0.0304	
As a percentage of 2014 Est. Tax Revenue	7.00%	
Per Citizen	$32	
% of CIP	33.64%	

Appendix K: Stormwater Utility Scenario Analysis

Table K- 1: Estimation of ESU fee needed to fund given annual revenue level under a flat fee per parcel structure

Size of ESU (Square feet) = 2,465

Additional Annual Revenue Needed = $1,800,000

Residential Fee -- Flat Fee Structure			
Annual Revenue Needed	**$1,800,000**		
Scenario ESU Fee needed to meet revenue level	**$89**		
Residential Property type	**Number of parcels**	**ESU Fee**	**Annual Flat Rate SW Utility Fee Per Parcel**
			$89
Townhomes and Single Family Attached	4,383	$89	$391,923
Single Family	14,941	$89	$1,336,006
Tier Three (RA, RE, ROS)	482	$89	$43,100
Total Residential revenue	**19,806**		**$1,771,028**
Non-residential Fee -- Flat Fee Structure			
Land Use	**Number of parcels**	**ESU Fee**	**Annual Flat Rate SW Utility ($)**
			$89
Commercial - Office	35	$89	$3,130
Commercial -Retail/Service/Restaurant	127	$89	$11,356
Mixed Use/Flex	18	$89	$1,610
Industrial	10	$89	$894
Institutional	40	$89	$3,577
Multifamily	9	$89	$805
TH Rec Area OS and Parking Lots	69	$89	$6,170
Transportation/Utility	16	$89	$1,431
Total Non-residential revenue	**324**		**$28,972**

Table K- 2: Estimation of ESU fee needed to fund given annual revenue level under a residential tiered structure and a non-residential imperious area structure

Size of ESU (Square feet) = 2,465

Additional Annual Revenue Needed = $1,800,000

Residential Fee - Tiered Fee Structure				
Annual Revenue Needed	**$1,800,000**			
Scenario ESU Fee needed to meet revenue level	**$68**			
Residential Property type Tier	**Number of parcels**	**Tier's ESU allocation per parcel**	**Annual Fee Per Parcel**	**Total Fee from all parcels in tier**
				$68
Tier One - Townhomes and Single Family Attached	4,383	0.60	$41	$178,709
Tier Two - Single Family	14,941	1.00	$68	$1,015,320
Tier Three (RA, RE, ROS)	482	2.00	$136	$65,509
Total Residential revenue	**19,806**			**$1,259,537**
Non-residential - Impervious Area Fee Structure				
Land Use	**Number of parcels**	**Total number of ESUs in the category (Total Category Impervious Area divided by size of one ESU)**	**Average Total Fee Per Parcel**	**Total Fee from all parcels in land use category**
				$68
Commercial - Office	35	906	$1,760	$61,599
Commercial - Retail/Service/Restaurant	127	5,387	$2,883	$366,102
Mixed Use/Flex	18	414	$1,563	$28,133
Industrial	10	47	$320	$3,199
Institutional	40	241	$410	$16,405
Multifamily	9	573	$4,323	$38,907
TH Rec Area OS and Parking Lots	69	368	$363	$25,030
Transportation/Utility	16	16	$68	$1,088
Total Non-residential revenue	**324**	**7,953**		**$540,463**

Table K- 3: Estimation of revenue from County stormwater fee based on Bowie parcel data

Estimate of Revenue Under Prince Georges County Stormwater Fee					
Residential Fee -- Tiered Fee Calculations -- ESU-based					
Revenue	**$932,360**				
Flat Fee Per Parcel	**$20**	**ESU Fee**	**$20**		
Residential Property type Tier	**Number of parcels**	**Tier's ESU allocation per parcel**	**Sub-Total revenue from Flat Fee**	**Sub-Total revenue from ESU Residential Tiered Based Fee**	**Total Revenue From County Fee**
			$20	**$20**	
Tier One - Townhomes and Single Family Attached	4,383	0.60	$87,660	$52,596	$140,256
Tier Two - Single Family	14,941	1.00	$298,820	$298,820	$597,640
Tier Three (RA, RE, ROS)	482	2.00	$9,640	$19,280	$28,920
Total Residential revenue	**19,806**		**$396,120**	**$370,696**	**$766,816**

Non-residential Fee -- Tiered Fee Calculations -- ESU-based					
Land Use Category	**Number of parcels in Category**	**Total number of ESUs in the category (Total Category Impervious Area divided by size of one ESU)**	**Sub-Total revenue from Flat Fee**	**Sub-Total revenue From ESU Impervious Area Based Fee**	**Total Revenue From County Fee**
			$20	**$20**	
Commercial - Office	35	906	$700	$18,129	$18,829
Commercial - Retail/Service/Restaurant	127	5,387	$2,540	$107,748	$110,288
Mixed Use/Flex	18	414	$360	$8,280	$8,640
Industrial	10	47	$200	$942	$1,142
Institutional	40	241	$800	$4,828	$5,628
Multifamily	9	573	$180	$11,451	$11,631
TH Rec Area OS and Parking Lots	69	368	$1,380	$7,366	$8,746
Transportation/Utility	16	16	$320	$320	$640
Total Non-residential revenue	**324**	**7,953**	**6,480**	**$159,064**	**$165,544**

Table K- 4: Summary of Non-Residential Parcel Data from City of Bowie Received on November 11, 2013

Non-Residential Land Use	Number of Parcel Accounts	Total Impervious Cover (Square Feet)	Number of ESU's at 2,465 square feet per ESU
Commercial - Multiple Accounts	13	1,233,935	501
Commercial - Office/Bank	22	1,000,492	406
Commercial - Retail/Restaurant	94	9,223,493	3742
Commercial - Service	33	4,056,451	1646
Industrial	10	116,046	47
Institutional	40	595,064	241
Melford (Mixed Use Flex)	18	1,020,486	414
Multifamily	9	1,411,306	573
Townhome open space and parking lots	65	759,830	308
Parks and Recreation (Townhome and Recreation Associations)	4	148,091	60
Single Family Multiple Accounts	86	50,944	21
Total Non-residential	**324**	**19,655,605**	**7953**

Table K- 5: Stormwater Fee Scale to Determine Estimated Level of Revenue at Different Fee Levels

Size of ESU = 2,465 square feet

Residential Fee -- Flat Fee Structure													
Residential Property Type	**Number of parcels**	**Annual ESU Rate**											
		$10	**$15**	**$20**	**$25**	**$30**	**$35**	**$40**	**$45**	**$50**	**$55**	**$60**	**$65**
Townhomes and Single Family Attached	4,383	$43,830	$65,745	$87,660	$109,575	$131,490	$153,405	$175,320	$197,235	$219,150	$241,065	$262,980	$284,895
Single Family	14,941	$149,410	$224,115	$298,820	$373,525	$448,230	$522,935	$597,640	$672,345	$747,050	$821,755	$896,460	$971,165
Tier Three (RA, RE, ROS)	482	$4,820	$7,230	$9,640	$12,050	$14,460	$16,870	$19,280	$21,690	$24,100	$26,510	$28,920	$31,330
Total	**19,806**	**$198,060**	**$297,090**	**$396,120**	**$495,150**	**$594,180**	**$693,210**	**$792,240**	**$891,270**	**$990,300**	**$1,089,330**	**$1,188,360**	**$1,287,390**

Commercial Fee -- Flat Fee Structure													
Land Use	**Number of parcels**	**Annual ESU Rate**											
		$10	**$15**	**$20**	**$25**	**$30**	**$35**	**$40**	**$45**	**$50**	**$55**	**$60**	**$65**
Commercial - Office	35	$350	$525	$700	$875	$1,050	$1,225	$1,400	$1,575	$1,750	$1,925	$2,100	$2,275
Commercial - Retail/Service/ Restaurant	127	$1,270	$1,905	$2,540	$3,175	$3,810	$4,445	$5,080	$5,715	$6,350	$6,985	$7,620	$8,255
Mixed Use/Flex	18	$180	$270	$360	$450	$540	$630	$720	$810	$900	$990	$1,080	$1,170
Industrial	10	$100	$150	$200	$250	$300	$350	$400	$450	$500	$550	$600	$650
Institutional	40	$400	$600	$800	$1,000	$1,200	$1,400	$1,600	$1,800	$2,000	$2,200	$2,400	$2,600
Multifamily	9	$90	$135	$180	$225	$270	$315	$360	$405	$450	$495	$540	$585
TH Rec Area OS and Parking Lots	69	$690	$1,035	$1,380	$1,725	$2,070	$2,415	$2,760	$3,105	$3,450	$3,795	$4,140	$4,485

Commercial Fee -- Flat Fee Structure													
Land Use	**Number of parcels**	**Annual ESU Rate**											
		$10	**$15**	**$20**	**$25**	**$30**	**$35**	**$40**	**$45**	**$50**	**$55**	**$60**	**$65**
Transportation /Utility	16	$160	$240	$320	$400	$480	$560	$640	$720	$800	$880	$960	$1,040
Total	**324**	**$3,240**	**$4,860**	**$6,480**	**$8,100**	**$9,720**	**$11,340**	**$12,960**	**$14,580**	**$16,200**	**$17,820**	**$19,440**	**$21,060**

Residential Fee -- Tiered Fee Calculations -- ESU-based													
Residential Property Type	**Number of parcels**	**# ESUs per Tier**	**Annual ESU Rate**										
			$10	**$15**	**$20**	**$25**	**$30**	**$35**	**$40**	**$45**	**$50**	**$55**	**$60**
Townhomes and Single Family Attached	4,383	1	$26,298	$39,447	$52,596	$65,745	$78,894	$92,043	$105,192	$118,341	$131,490	$144,639	$157,788
Single Family	14,941	1	$149,410	$224,115	$298,820	$373,525	$448,230	$522,935	$597,640	$672,345	$747,050	$821,755	$896,460
Tier Three (RA, RE, ROS)	482	2	$9,640	$14,460	$19,280	$24,100	$28,920	$33,740	$38,560	$43,380	$48,200	$53,020	$57,840
Total Residential revenue	**19,806**		**$185,348**	**$278,022**	**$370,696**	**$463,370**	**$556,044**	**$648,718**	**$741,392**	**$834,066**	**$926,740**	**$1,019,414**	**$1,112,088**

Non-residential Fee -- IMP Area Fee Calculations -- ERU-based													
Tier	**Number of parcels**	**# ESUs**	**Annual Rate SW Utility ($)**										
			$10	**$15**	**$20**	**$25**	**$30**	**$35**	**$40**	**$45**	**$50**	**$55**	**$60**
Commercial - Office	35	906	$9,065	$13,597	$18,129	$22,662	$27,194	$31,726	$36,258	$40,791	$45,323	$49,855	$54,388
Commercial - Retail/Service/Restaurant	127	5,387	$53,874	$80,811	$107,748	$134,685	$161,622	$188,559	$215,496	$242,433	$269,370	$296,307	$323,244
Mixed Use/Flex	18	414	$4,140	$6,210	$8,280	$10,350	$12,420	$14,490	$16,560	$18,630	$20,700	$22,769	$24,839
Industrial	10	47	$471	$706	$942	$1,177	$1,412	$1,648	$1,883	$2,118	$2,354	$2,589	$2,825
Institutional	40	241	$2,414	$3,621	$4,828	$6,035	$7,242	$8,449	$9,656	$10,863	$12,070	$13,277	$14,484
Multifamily	9	573	$5,725	$8,588	$11,451	$14,313	$17,176	$20,039	$22,902	$25,764	$28,627	$31,490	$34,352
TH Rec Area OS and Parking Lots	69	368	$3,683	$5,525	$7,366	$9,208	$11,050	$12,891	$14,733	$16,575	$18,416	$20,258	$22,099
Transportation/Utility	16	16	$160	$240	$320	$400	$480	$560	$640	$720	$801	$881	$961
Total Non-residential revenue			**$79,532**	**$119,298**	**$159,064**	**$198,830**	**$238,596**	**$278,362**	**$318,128**	**$357,894**	**$397,660**	**$437,427**	**$477,193**