EFC

2011

Financing Feasibility Study for Stormwater Management in Ocean City, Maryland

Prepared for the Town of Ocean City, Maryland

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

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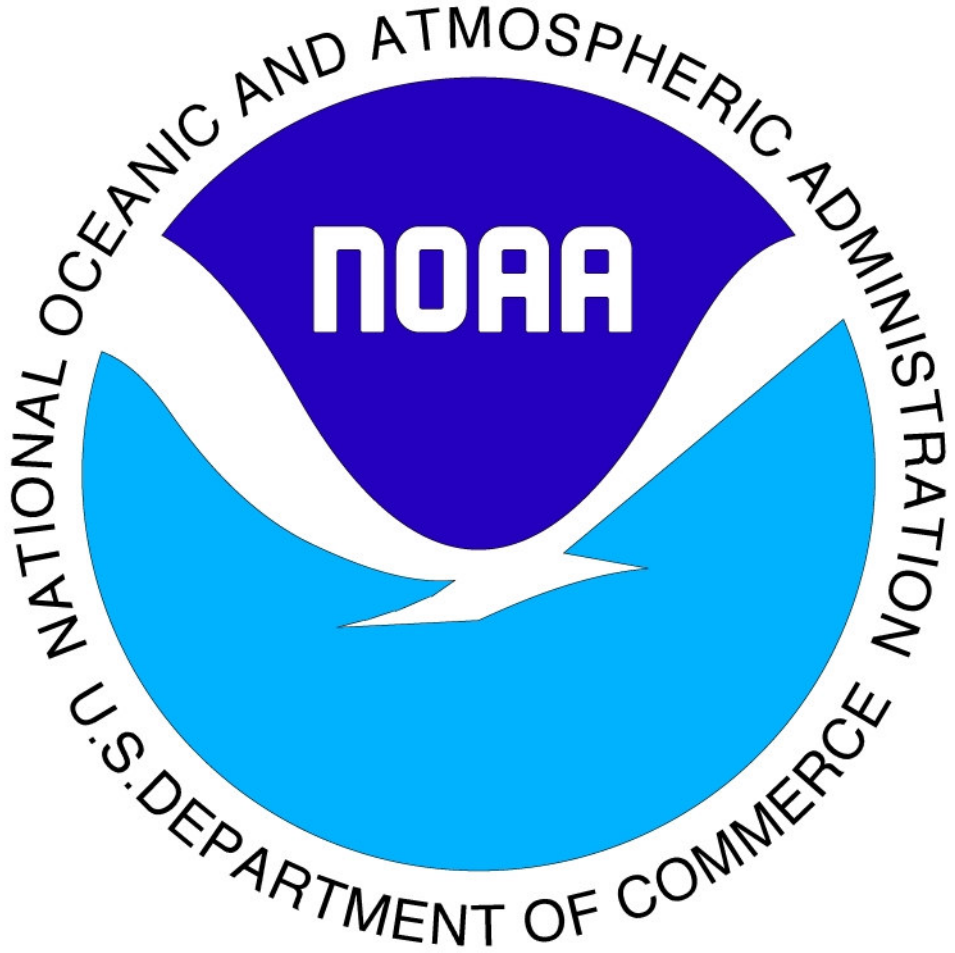

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Executive Summary

In November 2009, city engineers with the Town of Ocean City, Maryland met with representatives from the Maryland Department of Natural Resources (DNR) and the University of Maryland Environmental Finance Center (EFC) to discuss their concerns about managing stormwater runoff in their town. Among their concerns were an aging stormwater conveyance system, flooding impacts, water pollution concerns (due to unfunded mandates imposed by the Clean Water Act), and inadequate system maintenance. Their main concern was not lack of technical expertise in addressing these concerns but lack of funding. Because the municipal budget did not include dedicated funding for stormwater management activities in Ocean City, funds were being drawn on an as-needed basis from the general fund. Consequently, there were gaps in the current stormwater management strategy that were leading to public health and safety concerns.

In September 2010, the Environmental Finance Center (EFC) at the University of Maryland was contracted by the Town of Ocean City to conduct a stormwater financing feasibility study. To pay for the study, the Town of Ocean City was awarded a grant from the Maryland Department of Natural Resources (DNR) Chesapeake & Coastal Program in partnership with the National Oceanic and Atmospheric Administration (NOAA). The Town of Ocean City also contributed funding toward this project. The DNR and EFC-led Project Team believed that these concerns could be addressed if the Town of Ocean City was able to embrace alternative strategies for financing stormwater management.

The goal of this study was to provide a recommendation (or set of recommendations) to Ocean City officials for how the town might implement a long-term strategy for financing stormwater management. Other outputs included outreach and educational activities targeted to the general public, community leaders, and elected officials. Thus, the recommendations contained in this document are intended to guide the Town of Ocean City toward implementing a self-sustaining stormwater management program. Such action will achieve community and watershed protection priorities in an efficient and effective manner and will take full advantage of the dollars invested.

This year-long study incorporated information from various sources including Ocean City staff and officials, Worcester County staff, a Stormwater Workgroup, business leaders, and staff in five communities in Delaware, Maryland, and Virginia who have been working toward sustainable stormwater financing. Information was collected on Ocean City's stormwater management needs and current stormwater activities, other taxes and fees charged to Ocean 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 business associations and homeowner associations, and a presence at the Home, Condo, and Garden Show. A page was added to the town website to provide more information on the financing feasibility study and a survey was made available to solicit public comment. Finally, promotional materials were developed and distributed including posters and a prominent bus wrap.

As part of the study, the Project Team evaluated a series of funding options in terms of what would best fit Ocean City's needs for a fair, equitable, dedicated, and sustainable revenue source to pay for stormwater management. Considerations included general fund allocation, bond financing, grants, blended funding, a stormwater utility, and a stormwater tax. At the end of this evaluation, the Project Team felt comfortable recommending a stormwater utility for the Town of Ocean City.

Based on the needs assessed by the Project Team in this study, the Town of Ocean City will need to expend close to $12 million in stormwater expenses over the next ten years for repairs and improvements to the stormwater system. This report recommends distributing the costs of paying for repairs and improvements in proportion to the types of land uses that are contributing to the problem. Just as a building owner or tenant is responsible for paying its 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 the stormwater that is created from their built environment.

A stormwater utility fee allows for the assessment of the amount of impervious surface contributing to the stormwater problem on a per property basis. Since 79% of the town is covered in impervious surface, we believe that it is appropriate to charge properties that contribute significant runoff more and properties that contribute insignificant runoff less. Specifically, creating a stormwater utility will allow Ocean City to:

- Allocate the costs of stormwater management in a manner that is fair and equitable;
- Assist in the reduction of stormwater runoff to address flooding and water quality issues;
- Generate adequate revenues for stormwater management activities;
- Have stronger accountability for stormwater management spending; and
- Address and reduce water quality stressors.

The Project Team recommends the use of a rate structure based upon Equivalent Residential Unit (ERU) (also known as an Equivalent Runoff Unit) where 1 ERU equals 2,500 square feet. It is further recommended that each ERU on a property be assessed $35 per year.

The Project Team calculated revenue based on an ERU-based flat rate fee for residential properties and a fee structure for non-residential units based on impervious surface.

Residential --The residential fee is based on the assumption that an average property has about 2,500 square feet of impervious surface and, therefore, all properties are billed for 1 ERU per year. Thus, it is recommended that all residents will be charged $35 per year regardless of property size or amount of impervious. Revenue from residential properties will yield a total of $982,975 per year based on $35 multiplied by 28,085 properties.

Non-residential --The non-residential fee is based directly on the amount of impervious surface on a property. For example, if a commercial property is estimated to have an impervious surface of 10,000 square feet and each ERU is equal to 2,500 square feet, the property will be billed for 4 ERUs. If each ERU is worth $35 a year, the total bill per year for this business is $140. All commercial properties, regardless of status (governmental, non-profit, etc.) should be assessed a

stormwater utility fee based on its contribution to the problem. Revenue from all non-residential properties will yield an estimated total of $229,950 per year based on 1,080 non-residential properties each paying an average fee of approximately $213 per year.

The report concludes that Year 1 revenue will total $1,212,925. The Project Team projects that, assuming a slight reduction starting in Year 3 after a credit system is established, the utility will be able to collect the necessary $12 million by the end of Year 10 in order to properly repair and maintain the stormwater system.

Chapter 1: Introduction

Project Goals and Objectives

On November 4, 2009 representatives from the Maryland Department of Natural Resources (DNR) and the University of Maryland Environmental Finance Center (EFC) met with key staff from the Town of Ocean City, MD to discuss the town's long-term stormwater management needs.

Town staff indicated four main concerns with stormwater management in Ocean City:

1. **An aging conveyance system** – This system, built in the 1970's, was made with corrugated metal pipes that have corroded due to saltwater. Replacement of many sections of the conveyance system will be needed in the near-term to ensure that stormwater is being drained away from homes and businesses.
2. **Flooding** – Public frustration with flooding, causing transportation, public health, and safety concerns has prompted staff to seek a sustainable financing strategy for stormwater management.
3. **Water pollution concerns** – In Ocean City, as in most towns, stormwater, which carries a variety of pollutants, is not treated before it reaches the bay. As clean water is a major driver of tourism in Ocean City, maintaining a system that is able to filter all or a portion of the stormwater runoff will significantly improve water quality.
4. **Inadequate system maintenance** – City engineers also conveyed that the lack of equipment and personnel on staff to properly maintain the existing system has become problematic. For instance, the town does not have the capacity to properly clean the drop box catch basins on all stormwater drains (designed to collect sediment) in the town.

Town staff reported that the municipal budget did not include dedicated funding for stormwater management activities in Ocean City and funds were being drawn on an as-needed basis from the general fund. Consequently, there were gaps in the current stormwater management strategy that were leading to public health and safety concerns.

The DNR and EFC believed that these concerns could be addressed if the Town of Ocean City was able to embrace alternative strategies for financing stormwater management. Thus, in September 2010, the EFC was contracted by the town to conduct a stormwater feasibility study.

Between April and September 2010, which is designated as the pre-award period, the EFC conducted extensive background work in Ocean City to engage key business leaders who would have significant influence over the success of the project; gauge the level of public interest and knowledge of stormwater issues; gain a broad understanding of the need for a dedicated funding source for stormwater in Ocean City; and map out a coherent one-year plan of action for the project period.

Thus, the goal of this study was to provide a recommendation (or set of recommendations) to Ocean City officials for how the town might implement a long-term strategy for financing

stormwater management. To reach this goal, the Project Team set out a number of objectives including:

- Facilitating meetings as needed with a 5-7 member core project team and a Stormwater Work Group comprised of citizens. The core team will include key town staff from Public Works and the Coastal Bays Program.
- Conducting research toward identifying appropriate stormwater financing recommendations. Research may include:
    - gathering information from the town regarding current and future expenditures on stormwater management activities,
    - in-person interviews with stakeholders,
    - determining cost reducing collaboration opportunities,
    - compiling case studies,
    - if appropriate, identifying federal, state or private grant funding programs, and/or
    - investigating the options for creating a stormwater utility.
- Drafting a financing feasibility report, including recommendations.
- Providing guidance to the Coastal Bays Program and DNR who will lead stormwater management outreach and education efforts for this project.

Anticipated Outputs

The EFC will craft a set of financing recommendations designed to assess the current stormwater management needs of the town and to propose strategies for meeting these needs. DNR and the Coastal Bays Program will implement outreach and educational activities to the public, community leaders, and elected officials.

Anticipated Outcomes

As a result of the assistance of the EFC, DNR, and the Coastal Bays Program, we anticipate that the Town of Ocean City will be able to act upon one or more financing recommendations in order to implement a self-sustaining stormwater management program. Such action will achieve community and watershed protection priorities in an efficient and effective manner and will take full advantage of the dollars invested.

Project Funding

The Town of Ocean City was awarded a grant from the Maryland Department of Natural Resources (DNR) Chesapeake & Coastal Program in partnership with the National Oceanic and Atmospheric Administration (NOAA), which offers competitive funding to local communities. The Town of Ocean City also contributed funding toward this project.

This project was funded by a NOAA Coastal Zone Management grant through Maryland Department of Natural Resources. DNR also provided technical assistance for this project.

The Maryland Department of Natural Resources (DNR) supports communities in addressing nonpoint source pollution, including stormwater. DNR selected Ocean City because it identified the town as a good candidate for the implementation of a project/program that is locally-based, innovative, and sustainable and that will help to improve and restore water quality.

Information Gathering Process

Information was gathered for the feasibility study through a series of one-on-one interviews and stormwater work group meetings. Interviews were conducted in-person and/or over-the-phone and included Ocean City town officials, Worcester County officials, Ocean City's Chamber of Commerce, Ocean City's Economic Development Council, as well as many small and large local businesses. In the spring of 2010, the EFC created the Stormwater Work Group. This group consisted of representatives from the school district, the Chamber of Commerce, hotels, property management companies, homeowner association boards, and town staff. Stormwater Work Group Members are listed in Appendix A.

In addition, information was also gathered from several communities in Virginia, Maryland, North Carolina, and Delaware, as well as the District of Columbia, who have considered creating a stormwater utility or who have actually implemented a stormwater utility. Information from these interviews is integrated into Chapter 4. A list of case study interviewees can be found in Appendix B. To gather these case studies, the Project Team conducted several in-person and over-the-phone interviews in addition to independent research. Communities included:

- Alexandria, Virginia
- Chesapeake, Virginia
- Fayetteville, North Carolina
- Lewes, Delaware
- Lynchburg, Virginia
- Norfolk, Virginia
- Rockville, Maryland
- Suffolk, Virginia
- Takoma Park, Maryland
- Virginia Beach, Virginia
- Washington, DC

Timeline of Major Events, Presentations, and Meetings

April-September 2010 (pre-award period)

- **April 14, 2010** – Stormwater Work Group Meeting 1is held at Ocean City Town Hall.
- **June 7, 2010** – Stormwater Work Group Meeting 2 is held at Ocean City Town Hall.
- **July 15, 2010** – Stormwater Outreach and Education planning meeting held at Horn Point Lab in Cambridge, MD.
- **September 7-9th, 2010** – EFC Director Joanne Throwe conducts interviews with one large business owner and two large hotel owners.
- **September 8, 2010** – EFC Director Joanne Throwe presents feasibility study plan to large business owners on the Economic Development Committee.
- **September 8, 2010** – Stormwater Work Group Meeting 3 is held at Ocean City Town Hall.
- **September 8, 2010** – Ocean City Staff, EFC Staff, and DNR take a tour of stormwater management sites in Ocean City.
- **September 9, 2010** – EFC Staff and DNR presents feasibility study plan to small business owners at Ocean City Chamber of Commerce business breakfast.

October-December 2010

- **October 1, 2010** – EFC and Ocean City staff held a conference call in preparation for upcoming public events.
- **October 6, 2010** – First Public Meeting held at Ocean City Town Hall.

- **October 20, 2010** – Second Public Meeting held at Ocean City Convention Center.
- **October 21, 2010** – EFC staff and DNR representative travel to Lewes, DE for interview with Director of Public Works.
- **November 17, 2010** – EFC Director Joanne Throwe conducts a series of interviews in Ocean City with Chamber of Commerce officials, small business representatives, and Ocean City Staff to discuss a potential credit system, stormwater revenue needs, review existing budget allocations, and assess the current infrastructure system upgrade needs.
- **November 18, 2010** – Stormwater Outreach and Education planning meeting conference call is held with staff from DNR, Coastal Bays, Ocean City, and EFC.
- **November 18, 2010** – EFC Director Joanne Throwe meets with Worcester County Officials (Public Works Director, Planning and Zoning Director, and Natural Resources Manager).
- **November 22, 2010** – EFC staff and DNR representative met to review Stormwater Outreach and Education Plan.
- **November 30, 2010** – EFC Director Joanne Throwe presents at lunchtime seminar with over 40 US EPA Washington, DC Headquarters senior staff members to discuss stormwater financing. The Town of Ocean City study is highlighted throughout the presentation.
- **December 2, 2010** – EFC staff and DNR representative travel to Alexandria, VA for interview with Public Works Director (Maurice Daly).
- **December 20, 2010** – EFC staff and DNR representative travel to Rockville, MD for interview with Environmental Engineer (Lise Soukup).

January-March 2011

- **January 10, 2011** – EFC staff and DNR representative travel to Takoma Park, MD for interview with City Engineer (Ali Khalilian).
- **January 18, 2011** – EFC holds a work session with Ocean City staff to discuss potential budget for town.
- **February 14, 2011** – EFC holds a work session with Ocean City to discuss recommendations.
- **March 15, 2011** – EFC Director Joanne Throwe presents at an OC Town Council work session
- **March 18-20, 2011** – EFC staff works at the Green Initiative tables at the 2011 Home, Condo, and Garden Show at the Ocean City Convention Center.

April-June 2011

- **April 12, 2011** – EFC staff and DNR representative present preliminary recommendations to the Delmar Condo Managers meeting at BJs.
- **April 12, 2011** – EFC staff and DNR representative present preliminary recommendations and outreach materials to Stormwater Work Group.
- **April 16, 2011** – EFC staff present preliminary recommendations to the Montego Bay Civic Association.
- **May 1, 2011** – Outreach poster is finalized and displayed as a bus wrap.
- **June 25, 2011** – EFC staff and DNR representative present preliminary recommendations to the Caine Keys II Civic Association.

Overview of the Report

Chapter 2 of this report will summarize Ocean City's stormwater management challenges including infrastructure, flooding, water pollution, inadequate system maintenance, inadequate funding, and current and emerging regulatory issues. Subsequent sections of Chapter 2 will discuss why Ocean City is unique in terms of both stormwater management and town characteristics. Chapter 3 is a detailed discussion of all the public outreach related to this project, including public meetings, the stormwater survey and website, presentations, and promotional materials. Chapter 4 discusses various funding options that were taken into consideration during this feasibility study, such as general fund allocation, bond financing, grants, blended funding, the creation of a stormwater utility, and a stormwater tax. Chapter 5 is a discussion of Ocean City's stormwater funding needs. Chapter 6 contains more discussion on why a stormwater utility is recommended for Ocean City and how a rate system might be structured. Chapter 7 briefly discusses options for a credit system and recommendations for exemptions. Chapter 8 contains a final summary of recommendations. Eleven appendices follow with various documents referenced throughout the body of the report.

Chapter 2: Ocean City's Stormwater

What is stormwater?

Stormwater runoff is defined by the Environmental Protection Agency 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."[1] Stormwater, unlike the wastewater that enters the sewer system via sinks, toilets, etc., generally does not go to a wastewater treatment plan. 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. Thus, 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.[2]

Why is stormwater management a concern in Ocean City?

Ocean City, Maryland (Worcester County) is part of the 175 square mile Coastal Bays watershed. The Coastal Bays include the towns of Berlin and Ocean City, parts of Snow Hill and Pocomoke, and the Assawoman, Isle of Wight, Sinepuxent, Newport, and Chincoteague Bays. The Coastal Bays watershed has an estimated population of 45,000.[3] The Town of Ocean City is 4.6 square miles upland (36.4 square miles of the town is water). In 2009, the population of Ocean City was estimated at approximately 7,000.[4]

In Ocean City, 2,660 parcels were built prior to 1985. These properties most likely have no stormwater management features to decrease water quantity or improve water quality. 774 parcels were developed between 1985 and 2001. However, if the parcel didn't increase impervious surface by more than 10%, any requirements to implement stormwater management practices to decrease water quantity and protect water quality were waived. Since

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[1] National Pollutant Discharge Elimination System (NPDES), Stormwater Program, http://cfpub.epa.gov/npdes/home.cfm?program_id=6

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

[3] Personal communication, Carol Cain, Maryland Coastal Bays Program, July 22, 2011.

[4] U.S. Census Bureau, http://factfinder.census.gov

2001, 298 parcels have been developed and all have utilized stormwater BMPs.[5] Thus, the great majority of development in Ocean City has very few green infrastructure practices in place. Traditional "grey infrastructure", which covers most of Ocean City, is now widely acknowledged to be ineffective at protecting water quality, particularly on a barrier island. Under pre-development conditions, most stormwater was treated through infiltration (absorption into the ground) or natural filtering by wetlands or other vegetation.[6]

As indicated above, four initial concerns were expressed by Ocean City engineers in initial interviews: aging infrastructure, flooding, water pollution concerns, and inadequate system maintenance. Based on our work with Ocean City over the past year, we have added two related concerns to the list: inadequate funding and emerging regulatory issues.

Infrastructure

Ocean City, like most communities described above, utilizes a storm sewer system that is separate from the wastewater system. Catch basins collect stormwater along roadways and then the storm sewer empties untreated stormwater into the canals and the bay. Wastewater is sent to the Ocean City Wastewater Treatment Plant at 65th street.

Ocean City storm drain pipes are considered "open channel, gravity flow" and, therefore, rely on gravity and elevation to drain to the Bay. However, due to tidal back pressure and low elevation, stormwater does not always drain effectively with traditional infrastructure.

Ocean City has 205,655 linear feet (over 40 miles) of pipe to help with stormwater drainage. 82,974 linear feet (about 15 miles) of this pipe is corrugated metal pipe and known to deteriorate in a salt-water environment. This pipe, in particular, installed in the 1960s and 1980s, is overdue for replacement with an estimated cost of $6.14 million. The system also included 318 outfalls, 1,794 inlet/catch basins, and 86 manholes.[7]

A few additional points on Ocean City's stormwater infrastructure were gleaned in the process of conducting this feasibility study:

- In many areas of Ocean City, the distance from the center of Coastal Highway to the closest outfall is over 1,000 feet (in some areas around Caine Woods it is over 2,000 feet). This means stormwater has to travel quite a distance before it enters a storm drain and has the opportunity to pick up even more pollution along the way.
- Streets in Ocean City are at an average elevation of 6 feet above sea level, limiting the ability of gravity to aid in drainage.
- North of 33rd street, there is no storm drain system east of Coastal Highway. Thus, on the northbound lanes of Coastal Highway, stormwater drains across approximately 3

[5] Personal communication, Gail Blazer, Environmental Engineer, Town of Ocean City, October 2010.

[6] OC Stormwater Community Assessment & Outreach, Town of Ocean City Stormwater Program: Water Quality/Treatment, Powerpoint by Gail Blazer, http://oceancitymd.gov/Engineering/sw/tocsw.pdf

[7] Personal communication, Gail Blazer, Environmental Engineer, Town of Ocean City, October 2010.

acres of impervious surface at each intersection. Drainage has to cross the street to get into the catch basin inlets on the west side. [8]

Flooding

Flooding, one of the most visible consequences of inadequate stormwater management, has prompted a great deal of public frustration in Ocean City. Flooding of Coastal Highway and other areas, as highlighted above, causes transportation, public health, and safety concerns. During this study, we were informed by local businesses about their concerns for property damage and loss of revenue when streets flood significantly.

As a relatively flat barrier island at sea level with average elevation 7.00 NGVD (National Geodetic Vertical Datum), stormwater has a difficult time draining during "normal" rain events and high tides. Exceptional events, like the Nor'easter nicknamed NorIda that hit in November 2009, caused tidal surge 3 feet over normal high tide. During this event, 71 acres of property flooded in the downtown area. Had it rained during this event, inundation models show that the flooding would have increased significantly. Computer models created by town engineers show many areas of downtown 1 to 3 feet underwater during a high tide storm surge event.[9] The natural attributes that make drainage difficult, exacerbated by the amount of impervious surface in Ocean City, force local waterways to take on an increased amount of water.

It should be noted that a more robust stormwater program in Ocean City will not eliminate flooding altogether. While much can be done to retrofit the system and use best management practices (BMPs) to mimic natural drainage, the natural geography combined with the level of development in Ocean City will still result in some flooding.

Photos illustrating various flooding and water quality concerns can be found in Appendix K.

Water Pollution

In Ocean City, as in most towns, stormwater, which carries a variety of pollutants, is not treated before it reaches the Coastal Bays. As stormwater runoff flows across impervious

[8] OC Stormwater Community Assessment & Outreach, Stormwater in Ocean City, Powerpoint by Terry McGean, http://oceancitymd.gov/Engineering/sw/swmanagement.pdf

[9] Personal communication, Gail Blazer, Environmental Engineer, Town of Ocean City, October 2010.

surfaces in Ocean City, it picks up litter, pet waste, chemicals (fertilizers, oils, pesticides), and other pollutants before draining into the Coastal Bays.

In 2010, the Maryland Coastal Bays Program gave Coastal Bays a C rating in terms of water quality. Part of the National Estuary Program, the Coastal Bays Program is a partnership among the towns of Ocean City and Berlin, the National Park Service, Worcester County, the U.S. Environmental Protection Agency, and the Maryland Departments of Natural Resources, Agriculture, Environment, and Planning. Indicators for the C rating include total nitrogen, total phosphorous, chlorophyll a, and dissolved oxygen. Biotic indicators, including seagrasses and hard clams, are also measured.[10]

Other pollutants of concern are sediments (dirt particles that wash into the canals and bays causing degraded water quality and impacting aquatic life) and elevated water temperatures.[11] One interviewee noted significant sedimentation and erosion to the south of Ocean City.

Inadequate System Maintenance

Throughout this study, we observed that a lack of equipment and personnel was significantly hindering progress in upgrading the stormwater management infrastructure and maintaining existing infrastructure. For instance, the Ocean City Department of Public Works Street Construction Division, which maintains the storm drains along with the streets, consists of 13 people. One outcome of this personnel gap is that the town does not have the capacity to properly clean the drop box catch basins on all stormwater drains. These drains are designed to collect sediment and need regular cleaning and maintenance. In addition, the town has approximately 50 backlogged stormwater projects to repair storm drain and joint leaks, replace deteriorating outfalls, replace pipes and drains, replace catch basins, etc.[12]

Inadequate Funding

In the 1980's, stormwater management in Ocean City received funding from pavement funds. However, as Ocean City continued to develop at a rapid pace, the needs of the stormwater management program outpaced this funding mechanism. Therefore, the town began paying for stormwater management through the use of government bonds. As economic circumstances and stormwater management needs changed, funding was allocated through the general fund on an as-needed basis. While general fund allocations have been sufficient in the past, other town needs have shifted funding away from stormwater management projects leaving the current program inadequately funded.[13]

In 2010, stormwater management projects were funded through the public works construction street account which had a budget of $197,790. Stormwater received $65,000 with ongoing projects accounting for $50,000. Thus, only $15,000 was available for new stormwater

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[10] 2009 Coastal Bays Report Card, http://www.mdcoastalbays.org/content/docs/Report%20Card.pdf

[11] Philadelphia Water Department, Office of Watersheds, http://www.phillywatersheds.org/watershed_issues/degraded_waterways

[12] Personal communication, Hal Adkins, Director of Public Works, Town of Ocean City, September 28, 2011.

[13] Personal communication, Hal Adkins, Director of Public Works, Town of Ocean City November 16, 2010

management projects. With the lack of stormwater management funding available, city engineers were required to seek emergency discretionary funding (requiring a formal request to City Council) every time funding is needed. [14] As a result, we believe that there are three imminent needs of the stormwater program: (1) funds to address the project backlog (approximately 50 individual projects costing between $1,000 and $50,000 each), (2) funds to address a major infrastructure replacement of corrugated metal pipe, costing approximately $6 million dollars, and (3) funds for an ongoing operation and maintenance program to protect the current infrastructure investment. In order to address these issues, Ocean City must have a dedicated funding mechanism for its stormwater management program.

Current and Emerging Regulatory Issues

The **Clean Water Act** of 1972 prohibits the discharge of pollution into navigable waterways, unless authorized by a permit. In order to prevent nutrients, sediments, and harmful pollutants from being washed or dumped into a storm drain system, also called a municipal separate storm sewer system (MS4), some stormwater runoff is regulated under The National Pollutant Discharge Elimination System (NPDES) permit program. The purpose of the MS4 permit is to reduce the discharge of pollutants to the "maximum extent practicable", protect water quality, and satisfy the appropriate water quality requirement of the Clean Water Act.[15] The NPDES permitting program is separated into two categories based on population. A phase I community consists of communities with a populations of 100,000 or more, while a phase II community consists of smaller-scale communities. Phase I communities are covered by individual permits while Phase II are generally covered by a general permit. Although Ocean City is not currently regulated under the NPDES permit program, current discussion on new stormwater regulations could make Ocean City a Phase II community in the future. Additionally, every regulated MS4 is required to develop a stormwater management program (SWMP), addressing six minimum control measures (MCMs), to reduce the contamination of stormwater runoff. [16]

Another state and federal mandate that may eventually impact Ocean City, Worcester County, and the Coastal Bays is the development and implementation of a Coastal Bay TMDL (total maximum daily load) which limits levels of specific pollutants that may be discharged into waterways. The neighboring Chesapeake Bay – the largest estuary in the United States – has long been a target of efforts to restore water quality and habitat, manage fisheries, and protect the sub-watersheds that drain to Bay waters. The Obama Administration brought renewed federal energy to these efforts and, in May 2009, President Obama signed the Chesapeake Bay Executive Order, an expansive federal directive to restore water quality by implementing better agricultural practices, addressing stormwater pollution, expanding researching and monitoring efforts, and engaging in other restorative practices throughout the region. In April 2010, the Principals' Staff Committee (PSC) of the Chesapeake Bay Executive Council reaffirmed their commitment to establishing a Chesapeake Bay TMDL by December 31, 2010 and ordered the states and the District of Columbia to submit complete final Phase I Watershed Implementation Plans (WIPs) by November 29, 2010. Of the seven entities that comprise the Bay watershed – the District of Columbia, Delaware, Maryland, New York, Pennsylvania, West Virginia, and Virginia – Maryland continues to lead the way in fulfilling the objectives called for in the

[14] Personal communication, Hal Adkins, Public Works Director, Town of Ocean City, September 29. 2011.
[15] http://www.epa.gov/npdes/pubs/fact2-0.pdf
[16] http://cfpub.epa.gov/npdes/stormwater/munic.cfm

Executive Order. Thus, an emerging Coastal Bays TMDL could also impact Ocean City's future stormwater regulation. This Coastal Bay TMDL would likely require Ocean City to regulate and enforce nutrient limits in Assawoman Bay and other waterways within Ocean City.

In addition to federal regulations, the State of Maryland also regulates stormwater management. In 2007, Governor O'Malley signed the Maryland Stormwater Management Act. This act required that engineers follow the principles of environmental site design (ESD) and make use of nonstructural best management practices (BMPs) and other better site design techniques to the maximum extent practicable.[17] The implementation of this act is the responsibility of the Maryland Department of the Environment (MDE). Environmental site design includes optimizing conservation of natural features, minimizing the use of impervious surface, slowing down and holding stormwater runoff to maintain discharge timing, increasing infiltration, facilitating evaporation, and allowing other nonstructural practices and innovative technologies approved by MDE.

An additional state regulation affecting the town of Ocean City is the Critical Area Act. Given that 85% of Ocean City is in the Critical Area, any development must adhere to these regulations. The Critical Area Act establishes minimum setbacks from the water and wetlands for new construction. Additionally, the act includes regulations in creating buffers and requires property owners to include landscaping and impervious surfaces on their land to support sensitive areas.[18] Since impervious surface and buffers relate directly to stormwater, new development must take into account the Critical Area Act. Ocean City has a mitigation fund in place for homeowners or builders who do not follow the law or who would rather pay a fee than comply with planting rules.

Finally, the Town of Ocean City has agreed to be a partner in the implementation of the Comprehensive Conservation Management Plan (CCMP), along with the Maryland Coastal Bays Program, the Environmental Protection Agency (EPA), and other state agencies.[19] The purpose of the CCMP is to serve as a blueprint for the public agencies responsible for protecting the natural resources of the Coastal Bays watershed. It contains four Action Plans for the long-term restoration and protection of the coastal bays: Water Quality, Fish and Wildlife Recreation and Navigation and Community and Economic Development. Each Action Plan contains goals and actions presented as specific and attainable tasks, summarized both in text and table form. Together, these actions to restore and protect the bays constitute the program's proposals for managing this vital natural and economic resource. Goals and actions in the CCMP that address stormwater water quality and quantity issues should be taken into account when considering how to fund Ocean City's stormwater program.

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[17] Stormwater Management Act of 2007 MDE, http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/Pages/Programs/WaterPrograms/SedimentandStormwater/swm2007.aspx

[18] Critical Area Act, http://www.dnr.state.md.us/criticalarea/reg_act.asp

[19] Personal communication, Gail Blazer, Environmental Engineer, Town of Ocean City, April 2011.

What characteristics make Ocean City unique?

The Town of Ocean City has a combination of attributes that make it very unique in terms of stormwater. Some of these attributes are discussed above but several more deserve emphasis:

- **Ocean City is a highly developed urban setting with 79% impervious cover**, so little rainwater can infiltrate into the ground. It is relatively rare to see such dense urban cover located on a barrier island. For comparison, research in the field of stormwater management finds that biological degradation occurs whenever impervious cover in a watershed exceeds 10 or 20%.[20] In a typical shopping center, 95% of the land area is impervious. Aerial photos of Ocean City show nearly adjoining rooftops throughout the city. One 800 square foot roof produces 249 gallons of rainwater from a ½ inch storm.[21] The combination of impervious cover and elevation (which largely dictates the size and placement of storm sewer pipes) make Ocean City very vulnerable to stormwater management problems. In fact, a typical 300' x 300' city block generates roughly 3,500 gallons per minute of run-off during a heavy rainfall.[22] In Ocean City, full pipe capacity averages only 1,000 gallons/minute due to constraints of slope, pipe diameter, tidal back pressure, and 6' elevation streets.
- **Ocean City has a relatively small year-round population – approximately 7,000 residents in 2009 – but has an infrastructure that attempts to support between 170,000 and 240,000 visitors (excluding day visitors) on a given summer weekend.[23]** (The Ocean City Convention and Visitors Bureau estimates that Ocean City has 11 million visitors per year.) The infrastructure of Ocean City is designed to accommodate the larger summer population. Even though this larger population only resides in Ocean City for 3-4 months every year, the stormwater impact is felt year round. (The peak demoflush population, a mathematical formula which estimates population based on flow amounts, reflects this demand. The formula project that peak population will increase from 322,308 in 2005 to 355,309 (10%) by 2020.[24])
- **Ocean City, as a tourist destination with 11 million annual visitors[25], has a strong incentive to protect and maintain clean water.** Clean water – which translates to clean beaches, litter-free canals, and waterways that do not endanger the health of swimmers, boaters, fishermen, etc. – is a major driver of tourism in Ocean City. Tourism, in turn, is a major driver of the economic vitality of the town. Thus, maintaining a stormwater system that is able to filter all or a portion of stormwater runoff will protect what is essentially Ocean City's investment in clean water.

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[20] Schueler, Tom. Importance of Imperviousness. 1994."The Importance of Imperviousness." Watershed Protection Techniques Quarterly. Vol. 1, No. 3.Center for Watershed Protection.
[21] U.S. Geological Survey, http://ga.water.usgs.gov/edu/sc2.html
[22] OC Stormwater Community Assessment & Outreach, Stormwater in Ocean City, Powerpoint by Terry McGean, http://oceancitymd.gov/Engineering/sw/swmanagement.pdf
[23] Town of Ocean City Comprehensive Plan, Municipal Growth Element, http://www.mdp.state.md.us/PDF/OurWork/CompPlans/Worcester/OceanCity/09_MGE_OceanCity.pdf
[24] Town of Ocean City Comprehensive Plan, Municipal Growth Element, http://www.mdp.state.md.us/PDF/OurWork/CompPlans/Worcester/OceanCity/09_MGE_OceanCity.pdf
[25] Ocean City Convention & Visitors Bureau, http://ococean.com/members

- **Development and redevelopment continues in Ocean City and the region** and population trends suggest that Worcester County will increase 11% by 2020 and 23.5% by 2040.[26] New development in Maryland is subject to rigid stormwater management regulations.

Current Stormwater Activities in Ocean City

Through general fund allocation, Capital Improvement Plan monies, and grants, the Town of Ocean City has been able to implement a handful of pilot stormwater management projects such as capital improvements to the 63rd Street outfall, the 57th Street end turf grid, and the Tunnel Avenue baffle box outfall, the installation of pervious pavers on town projects, storm drain stenciling, and the installation of catch basin inserts. However, without an operation and maintenance program these capital improvements cannot reach their full potential. The town has also purchased 35 catch basin inserts that require maintenance twice a year. Since no maintenance program exists, the catch basins are prone to fill with debris and can no longer serve their intended purpose.

In addition to capital improvements, the town of Ocean City offers several mini-grants and cost share programs for stormwater management projects on private property. These programs include BayScape Garden grants, Beach District grants, rain garden grants, a rain barrel cost share program, and a retrofit cost share program.

The following is a complete list of the programs and projects currently provided by the town:

- Pervious pavers on public projects
- Dune and wetland restoration & patrol
- Street and beach cleaning
- Hazardous waste cleanup day
- Bulk pickup days
- Cost share program
- Rain gardens & bioretention areas
- BayScape Gardens
- Beach District planting
- Rain barrel program
- Catch basin inserts
- Nutrient Separating Baffle Boxes
- Outfall retrofits

[26] Maryland Department of Planning, http://www.mdp.state.md.us/msdc/CNTY_MENU/worc.shtml

Goals of Ocean City Stormwater Program

Ocean City engineers strive to implement technologies that reduce runoff and treat stormwater on site. In this way, both water quantity (the volume of stormwater) and water quality (the amount of pollution entering waterways) are addressed. Designing BMPs that can treat at least a 1 inch storm will address both quantity and quality concerns for the vast majority of weather events. While infrastructure is a main concern and focus for the town, they are also seeking stormwater solutions that will benefit the entire Coastal Bays watershed and that will meet any current or future mandates for load allocation. To this end, the town takes its commitment to the water quality goals outlined in the Comprehensive Conservation Management Plan (CCMP), which was signed by town officials, seriously.[27]

Thus, the Town of Ocean City has expressed the following goals:

- Allocate the costs of stormwater management in a manner that is fair and equitable.
- Assist in the reduction of stormwater runoff to address flooding and water quality issues.
- Generate adequate revenues for stormwater management activities such as:
    - Backlogged projects
    - Current Projects
    - Future Projects
    - Emergency Projects
    - Make stormwater management a self sustaining program
    - Education and outreach programs
    - Fund governmental mandates: Total Maximum Daily Loads (TMDL), National Pollution Discharge and Elimination System (NPDES).
- Have stronger accountability for stormwater management spending
- Address and reduce water quality stressors[28]

In addition, the town has identified a need to obtain funding for the following programs and projects, in addition to funding to maintain the current programs and projects listed above:

- Retrofit catch basins for water quality treatment
- Storm drain catch basin and pipe cleaning program
- Maintenance, repair and replacement of degraded storm drain pipes
- Raise infrastructure and roads to reduce flooding

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[27] Personal communication, Gail Blazer, Environmental Engineer, Town of Ocean City, April 2011.

[28] http://www.epa.gov/ednnrmrl/publications/waterquality/stressorspollutants/index.htm

- Outfall retrofits for water quality treatment
- Outfall retrofit for flood reduction
- Install new storm drain pipes and catch basins for efficient conveyance

Water-related Taxes and Fees in Ocean City

In order to dispel any misconceptions that residents and businesses already pay fees or taxes to fund the stormwater program, this section is intended to explain several water-related taxes and fees Ocean City residents and businesses currently pay. To reiterate, NONE of the fees and taxes summarized below are used to fund stormwater management in Ocean City. The section will also explain the components of the enterprise funds and sales and use taxes. All figures are from Ocean City's 2009 Revenue Book.[29]

Property Tax

For fiscal year 2011, about 2.7% of the property tax collected in Ocean City, or less than $100,000 was budgeted for stormwater pipe maintenance from the Public Works Construction Division budget. Comprehensive stormwater management in Ocean City is estimated to cost about $1 million per year.

Bay Restoration Fee

Every Maryland homeowner served by a wastewater treatment plant pays $2.50 per month to support the Bay Restoration Fund, passed in 2004 and managed by the Maryland Department of the Environment. This fee is also known as the "Maryland Flush Tax". 50% of the Flush Tax goes to cover crop programs throughout Maryland. The rest of this tax goes to septic tank upgrades and the upgrade of waste water treatment plants to meet Enhanced Nutrient Removal standards for plants in Maryland that discharge into the Chesapeake Bay. The Town of Ocean City does not see any of these funds return to the town because the wastewater treatment plant discharges to the Atlantic Ocean and the town does not have any septic tanks.

Water Fund

All water users in Ocean City pay metered water usage charges and fixture charges which pays for things like water main upgrades, wells, water treatment plant improvements, water towers, and debt service on improvements made from 2001-2007.

The charges are based on metered water usage plus an additional fee of $2.80 per fixture per quarter (2011 rate) and $2.60 per fixture per quarter (2012 rate). Currently, rates are $2.70 per 1,000 gallons per quarterly billing. Fixture charges are based on the number of equivalent fixtures in each dwelling and business per the Southern Standard Building Code. Rates per fixture are set by the Town Council based on operation and capital costs. In the case of vacant lots to whom the town's water system is available, property owners are charged a flat fee for each lot at $17.40 per quarter. Water usage is considered a tax and, thus, uncollected water bills are taxed according to the rate set by Town Council of 18% per annum. Such rates, charges, and interest thereon are considered a lien on the real property served.

[29] http://oceancitymd.gov/Finance/forms/2009-Revenue-Book.pdf

New hooks-ups in Ocean City are charged based on a water connection charge rate schedule set by the Town Council by ordinance. Rates are generally determined by meter size. Other fees include cut-off and reconnect fees, temporary connection fees, and damage fees. Cut-off and reconnect fees are levied for non-payment. Once cut-off is required, a $20 fee is added to the outstanding bill. A $20 fee is also paid to reestablish service during business hours and the after-hours fee is $30. Temporary connection fees are paid by contractors who temporarily hook up to town water lines through fire hydrants. The charges are $2.00 per day or $2.70 per 1000 gallons. Finally, time and materials are billed to any individual or contractor who damages the Town water distribution system (normally pipes and hydrants) through accident or negligence. Charges are set by the Water Department based on the actual cost or repair.

Wastewater Fund

All housing units, commercial structures, pools, and users discharging sewerage, or those who have sewerage treatment available to them, pay a fixture fee for wastewater services. This fund pays for treatment of wastewater, operating expenses, wastewater main maintenance, pumping station maintenance, and plant improvements and debt service on improvements made from 2001-2010.

This fee is based on the number of plumbing fixtures in each unit at a flat, quarterly rate set by the Ocean City Town Council. The rate is currently $7.95 per fixture per quarter (as of July 1, 2011) and pools are charged $32.25 per quarter. As with water fees, owners of vacant lots to whom the town's wastewater system is available are charged a flat fee for each lot at $16.50 per quarter. Property owners in the West Ocean City Wastewater District whose sewage is treated at the 64th Street treatment plant are billed annually by Worcester County, based on a contract with the Worcester County Commissioners. Sewage treatment, like water above, is considered a tax and, thus, uncollected sewer bills are taxed according to the rate set by Town Council of 18% per annum. Such rates, charges, and interest thereon are considered a lien on the real property served.

Plumbing permits are issued for plumbing installed in new buildings or additions or alterations/repairs in accordance with the Town of Ocean City Plumbing Regulations. Fees are set at $30 per commercial fixture with a minimum fee permit of $90 and $15 per domestic fixture with a minimum permit fee of $45.

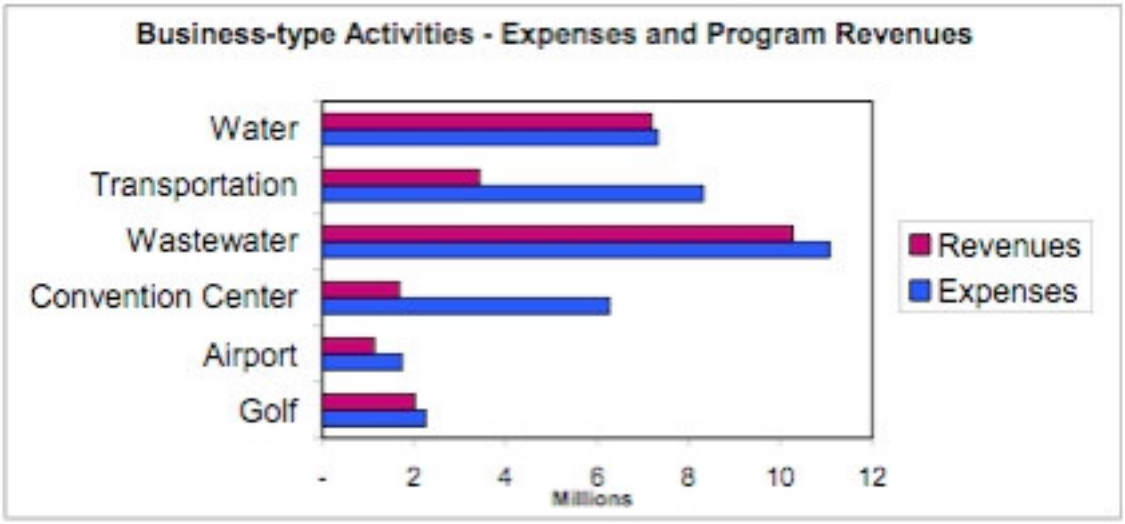
Other miscellaneous fees include lab fees, connection charges, damage fees, and fees on interest-delinquent accounts. Lab fees are collected from users requiring periodic laboratory testing per State of Maryland regulations. The fee is determined by the type of test. New connection fees are charged based on the diameter of the sewer connection and street width. Finally, time and materials are billed to any individual or contractor who damages the collection system or requires obstructions to be cleared through accident or negligence. Charges are set by the Water Department based on the actual cost or repair.

Enterprise Fund

The Town of Ocean City, in their Comprehensive Annual Financial Report ending in June 2010 (FY 2010), describes Enterprise Funds as those "used to account for the acquisition, operation, and maintenance of governmental facilities and services which are entirely or predominantly

self-supporting by user charges."[30] Ocean City has established six Enterprise Funds including water, transportation, wastewater, convention center, airport, and golf. Four of the Enterprise Funds operated at a loss during FY 2010 - the convention center ($3,716,914), transportation ($38,084), airport ($68,149), and golf ($147,901). [31] Although the transportation fund receives grants from state and federal governments and a subsidy from the general fund, increases in wages, fuel, and vehicle maintenance generated a deficit. Additionally, private air travel and leisure activities were down likely due to the flagging economy and subsequent impacts on tourism. The two funds operating at a gain, water and wastewater, had gains of $14,215 and $274,387 respectively. The small gain in the water fund was largely due to a $1,357,097 decrease in infrastructure improvement spending from the previous year, and $136,733 decrease in operating expenses. Lastly, the gain in the wastewater fund came largely from the increase in capital assets, including land at 64th Street valuing $1,755,496, a decrease of $419,822 in operating expenses, $259,812 reduction in contacted services, $115,321 reduction in chemicals, and $18,941 reduction in energy costs.

The graph below, from a financial report drafted the year before (FY 2009) also shows a discrepancy between expenses and program revenues. During this fiscal year, the water, wastewater and golf course funds were self- supporting and users or reserves covered all costs. However, the operations of the transportation, airport, and convention center only recovered 43% of expenses from user charges.[32]



Source: Town of Ocean City, Maryland. Report to Citizens Fiscal Year 2009

Both fiscal years discussed above reveal that the enterprise funds are not necessarily reliable revenue generators. Although both water and wastewater funds operated at a gain in FY 2010,

[30] Comprehensive Annual Financial Report, Town of Ocean City, Maryland. For Fiscal Year Ended June 30, 2010, http://oceancitymd.gov/Finance/pdf/2010OceanCityMDCAFR.pdf.
[31] Comprehensive Annual Financial Report, Town of Ocean City, Maryland. For Fiscal Year Ended June 30, 2010, http://oceancitymd.gov/Finance/pdf/2010OceanCityMDCAFR.pdf.
[32] Town of Ocean City, Maryland. Report to Citizens Fiscal Year 2009, http://oceancitymd.gov/Finance/forms/popular-report09.pdf

these gains would not be significant enough to cover a stormwater management program and cannot be counted on from year to year. Therefore, it is not possible to fund stormwater management through an existing enterprise fund without going into further debt.

Sales and Use Taxes

Ocean City businesses, residents, and visitors pay a variety of other taxes on income, highway usage, entertainment venues, and room rentals. None of this funding is dedicated to the stormwater program.

Income Tax - The State of Maryland returns 8.5% of the State Income Tax collected from Ocean City residents to the Town of Ocean City. The tax is collected by the State and distributed quarterly. The payments are deducted from the County share of local income tax. (These taxes go into the town's general fund.)

Highway Tax - Gasoline taxes and other fees are collected throughout the state and certified to the State Motor Vehicle Revenue Account. The State retains 65% of the Highway User Tax with the rest divided among the counties and municipalities according to their proportionate road mileage and number of driver registrations. All revenue is collected by the State and distributions are made monthly. Highway User Tax funds may only be used to pay for transportation facilities or improvements, such as airports and street maintenance.

Entertainment Taxes - Taxes on entertainment and amusement activities in Ocean City include, but are not limited to, refreshments /meals at hotels and restaurants when live entertainment is performing, movie theaters, carnival-type rides and games, coin-operated amusement machines, boat rentals, and miniature golf courses. The tax is collected by the State Comptroller and remitted to the Town of Ocean City quarterly after a deduction to cover the State's administrative expense. Currently 3% of gross revenue comes from taxable admissions and amusements. Maximum allowed by the State is 11%, except on those activities subject to the 6% State sales tax, whereas the maximum admissions and amusements tax is 5%. (It is assumed that these taxes are also allocated to the town's general fund.)

Room Tax - Ocean City has a 4.5% tax on short-term (4 month of less) rentals of hotels, motels, bed and breakfasts, etc. The tax is collected by Worcester County and remitted monthly to the Town of Ocean City after a 1% deduction to cover the County's administrative cost of collection. All of this tax, about $4.5 million/year, funds advertising to promote tourism in Ocean City.

Chapter 3: Public Outreach

Based on the experience of the Project Team in other communities, one of the most important ways to achieve a high degree of accuracy in our recommendations is to engage local business and residents throughout the process. This is generally 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 opens the dialogue. This process also allows a town to develop a comprehensive long-term stormwater management plan that is in the best interest of a knowledgeable citizenry. The public education and outreach is so important, in fact, that it is one of six minimum control measures listed in Phase II permits. Typically, a feasibility study that does not take into account significant input from their community will have little chance of success in gaining support from their City Council.

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 feasibility study. Key outreach events are included in the timeline in Chapter 1. The goal of the outreach was to communicate accurate information to Ocean City stakeholders about stormwater infrastructure problems, financing shortfalls, and solutions for long-term funding as well as to collect community feedback that would be reflected in the results of our study. Thus, public outreach was accomplished first by establishing a Stormwater Work Group and second by creating and implementing an Outreach and Marketing Strategy.

The Stormwater Work Group, launched in April 2010, was a guiding force in the outcome of this study. Prior to launch, the Project Team assembled a list of names, businesses, and organizations who might be important to include in the work group. Phone interviews were conducted with as many candidates as possible, and a final group was selected to participate. Please see Appendix A for a list of the stakeholders who served on the Stormwater Work Group.

The Stormwater Work Group was comprised of 17 members representing a diverse set of backgrounds in the community, including residents, business owners, town officials, and community organizations. Over the course of the project, the work group met four times at the Ocean City Town Hall, on April 14, June 7, and September 8, 2010 and April 12, 2011. Of the 17 members, seven were town officials representing the Public Relations, Public Works, Engineering & Construction Inspection, Planning & Community Development, Emergency Services, and Police departments. Additionally, two members represented the Maryland Coastal Bays Program, two members represented local schools (Ocean City Elementary School and Stephen Decatur High School), one member represented Maryland's Department of Natural Resources, one member represented the Chamber of Commerce, one member represented a large property management business (Mann Properties), two members represented a citizen-based watershed organization (Friends of Walkers Pond), one member represented a business association (Ocean City Hotel-Motel-Restaurant Association), and two members represented homeowner associations (Montego Bay Civic Association and Caine Keys II Civic Association).

The Stormwater Work Group served several important purposes. First, as a cross section of both business and residential stakeholders, the work group was an important advocate for how to communicate information to the community at large and the proper tone, language, and method of this communication. In fact the work group reviewed and commented on all outreach materials before they were made public. Second, work group members were exceedingly well-connected and generously shared their professional networks for purposes of outreach or when the Project Team needed a contact with a certain expertise. Third, members of the work group supported our efforts at the two public meetings and at a series of homeowner association presentations by attending these meetings/presentations, and providing introductions to key players. Finally, the work group was an unprecedented opportunity for municipal officials and members of the community (business leaders, citizen leaders) to share input on the stormwater challenges in Ocean City and begin to discuss solutions. Agendas from each of the Stormwater Work Group meetings are included in Appendix D.

In addition to the Stormwater Work Group, an Outreach and Marketing Strategy was drafted to span from October 2010 to September 2011. The intended audience was citizens, businesses, and elected officials. A copy of the strategy can be found in Appendix C. Highlights of this strategy are described below.

Public Meetings

Public meetings, held on October 6 and 20, 2010, were designed to communicate the basics of stormwater management, the NOAA-DNR grant award, and the purpose of the feasibility study. A short presentation by town staff also highlighted the Ocean City Stormwater Program's current status and future needs. Attendees were also invited to participate in an open dialogue with town staff.

The first meeting was held at Ocean City Town Hall and the second was held at the Ocean City Convention Center. The meetings had identical content. These public meetings also gave the public a chance to ask questions and make comments about the town's needs in terms of stormwater. At each meeting, a large map was displayed and the public was invited to indicate on the map the location of stormwater concerns – i.e., trash accumulation, erosion, flooding, etc. Informational handouts were also available at the meetings along with the web address to the town website. Please see Appendix E for a copy of the flyer used at the public meetings, Appendix F for the public meeting agenda, and Appendix G for questions and answers generated at the public meetings.

Public meeting flyers were distributed via the stormwater website, the Greater Ocean City Chamber of Commerce listserv (900 business members were reached via email and newsletter), and the Ocean City Hotel-Motel Association (382 members reached via email). In addition, flyers were made available around town.

Attendance at the public meetings was fair. The first public meeting had less than two dozen participants and the second public meeting had approximately thirty attendees. Feedback included questions about specific stormwater problems in locations around Ocean City, such as the east-bound Coastal Highway and the inlet parking lot. At the meetings, the Project Team was able to highlight successful stormwater projects such as the pervious pavement project at the

Gateway Grand hotel to show the potential for change with a stormwater program. Basic costs of stormwater management, including the need for a well-funded operations and maintenance program were shared with the public.

Survey

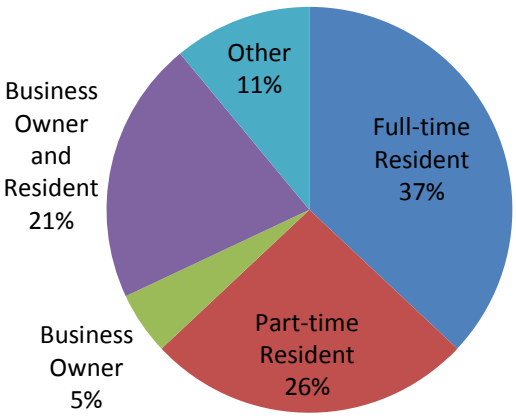
A survey was drafted for distribution at the public meetings and was also made available online via a survey monkey link on the town website[33]. The survey was developed to assess public concern regarding flooding, property damage, unhealthy water, and litter. The survey also assessed public sentiment on the importance of clean water, sustainability in general, appropriate funding for a stormwater program, and education for tourists and/or residents on keeping waterways and beaches clean. Please see Appendix H for the survey instrument.

The 20 survey participants illuminated real concerns with stormwater and its effects on their quality of life. Figure 1 provides the participants' residency status and/or relationship to the Town of Ocean City.

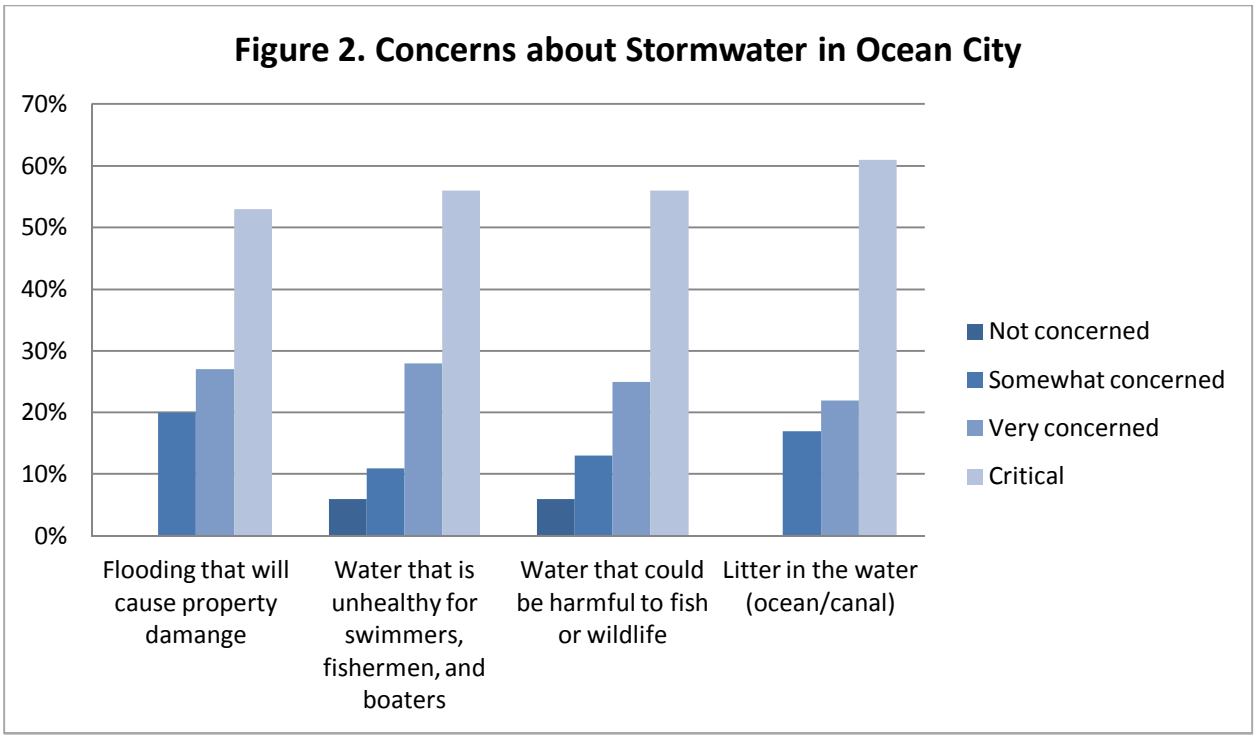
Figure 2 highlights the participants' concerns about the effects of stormwater. Over 50% of responses revealed critical concerns about property damage, water quality, and wildlife health.

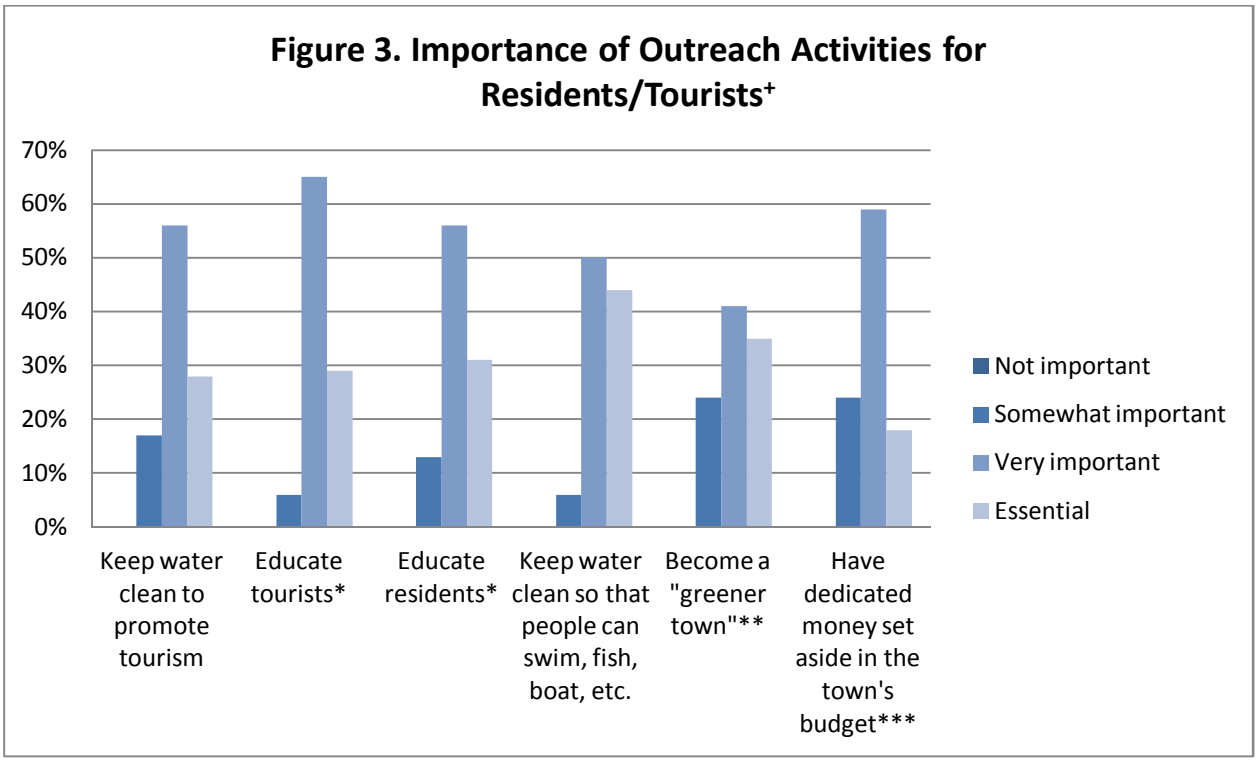
Lastly, participants were asked about the importance of outreach activities to educate residents and tourists as well as take action to improve water quality issues. Figure 3 highlights the participants' results which show that, in all categories but one, at least 50% of responses revealed that these issues are very important to the community.

Figure 1. Residency Status/Relationship to Ocean City



[33] http://oceancitymd.gov/Engineering/ocstormwater.html





*On how to keep the water, beaches, streets, etc. clean
**Including more plants and trees, walk/bike-able, energy efficient buildings
***To improve flooding and water quality problems
+Note that no responses of "Not important" were collected for this set of questions so the graph only show three bars that read, left to right, "Somewhat important", "Very important", and "Essential".

Stormwater Website

Another tool outlined in the outreach and marketing strategy was the development of a webpage that could reside on the Town of Ocean City site and provide information to the public about the ongoing feasibility study. Thus, an "OC Stormwater Community Assessment & Outreach" page was posted on November 30, 2010 on the existing Town of Ocean City site. The site included a link to the stormwater survey referenced above, a blog, Q&A generated at the public meetings, a series of informational powerpoint presentations, information about the public meetings, and a fact sheet. All resources are available for download at http://oceancitymd.gov/Engineering/ocstormwater.html.

Presentations to Key Business and Homeowner Associations

The outreach and marketing strategy called for a series of presentations to key business associations and homeowner associations. Many of the stormwater work group members helped to facilitate these connections. On September 8, 2010, the Project Team presented information about the stormwater feasibility study at the Economic Development Council Breakfast. On September 9, 2010, a similar presentation was made to the Greater Ocean City Chamber of Commerce Business Breakfast. On April 12, 2011, the Project Team presented to the Delmar Condo Managers association. Attendees generally voiced support for the study and gave feedback on stormwater challenges in Ocean City and how they impact the business community.

Two large homeowner associations also hosted the Project Team in the spring of 2011 for a presentation on the study and the impacts of stormwater on Ocean City homeowners. On April 16, 2011 the Project Team presented to the Montego Bay Civic Association (1,523 lots) and on June 25, 2011 to the Caine Keys II Civic Association (314 homes, 14 vacant lots). One of the most significant discussions that occurred at these meetings was about how some residents believed they were already paying for stormwater management. As a result, the Project Team put together a short synopsis for the Montego Bay Civic Association to include in their newsletter about water-related taxes and fees (both state and federal) paid by Ocean City homeowners.

Home, Condo, and Garden Show

On March 18-20, 2011 the Project Team worked the Green Initiative tables at the 2011 Home, Condo, and Garden Show at the Ocean City Convention Center. During this event, information was provided about the stormwater study. The survey was also distributed to interested visitors. A contact list of Ocean City residents and visitors who were interested in learning more about Ocean City green initiatives was also collected at this event. Visitors expressed concerns about the loss of curbside recycling and interest in rain barrels and rain gardens, the mini grant program, and a credit system for stormwater management technologies that use green infrastructure. Visitors had questions about why stormwater is not funded through the existing town budget.

Promotional Materials

A series of promotional outreach materials was generated throughout this study. Many of these materials have been discussed in the above sections and are included in the appendices. Additional promotional materials include a Spring 2011 Ocean City newsletter article (Proposed

Ocean City stormwater fee would generate revenue for town infrastructure, http://oceancitymd.gov/pdf/newsletter_S11.pdf, page 7), a "Protect our Coastal Bays" poster and bus wrap (launched on May 1, 2011) (Appendix I), a Fact Sheet (Appendix J), and an article, featuring Ocean City, published in the March/April 2011 issue of Stormwater Solutions (http://estormwater.com/Storm-Water-Financing-article12656).

Finally, in May 2011, the Project Team, with funding from the MD Coastal Bays Program, assisted with the placement of two advertisements in Ocean City newspapers. The "Protect our Coastal Bays" message used for the posters and bus wrap ran on May 20th and 27th in the OC Times and OC Dispatch.

Chapter 4: Funding Options

It has been clear from the initial involvement of the Project Team in this feasibility study that the Town of Ocean City needs a dedicated, sustainable source of funding for their stormwater program. This idea has been further supported by our analysis of the municipal budget and existing taxes and fees.

Other communities across the country have chosen to fund stormwater programs through a variety of strategies or combinations of strategies. Some of these financing strategies, along with brief comments on their advantages and disadvantages are discussed in the section below. A further discussion on the appropriateness of these strategies for the Town of Ocean City will follow in subsequent chapters.

General Fund Allocation

While many local governments are turning to alternative methods of funding for stormwater management, general fund allocation still remains the most common. Local governments receive general funding from several sources, which include property taxes, sales and use taxes, licenses, permits, intergovernmental revenue, service charges, fines, and forfeitures. The city council distributes the revenue generated from these sources among the local government programs as it deems necessary. However, relying on general fund allocations for the funding of stormwater management programs presents an issue of instability.

When much of a town's infrastructure has reached the end of its natural life expectancy, as is the case for Ocean City's storm drain system, costs for emergency repair will start to become a more frequent occurrence and a much bigger financial burden on the General Fund. It is also important to remember that when repairs are done on an emergency basis, the costs can typically be double, if not triple, what they would be under a normal scheduled replacement program. Not only will this situation lead to more of the General Fund being allocated towards emergency repairs, but with it comes an increase in complaints about traffic disruption and congestion within a community that will require more town staff hours in response to these calls. For a town that is very dependent on tourism, an increase in unplanned disruption for repairs will become a negative factor affecting future revenue.

Since many local governments programs compete for allocations from the general fund, this is typically not a sufficient or stable enough source of funding. For example, government programs such as public safety and social services are consistently seen as a higher priority than stormwater management programs. Therefore, stormwater management has historically been at the bottom of the priority lists of local governments. As a result, stormwater management receives little or no funding and funding levels fluctuate from year to year generally based on emergency needs only. In addition, changing city council members, shifting council priorities, weather events, and other city emergencies all affect the allocation of general funds. The lack of a stable financing mechanism makes it difficult to fund, plan, and carry out a consistent long-term stormwater management program. [34]

[34] Guidance for Municipal Stormwater Funding. National Association of Flood and Stormwater Management Agencies. January 2006.

It should be noted, however, that for some small local governments, stormwater management program funding can, indeed, be met through general fund allocations and no additional financial mechanism for stormwater management is necessary. In such cases, general fund revenues and expenditures are understood, well-established, and accepted by citizens.

Bond Financing

Bonds, although not a revenue source, can be used to finance both the operations and maintenance of stormwater management programs. Local governments can use this financing mechanism when they cannot meet the demand through general funds. Additionally, bond financing is used for large capital improvements that will not recur on an annual basis. This allows local governments to take on large stormwater infrastructure improvements that may not have been a possibility without some kind of financing. [35]

However, since bond financing relies on borrowed funds, the debt must be repaid. In the case of many local governments, bond debt is often paid off through the general fund. This leads to the underfunding of other governments programs in the future. Therefore, though bond financing may make short term stormwater management projects possible, as part of a blended funding scenario (see below), it is not a sustainable financing solution.

Grants

Grants, like bond financing, are not a revenue source. Therefore, financing stormwater management programs through grants is neither a stable nor a long-term solution. Due to the competitiveness and instability of grant financing, grants should not be considered a sustainable financing solution. However, grants may be used for short-term capital and pilot projects.

Blended Funding

Blended funding allows stormwater management programs to be financed through several sources of funding. These sources include stormwater taxes, grants, and loans. This financing mechanism is the reality for most local governments and allows them to spend more on stormwater management than would be possible with a single revenue stream. At the same time, funding fluctuates from year to year as one source or another temporarily dries up. Thus, while blended funding decreases the risks associated with individual financing components, such as instability and unsustainability, the risks of each funding mechanism and its ability to sustain a stormwater program still exist.

Stormwater Utility

A utility is an entity that may collect fees for a specific purpose, in this case, to fund a stormwater management program. A stormwater utility is, considered a dedicated method because funding does not greatly fluctuate year to year and cannot be re-allocated to serve a purpose other than the stormwater program. Projects that may be supported by a stormwater utility include infrastructure retrofits and replacement, public outreach, operations, and

[35] Guidance for Municipal Stormwater Funding. National Association of Flood and Stormwater Management Agencies. January 2006.

maintenance programs, and a variety of other items including staff positions (Planner, Stormwater Manager, etc.), if warranted.

In 1994, the Environmental Protection Agency reported the existence of approximately 100 utilities around the country. In the Western Kentucky University Stormwater Utility Survey of 2011, the authors were able to document 1,175 stormwater utilities (SWUs) located in 39 states and the District of Columbia. They estimate, however, that there are actually between 1,200 and 1,500 SWUs in the U.S. They also state that the average population of a U.S. community with a stormwater utility is approximately 79,000 and the median population is 20,000.[36]

Following a model similar to what is used by a water and wastewater utility, stormwater utilities charge a recurring (usually monthly or quarterly) user fee based on the amount of stormwater "produced" on a landowner's property. These user fees are typically calculated based on the amount of impervious surface (land that does not permit the absorption of rainwater) on the property. Thus, a property owner would be assessed a fee in proportion to the amount of driveway, rooftop, patio, parking lot, and other paved area on the property.

Many communities choose to set up a rate system based on a factor called an Equivalent Residential Unit (ERU) (also known as an Equivalent Runoff Unit). Once an average amount of impervious surface for a single family residential parcel is determined, an ERU (the square footage on a property that is expected to be impervious) is established. The ERU is then used to determine the amount a parcel is charged, sometimes as a flat fee and sometimes as a tiered system. Fees for non-residential properties are typically assessed by multiplying the ERU times the non-residential parcel size. Reportedly, the mean ERU of the utilities assessed in the Western Kentucky University Study was 2,957 square feet of impervious area with a standard deviation of 1,559 square feet.[37] The mean ERU (based on impervious area) reported in the 2010 Black & Veatch Stormwater Utility Survey was 2,453 square feet.[38]

The advantages of establishing a stormwater utility are numerous. In general, these advantages include:

- Stormwater fee revenue is much more reliable and consistent than property tax revenue. (And basing a budget on tax revenue means that a stormwater program has to compete, year-to-year, with other programs funded on tax revenues.)
- Creating a utility means that the stormwater system is treated as infrastructure (as it should be) and not an optional community program.
- A stormwater utility creates a dedicated funding mechanism. Although the local government can change the stormwater utility fee rates as needed, stormwater utility revenues can only be used for stormwater projects.

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[36] Western Kentucky University Stormwater Utility Survey 2011, http://wku.edu/engineering/documents/swusurveys/wku-swusurvey-2011.pdf

[37] Western Kentucky University Stormwater Utility Survey 2011, http://wku.edu/engineering/documents/swusurveys/wku-swusurvey-2011.pdf

[38] 2010 Black & Veatch Stormwater Utility Survey, http://www.bv.com/Markets/management_consulting/Stormwater_Survey.aspx

- Stormwater fee structure can be designed to take into account a community's unique characteristics (housing type, lot size, proportion of industry to residential to government owned properties).
- Stormwater fees are more equitable than taxes because the fee is based on a property's impervious surface and reflects the property's contribution to stormwater runoff.
- Stormwater fees can be a powerful tool for education. Since the fee is directly linked to impervious surface on a property, property owners have an economic incentive to minimize impervious surface if a credit system is put in place.
- Stormwater fees can be charged to tax-exempt properties. This is especially important in cities that have large amounts of government buildings, places of worship, and schools. Since many of these properties are typically large, they can account for a large proportion of a city's stormwater runoff.

Challenges to setting up a stormwater utility should also be taken into account before a community is ready to commit. In general, these challenges include:

- Administrative hurdles at project onset will require startup funding. In particular, costs associated with setting up a new billing system and answering public inquires will be significant for some communities. In many cases, however, these costs decrease dramatically once the utility has been in place for several months.
- Public education, for citizens, municipal officials and elected officials, is essential to the success of a stormwater utility. This will require direct funding or in-kind funding at the local level, possibly through grants or partnerships. The 2010 Black and Veatch stormwater utility survey maintains that 70% of the communities surveyed believed that "organized ongoing public information/education were essential to a stormwater utility fee." [39]
- Lastly, since the stormwater utility fee is based on impervious surface, the impervious surface of each property must be calculated (or a community may choose to assess the impervious surface of a set of representative properties). This typically requires the use of geographical information systems (GIS) as well as an employee to interpret it. Once again, this will cost the government both time and money.

Stormwater fees vary from community to community. The 2011 study from Western Kentucky University reports that the average monthly single family residential fee in the surveyed communities was $4.19, the standard deviation was $2.55, and the median fee was $3.65.[40] In 2010, Black & Veatch reported 2009 fees ranging from $0.75/month (Auburndale, Florida) to $19.80/month (Portland, Oregon).[41] The range of fee amounts likely reflects political climate, level of state and federal regulation, and community needs.

[39] 2010 Black & Veatch Stormwater Utility Survey, http://www.bv.com/Markets/management_consulting/Stormwater_Survey.aspx
[40] Western Kentucky University Stormwater Utility Survey 2011, http://wku.edu/engineering/documents/swusurveys/wku-swusurvey-2011.pdf
[41] 2010 Black & Veatch Stormwater Utility Survey, http://www.bv.com/Markets/management_consulting/Stormwater_Survey.aspx

Stormwater Tax

Some communities looking for an alternative to creating a separate utility fee, including Annapolis, MD and Prince Georges County, MD, have chosen to finance stormwater management through taxes. This source of financing would require an increase in taxes or a decrease in government spending. Increased taxes can take the form of property, income, sales, or other taxes referred to as a stormwater tax or charge. Although this revenue will be deposited in the general fund, city council can designate the increase in revenue to stormwater management. This will ensure that at least a percentage of the general fund will be used for stormwater management. However, factors such as city emergencies, changing council priorities, and/or a shift in council membership can cause the funding allocated to the stormwater program to fluctuate.

The most common type of stormwater tax/charge is an increase in property taxes with the additional revenue designated for the stormwater program. Alexandria, Virginia uses this method to finance the city's stormwater management program. In 2011, Alexandria dedicated a half cent per $100 assessed property value for stormwater management projects. (Thus, a $200,000 property will pay $10 per year towards stormwater management. Notably, this is at the low end of the stormwater utility fees reported in the Black & Veatch stormwater utility survey. The lowest fee reported in the survey is from Auburndale, Florida which shows an average charge of $0.75 per month or $9.00 per year.[42]) This method will provide $3.1 million for the fiscal year 2011. Alexandria officials opted for a tax, versus the creation of a utility, because the city does not currently operate any public utilities. Without the administrative and billing structure of a water or wastewater utility already in place, providing a framework for a new stormwater utility, the implementation of a new utility would be costly. Additionally, Alexandria's City Manager James Hartmann maintains that real estate taxes have the advantage of being tax deductible for property owners and that the city finds them simpler to administer. [43]

One advantage of implementing a new stormwater tax within an existing tax system is that the process of billing property owners is already established, and neither the local government nor property owners need to learn a new billing system. This helps to eliminate some of the administrative costs because adding an additional line item within the tax bill will not require much funding. Lastly, a stormwater tax is a tax-deductible item. This will allow local property owners to alleviate some of the financial burden placed on them by the stormwater tax.

A significant drawback to implementing a stormwater tax is equity. A stormwater tax based on assessed property value says very little about the property's contribution to stormwater runoff. This disconnect, besides being a missed opportunity to connect people with their impact on their watershed, will result in residents being charged for the value of their property rather than for stormwater runoff. For instance, a property valuing $500,000 with proactive stormwater management practices in place (rainbarrel, raingarden, etc.) will be charged substantially more than a property with a value of $300,000 that does nothing to manage their stormwater runoff.

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[42] 2010 Black & Veatch Stormwater Utility Survey, http://www.bv.com/Markets/management_consulting/Stormwater_Survey.aspx

[43] City of Alexandria, Virginia. James K. Hartmann, City Manager. Memorandum March 12, 2010.

Additionally, any increase in taxes is politically different. And even if an increase is achieved, a stormwater tax is not dedicated and thus requires a reallocation of the general fund. If a reallocation of funding from the general fund occurs, stormwater management is unlikely to receive substantial funding. Furthermore, due to tax fluctuations stormwater taxes are a non-stable source of revenue. Economic conditions that the city government cannot control cause property values to fluctuate. Therefore, the revenue generated by a stormwater tax based on property value will fluctuate. These fluctuations make it difficult for city governments to plan and carry out a consistent, long-term stormwater management program.

Another concern with a stormwater tax is that tax-exempt properties, often contributors to stormwater management problems due to large building footprints and large parking lots, are difficult to tax. Although a property tax bill can be created for tax-exempt properties, this will require an increase in administrative costs. Additionally, many tax-exempt properties (such as government buildings, places of worship, and schools) will fight paying such a tax.

Lastly, stormwater taxes place a larger financial burden on residential properties. An example supporting this claim can be found in Takoma Park, Maryland,

> "The rates assessed by the City Council for stormwater management have varied from 3 cents to 8 cents per $100 of assessed value. It would require a tax of about 6 cents per $100 to generate the same amount of revenue as the stormwater fee generates. About 80 percent of single-family homeowners pay less for stormwater management under the fee system than they would have paid under the property tax system." [44]

Although most of stormwater management revenue will come from residential properties, residents typically will not favor giving commercial and industrial properties a break.

[44] http://www.takomaparkmd.gov/publicworks/stormwater.html

A summary of the advantages and disadvantages of a stormwater utility versus a stormwater tax is below:

Utility	Tax
Pros	**Pros**
Reliable and consistent year-to-year funding	Billing system already in place
Stormwater system gets funded as infrastructure instead of optional community program	May be initially easier for public to understand because it is based on property value
Dedicated funding mechanism	Tax deductible
Can be structured to fit unique community characteristics	Lower administrative costs
Fee is equitably based on contribution to runoff	
Credit system possible	
Tax-exempt properties included	
Cons	**Cons**
Administrative start up costs	Not equitable
Direct or in-kind funding needed for public education	Requires politically-difficult increase in property taxes
GIS software and analysis needed	Will require reallocation from general fund
	Fluctuations in revenue likely
	Many properties tax exempt
	Larger burden on residential properties

Chapter 5: Ocean City Stormwater Program Funding Needs

In assessing the needs of a sustainable stormwater program, the Project Team worked with town officials to take a comprehensive look at all aspects of their current spending on stormwater management. We found that the current level of funding dedicated to stormwater management in Ocean City was drastically under-budget compared to the demonstrated need.

The Project Team found that a revenue stream of almost $12 million, when adjusted for inflation at a rate of 2.5% per year will be needed over the next ten years to fully support a comprehensive stormwater program.[45] The total cost can be broken down into the following categories:

Personnel Costs

Total personnel costs consist of expenditures for a maximum of two new full time staff at $45,000 each, including benefits, for drainage system cleaning and repair positions. Salary is also included for one new full time staff member at $65,000 for utility implementation and three additional temporary interns at $5,000, one each for fall, spring, and summer. It is assumed that salaries and wages will increase each year with inflation. A summary follows:

- 1 Drainage system cleaning position @ $45,000/year including benefits
- 1 Cleaning/Repair position @ $45,000/year including benefits
- 1 Utility implementation position @ $65,000/year including benefits
- 3 Additional interns per year @ $5,000/each semester

Total Personnel Costs:

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
$170,000	$174,250	$178,606	$183,071	$187,648	$192,339	$197,148	$202,077	$207,128	$212,307

Capital Improvements

Capital improvements consist of expenditures to replace the failing pipe currently used in the collection system, including costs associated with inspections; buying and installing additional pipe, structures, and outfalls; and retrofits for infrastructure. It is assumed that all capital improvement costs will increase each year with inflation.

- Collections system
  - Replace failing pipe @ $500,000 per year
  - Inspection @ $20,000 per year
  - Additional capacity for work @ $88,000 per year

[45] Inflation was taken into account for all expenditures in years 2-10; Inflation = 2.5% based on 10 year percent change in consumer price index (CPI). The % change in annual CPI since 1999, from December-December = 2.45%. The percent change in the annual average CPI since 1999 = 2.47%. (U.S. Department Of Labor Bureau of Labor Statistics, Washington, D.C. 20212, Consumer Price Index, All Urban Consumers, U.S. City Average, All Items, 1982-84=100, Retrieved from: ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt

- Retrofit infrastructure
  - Retrofit program @ $75,000 per year
  - Inspections @ $2,500 per year
  - Other retrofit expenses @ $7,500 per year

Total Capital Improvement Costs:

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
$693,000	$710,325	$728,083	$746,285	$764,942	$784,066	$803,668	$823,353	$844,353	$865,462

Operations and Maintenance

Operations and maintenance costs consist of expenditures for purchasing and installing camera equipment for surveillance of illegal dumping; implementing two recommended BMPs per year in the first four years[46]; equipment and employee training for drainage system cleaning and repair; contracted cleaning as needed (a cost-effective alternative to purchasing trucks); the cost-share program; the mini-grant program, which is expected to increase from $10,000 in the first year to $20,000 in year three; storm drain stenciling; outreach efforts (including funds for meetings, workshops, website creation, stormwater hotline, print materials, volunteer program supplies [trash bags, t-shirts, litter gutters, gloves]); advertising; postage; emergency response services for cave-ins and flooding; stormwater inventory and planning, which includes annual inspections; and purchasing software with an assumed annual fee of $100 to maintain the most up to date version.

The total for an adequate operations and maintenance program is equivalent to almost $200,000 in year one. It is anticipated that the budget for years two through ten will be variable based on the installation of Best Management Practices (BMP's) recommended and prioritized by the *Stormwater Management Best Management Practice Feasibility Study* prepared for the Town of Ocean City Engineering Department in May 2011 by George, Miles & Buhr, LLC. It is assumed that all operations and maintenance costs will increase each year with inflation.

- Camera equipment @ $10,000 for year 1 only
- Recommended Best Management Practices (BMPs) in years 1-4 as follows:

Year 1	Year 2	Year 3	Year 4
$42,490	$107,113	$6,934	$399,903

- Drainage system cleaning and repair
  - Equipment, employee training, other @ $10,000 per year
- Contracted cleaning @ $20,000 per year
- Cost-share program @ $50,000 per year

[46] *Stormwater Management Best Management Practice Feasibility Study* prepared for the Town of Ocean City Engineering Department, May 2011, George, Miles & Buhr, LLC.

- Mini-grant program @ $10,000 for years 1 and 2 increasing to $20,000 for years 3-10
- Storm drain stenciling @ $5,000 per year
- Outreach initiatives @ $14,500 per year
- Emergency response @ $30,000 per year
- Stormwater inventory and planning @ $5,000 per year
- Software @ $400 for first year plus additional $100 every year thereafter

Total Operations & Maintenance Costs:

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
$197,390	$255,328	$168,348	$565,353	$169,586	$173,825	$178,171	$182,625	$187,191	$191,871

Regarding estimated expenditures for operations and maintenance, it is very important that the town of Ocean City have a regular storm drain cleaning program in place instead of the sporadic cleaning program currently in place. According to town officials, storm drain cleaning is currently based on the availability of the Department of Public Works Jet Vac truck. As part of this study, the Project Team did explore the possibility of recommending the purchase of a new truck compared with contracting the services out. At the time of writing this report, it was unclear which would be more cost effective because we were unable to get a specific quote for the cost of contract cleaning for the town. For calculation purposes above, we estimated contract cleaning at $20,000 per year. The Project Team therefore recommends that the town contract storm drain cleaning out for the first year. At the end of the year, the town will have a better idea of the annual cost of contract cleaning versus the costs associated with purchasing a new truck (including insurance and maintenance of that truck and capacity costs).

Total Expenditures

The total expenditures, including personnel costs, capital improvement costs, and operations & maintenance costs are as follows:

Total Expenditures:

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
$1,060,390	**$1,139,903**	**$1,075,038**	**$1,494,709**	**$1,122,176**	**$1,150,231**	**$1,178,986**	**$1,208,461**	**$1,238,673**	**$1,269,639**

Total cumulative expenditures 10 years: $11,938,206

Based on the total expenditures for 10 years, a discussion of the necessary revenue to maintain a sustainable stormwater management program follows.

Chapter 6: Rate Structure Analysis

Why This Study is Recommending a Stormwater Utility for Ocean City

Based on the needs assessed by the Project Team in the section above, the Town of Ocean City will incur close to $12 million in stormwater expenses over the next ten years. Our key recommendation is to create a stormwater utility fee that will distribute the costs of paying for repairs and improvements in proportion to the types of land uses that are contributing to the problem. As explained earlier, the more impervious surface that a property has, the more stormwater it generates and the more responsibility the property owner has to help the Town of Ocean City manage stormwater. The basic premise behind a stormwater utility is that, as private driveways, parking lots, swimming pools, decks, and other such structures allow residents and businesses to enjoy additional living and working conveniences, the extra burden of repairing and maintaining the infrastructure burdened by those additional structures should be shared by those contributing to the problem and not solely by a town. Just as a building is responsible for paying its share of processing the waste it generates, the potable water is uses, or the electricity it consumes, so should they recognize and be accountable for the stormwater that is created from their built environment.

Once it became clear that there was a significant need to have a dedicated funding source to cover the growing stormwater costs for the Town of Ocean City, the Project Team considered what the best source of the funds would be. The Project Team initially considered assessing a property tax, but since the value of a property is not an indicator of the amount of runoff, the property tax was not seen to be the most equitable way to pay for a stormwater program for the town. For example, two properties – a hotel and a strip mall – may pay identical property tax due to their assessed value. However, the tall hotel that does not have a large parking lot (i.e. the square footage is significant but it is vertical and thus has less of a footprint) contributes less to the stormwater problem than the strip mall with a large parking lot and paved store entrances. The hotel should not have to pay as much for stormwater management because it is contributing less runoff. But, if property tax is used to determine the stormwater tax, the hotel will pay the same amount as the strip mall.

A stormwater utility fee allows for the assessment of the amount of impervious surface contributing to the stormwater problem. Since 79% of the town is covered in impervious surface, we believe that it is appropriate to charge properties that contribute significant runoff more and properties that contribute insignificant runoff less. Additionally, a utility fee can be structured with respect to Ocean City's unique characteristics.

Ocean City Stormwater Utility Goals and Objectives

In the early stages of this study, the Project Team was able to assess that there were large expenditures associated with managing the Town of Ocean City's stormwater program. It became abundantly clear that a utility was potentially going to be the best option for consideration as a way to secure dedicated funding for the stormwater program.

Thus, when various town officials from several departments worked with the Project Team to assemble and prioritize specific goals and objectives for the stormwater program, the goals and

objectives were reconsidered to determine how well they fit with the idea of a utility. The goals and objectives, addressed in Chapter 2 but included here for additional consideration, are:

- Allocate the costs of stormwater management in a manner that is fair and equitable.
- Assist in the reduction of stormwater runoff to address flooding and water quality issues.
- Generate adequate revenues for stormwater management activities such as:
    - Backlogged projects
    - Current Projects
    - Future Projects
    - Emergency Projects
    - Make stormwater management a self sustaining program
    - Education and outreach programs
    - Fund governmental mandates: Total Maximum Daily Loads (TMDL), National Pollution Discharge and Elimination System (NPDES).
- Have stronger accountability for stormwater management spending
- Address and reduce water quality stressors[47]

These goals and objectives are not listed in any particular order of importance because they are all priorities for the town. Additionally, the Project Team believes that these goals and objectives can be well met with funding generated through a stormwater utility.

Billing Recommendations

There are two options to consider for billing of a stormwater utility for Ocean City. One is to put it as a separate line on the tax bill and the other is to include it on the wastewater bill. Each option has advantages and disadvantages. If stormwater is listed as a line item on the property tax bill, it is less likely to be contested since the amount would be very small compared to the larger assessment of the total tax bill. The drawback, however, is that Ocean City taxes are paid to Worcester County and so the revenue would have an extra step of processing before it was returned to the Town of Ocean City. In contrast, if billing occurs as a separate line on the wastewater bill, it is easier for Ocean City to collect this money since it wouldn't be a considerable additional administrative burden. (Since the wastewater system cannot be shut off for delinquent payments, however, some stormwater fees could go unpaid. It is assumed that unpaid bills would be forwarded to collection agencies and could eventually be recovered.)

With those two billing choices in mind, it is recommended that the Town of Ocean City apply the stormwater utility fee billing to the wastewater bill as a separate line on the bill that would indicate exactly how much is being applied towards stormwater. Another recommendation is to

[47] http://www.epa.gov/ednnrmrl/publications/waterquality/stressorspollutants/index.htm

have a policy in place that would not forgive non-payers should they simply refuse to pay their fee (i.e. pay the portion of the bill that is for wastewater but fail to pay the portion designated for stormwater). Leniency on payments should be avoided from the inception of the utility. Based on the experience of other communities, when a city becomes known for not enforcing their fee collection, word spreads very quickly and expected revenue is lost. A stated action policy for non-payment should be set up in advance with strict penalties put into place, similar to the penalties faced for non-payment of the wastewater bill.

For example, interviews with program staff in Takoma Park, Maryland revealed that the city had a high rate of non-payment in the initial years of implementing their utility. Because no penalty was assessed to non-payers, loss of anticipated revenue began to affect the program. Program staff finally created a policy that stated after three late notices a lien would be placed on the property. They also instituted penalties, including accrued interest, for non-payment. The city was thus able to remedy the non-payment situation very quickly. The Town of Ocean City should avoid this mistake by launching the utility with a strict enforcement policy in place, with a policy in place for non-payment that results in official action by town officials.

One specific consideration for the Town of Ocean City is that there are many property managers and associations who may be the account holder for wastewater billing. For example, if a condominium, townhouse, or mobile park complex gets one bill for the entire complex, the bill should be divided up by the property manager and each unit should be expected to pay their share of the bill. If a residential dwelling resides within a commercial business, such as a condo located in a hotel, and the hotel owner is assessed a fee on the hotel wastewater bill, the resident should be expected to pay a small portion of the fee. Utility staff will need to consider various other circumstances and establish policies ahead of time to address them. For example, the town does have a vacant lot charge and the stormwater utility bill should be applied to that vacant lot bill.

Finally, based on the experience of other communities interviewed in the course of this project, it is recommended that the town set up a strong administrative structure to deal with public questions and concerns, particularly when the utility is first launched. Other communities who have implemented stormwater utilities report that the outreach need is very high at first but declines as the utility rolls out. A help line and town staff members should be made available to quickly address customer concerns.

Rate Structure Analysis

In determining an equitable funding strategy for collecting approximately $12 million in revenue, over the next ten years, to pay for stormwater related expenditures, a review of total dwellings was made using the average impervious surface of 1 ERU equal to 2,500 square feet. The Project Team calculated revenue based on an ERU-based flat rate fee for residential properties and a fee structure for non-residential units.

Summary of recommended rate structure for residential properties

The decision to recommend a flat rate fee for residential properties was not made lightly. After reviewing the large number of residential units and the many different types of residential properties located within the town of Ocean City, the Project Team became concerned that

additional capacity would be required by the town in order to properly estimate the total impervious surface for so many properties. The Project Team consulted with the town staff and it was agreed by all parties that calculating impervious surface on every residential property would cause significant administrative burden. In addition to this being an overwhelming effort, the Project Team agreed that the risk of errors on bills could cause confusion about the billing calculation and increase the risk of complaints from the residential population. Additionally, the Project Team found that there was not a large enough discrepancy between the sizes of the residential units to consider taking on the task of developing unique bills for 28,085 residents. The best recommendation to solve this problem was to calculate a fee that would be fair based on the average size of residential units.

Summary of recommended rate structure for non-residential properties

The decision to recommend a fee structure using actual impervious surface for non-residential units was based on the fact that commercial units ranged so greatly in size, with some large hotels to mid-level stores to very small shops. Due to this large discrepancy that exists in size between non-residential units, it is therefore recommended that the fairest system would be to calculate a fee structure using the actual impervious surface of the non-residential unit and issuing the bill. It was agreed upon by town officials and the Project Team that calculating the impervious surface for non-residential properties would be feasible and practical for the town staff to administer and would be the most equitable method based on the large size of many of the commercial properties. The town of Ocean City has adequate GIS mapping already in existence for estimating the impervious surface for each commercial building. Although the size of many properties may be significant, the total number of properties being assessed would not prove difficult for town staff compared to that of assessing residential properties.

For all 1,080 commercial properties, it is recommended that a utility fee be assessed based on each one's total impervious surface. For example, if a commercial property is estimated to have an impervious surface of 10,000 square feet and each ERU is equal to 2,500 square feet, the property will be billed for 4 ERUs. If each ERU is worth $35 a year, the total bill per year for this business is $140. All commercial properties, regardless of status (governmental, non-profit, etc.) should be assessed a stormwater utility fee based on its contribution to the problem.

After conducting a sensitivity analysis using various fee structures, the Project Team found that **$35** a year per ERU of impervious surface was found to yield the lowest revenue necessary to maintain a sustainable stormwater management program. Since the town has not yet decided which BMPs will need to be implemented over the next four years, and the BMPs have varying costs, a utility rate adjustment may need to be made by year five. Another variable to be considered in terms of rate adjustment is the impact of a credit system, if it is implemented as recommended, by year three.

Estimated total revenue from all properties

The estimated total revenue generated is distributed between residential and non-residential properties and is calculated as follows:

Residential - The residential properties yield a total of $982,975 per year based on a fixed yearly rate of $35 for a total of 28,085 residential properties. (Thus, the residential fee is based on the

assumption that an average property has about 2,500 square feet of impervious surface and, therefore, all properties are billed for 1 ERU per year.)

Non-Residential - There are approximately 1,537 businesses in the Town of Ocean City, located within a total of 1,080 commercial properties. Since we would be basing a stormwater utility bill on the impervious surface of a property, the bill will be sent to the property owner or property manager of that building. It will be the property manager's responsibility to disburse the billing to the business clients as they see fit.

Based on 1,080 non-residential properties, the total revenue yield is estimated to be $229,950 per year. The town of Ocean City provided the Project Team with the average impervious surface of a non-residential property which equals 15,208.31 square feet. This number was then divided by 2,500 square feet (as stated earlier equals 1 ERU), which yields 6.083324 ERUs. Thus, 6.083324 is the average amount of impervious surface on a non-residential property. 6.083324 was then multiplied by $35 ($212.92 per property per year), and then multiplied by the total number of non-residential properties, which equals 1,080 units.

When adding the anticipated revenue totals over the next ten years from residential and commercial properties, we are able to reach the required $12 million necessary for maintaining a sustainable stormwater management program as seen in the chart below:

Total Revenues:

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Residential Properties	$982,975	$982,975	$982,975	$982,975	$982,975	$982,975	$982,975	$982,975	$982,975	$982,975
Commercial Properties	$229,950	$229,950	$229,950	$229,950	$229,950	$229,950	$229,950	$229,950	$229,950	$229,950
Credits	$0	$0	$30,000	$30,750	$31,519	$32,307	$33,114	$33,942	$34,791	$35,661
Total Revenues	**$1,212,925**	**$1,212,925**	**$1,182,925**	**$1,182,175**	**$1,181,406**	**$1,180,618**	**$1,179,810**	**$1,178,982**	**$1,178,134**	**$1,177,264**

As indicated above, based on a credit system imposed in year 3, revenues will decrease depending on how many residents take advantage and to what extent they utilize the system. An estimate of the impact of these credits must be considered in future years and is included in the table. It is unclear just how effective the credit system will be and there are no data that supports an average amount to consider. Therefore, the Project Team used a starting point of $30,000 adjusted for inflation at 2.5% each year. For more information about a credit system, please see Chapter 7.

More on how the ERU was calculated for Ocean City - As stated earlier in this report, an Equivalent Runoff Unit (ERU) is the amount of impervious surface, usually measured in square feet, of a typical property. An ERU is often calculated by collecting the impervious square footage of a random sample of houses across an area of a city. The resulting numbers are then analyzed and an average or median impervious surface value for the data set is used to determine the value of an ERU.

Calculating an exact ERU for the Town of Ocean City proved interesting for a number of reasons. The biggest challenge was, by far, the range of dwelling-types located within the town

limits. Ocean City has an atypical mix of dwelling-types since it caters to the tourism industry rather than being a place for year round living. Within the Town of Ocean City, there are 2,211 single family homes; 1,161 condominium projects with a total of 22,804 units; 1,283 townhouses and duplex units; and 1,787 mobile homes. An additional challenge were dwelling-units housed within commercial businesses (or businesses housed within dwelling-units). In Ocean City, some of the condo units hold businesses and some of the businesses, such as area hotels, have residential units mixed in. A third challenge was determining which entity was responsible for impervious surface when it is shared space. For instance, some businesses share parking lots, walkways, and common areas (and some, we found, even share bathrooms). In a municipality such as Ocean City where every plot of land is of high value, development occurs cheek by jowl and shared arrangements become a necessity. Adjusting for these variations proved challenging when trying to determine what was considered an "average" number or random sample.

In order to calculate a fair and equitable ERU rate for the Town of Ocean City, the Project Team began by collecting information about the total number of residents and businesses in the town. Because of the wide variety of housing options, the Project Team decided not to choose a random sample within the town but rather, examined the total number of dwellings of all single family homes; multi-family units; condominiums, apartments, townhouses, mobile homes; as well as commercial properties; tax exempt buildings; and industrial buildings. The Project Team looked for the average lot size and the average impervious surface using GIS mapping for each type of dwelling.[48] With this information, the Project Team was able to determine the appropriate ERU to set for the Town of Ocean City. Based on this data collection, it was determined that one ERU should be equal to 2,500 square feet of impervious surface.

Average Impervious Surface by Dwelling Type:

Dwelling Unit	Average Impervious Surface
Single-Family Dwellings	3,481.26
Condos	1,065.11
Town Houses/Duplexes	1,865.41
Mobile Homes	2,097.74
Non-residential Properties	15,208.31
Average total impervious surface (residential & non-residential):	4,691.46
Average total impervious surface (residential only):	2,127.38

The justification for an ERU being set at 2,500 square feet is that it is a number that falls between the two averages – 4,691.46 square feet for all properties and 2,127.38 square feet for residential properties – and that it is very close to the average ERU square footage found around the country (2,453 square feet was the average ERU for the 70 utilities in 20 states surveyed for the 2010 Black & Veatch stormwater survey; 2,957 square feet (with a standard deviation of 1,559 square feet) for the 1,175 utilities in 39 states and the District of Columbia was the average ERU for the Western Kentucky University survey, both cited extensively in previous sections).

[48] Personal communication, Karen Zera, GIS Coordinator, Town of Ocean City, January 21, 2011.

In addition, after conducting a sensitivity analysis that used different ERU calculations to compare the average impervious surface for a Town House and a non-residential property, 2,500 square feet stood out as an equitable number that is fair for all dwelling types. As a community that relies so heavily on tourism as a base for the local economy, the Project Team recommends that ERUs should be capped at 25 for any one business. This cap is recommended so as to not financially devastate any one particular local business and will make the bill both manageable and reasonable for all involved. It is recommended that no bill be beyond 25 ERU's regardless of size of property.

Finally the Project Team recommends that, when explaining the fee structure to property owners with smaller properties (who may not literally have 2,500 square feet of property, much less 2,500 square feet of impervious surface), that the structure was set up based on average contribution to stormwater runoff. It also should be noted that additional structures beyond the units themselves, such as swimming pools, paved parking lots or cement landings, sheds, patios, courtyards, tennis courts, recreational and/or workout rooms, and other such structures are part of calculated total impervious surface. Regardless of individual ownership, some of these amenities and storage spaces must be shared by all owners of the buildings.

Flat fee versus tiered system for residential properties - Early on, the Project Team considered whether to recommend a tiered system of payment for different residential dwellings or a flat fee. In a tiered structure, the ERU-based system allows differentiation based on the amount of impervious surface on a residential property. This differentiation allows residential parcels with smaller amounts of impervious surface to be charged less than a residential parcel with large amounts of impervious surface. Once all impervious surfaces are calculated, generally based on aerial photos and a GIS database, residential tiers can be established. Although this ERU rate structure provides a larger amount of equity among residential units, calculating each parcel's impervious surface increases administrative costs. In a flat fee scenario, the ERU-based system charges all residential properties the same flat fee regardless of acreage, house size, the existence of outbuildings, or the amount of impervious surface on a property. (Commercial and industrial properties may be charged a flat fee based on property size and/or a multiple of the established ERU.) A drawback of this structure is that, once an ERU is set as an average, no differentiation is made between residential parcels of different sizes. In a community where lot sizes or house sizes range from very small to quite large, this structure may not be appropriate or equitable. However, the advantage of this structure is that it is simple, easy to explain to the public, and does not require access to a GIS database of every property.

After much analysis, it is recommended that the Town of Ocean City charge a flat rate for residential dwellings regardless of parcel size, building footprint size, the existence of outbuildings, or housing type. The reason for this recommendation is primarily based on the sheer number of different types of dwellings that exist within the town. It would be an overwhelming administrative burden to initiate a new stormwater utility with the expectation of calculating the impervious surface for so many different types of residential dwellings within the Town. A tiered system may also open up an opportunity for confusion and misinformation among residents (and the corresponding administrative burden to address these concerns), particularly because so many homeowners do not reside in Ocean City year round.

The sheer number of different residential units within the town of Ocean City, the time it would take for town officials to calculate all impervious surface for each unit (or even each housing type), as well as the potential confusion by rate payers, are all justifications for the use of a flat fee for residential properties. These justifications were supported by stormwater utility officials in Takoma Park, Maryland, Alexandria, Virginia, and Lewes, Delaware, based on their own experience setting up a utility. Therefore, it is recommended that all residential properties, regardless of parcel size, building footprint size, the existence of outbuildings, or housing type, pay a flat fee of $35 per year.

Chapter 7: Credit System and Exemptions

Explanation of Credit System

A typical feature of many stormwater utilities around the country is some type of credit system which allows a reduction or adjustment to be made to an assessed utility fee. A credit is usually allowed if a homeowner or business has put into place some sort of approved Best Management Practice (BMP), a retention system, or a detention system that will reduce stormwater runoff discharged from a property. The incentivized natured of a credit system aligns well with the philosophy of a utility - that property owners should be responsible for the stormwater runoff contributed by their property. Thus, if an action or an investment made on a property reduces the total impact of stormwater, the property owner should be offered a reduction in their stormwater fee in exchange for taking action.

What is offered as a credit can vary significantly between communities. The most important thing about a credit system is that it is well thought-out, equitable, and resistant to any potential abuse that may derail the legality and legitimacy of a stormwater utility program. Notably, many utilities that were interviewed by the Project Team reported that credit systems do not result in a significant reduction of utility revenue but do generate community goodwill.

Black & Veatch report that 53% of 70 surveyed utilities reported offering credits for private detention/retention facilities. This is up from 2005 and 2007 responses which were around 45%. Additionally, when asked in the 2010 survey if the utility offered credits for a series of BMPs, 85% of respondents said yes to retention ponds, 42% said yes to rain gardens, 42% said yes to other (which included bio-retention swales, green roofs, detention tanks, and pervious pavement), and 18% said yes to rain barrels.[49]

The creation of a credit system is one way to show residents and businesses that the proposed recommendation of a stormwater utility is a fee-based entity and not a tax-based entity. A credit system gives an opportunity to reduce or eliminate the charge of paying an assessed stormwater fee, an opportunity not feasible with a tax-based stormwater fee. Having a well understood and fair credit system in place encourages practices that are voluntary rather than required. This helps achieve some of the long term goals of improving water quality.

In some cases, communities choose to offer no credit system at all. These communities likely see such a system as complicated, time consuming, and potentially costly. Since stormwater fees are relatively little money, communities may also determine that a credit system is a lot of effort (for utility administrators as well as utility customers) for only a slight cost savings.

Credit systems can include a clause that allows credits for past efforts, such as BMPs completed within a certain time frame of implementing a Stormwater Utility Fee. Most often, credits are granted on an individual basis but, in some situations, they could apply to a group of individual property owners who are part of an entity like a condominium or homeowner association, mobile home park, or businesses with shared space.

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[49] 2010 Black & Veatch Stormwater Utility Survey, http://www.bv.com/Markets/management_consulting/Stormwater_Survey.aspx

Finally, there may be times when there is a question as to whether a Stormwater Utility fee has been incorrectly calculated and an appeal in writing is often considered an accepted format for requesting recalculation of a fee. In this case, the credit system may be used to account for any discrepancies in the system.

Specific Recommendation for Ocean City Regarding a Credit System

The Project Team recognizes that there is great value in having the Town of Ocean City include a fair and detailed stormwater utility credit system to allow and encourage property owners to incorporate certain measures that will reduce their impact of stormwater. Having said this, however, setting up such a credit system can be very time consuming. In discussions with other communities who have implemented utilities, the Project Team learned that a lot of time and energy goes into creating a fair, clearly articulated, and well thought out credit system. Thus, it is the recommendation of the EFC Project Team that Ocean City not implement a credit system until year three, in order to have sufficient time and resources to devote to establishing the utility.

In the second year, utility administrators should begin compiling a complete list of appropriate BMPs that could be used on Ocean City properties. At this time, discussion can begin among the Town Engineer, Department of Public Works Director, and Environmental Planner regarding the appropriate amount of credit that should apply to each BMP. Alternately, this task could be contracted out to organizations having experience in this area. It is also recommended that the Town of Ocean City create a manual that will help explain the allowable credits. Once the credit system is in place, it is recommended that the Town of Ocean City consider allowing credits to be applied to BMPs dating back up to five years. This will account for those pro-active property owners who have already taken the initiative to put some stormwater controls in place.

Assuming that a credit system is put in place by year three, a reduction in the revenue stream anticipated for the stormwater program should be accounted for. Unfortunately, the Project Team was unable to find data from other utilities on how many utility customers can be expected to take advantage of stormwater utility credit systems. Thus, the Project Team projected that credits totaling $30,000, beginning in year three and increasing with inflation every year thereafter, could be expected. If this estimate is correct, in the fifth year of the Ocean City Stormwater Utility, a potential increase of $5/year per ERU should be considered. This may also account for unanticipated expenses or shortfalls in revenues.

Exemptions

Some utilities decide to grant an exemption to a property that will completely clear the property owner of paying a stormwater fee. Caution must be advised when making exemptions to a stormwater utility for two reasons. The first is an issue of equity – the exemption may not be considered fair for others unable to take advantage of the exemption. The legality of any exemption and whether it is discriminatory must be carefully examined. The second reason for caution is that long-term revenue calculations for the utility are based on the assumption that all property owners contribute to the stormwater problem and all property owners should contribute to the utility which is designed to remediate the problem. If too many exemptions are allowed, it could significantly impact the total revenue needed to pay the full cost of the stormwater problem in Ocean City. Examples of common exemptions include vacant lots, agriculture land,

or undeveloped property. The reasoning is that there is little or possibly no contribution to stormwater from these properties and, therefore, fees shouldn't be charged. Other considerations for possible exemptions include public roads maintained by state and county (popular exemption with many states), non-profits, federal or state properties, and elderly or welfare recipients.

The Project Team recommends that Ocean City severely limit any exemptions. If exemptions are to be allowed in the first year or subsequent years, the only one that seems to have any merit would pertain to undeveloped land in Ocean City with no structures. (The Project Team does not consider parking lots [obvious contributors to stormwater runoff] undeveloped simply because there are no structures.) Further, the Project Team does not recommend including non-profits (including houses of worship) or government buildings in exemptions. Tax exempt properties who question their obligation to pay a stormwater fee may need to be reminded that the fee is directly related to their property's contribution to runoff.

Chapter 8: Summary of Recommendations

In summary, the Project Team strongly urges the Town of Ocean City to invest in their stormwater program now to prevent catastrophic failure in the future. The stormwater system, like the town's water and wastewater systems, must be treated as critical infrastructure with dedicated funding for repair and maintenance. After exploring a suite of financing options, the Project Team recommends the creation of a stormwater utility.

As stated in Chapter 6, the Project Team recommends the use of a rate structure based upon Equivalent Residential Unit (ERU) (also known as an Equivalent Runoff Unit) where 1 ERU equals 2,500 square feet. It is further recommended that each ERU on a property be assessed $35 per year.

The Project Team calculated revenue based on an ERU-based flat rate fee for residential properties and a fee structure for non-residential units based on impervious surface.

Residential --The residential fee is based on the assumption that an average property has about 2,500 square feet of impervious surface and, therefore, all properties are billed for 1 ERU per year. Thus, it is recommended that all residents will be charged $35 per year regardless of property size or amount of impervious. Revenue from residential properties will yield a total of $982,975 per year based on $35 multiplied by 28,085 properties.

Non-residential --The non-residential fee is based directly on the amount of impervious surface on a property. For example, if a commercial property is estimated to have an impervious surface of 10,000 square feet and each ERU is equal to 2,500 square feet, the property will be billed for 4 ERUs. If each ERU is worth $35 a year, the total bill per year for this business is $140. All commercial properties, regardless of status (governmental, non-profit, etc.) should be assessed a stormwater utility fee based on its contribution to the problem. Revenue from all non-residential properties will yield an estimated total of $229,950 per year based on 1,080 non-residential properties each paying an average fee of approximately $213 per year.

The report concludes that Year 1 revenue will total $1,212,925. The Project Team projects that, assuming a slight reduction starting in year 3 after a credit system is established, the utility will be able to collect the necessary $12 million by the end of Year 10 in order to properly repair and maintain the stormwater system. It is also recommended that the town wait until Year 3 to launch a credit system and consider raising the rate slightly from $35 to $40 per ERU per year in Year 5.

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.

Megan Hughes, Program Manager – mhughes3@umd.edu

Megan Hughes has been with the EFC since early 2008. From 2003 to 2007 she served as an Instructor and Internship Coordinator for the Center for Environmental Programs at Bowling Green State University in Bowling Green, OH. She also worked for two years with the Chapel Hill, NC, firm Environmental Consultants and Research (EC/R, Inc.) as a contractor to the Environmental Protection Agency Office of Air Quality Planning and Standards (OAQPS). Ms. Hughes received her Master of Environmental Management degree from Duke University's Nicholas School of the Environment and Earth Sciences and a Bachelor of Arts Degree in Environmental Studies from the University of North Carolina at Wilmington. Her Master's Project, entitled "Creating the Urban Toolshed: A case study of Durham children's perceptions of nature and neighborhood," was authored during her time as an environmental education consultant for Durham Parks and Recreation in Durham, NC. During graduate studies, she also held a series of positions in the Triangle region of NC with the North Carolina Solar Center, the Center for Environmental Education, and Triangle J Council of Governments.

Steven Theroux, Graduate Assistant – stheroux@umd.edu

Steven Theroux is a second year Environmental Policy student who will be graduating in spring 2012 with a Masters of Public Policy. He has worked as a graduate assistant for the EFC since the fall of 2010. Steven's research interests include water resource management, renewable energy, green infrastructure, and local government finance.

Acknowledgements

Special thanks to **Monica Billig**, EFC Graduate Assistant, for general project support.

Special thanks to **Carrie Decker**, Watershed Implementation Specialist with the Maryland Department of Natural Resources Watershed Services Unit, for leading the public outreach and education components of this study.

Special thanks to the members of the **Ocean City Stormwater Work Group** for their support and ideas throughout the project.

Appendix A – Stormwater Work Group Members

The Stormwater Work Group was comprised of 17 members representing a diverse set of backgrounds in the community, including residents, business owners, town officials, and community organizations. Over the course of the project, the work group met four times at the Ocean City Town Hall, on April 14, June 7, and September 8, 2010 and April 12, 2011. Of the 17 members, seven were town officials representing the Public Relations, Public Works, Engineering & Construction Inspection, Planning & Community Development, Emergency Services, and Police departments. Additionally, two members represented the Maryland Coastal Bays Program, two members represented local schools (Ocean City Elementary School and Stephen Decatur High School), one member represented Maryland's Department of Natural Resources, one member represented the Chamber of Commerce, one member represented a large property management business (Mann Properties), two members represented a citizen-based watershed organization (Friends of Walkers Pond), one member represented a business association (Ocean City Hotel-Motel-Restaurant Association), and two members represented homeowner associations (Montego Bay Civic Association and Caine Keys II Civic Association).

Name	Title & Department	Affiliation
Donna Abbott	Communications Manager	Town of Ocean City
Hal Adkins	Director of Public Works, Public Works Department	Town of Ocean City
Gail P. Blazer	Environmental Engineer, Engineering & Construction Inspection Department	Town of Ocean City
Carol Cain	Technical Coordinator	Maryland Coastal Bays Program
Igor Conev	Chief Operating Officer	Mann Properties
Carrie Decker	Natural Resource Planner, Chesapeake & Coastal Program	Maryland Department of Natural Resources
Tina Dorsey	President	Friends of Walkers Pond
Jesse Houston	Director, Planning & Community Development Department	Town of Ocean City
Megan Hughes	Program Manager	Environmental Finance Center
Susan Jones	Executive Director	Ocean City Hotel-Motel-Restaurant Association
Irene Kordick	Principal	Ocean City Elementary School
Vera McCullough	President	Montego Bay Civic Association; Friends of Walkers Pond
Terry McGean	City Engineer, Engineering & Construction Inspection Department	Town of Ocean City

Name	Title & Department	Affiliation
Mark Paddack	Police Officer, Ocean City Police Department; President	Town of Ocean City; Caine Keys II Civic Association Inc.
Jim Parsons	Public Works Chief Deputy Director, Public Works Department	Town of Ocean City
Melanie Pursel	Executive Director	The Greater Ocean City, Maryland Chamber of Commerce
Louis Taylor	Principal	Stephen Decatur High School
Joe Theobald	Director of Emergency Services, Emergency Services Department	Town of Ocean City
Joanne Throwe	Director	Environmental Finance Center
Dave Wilson	Executive Director	Maryland Coastal Bays Program

Appendix B – Interviewees

Town of Ocean City and Worchester County Interviews

Name	Title and Department	Organization
Hal Adkins	Public Works Director, Public Works Department	Town of Ocean City, MD
Gail Blazer	Environmental Engineer, Engineering & Construction Inspection Department	Town of Ocean City, MD
Chris McCabe	Natural Resources Administrator, Development Review and Permitting	Worcester County, MD
Terry McGean	City Engineer, Engineering & Construction Inspection Department	Town of Ocean City, MD
Ed Tudor	Director, Department of Development Review and Permitting	Worcester County, MD
John Tustin	Director, Public Works Department	Worcester County, MD

Case Study Interviews

Name	Title and Department	Organization
Daryl Braithwaite	Director, Public Works Department	City of Takoma Park, MD
Maurice Daly	Division Chief, Engineering & Design Division, The Department of Transportation & Environmental Services	City of Alexandria, VA
Darrin Gordon	Assistant General Manager, Board of Public Works	City of Lewes, DE
Ali Khalilian	City Engineer, Public Works Department	City of Takoma Park, MD
Kenneth Mecham	General Manager, Board of Public Works	City of Lewes, DE
Lise Soukup	Environmental Engineer, Department of Public Works	City of Rockville, MD

Appendix C – Outreach and Marketing Strategy

Outreach and Marketing Strategy for Ocean City Stormwater Plan

Where: Ocean City, Maryland

When: October 2010 to September 2011

Partners: MD Department of Natural Resources, UMD Environmental Finance Center, Town of Ocean City, MD Coastal Bays Program

What: A public outreach, education and marketing plan that communicates stormwater infrastructure problems, financing shortfalls and solutions for long-term funding. The marketing plan will highlight secondary benefits from stormwater infrastructure remediation such as water quality benefits, flood remediation, and aquifer recharge enhancements.

Why: To improve stormwater (and water quality) conditions in Ocean City and create a dedicated funding source for infrastructure, operations and maintenance needs.

Audience: Citizens, businesses, elected officials

October 2010

- Hold 2-3 public meetings in Ocean City to communicate the basics of stormwater, the NOAA-DNR grant award, what the feasibility study aims to accomplish, and the background on why the town needs to pursue a dedicated funding mechanism for stormwater. *(completed)*

November-December 2010

- Apply for outreach/marketing grants with help of CBP (Steve Taylor) and determine more detailed plan based on funds granted.
- Research other stormwater outreach and marketing approaches from other towns and cities that have enacted a utility. (*Status: Spoken with Lewes, DE, Rockville, MD, Washington, DC, Takoma Park, MD and Alexandria, VA on their outreach and education work related to passing a SW Utility*)
- Develop educational and outreach approaches, logos, slogans, photos, etc. ('what do we want to communicate?') (*Hold brainstorming session for this?)*
- Work with the town of OC to post a stormwater blog and other materials (Q &A fact sheet), and educational information on their website. (*SW Blog is up as of November 30th, 2010)*

January 2011-March 2011

- Brief Town Council on our progress and outreach efforts
- Hold Stormwater Work Group meeting for updates and input to the Outreach Plan; ask for assistance from members
- Begin marketing and outreach effort, including:

    - Draft article for town newsletter (spring 2011 edition)
    - TV, radio, newspaper articles and ads; on the SW utility development (written by EFC, Town of OC, CBP, Surf Rider Foundation)
    - Magazine articles regarding stormwater efforts in OC (Spring 2011 OC newsletter & March edition of National Stormwater Publication--EFC)
    - On-going educational/informational updates to OC website
    - Presentations to HOAs, nonprofits, and other groups who want more information on what we are up to and are planning to do, why they should be involved
    - Storm drain stencil campaign (Town/CBP)

April-May 2011

- On-going presentations to HOAs, civic groups, nonprofits, and other groups who want more information on what we are up to and are planning to do; communicate why they should be involved
- Update and present draft findings to elected officials; also possible educational workshop for them

June-August 2011

- Hold 2 public meetings to explain stormwater utility options and get feedback for final report.
- Continue outreach of the utility and options to public and elected officials via newspaper, magazines, posters/fliers, radio/tv

September 2011 & beyond

- Communicate and make public the final findings/document on EFC and OC websites.
- Possible alternative would be to hold final public meetings at the very end of the project instead or in addition to ones in June-August.
- Presentation to elected officials on findings and recommendations.
- Seek specific outcome from elected officials

Appendix D – Stormwater Work Group Meeting Agendas

Ocean City Stormwater Work Group Meeting 1– April 14, 2010, 2-4pm, City Hall

Meeting Purpose: The purpose of this meeting is to come together for the first time as a Work Group, get oriented to the intentions of the Stormwater Financing Strategy project, gain a baseline understanding of stormwater issues, and start discussing stormwater issues specific to Ocean City.

2:00-2:30pm **Introductions** (30 minutes) (Facilitator: Joanne Throwe)

2:30-2:40pm **What are the goals of the Stormwater Financing Strategy Project?**

(10 minutes) (Facilitator: Joanne Throwe)

2:40-3:00pm **Stormwater 101** (20 minutes) (Facilitator: Megan Hughes)

3:00-3:20pm **Push Pin Map Activity and Break** (20 minutes) (Facilitator: Megan Hughes)

Where can we identify stormwater issues in Ocean City (flooding, trash, damaged roads, etc.)?

3:20-3:35pm **Map Discussion** (15 minutes) (Facilitator: Megan Hughes)

3:35-3:45pm **Stormwater Work Group Charge** (10 minutes) (Facilitator: Carrie Decker)

3:45-4:00pm **Question and Answer, Feedback, Comments** (15 minutes) (Facilitator: Joanne Throwe)

Folder contents:
Agenda
Contact list for all workgroup participants
Feedback and comment form
Stormwater 101 Presentation Slides

Ocean City Stormwater Work Group Meeting 2 – June 7, 2010, 1:30-3:30pm, City Hall

Meeting Purpose: *The purpose of this meeting is to learn more about how other communities, particularly coastal communities like Ocean City, pay for successful stormwater management programs and to get feedback from Work Group participants about how these strategies may or may not work for Ocean City.*

1:30-1:45pm Introductions & Brief Background of Project -Joanne Throwe, EFC

1:45-1:55pm Current Ocean City Stormwater Conditions and Needs
-Gail Blazer, Town of Ocean City

1:55-2:10pm What is a Stormwater Utility?
-Joanne Throwe, EFC

2:10-2:30pm Case Studies in Stormwater Fee Structures
-Megan Hughes, EFC

2:30-3:30pm Facilitated Discussion of Presentations
-Joanne Throwe, EFC

3:30pm Adjourn & Next Meeting Dates and Topic

Ocean City Stormwater Work Group Meeting 3 – September 8, 2010, 1-2:30pm, City Hall

Meeting Purpose: *The purpose of this meeting is to receive input from the Committee on the Outreach activities and events coming up this fall, and to discuss details of the work to be done starting October 1st*

1 pm	Welcome & Introductions—Carrie Decker
1:10-1:50pm	Details of proposed Outreach and Education Plan -Gail Blazer, Carrie Decker, Megan Hughes
1:50-2:10pm	NOAA-CZM Grant for Ocean City Stormwater Study -Carrie Decker & Joanne Throwe
2:10-2:30pm	Next Steps for the SW Committee -Joanne Throwe & All
2:30 pm	Adjourn

Ocean City Stormwater Work Group Meeting 4 – April 12, 2011, 2:30pm, City Hall

I. Introductions and Welcome (5 minutes)

II. Presentation to the City Council in March 2011: Joanne Throwe (30 minutes)

III. Materials & Update on Outreach and Marketing, and Next Steps: Carrie Decker (15 minutes)

IV. Upcoming Events and Involvement from the Committee (10 minutes)

V. Feedback and Direction from the Committee (10 minutes)

VI. Adjourn

Appendix E – Public Meeting Flyer

Please join us!
Wed, Oct 6, 2010 - Town Hall - 6-8PM
Wed, Oct 20, 2010 - Convention Ctr - 6-8PM

Ocean City Public Meeting: Stormwater Run-off

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

Contact Gail Blazer
Phone: 410-289-8825
Email:
gblazer@oceancitymd.gov

Town of Ocean City
MD Department of Natural Resources
Univ of MD Environmental Finance Ctr
MD Coastal Bays Program

Appendix F – Public Meeting Agenda

Ocean City Stormwater Public Meetings
October 6th 2010 City Hall
October 20th 2010 OC Convention Center

6 pm **Introductions and Background** –

- *Introductions of town staff and project partners*
- *Goals of public meeting*
  - *explain State and Federal push for addressing stormwater*
  - *discuss non-point source pollution and why it is problematic in Ocean City*

6:15 pm **Town of OC: Stormwater Program, Progress and Existing Needs –**

6:30 pm **Open Dialogue: What are Your Issues with Stormwater?**

7:15 pm **Review Overall Feedback/Findings and Next Steps**

7:30 pm **Adjourn**

Appendix G – Public Meeting Q&A

Ocean City Stormwater Feasibility Study:
Questions and Answers from the Public Meetings

Q: Does Fenwick Island drain better than Ocean City?
A: A bit, because their canal is closer, open ditches, and there is less impervious surface there.

Q: Why didn't they put drains on the east bound side of the highway?
A: State Highway Engineers completed a study that determined that storm drains on the east side of the Highway would not improve the flooding conditions. The City disputes these findings and has installed drains on the east side of Coastal Highway at 48th street as a demonstration project.

Q: Has the City Council seen the stormwater presentation you presented at the Public Meetings?
A: No, not this one but a variation of this yes. The Council voted unanimously on Jan 26, 2010 to allow the stormwater financing feasibility study to get underway.

Q: What are the mini grant programs? And can you be clearer about how to access them to the public?
A: The Town of Ocean City advertises this program broadly in newspapers, newsletters, etc. every year and many people do know about them and apply. Mini-grants are offered for Beach District plantings, BayScape Gardens, Rain Gardens, Rain Barrels and Cost
Share projects. Contact Gail Blazer at (410) 289-8825 for more information.

Q: Did the Gateway Grand hotel get an incentive for putting in pervious pavement?
A: No, they did not get an incentive but they were required to implement stormwater management to capture and treat any water that runs off the site.

Q: Can we use the State prisoner program to maintain and upkeep storm drains and other work that isn't currently funded?
A: No, we need trained professional staff to do that work because it is moderately technical in nature.

Q: Is there any treatment at the inlet lot area?
A: No, it is very visible but it is not a high priority area to treat and would be very expensive as well. Also ¾ flows on the beach and ¼ flows into the inlet which has a large current and ability to flush pollutants. Dead end canal outfalls are a higher priority due to poor flushing

Q: Have you looked at other areas (Bays) besides Assawoman Bay to improve water quality?
A: Yes, we have a consultant doing an assessment and prioritization now of what we need to do and where.

Q: Can we use volunteers for a maintenance crew in the town?
A: No, we would need to have paid and trained staff to do this work—it is technical in nature.

Q: Can we have the town raise the amount of fines for non-compliance to put toward mitigation and enforcement staff and projects?
A: We would rather have strong education and outreach program than enforcement, but this can be a part of a funded maintenance plan.

Q: What exactly is a baffle box?
A: A Baffle box is a concrete vault that is installed into a storm drain. They have sections separated with baffles that allow for sediment (trash, sand and other debris) to drop out so they are 'caught' before entering the Bay. The ones the City has installed are designed with a basket type devise that lifts large trash and debris up out of the water that can be easily removed with a vacuum truck.

Q: What is the estimated price tag for fixing all infrastructure issues?
A: The full cost to repair the entire storm drain system and add needed treatment has yet to be determined. The estimated total cost just to replace all the existing metal storm drain pipes in the City is $6 million.

Q: When or has development stopped being built on wetlands?
A: You cannot build on tidal wetlands; however non-tidal wetlands can be filled up to 5,000 sq/ft. tidally influenced wetlands surround the town. However there are pockets of non-tidal throughout the town. Also tidal wetlands can have fringe non-tidal wetlands where there is not a bulkhead. The town currently has 35+/- acres of tidal wetlands.

Appendix H – Stormwater Survey

Public Meeting Exit Survey
October 6 and 20, 2010
Email (optional) _____

Thank you - your feedback is very important!
If you would like to tell us about a specific water quality or flooding issue in your neighborhood, please write on the back of this survey.

		Not Concerned	Somewhat Concerned	Very Concerned	Critical	Additional Comments (Please continue comments on the back if necessary.)
1	**In Ocean City, how concerned are you about:**					
	Flooding that makes driving around town difficult?					
	Flooding that keeps people from visiting restaurants and shops?					
	Flooding that will cause property damage?					
	Water that is unhealthy for swimmers, fishermen, and boaters?					
	Water that could be harmful to fish or wildlife?					
	Litter in the water (ocean/canal)?					

		Not Important	Somewhat Important	Very Important	Essential	Additional Comments (Please continue comments on the back if necessary.)
2	**In Ocean City, how important is it to:**					
	Keep water clean to promote tourism?					
	Educate **tourists** on how to keep the water, beaches, streets etc. clean?					
	Educate **residents** on how to keep the water, beaches, streets etc. clean?					
	Keep water clean so that people can swim, fish, boat, etc.?					
	Become a "greener town" (including more plants and trees, walk/bike-able, energy efficient buildings)?					
	Have dedicated money set aside in the town's budget to improve flooding and water quality problems?					

You are a: Full-Time Resident ☐ Part-Time Resident ☐ Business Owner ☐ Both Owner and Resident ☐
Other _____

Appendix I – "Protect our Coastal Bays" Poster and Bus Wrap

Appendix J – Fact Sheet

Stormwater in Ocean City Fact Sheet

* **The way stormwater (rainwater) drains on the barrier island of Ocean City has changed over time because there are hard surfaces like roads, driveways, rooftops, and turf.**

* **Stormwater in the Ocean City flows untreated (including gasoline, oil, trash and sediment) directly into our Coastal Bays.**

* **The Town of Ocean City is at sea level—so drainage is a big issue when it rains or with a storm surge.**

* **Ocean City is 79% *impervious*, which means most of the land is covered by streets, buildings and other hard surfaces that do not allow water to get into the ground.**

* **On the northbound lanes of Coastal Highway, stormwater drains from approximately 3 acres of impervious surface cross at each intersection. Coastal Highway does not have catch basin inlets on the east side of the highway. Drainage has to cross the street to get into the catch basin inlets on the west side.**

* **Ocean City has 82, 974 linear feet of Corrugated Metal Pipe underground to help drain the city. This pipe is known to deteriorate in a salt-water environment and is overdue for replacement. The cost to replace this is approximately $6.14 million.**

* **90% of all rain events result in about 1 inch of rainfall. We can design simple stormwater systems, such as rain gardens, to catch 1 inch of rainfall before it drains into a storm sewer.**

* **In Ocean City, 2,660 parcels were developed that have no stormwater management controls and could benefit from upgrades.**

* **Existing private stormwater systems are inspected every three years. The town sends owners maintenance notices and requires upgrades on new or retrofitted properties.**

* **The Town currently provides the following programs and projects:**
  * Pervious pavers on public projects
  * Dune and wetland restoration & patrol
  * Street & Beach Cleaning
  * Hazardous waste cleanup day
  * Bulk pickup days
  * Cost share program
  * Rain Gardens & Bioretention areas
  * BayScape Gardens
  * Beach District Planting
  * Rain Barrel Program
  * Catch basin inserts
  * Nutrient Separating Baffle Box
  * Outfall retrofit

* **Programs and projects needed but not currently funded:**
  * Retrofit catch basins for water quality treatment
  * Storm drain catch basin and pipe cleaning program
  * Maintenance, repair and replacement of degraded storm drain pipes
  * Raising infrastructure and roads to reduce flooding
  * Outfall retrofits for water quality treatment
  * Outfall retrofit for flood reduction
  * Installing new storm drain pipes and catch basins for efficient conveyance

Please contact Megan Hughes at the Environmental Finance Center with any questions or comments about this fact sheet or project at mhughes3@umd.edu or 301-405-4035.

Appendix K – Photos of Flooding and Water Quality Concerns

Photos taken September 8, 2010, Environmental Finance Center

Storm drain in need of clean-out due to leaf debris

Litter accumulation along one of the canals

Corrugated metal storm drain pipe with tidal influx