



Paying for Municipal Stormwater Management

CWEA August 2019



**ENVIRONMENTAL
FINANCE CENTER**

Environmental Finance Centers

- **UMD EFC is one of 10 EPA Region centers mostly based at universities.**
- **UMD Serves EPA Region 3 - PA, DE, MD, DC, VA, WV.**
- **Strengthen the capacity and provide technical, research, and policy assistance to decision makers.**
- **Equip communities with the knowledge and tools they need to create more sustainable environments, more resilient societies and more robust economies.**



**ENVIRONMENTAL
FINANCE CENTER**

OUTLINE

- Introduction
- Developing a municipal stormwater program
 1. Assess programs, departments, demographics, and current investments
 2. Identify needs and program gaps
 3. Evaluate costs for level of service
 4. Budget development or revisions
 5. Funding and financing strategies
- Resources

MS4 "Second Generation"

- **Creation of a stormwater program to address MCMs**
- **New pollutant reduction requirements to meet (20%)**
- **Chesapeake Bay TMDL as well as local impairments**
- **How to plan and increase revenue to pay for needed work?**

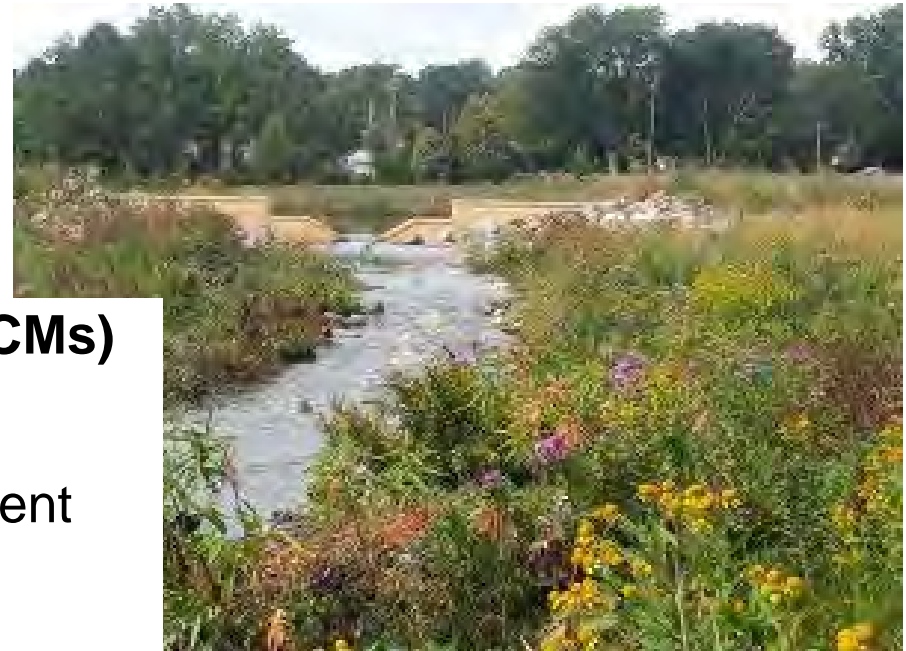


MS4 PERMIT REQUIREMENTS

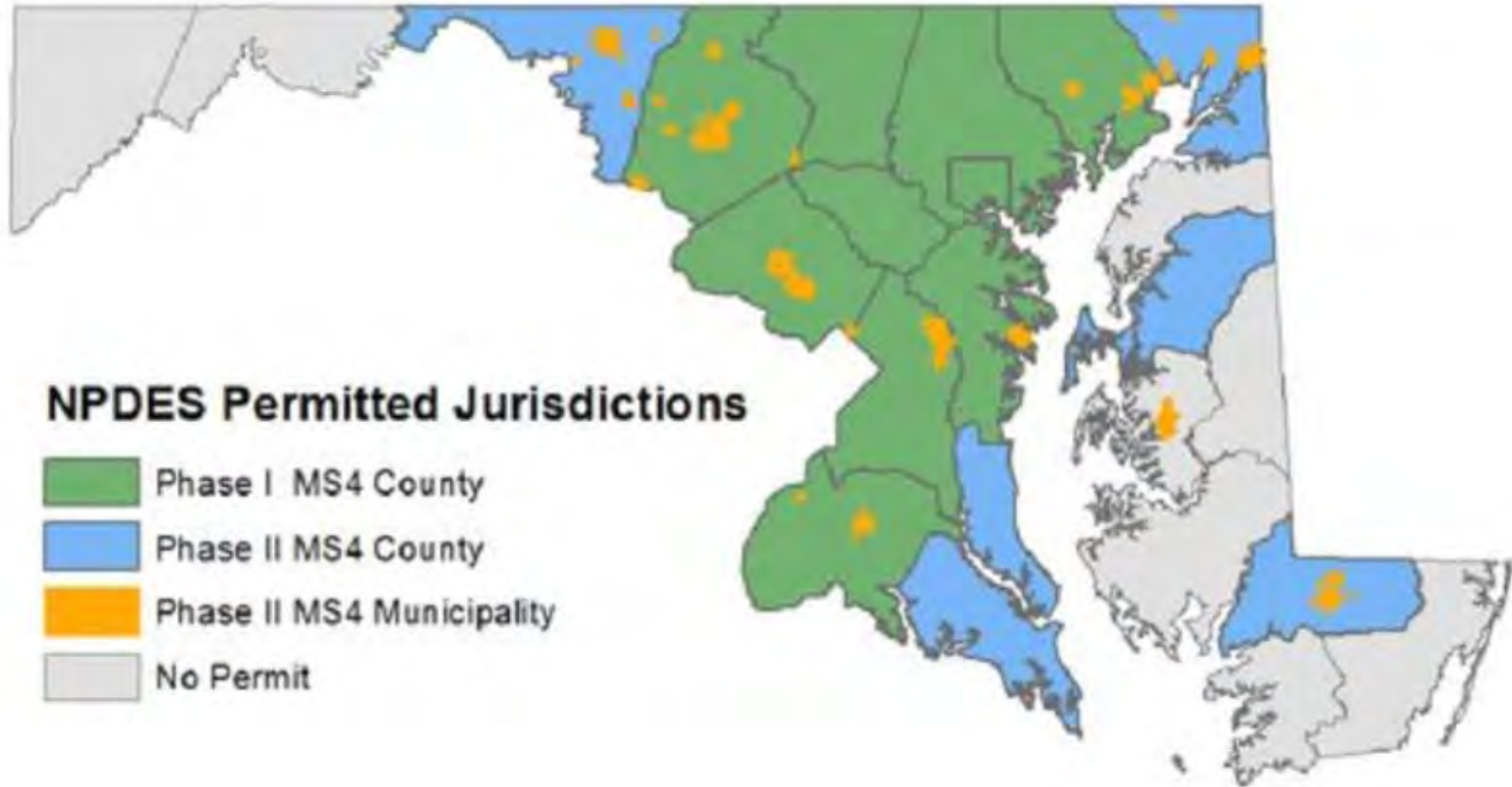
Six minimum control measures (MCMs)

- Public education and outreach
- Public engagement and involvement
- Illicit discharge detection and elimination
- Construction stormwater runoff control
- Post-construction stormwater runoff control
- Good housekeeping and pollution prevention

Chesapeake Bay TMDL Pollutant Load Requirements (20% IA) - intended to meet local impairment as well.



Storm Sewer System Permits



WHO DO WE HAVE IN
THE ROOM?

HOW MANY ARE NEW PHASE IIs?

COMPONENTS OF A STORMWATER PROGRAM

- **Capital Improvements (BMPs)**
- **Operations and Maintenance**
- **Public Education and Involvement**
- **Technical Support**
- **Engineering and Planning**
- **Regulatory Compliance and Enforcement**
- **Administration**
- **Billing and Finance**



BASIC COSTS

- ✓ Capital projects
- ✓ Personnel
- ✓ Equipment
- ✓ Operations & Maintenance





TYPICAL FUNDING OPTIONS FOR TRADITIONAL MS4

- ✓ **General Fund**
- ✓ **Fees for permit review and inspections**
- ✓ **Grants**
- ✓ **Bonds/Loans**
- ✓ **Stormwater Utility Fees**

The screenshot displays the Maryland Department of the Environment (MDE) website. The header includes the MDE logo, the text 'DEPARTMENT OF THE ENVIRONMENT Maryland', a search bar with the placeholder 'Enter search term', and social media icons for Facebook, Twitter, YouTube, and LinkedIn. A navigation menu below the header lists: HOME, ABOUT MDE, AIR, LAND, WATER, MARYLANDER, PERMITS, and NEWSROOM. The main content area features a section titled 'Grants and Other Financial Assistance Opportunities at MDE'. Below this title, it states: 'The following financial assistance is offered and/or facilitated by the Maryland Department of the Environment. Funding may be in the form of grants, loans, or direct payments for specified uses.' To the right of this text is a box labeled 'FastTrack' with the text: 'A one-stop shop to help businesses in Maryland easily access resources throughout state agencies.' At the bottom left of the screenshot, there are two links: 'Water Quality Financing' and 'Water Quality Revolving Loan Fund'.

NON-TRADITIONAL MS4

- State departments of transportation (DOTs), airports, universities, local sewer districts, hospitals, military installations, post offices, prisons, or irrigation districts
- Provide stormwater drainage service to human populations, and not to individual buildings

WHO DO WE HAVE IN
THE ROOM?

HOW MANY ARE MUNICIPAL MS4?

**HOW MANY ARE
“NONTRADITIONAL”?**

**IS ANYONE REPRESENTING A
SPECIFIC CLIENT (CONSULTANTS)?**

Needs Assessment Survey Results (WEF, 2019)

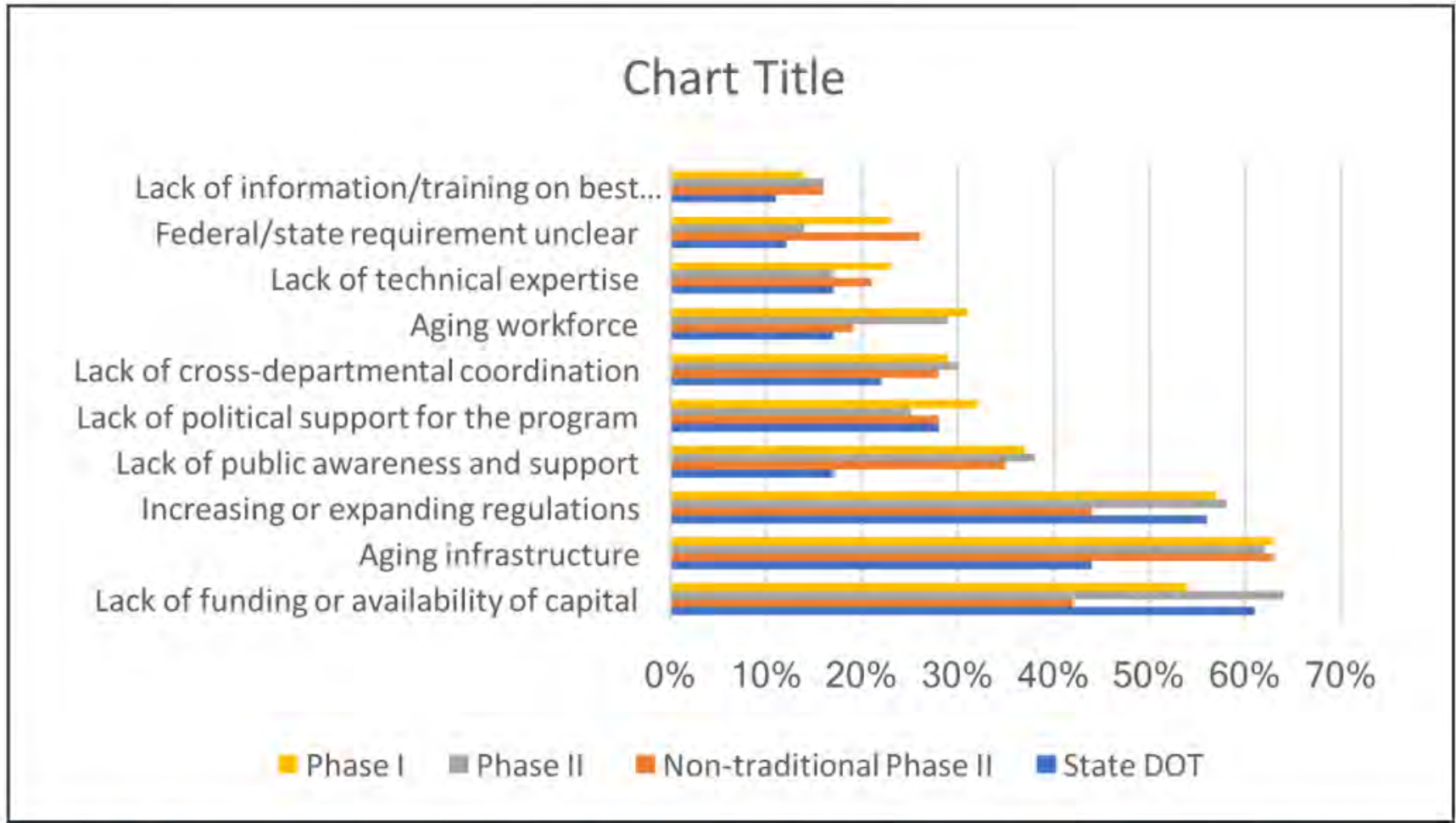


Figure 1. Stormwater program challenges – fairly or extremely significant challenge

Needs Assessment Survey Results (WEF, 2019)

Table 2. Highest ranked sub-topics under information and resource need priority categories

Stormwater topic	Phase I (PI) and II (PII) communities	Non-traditional Phase II (NT)/state DOT
Funding and financing	<ul style="list-style-type: none"> Leveraging additional sources of funding based on co-benefits 	<ul style="list-style-type: none"> Leveraging additional sources of funding based on co-benefits
	<ul style="list-style-type: none"> Inventory of available funding sources (PI) 	<ul style="list-style-type: none"> Analysis of stormwater funding needs (DOT)
	<ul style="list-style-type: none"> Analysis of stormwater funding needs (PII) 	<ul style="list-style-type: none"> Inventory of available funding sources (NT)
Asset management	<ul style="list-style-type: none"> Cost estimating/cash flow analysis for capital expenditures 	<ul style="list-style-type: none"> Evaluating BMP life-cycle costs
	<ul style="list-style-type: none"> Evaluating life-cycle costs of stormwater control measures (PII) 	<ul style="list-style-type: none"> Developing condition assessments (NT)
	<ul style="list-style-type: none"> Prioritizing stormwater asset maintenance and replacement (PI) 	<ul style="list-style-type: none"> Prioritizing asset maintenance and replacement (NT)
		<ul style="list-style-type: none"> Creating inventory/database of stormwater assets (DOT)



WHAT WE HEAR FROM MUNICIPALITIES

**Where to locate
BMPs?**

**Municipal/Public
Land**

Private Land

What BMPs?

**Bioswales, Basin
Retrofits**

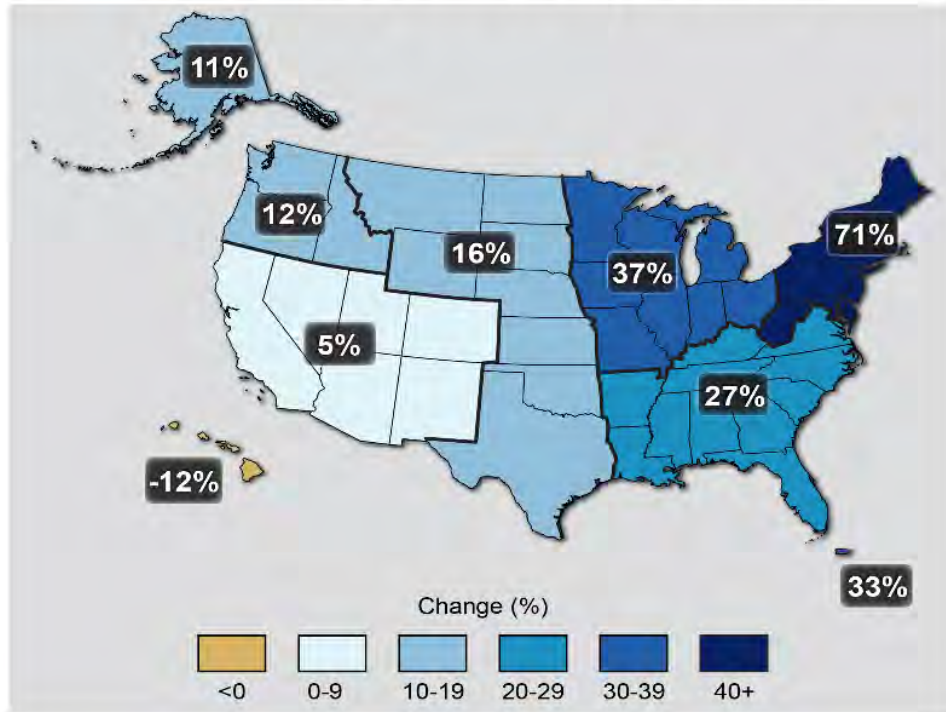
**Streambank
Restoration**

How to pay?

General Funds

Grants

Observed Change in Very Heavy Precipitation

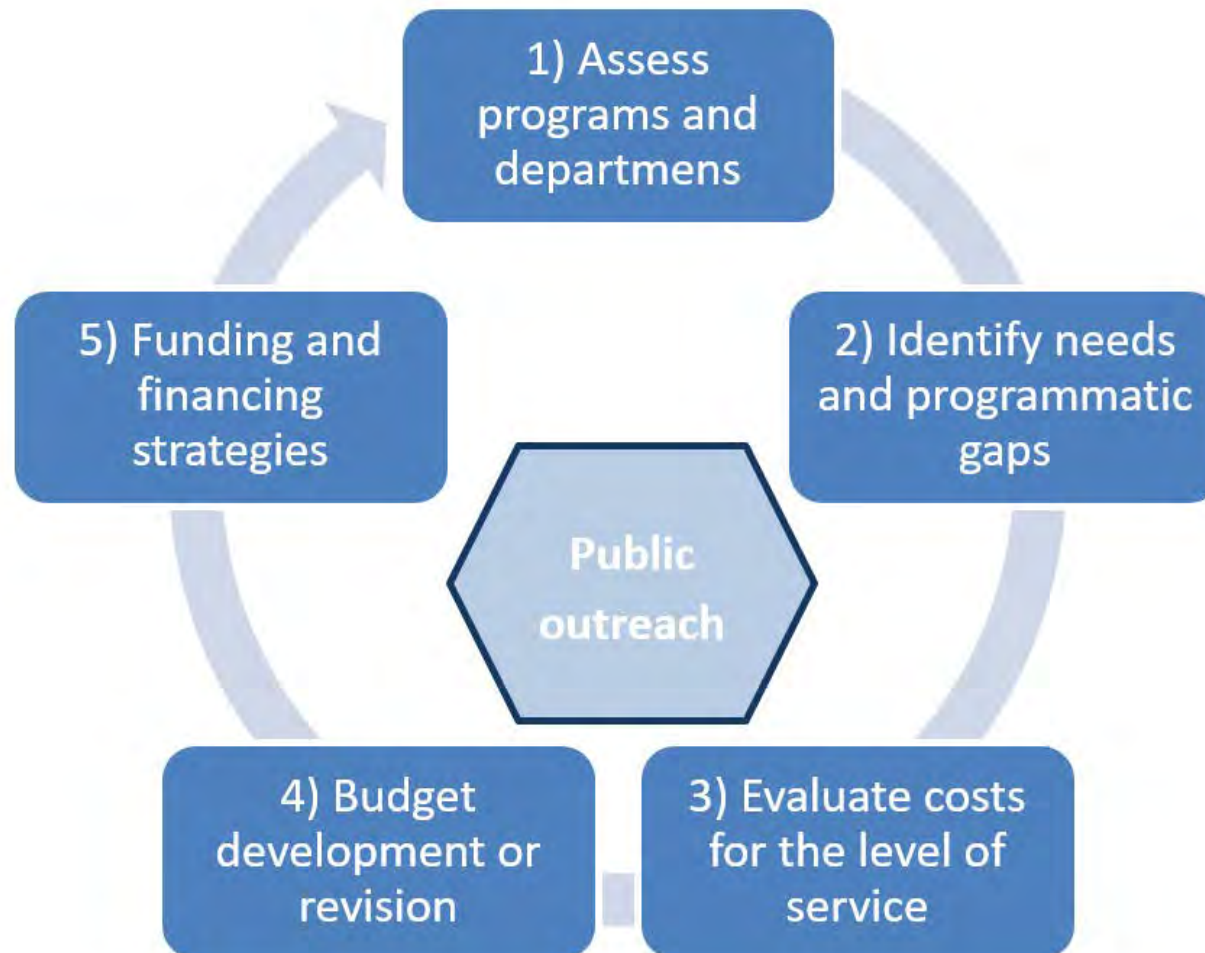


<https://nca2014.globalchange.gov/report/our-changing-climate/heavy-downpours-increasing>

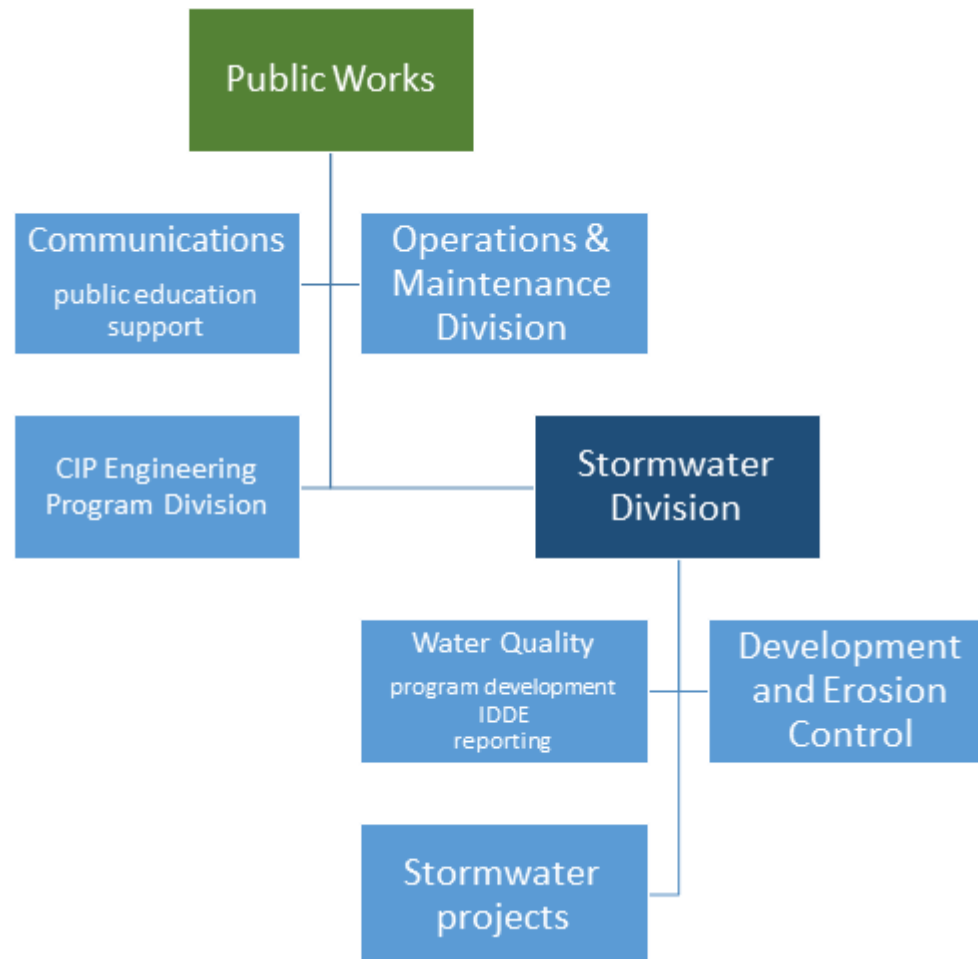
“...the GI watershed continued to produce less surface runoff than the traditional watershed under projected future climate conditions.”

Giese, E., Rockler, A., Shirmohammadi, A., & Pavao-Zuckerman, M. A. (2019). Assessing Watershed-Scale Stormwater Green Infrastructure Response to Climate Change in Clarksburg, Maryland. *Journal of Water Resources Planning and Management*, 145(10), 05019015.

DEVELOPING A MUNICIPAL STORMWATER PROGRAM



EXAMPLE MUNICIPAL STRUCTURE





1. EXISTING PROGRAMS AND OPERATIONS

- For nontraditional - how is your program structured/going to be structured?
- For existing Phase IIs - how is your existing structure working?
- Do you have some stormwater BMPs?
- New Phase IIs, do you know community demographics?



Municipality	Population	Median Household Income	Poverty Rate	Population 65 Years +	Total Number of Households
Town of Boonsboro	3,472	\$66,657	10.0%	16.9%	1,365
Town of Easton	16,606	\$52,724	12.2%	23.5%	7,491
City of Fruitland	5,172	\$63,922	14.9%	9.8%	1,851
Town of Indian Head	3,842	\$66,250	9.9%	8.0%	1,383
Town of La Plata	9,160	\$92,738	5.1%	14.7%	2,970
Town of Rising Sun	2,809	\$60,240	9.9%	11.4%	1,001
Town of Williamsport	2,091	\$38,295	19.8%	21.9%	958
Queen Anne's County	49,071	\$89,241	6.4%	17.8%	17,995
St. Mary's County	110,979	\$86,508	8.2%	11.9%	39,276
Wicomico County	102,014	\$54,493	15.9%	14.7%	37,415



Municipality	Budget for Stormwater Management (dept/fund)	Total Operating Expenses	Total Public Works Expenses	Percent of Expenses spent on Public Works	Total Capital Expenses	Notes
Town of Boonsboro (FY 2019 Budget)	General Fund	\$1,951,338	\$73,500	3.8%	\$77,500; long term capital improvements are separate and equal \$263,712 (included in total operating expenses)	Balanced budget; also has Highways & Streets Dept. (total budget is \$203,400); also has Water Fund with Total Operating Expenses \$767,061
Town of La Plata (FY 2018 Budget)	Stormwater Management Fund (Total Expenses are \$324,115)	\$7,075,490	\$892,735	12.6%	\$713,000	Multiple existing Enterprise Funds (Sanitation, Sewer, Water, Stormwater Management); Public Works Budget is part of the General Fund
Town of Rising Sun (FY 2018 Budget)	General Fund	\$2,256,432,01	\$66,426	2.9%	N/A	Streets & Sidewalks Department separate from PWD (Total budget is \$90,955); Have Water & Sewer Funds
Queen Anne's County (FY 2019 Budget)	General Fund	\$138,061,406	\$10,254,620	7.4%	\$29,434,431	6-year Capital Budget totals \$196,176,690



EXISTING STORMWATER INVESTMENTS

DETERMINING BUDGET GAPS WORKSHEET	
	Year 1
Expenditures	
<i>Personnel Costs</i>	
Employee 1	
Employee 2	
Employee 3	
Employee 4	
Total Personnel Costs	\$0
<i>Capital Improvement Costs</i>	
Total Capital Costs	\$0
<i>Operations & Maintenance Costs</i>	
Total O&M Costs	\$0
Total Expenditures	\$0



2. NEEDS AND PROGRAMMATIC GAPS

- Begin plan development (more on this later in the day)
 - MCMs or
 - Adding 20% IA reduction
- How will needs change to meet your plan?
 - personnel (management - maintenance)
 - budget
 - revenue



3. ASSESS EXISTING INFRASTRUCTURE AND LEVEL OF SERVICE

Asset Evaluation

- Gray infrastructure (inlets, pipes)
- Green infrastructure
- Are these facilities mapped?

Level of Service

- Minimum
- Moderate
- High



4. BUDGET OR BUDGET REVISIONS (BERLIN, MD)

Berlin Proposed Stormwater Budget, Year 1		
	Cost	Comments
Revenues		
Residential properties	\$70,000	1,400 residential properties at a flat rate fee of \$50
Commercial properties	\$391,846	785 commercial/industrial/multi-family properties charged based on 1 ERU = 2,100 square feet where 1 ERU = \$45
Total Revenues	\$461,846	
Expenditures		
Personnel Costs		
Cleaning (inlets, ditches, drains) staff	\$90,000	2 FTE @ \$30,000 plus \$15,000 fringe benefits
Comprehensive trash collection staff	\$0	No staff needed, will utilize volunteers and electric company
Green Infrastructure Plan staff	\$0	No staff needed
IDD&E staff	\$0	No staff needed
Public outreach & education staff	\$0	No staff needed, will utilize NGO's and volunteer groups
GIS management intern	\$0	Will utilize current staff and 1 intern
Total Personnel Costs	\$90,000	
Capital Improvements - includes design, equipment, and installation		
Area 2 and 3 upgrades	\$1,414,199	Engineering study indicates that Area 2 and 3 should be completed first; will take 12 months to design Area 2 and 18 months for Area 3; both are estimated to take 3 months of construction work; cost includes design and planning and 30% contingency
WWTP Truck	\$30,000	Funds will be set aside each year towards the purchase of a new truck at the end of a 10 year period; calculated at 10% of \$300,000 truck purchase price
Total Capital Improvements	\$1,444,199	
Operations & Maintenance		
Cleaning (inlets, ditches, drains)	\$5,000	Gas, insurance, routine maintenance of existing WWTP truck
Comprehensive trash collection	\$500	Promotional materials for waste collection events
Green Infrastructure Plan	\$100,000	BMP erosion control measures (includes design services)
IDD&E	\$3,000	Equipment and analysis expenses
Public outreach & education	\$10,000	General Fund budgets \$10,000 for environmental projects. These funds will be put toward outreach and education as needed.
Redevelopment projects	\$45,000	Annual operating expenses
Total Operations & Maintenance	\$163,500	
Total Expenditures	\$1,697,699	
Surplus (deficit)	(\$1,235,853)	

MULTI YEAR BUDGETING & FUNDING GAP ANALYSIS

DETERMINING BUDGET GAPS WORKSHEET											
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
Revenues											
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Expenditures											
Personnel Costs											
Employee 1											
Employee 2											
Employee 3											
Employee 4											
Total Personnel Costs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Capital Improvement Costs											
Total Capital Costs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Operations & Maintenance Costs											
Total O&M Costs	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
<i>Surplus (deficit)</i>	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
										Total surplus (deficit):	\$0

Berlin, MD Proposed Stormwater Budget, 10 Year Projection

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenues										
Residential properties	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000
Commercial properties	\$391,846	\$391,846	\$391,846	\$391,846	\$391,846	\$391,846	\$391,846	\$391,846	\$391,846	\$391,846
Total Revenues	\$461,846	\$461,846	\$461,846	\$461,846	\$461,846	\$461,846	\$461,846	\$461,846	\$461,846	\$461,846
Expenditures										
Personnel Costs										
Cleaning (inlets, ditches, drains) staff	\$90,000	\$92,250	\$94,556	\$96,920	\$99,343	\$101,827	\$104,372	\$106,982	\$109,656	\$112,398
Comprehensive trash collection staff	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Green Infrastructure Plan staff	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
ID&E staff	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Public outreach & education staff	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
GIS management intern	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Personnel Costs	\$90,000	\$92,250	\$94,556	\$96,920	\$99,343	\$101,827	\$104,372	\$106,982	\$109,656	\$112,398
Capital Improvements - includes equipment, installation, and inspection										
Area 2 (Cedar, Pine, Maple, Franklin, etc.)	\$1,018,582									
Area 3 (Williams Street near Electrical Plant)	\$395,617									
Area 5 (Henry's Mill/Henry's Green)		\$1,114,293								
Area 1 (West St Near Abbey Lane)		\$1,913,814								
Area 6 (Hudson Branch @ Flower/Showell)			\$570,000							
Area 16 (Decatur Farms)			\$112,500							
Annual savings for truck	\$30,000	\$30,750	\$31,519	\$32,307	\$33,114	\$33,942	\$34,791	\$35,661	\$36,552	\$37,466
Total Capital Improvements	\$1,444,199	\$3,058,857	\$714,019	\$32,307	\$33,114	\$33,942	\$34,791	\$35,661	\$36,552	\$37,466
Operations & Maintenance										
Vehicle maintenance	\$5,000	\$5,125	\$5,253	\$5,384	\$5,519	\$5,657	\$5,798	\$5,943	\$6,092	\$6,244
Trash collection promotional materials	\$500	\$513	\$525	\$538	\$552	\$566	\$580	\$594	\$609	\$624
Erosion control measures and BMPs	\$100,000	\$102,500	\$105,063	\$107,689	\$110,381	\$113,141	\$115,969	\$118,869	\$121,840	\$124,886
ID&E inspection equipment & analysis	\$3,000	\$3,075	\$3,152	\$3,231	\$3,311	\$3,394	\$3,479	\$3,566	\$3,655	\$3,747
Public outreach & education	\$10,000	\$10,250	\$10,506	\$10,769	\$11,038	\$11,314	\$11,597	\$11,887	\$12,184	\$12,489
Redevelopment projects	\$45,000	\$46,125	\$47,278	\$48,460	\$49,672	\$50,913	\$52,186	\$53,491	\$54,828	\$56,199
Total Operations & Maintenance	\$163,500	\$167,588	\$171,777	\$176,072	\$180,473	\$184,985	\$189,610	\$194,350	\$199,209	\$204,189
Total Expenditures	\$1,697,699	\$3,318,695	\$980,352	\$305,298	\$312,931	\$320,754	\$328,773	\$336,992	\$345,417	\$354,053
<i>Surplus (deficit)</i>	<i>(\$1,235,853)</i>	<i>(\$2,856,849)</i>	<i>(\$518,506)</i>	<i>\$156,548</i>	<i>\$148,915</i>	<i>\$141,092</i>	<i>\$133,073</i>	<i>\$124,854</i>	<i>\$116,429</i>	<i>\$107,793</i>

BERLIN EXAMPLE



5. FUNDING AND FINANCING STRATEGIES

- 1) Cost Savings**
- 2) Revenue and Cash Flow Management**
- 3) Engaging Private Property Owners**

5. FUNDING AND FINANCING STRATEGIES

1) Cost Savings

- Planning
- Regulation
- Asset management
- Coordination with other community priorities
 - E.G. GSI, DIG ONCE
- Collaborative approaches

“An examination of the City of Lancaster, Pennsylvania’s efforts to **incorporate green infrastructure into planned capital improvement projects indicated costs were 45% lower** than if these green infrastructure projects had been installed outside of the CIP process”

U.S. EPA Region 9 (2014) ASSET MANAGEMENT: Incorporating Asset Management Planning Provisions into NPDES Permits. Water Division.
<https://www.epa.gov/sites/production/files/2018-01/documents/incorporating-asset-mgmt-through-permits.pdf>



ASSET MANAGEMENT APPROACH

Holistic Planning Approach

- 1. Identify AM scope**
- 2. Establishing the Desired Level of Service**
- 3. Choosing and Implementing Asset Management Software/structure**
- 4. Cataloging Assets**
- 5. Scoring Assets**
- 6. Continuing AMP Development**

U.S. EPA Region 9 and U.S. Environmental Protection Agency Office of Science and Technology. (2017) Asset Management Programs for Stormwater and Wastewater Systems: Overcoming Barriers to Development and Implementation. EPA Contract No. EP-C-14-003.

<https://www.epa.gov/sites/production/files/2018-01/documents/overcoming-barriers-to-development-and-implementation-of-asset-management-plans.pdf>

STORMWATER COLLABORATIVE MODELS

**Model A: No plan, collaborative
BMP implementation on a
project-by-project basis**

**Model B: One plan,
municipalities/partners enter into
MOU outlining implementation of
specific elements**

**Model C: Municipality enters
into performance-based contract
for implementation**



Collaborative approaches

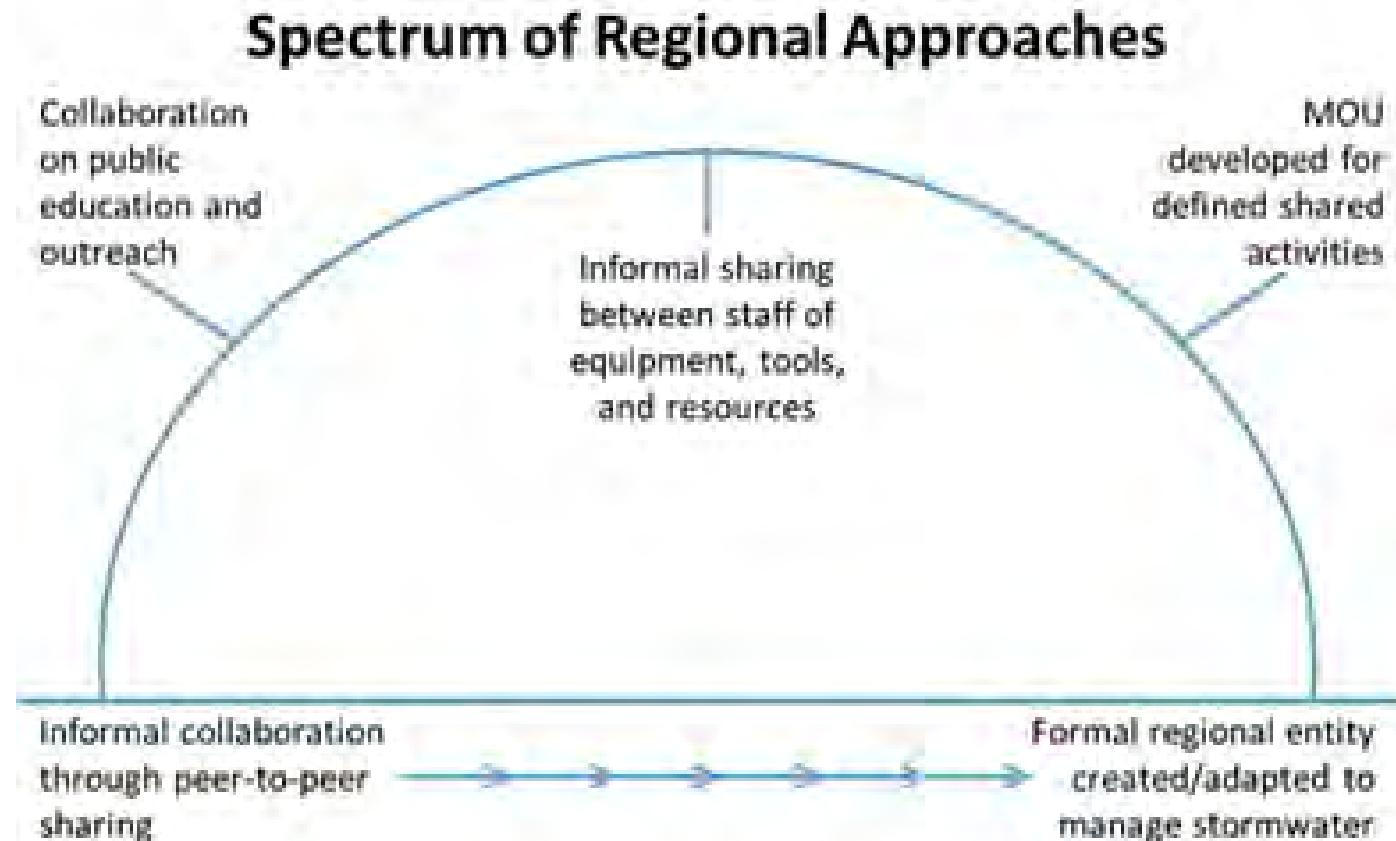


Figure from Memo - Financing Municipal Stormwater Programs Developed by the Environmental Finance Center (EFC) at the University of Maryland

Gateway Park, Darley Park Neighborhood, Baltimore City, MD

Size: 20 trees & 4 bioretention areas totaling 2,194 ft²

Pollution Reduction: 5.72 lbs nitrogen, 0.6 lbs phosphorus, 221.94 lbs sediment

Total Cost: \$629,175

Funding Sources: MD DNR and HCD, CBT, Under Armour/ESPN



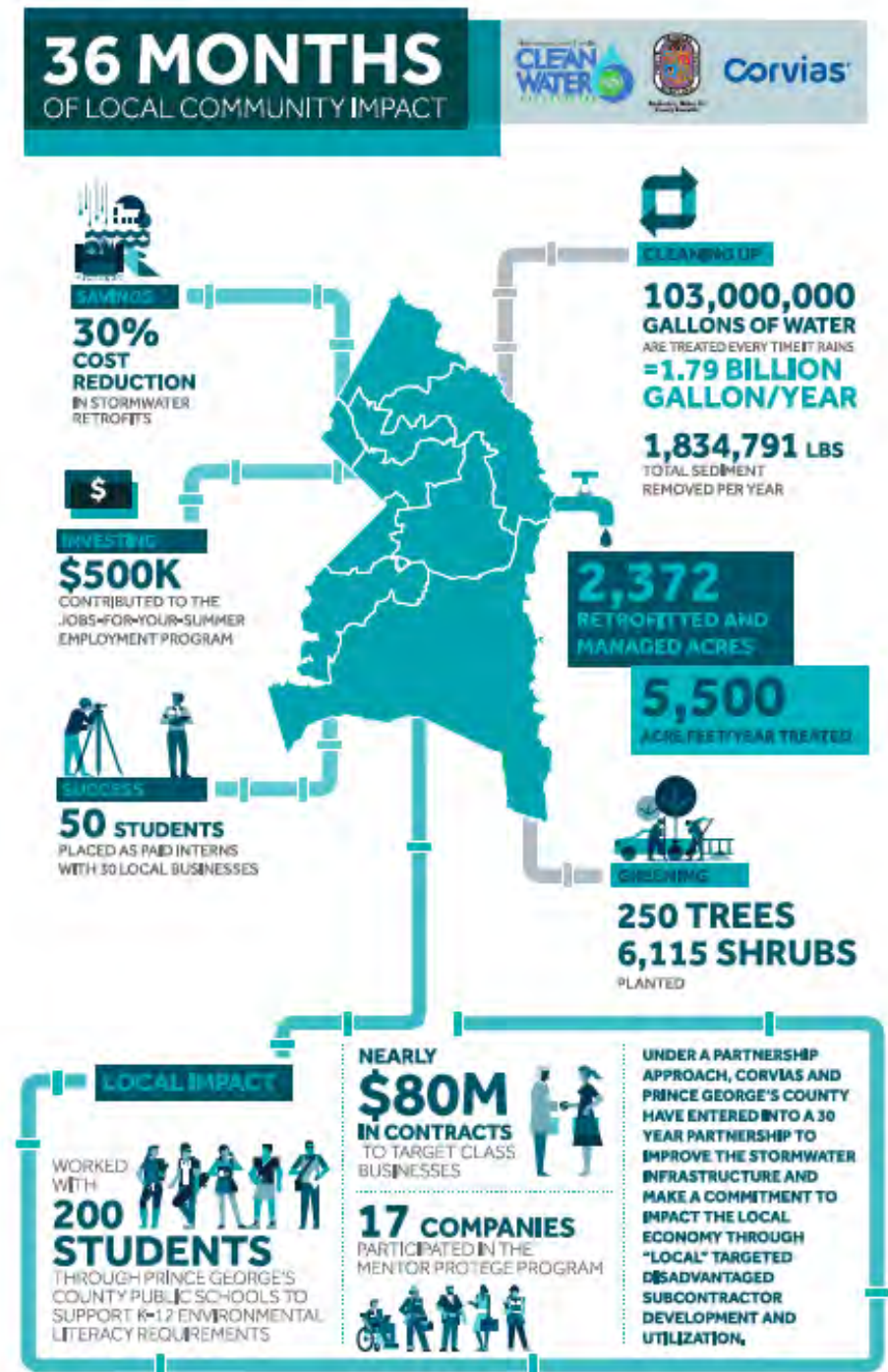
the
Neighborhood
DesignCenter

**WATERFRONT
PARTNERSHIP**
OF BALTIMORE



PRINCE GEORGE'S COUNTY CLEAN WATER PARTNERSHIP

For additional information:
https://www.princegeorgescountymd.gov/DocumentCenter/View/16454/PG-Guidebook1_Final_100416_sm



CAMDEN COUNTY MUNICIPAL UTILITY AUTHORITY

The Camden County Municipal Utilities Authority is committed to protecting water quality, odor minimization, cost efficiency, minimizing carbon footprint, and community service.

- Overperforms on its NPDES wastewater permit requirements
- Uses an Environmental Management System to optimize water quality performance and maximize cost efficiencies
- Implements green infrastructure projects through Camden SMART (founding member)

DID ALL OF THIS WITHOUT RAISING RATES!





5. FUNDING AND FINANCING STRATEGIES

- 1) **Cost Savings**
- 2) **Revenue and Cash Flow Management**
- 3) **Engaging Private Property Owners**

FINANCING STRATEGY

ACTIVITIES

- Capital Improvements (BMPs)
- Operations and Maintenance
- Public Education and Involvement
- Technical Support
- Engineering and Planning
- Regulatory Compliance and Enforcement
- Administration
- Billing and Finance

PARTNERS

- Internal Municipal Partners (Parks & Rec, Road Crew, Admin)
- Watershed Organizations
- Conservation District
- County Planning Department
- Municipal Committee (Open Space, Parks & Rec)
- Existing Municipal Authorities
- Other Municipalities

TYPICAL REVENUES

- General Funds
- CIP Funds
- Bonds
- Grants
- Fees



Source	Cost Coverage		Strengths	Weakness
	Capital	O&M		
General Fund	Yes	Yes	Can be used to support all program costs	Competes with other community priorities, changes from year-to-year, less equitably spreads costs across payers
Grants	Yes	No	Good source for “shovel ready” project implementation, demonstration projects and initial program staff	Not guaranteed, highly competitive, suitable for demonstration projects, not sustainable in the long-term
SRF & Loan Programs	Yes	No	Can offer up-front capital for larger projects	Not guaranteed fund source, highly competitive, must repay often with interest
Bond Financing	Yes	No	Can be used for large, long-term expenditures	Dependent on fiscal capacity, must repay with interest, cost of securing bond may be high
Permit, Development & Inspection Fees	Yes	No	Offers nexus to system and program expansion needs	May not sufficiently cover program costs, may deter development
Stormwater Utility Fee	Yes	Yes	Can generate sufficient revenue, sustainable, dependable, equitable depending on design, support all program costs	Requires significant public dialogue, can create administrative challenges
Tax Districts	Yes	Yes	Can generate sufficient revenue, sustainable, dependable	Necessitates enabling statute, can have equity problems due to property value basis

Table from Memo - Financing Municipal Stormwater Programs Developed by the Environmental Finance Center (EFC) at the University of Maryland

PHASE II's

EXISTING PHASE II's -

HOW IS YOUR REVENUE GENERATED?

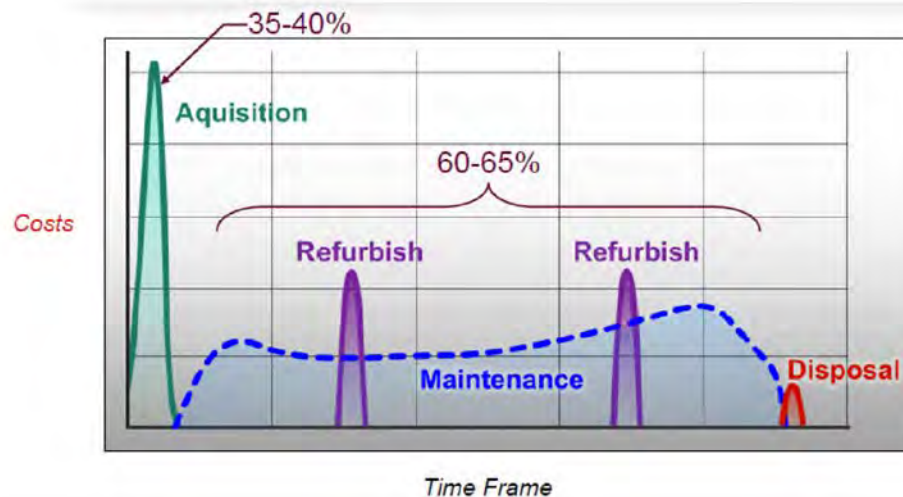
DO YOU NEED TO CONSIDER NEW SOURCES?

NON TRADITIONALS -

HOW IS OR WILL REVENUE OR FUNDS BE ACQUIRED?

FINANCING RECOMMENDATIONS

- Review codes and ordinances to see where incentivizing impervious cover.
- Diversify funding sources
- Consider the full life cycle and replacement costs in planning, implementing, operating and maintaining stormwater BMPs.
- O & M is about protecting your investment -- include O & M costs for at least first 5 years in requests for proposals for BMP project implementation.
- Track costs of all stormwater activities, BMP implementation and O & M consistently to support more accurate budgeting.



IF YOU DECIDE TO CONSIDER A STORMWATER USER FEE OR UTILITY

- In EPA Region 3, all states have legal authority to establish stormwater utilities
- Make sure you understand where your existing code allows for – or actually incentivizes -- impervious cover.
- Look to gain all efficiencies and leverage as much as possible before estimating revenue needs.
- Will administration costs outweigh new revenue?
- Create a stakeholder engagement group that includes a variety of different kinds of landowners and potential opponents.

STORMWATER UTILITIES

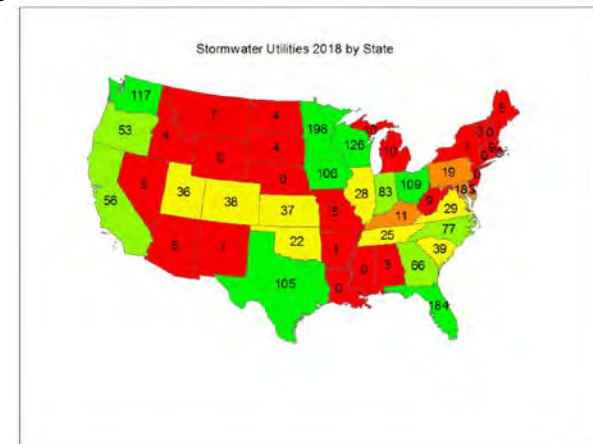
PROACTIVE AND CONSISTENT PUBLIC EDUCATION ONE OF THE MOST IMPORTANT FACTORS

THIS IS A FEE FOR SERVICE NOT A TAX

The most widely used method of funding is the Equivalent Residential Unit (ERU) system (n=786)

Tier fee (241 SWUs)

Flat fee (236 SWUs)



Western Kentucky University
Stormwater Utility Survey, 2018
<https://www.wku.edu/seas/undergradprogramdescription/swusurvey2018.pdf>



TAKOMA PARK

Stormwater Program Budget

FY 1990

- **\$200,000**
- \$60,000 capital
- \$140,000 maintenance & services

FY 2016

- **\$507,700 ***
- \$130,000 capital
- \$244,500 maintenance & services
- \$133,200 personnel

FY 2018 Proposed

- **\$696,600 ***
- \$240,600 capital
- \$310,500 maintenance & services
- \$145,500 personnel

* Figure does not include grant funding for Flower Ave Green Street Project

Capital includes construction costs for new facilities

Maintenance and Services includes office supplies, outside labor, engineering services, subcontract work, and bank charges.

Personnel includes 50% of an engineer, 40% special project coordinator and 25% construction manager

REVENUE: in FY 17 about \$414,000 generated by the utility fee; less than \$1,000 from permit fees.

SUCCESSFUL FEE INCREASE

ERU is equal to an impervious area of 1,228 square feet.

Initial Fee was \$48.00 and became effective on July 1, 2003.

2017 Proposed Rate Increase

Documented need

The base rate of \$55 provided \$414,000 in revenue.

Gap

To achieve the annual funding level of \$700,000, the base rate was increased to \$92.



5. FUNDING AND FINANCING STRATEGIES

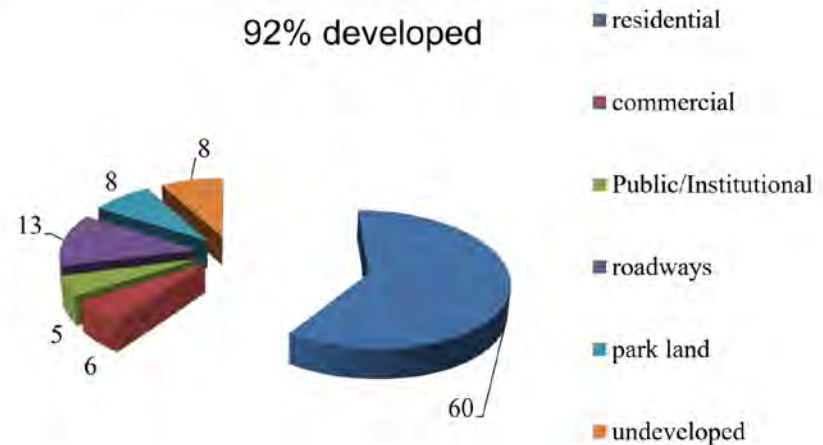
- 1) **Cost Savings**
- 2) **Revenue and Cash Flow Management**
- 3) **Engaging Private Property Owners**

Engaging private property and sector

- **Percentage of stormwater generated from non-municipal or public land?**
- **Fee system incentivizes involvement and action**
- **MCMs for education and ordinances**

Takoma Park Land Uses

Located just outside the District of Columbia, Takoma Park is approximately 2 square miles with a population of 17,000.



<http://publicworks-takomapark.s3.amazonaws.com/public/stormwater/Takoma%20Park%20Stormwater%20Management%20Funding%20and%20Programs.pdf>

Engaging private property and sector

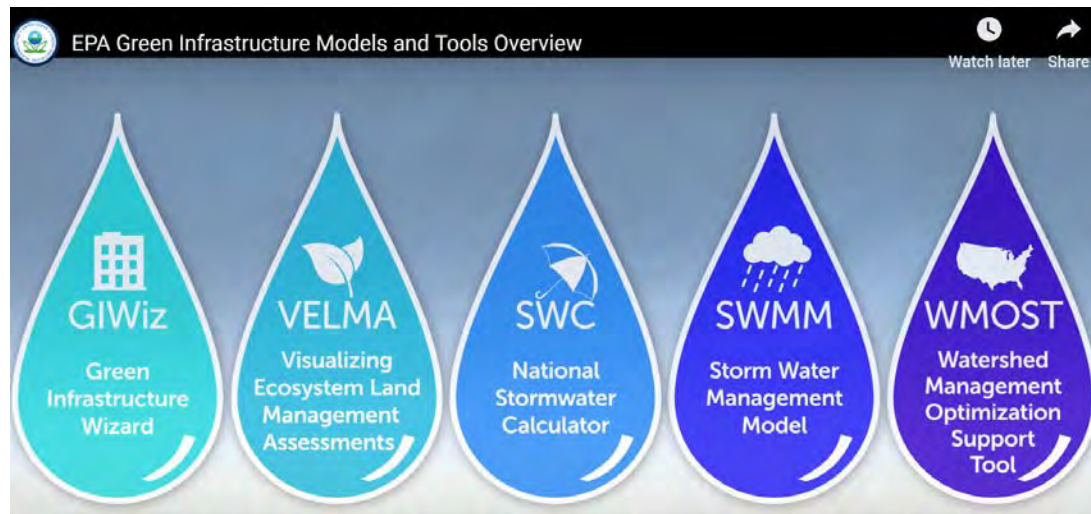
- **Rebates (cost share for BMPs)**
- **Fee credits (reduction in fee for BMP/IA treatment)**
- **Alternative compliance (faith based centers)**
- **Commercial property tax incentives**

RESOURCES

RESOURCES FOR BMPS AND COSTS

EPA Toolkits

<https://www.epa.gov/water-research/green-infrastructure-modeling-toolkit>



RESOURCES FOR BMPS AND COSTS

National Stormwater Calculator

<https://www.epa.gov/water-research/national-stormwater-calculator>

Modeling Capabilities

Hydrology Analysis

Cost Module

Climate Scenarios

Estimate of Probable Maintenance Costs

[Capital Costs](#) [Graphical View](#)

Cost By LID Control Type	Current Scenario (C)		Baseline Scenario (B)		Difference (C - B)	
	Low	High	Low	High	Low	High
Disconnection	\$0	\$0	\$0	\$0	\$0	\$0
Rainwater Harvesting	\$165	\$396	\$0	\$0	\$165	\$396
Rain Gardens	\$1,394	\$33,708	\$0	\$0	\$1,394	\$33,708
Green Roofs	\$0	\$0	\$0	\$0	\$0	\$0
Street Planters	\$0	\$0	\$0	\$0	\$0	\$0
Infiltration Basins	\$2,864	\$104,026	\$0	\$0	\$2,864	\$104,026
Permeable Pavement	\$3,747	\$20,465	\$0	\$0	\$3,747	\$20,465

Note: site complexity variables that affect cost shown below:

Current Scenario	Baseline Scenario
Dev. Type Re-development	Re-development
Site Suitability Poor	Poor
Topography Mod. Steep (10% Slope)	Mod. Steep (10% Slope)
Soil Type B	B
Cost Region Atlanta (56 miles) 1.12	Atlanta (56 miles) 1.12

RESOURCES FOR BMPS AND COSTS

<https://www.epa.gov/green-infrastructure/green-infrastructure-cost-benefit-resources>



Costs

	Construction Cost (\$)				Annual Maintenance Cost (\$)				Life Cycle Cost (\$, NPV)			
	Conventional	Green	Difference	%	Conventional	Green	Difference	%	Conventional	Green	Difference	%
Parking Lot	\$41,325	\$0	\$-41,325	-100%	\$1,125	\$0	\$-1,125	-100%	\$85,954	\$0	\$-85,954	-100%
Conventional Stormwater Storage	\$8,422	\$0	\$-8,422	-100%	\$22	\$0	\$-22	-100%	\$10,945	\$0	\$-10,945	-100%
Standard Roof	\$75,000	\$75,000	\$0	0%	\$500	\$500	\$0	0%	\$107,142	\$107,142	\$0	0%
Permeable Pavement- Pavers	\$0	\$53,250	\$53,250	0%	\$0	\$270	\$270	0%	\$0	\$73,377	\$73,377	0%
Turf	\$5,473	\$5,473	\$0	0%	\$2,345	\$2,345	\$0	0%	\$80,982	\$80,982	\$0	0%
Total	\$130,219	\$133,723	\$3,503	3%	\$3,992	\$3,115	\$-877	-22%	\$285,022	\$261,501	\$-23,522	-8%

Detailed cost sheet.

RESOURCES FOR BMPS AND COSTS

In development - Beta test

Available Spring 2020



Community-enabled Lifecycle Analysis
of Stormwater Infrastructure Costs
(CLASIC)

EPA National Priorities Grant #836173



RESOURCES FOR CO-BENEFITS

- *Framework and Tools for Quantifying Green Infrastructure Co-Benefits and Linking with Triple Bottom Line Analysis.* (Corona Env. WEF funding)
 - Expected to be completed in 2019-2020
- *Holistically Analyzing the Benefits of Green Infrastructure Guidance for Local Governments* (UMD EFC, 2017)

https://www.chesapeakebay.net/documents/EFC_Holistic_Benefits_GI_Report.pdf



<https://mostcenter.org/>

MOST CENTER



Course Syllabus:

Module 1. Introduction and Overview (7 min)

Module 2. Defining the Need (11 min)

Module 3. Cost Reducers (12 min)

Module 4. Revenue and Cash Flow Management (10 min)

Module 5. Engaging the Private Sector (10 min)

Module 6. Education and Outreach (10 min)

QUESTIONS?

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SCHOOL OF
ARCHITECTURE,
PLANNING & PRESERVATION

University of Maryland

7480 Preinkert Drive

College Park, MD 20742

Maryland's Built Environment School



Claud E. Kitchens Outdoor School

Clear Spring, Maryland

\$5,000 grant

National Fish & Wildlife
Foundation, CB Trust
Installed by teacher
volunteers



Hollywood Branch Stream Restoration

mostcenter.org/casestories

■ Problem:

Portions of Hollywood Branch, a tributary of the Anacostia River, were becoming severely eroded from stormwater during rain events, creating unsafe and unsightly conditions in addition to damaging water quality in the stream.

■ Solution:

Montgomery County and the Maryland-National Capital Parks and Planning Commission launched a stream restoration effort for Hollywood Branch. The project involved stabilizing the stream channel, repairing damaged storm drain outfalls, and creating micro wetlands to treat runoff and recharge stream flows. The restoration was integrated with an adjacent green infrastructure project, the Cannon Road Green Streets effort.

Maintenance Plan: There is an ongoing summary of conditions for stable or unstable stream analysis.



The stream prior to restoration



The same area of stream, after restoration
Photo credit: Montgomery County DEP

Key Project Facts

Location: Colesville, MD

Type of Project: Stream Restoration

Scale: 4,470 linear feet

Cost: \$1.7 million for construction;
\$449,000 for engineering & design

Funding Sources: Montgomery County stormwater fees

Contact: Darian Copez, (240)777-7774
E-mail: Darian.Copiz@montgomerycountymd.gov

What is Polluted Runoff?

The growth of our cities has resulted in too many paved surfaces, which prevent rain water from being absorbed by the ground. Instead, the water runs off streets and buildings, collecting trash and dangerous chemicals on its way. This contaminated water overflows into our streams and rivers, creating public health hazards and toxic waters.

Stormwater projects create safe paths for polluted runoff to be captured and filtered before it reaches our waterways. They keep communities healthy and the environment clean.

When communities and their local governments work together to solve big problems like stormwater runoff, that's a story worth telling!

DERRY TOWNSHIP (PA) MUNICIPAL AUTHORITY

- **Providing a cost effective public service to protect and enhance the water environment and quality of life for our local and regional community.**
- **Got funding for system assessment: \$11 million for repairs and \$15 million for GSI to address stormwater management and flooding**
- **Determining ERU depends on good data**



Stormwater Utilities - Suggested Steps

- 1. Development of a Feasibility Study.**
- 2. Create a Billing System.**
- 3. Roll Out a Public Information Program**
- 4. Identifying key users and groups.**
 - a. Establishing an advisory committee.
 - b. Creating a stormwater utility Web site.
 - c. Preparing pamphlets and presentations.
 - d. Meeting with key user groups and the media.
 - e. Distributing information before initial billing.
- 5. Adopt an Ordinance.**
- 6. Provide Credits/Exemptions Credits or exemptions.**
- 7. Implementation.**

More on Stormwater Utilities

ERU - Parcels are billed on the basis of how much impervious area is on the parcel, regardless of the total area of the parcel.

Data is collected in the community to determine a representative sample of Single Family Residential (SFR) parcel impervious area - This amount is called one ERU.

In most cases, all SFRs up to a defined maximum total area are billed a flat rate for one ERU.

Having a tiered-SFR, with different size categories and flat-rates improves the equitability of the bills sent to homeowners

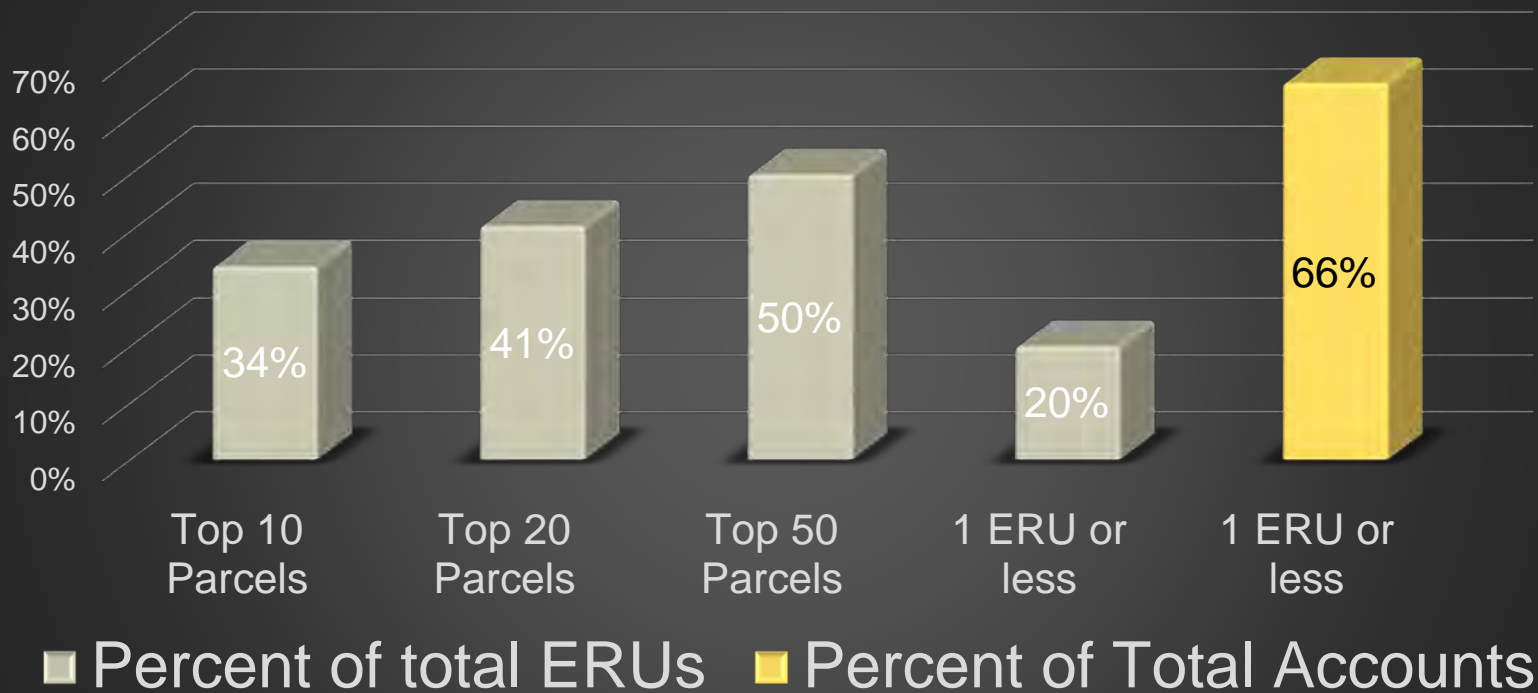
https://www.epa.gov/sites/production/files/2015-10/documents/region3_factsheet_funding_0.pdf

More on Stormwater Utilities

The impervious areas of non-SFR parcels are usually individually measured.

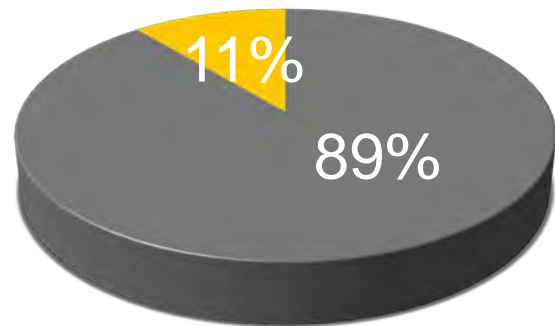
Each non-SFR impervious area is divided by the impervious area of the typical SFR parcel to determine the number of ERUs to be billed to the parcel.

BREAKDOWN OF ERUS



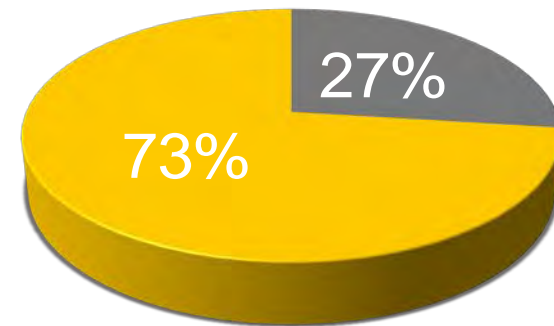
ACCOUNTS V ERUS

Number of Accounts



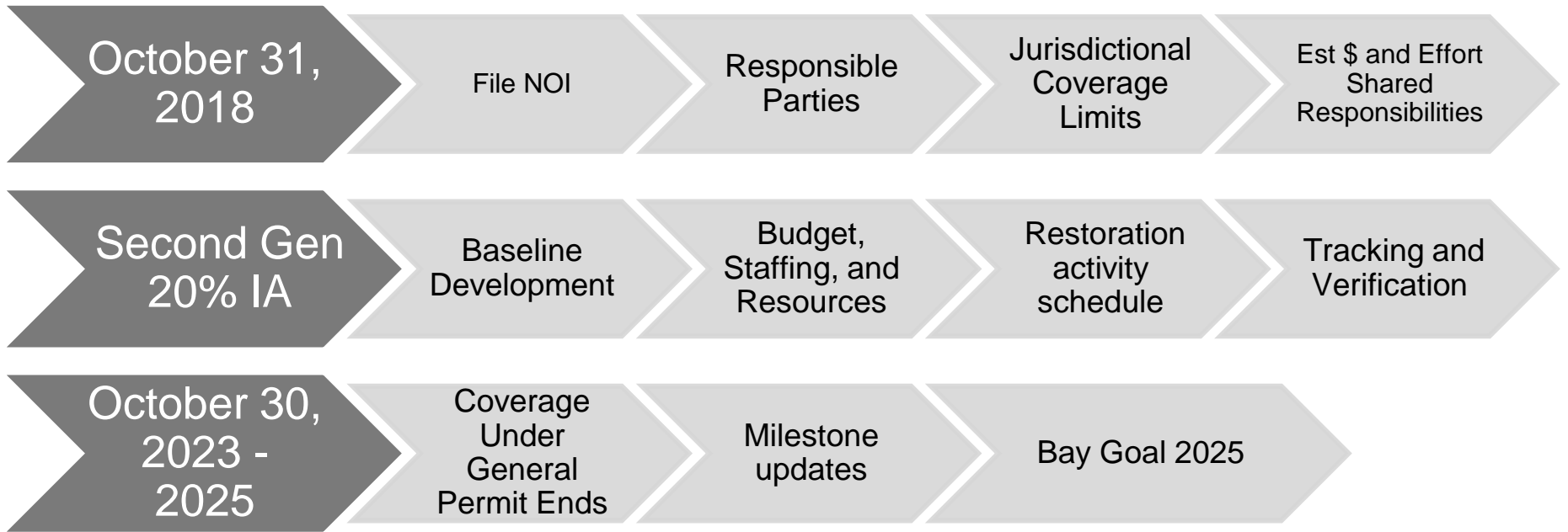
- Residential
- Non-Residential

Number of ERUs



- Residential
- Non-Residential

MDE "Second Generation" General Permit Phase II



<https://mde.state.md.us/programs/water/StormwaterManagementProgram/Documents/fact%20sheet%20municipal%20permit.pdf>

Table A.1. Phase II MS4 General Permit Designation by County

Counties and Baltimore City	Jurisdictions Designated for Phase II MS4 Coverage	Justification
Allegany	N/A	County has CSS
Anne Arundel	Annapolis	City is located w/in UA
Baltimore	N/A	Phase I permit covers entire county
Baltimore City	N/A	Phase I permit covers entire city
Calvert	Calvert County*	County is located w/in UA and meets MDE designation criteria
Caroline	N/A	Not located w/in UA
Carroll	N/A	Phase I permit covers all municipalities
Cecil	Cecil County, Elkton, North East*, Perryville*, and Rising Sun*	County and municipalities are located w/in UA; County also meets MDE designation criteria
Charles	Indian Head* and La Plata*	Towns are located w/in UA
Dorchester	N/A	Not located w/in UA
Frederick	Brunswick, Emmitsburg, Frederick, Middletown, Mount Airy, Myersville, Thurmont, and Walkersville	Middletown, Mount Airy, and Walkersville are located w/in UA; Brunswick, Emmitsburg, Thurmont, and Myersville meet MDE designation criteria
Garrett	N/A	Not located w/in UA
Harford	Aberdeen, Bel Air, and Havre de Grace	Towns and city are located w/in UA
Howard	N/A	Phase I permit covers entire county
Kent	N/A	Not located w/in UA
Montgomery	Gaithersburg, Rockville, and Takoma Park	Cities are located w/in UA; Phase I permit covers all other municipalities
Prince George's	Bowie	City is located w/in UA; Phase I permit covers all other municipalities
Queen Anne's	Queen Anne's County*	County is located w/in UA and meets MDE designation criteria
St. Mary's	St. Mary's County*	County is located w/in UA and meets MDE designation criteria
Somerset	N/A	Not located w/in UA
Talbot	Easton*	Town meets MDE designation criteria
Washington	Washington County, Boonsboro*, Hagerstown, Smithsburg, and Williamsport*	County and municipalities are located w/in UA; County also meets MDE designation criteria
Wicomico	Wicomico County*, Fruitland*, and Salisbury	County and cities are located w/in UA; County also meets MDE designation criteria
Worcester	N/A	Not located w/in UA

* Indicates a county or municipality newly designated for coverage as a Phase II small MS4

EASTERN SHORE CIRCUIT RIDER (NFWF Funds 2017)

- **Serves for six municipalities:**
 - Talbot County
 - Queen Anne's County
 - City of Cambridge
 - City of Salisbury
 - Town of Easton
 - Town of Oxford
- **All water quality issues**
- **Housed at the Chesapeake Bay Foundation, East Shore office**
- **Shared staff person and other shared technical services**
 - leverage limited resources,
 - plan and prioritize projects, and
 - speed the delivery of stormwater best management practices

DERWOOD STATION 2

MONTGOMERY COUNTY, MD

Scale:

3,000 square feet treating runoff from 3 acres, 1 acre of which is impervious.

Funding Source:

Chesapeake Bay Trust, Montgomery County Watershed Restoration and Outreach Grant Program (\$85,000)

Containing 222 homes, Derwood Station No. 2 is part of the larger Derwood Station HOA in Montgomery County, MD. A two-acre, grassy, common area received stormwater runoff directly from a culvert and flooded during rain events. The polluted runoff ran directly into the adjacent Crabbs Branch and created an erosion issue.

The Derwood Station No. 2 Board worked with a landscape designer to develop a multi-faceted plan to address the flooding while simultaneously creating a usable community space. The HOA then partnered with Rock Creek Conservancy to install conservation landscaping utilizing a series of five check dams and cobble pools, in conjunction with a curved design mimicking a natural streambed, to slow down the water, allowing it to soak into the ground. The larger intent of the design was to connect the project both ecologically and hydrologically to the adjacent Crabbs Branch stream valley.

Co-Benefits:

Habitat Creation: The habitat-focused design featured over 3,000 native shrubs, grasses, and flowering perennials, which created essential habitat for pollinator species.

Community Benefits: The project is adjacent to a multi-use trail featuring benches and tables for community use. The HOA is using the site as a demonstration project and providing tours for other organizations that want to take on similar projects.

<https://mostcenter.org/featured-stories>