Montgomery County MD MS4 Phase I/ II WIP Contributions
November 18, 2011

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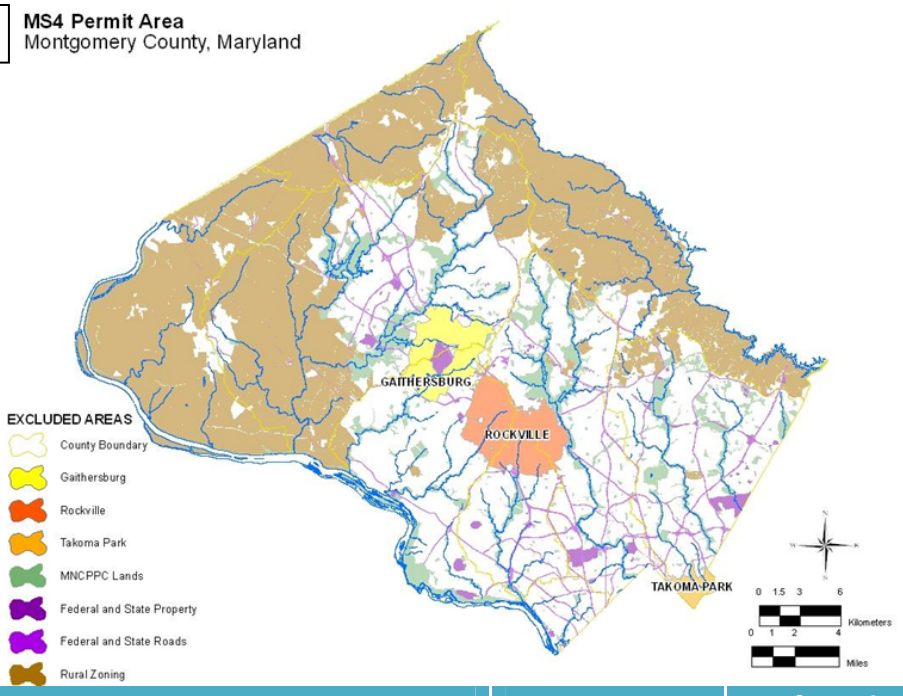
Section III.

A. Overview of the Local Team's process

The Montgomery County Department of Environmental Protection (DEP) agreed to serve as the local liaison for scheduling meetings related to Maryland's Chesapeake Bay Watershed Implementation Plan process. There is no formal local team, but DEP did organize two public information meetings (April 2011 and October 2011) on the WIP process and local involvement.

The DEP is the lead agency for coordinating the County's Phase 1 MS4 permit. The DEP agreed to compile and submit to MDE a joint document which included the County's implementation plan and those for the four MS4 Phase 2 permittees in the County. These are the cities of Gaithersburg, Rockville, Takoma Park, and the MNCPPC-Department of Parks. The County's agricultural and wastewater treatment sectors will be submitting plans separate from the MS4 permittees. The Federal military agencies submitted plans to MDE on November 15. The other Federal agencies and the State agencies will also be submitting their own plans. Figure 1 identifies the County's MS4 permit area, the Phase 2 permittees, and other distinct areas within Montgomery County.

Figure 1. **MS4 Permit Area**
Montgomery County, Maryland



	Area in Acres	% of Total Area
Total County Area	324,552	100%
Total Area of Impervious Surface	35,965	11%
County Area Subject to Stormwater Permit (1)	138,649	43%
Impervious Cover Subject to Stormwater Permit (2)	25,119	18%

1. Exclusions include: Certain zoning codes, parklands, forests, municipalities with own stormwater management programs, state and federal properties, and state and federal maintained roads
2. Percent of County Jurisdictional Area subject to the Stormwater Permit

Information presented and attendees at the two public information meetings are posted at: http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Pages/MontgomeryTeam.aspx.

At the April 2011 meeting, the DEP provided information on its Countywide Coordinated Implementation Strategy (Countywide Strategy), posted at: http://www.montgomerycountymd.gov/content/dep/downloads/Countywide_CIS_Draft_Combined_021611.pdf

The Countywide Strategy was developed to meet MS4 permit requirements, in particular to add runoff management to the Maximum Extent Practicable (MEP). By February 2015, the County must add runoff management to impervious acreage equal to 20% of the impervious acreage that currently lacks MEP management. The general approach for developing the Countywide Strategy included use of the existing, extensive project inventories for stormwater retrofits, assumptions about potential additional project acreage, and use of the Watershed Treatment Model (WTM) and pollutant loadings by land use.

With this approach, the DEP was able to show a proposed implementation rate, estimated pollutant reductions, and associated cost estimate to meet the MS4 permit requirements. Table 1 summarizes these assumptions. The Countywide Strategy as drafted would also meet the Maryland timeline to achieve Bay Program nutrient reduction goals published at that time. The draft was submitted to MDE in February 2011 as required in the County's MS4 permit. The estimated cost to meet permit requirements was $305 million by 2015; to meet Bay Program targets, the estimated cost was $622 million by 2017 and $987 million by 2020.

Table 1.

Countywide Watersheds

Summary of Implementation Plan schedule with expected MS4 permit area WLA compliance endpoints

	2015	2017	2020	2025	2030	Permit/ TMDL Targets 2017	Permit/ TMDL Targets 2020
Impervious Area Treated (acres)	4,302	6,014	7,722	10,518	11,154	6,008	7,723
% of Impervious Area Treated by ESD	18%	34%	47%	60%	63%		
Impervious Area Treatment Cost (Million $)	305	622	987	1,687	1,884		
% of Cost for ESD	53%	66%	70%	80%	80%		
Nitrogen (% Reduction)	18%	25%	36%	46%	51%	9%	20%
Phosphorus (% Reduction)	17%	23%	34%	44%	46%	12%	34%
Sediment (% Reduction)	23%	34%	54%	60%	62%	20%	37%
Bacteria (% Reduction)	11%	15%	20%	28%	30%		
Trash (% Reduction)	18%	26%	33%	41%	42%		

Assumptions:
1. Does not inclde repeated Outreach and Education costs beyond FY2015
2. Does not include an inflatoin multiplier

No summaries were prepared for the April and October public information meetings, but two significant items were identified during the discussion sessions. The first was related to finding funding in the time interval required. The second was actual project implementation in the time interval required (i.e. between 2012 and 2017). While the County was moving forward with identifying funding and accelerating project implementation to meet its specific permit requirements, none of the other MS4 Permittees had similar permit requirements and regulatory timelines. Consequently, they expressed concerns about not being able to create a mandate from their elected officials to find increased funding or to increase implementation rate.

Subsequent to the April 2011 meeting, the DEP participated in a briefing of City of Gaithersburg elected officials on the County's MS4 permit regulatory requirements and the programmatic requirements to meet Chesapeake Bay restoration goals. During 2011, the DEP also briefed both the County Executive and County Council on the MS4 permit requirements and did note that the project implementation rate to meet MS4 permit requirements would also meet Maryland's Chesapeake Bay restoration goals and timelines.

B. County Area Phase II WIP Strategies for MS4 Phase I/II

1. Montgomery County MS4 Phase I

The Countywide Strategy provides the framework for the County's approach for enhancing stormwater management and reducing pollutants entering local tributaries. By 2017, the Strategy indicates an implementation rate to add runoff management to over 6,000 impervious acres not treated to the MEP in baseline year 2009. Most of this treatment will be achieved by retrofits to existing traditional structural controls, in particular dry ponds and extended detention dry ponds. Approximately 34% of those acres will be treated using ESD techniques such as micro-bioretention, rain gardens, green roofs, and pervious pavement.

Greater detail on the type of implementation by watershed is included in Section IV. Technical Appendix A. For each of the County watersheds for which retrofit inventories had been completed, the 'high' and 'low' priority projects for implementation are listed in the watershed-specific implementation plans. By 2015, there is an expected 100% implementation rate for 'high' priority projects. These plans can be found at http://www.montgomerycountymd.gov/dectmpl.asp?url=/content/dep/water/wris.asp#plans.

Figure 2 was extracted from the MDE WIP Phase 2 allocations posted in October 2011 at http://www.mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Pages/MD_WIP_Phase_II_Target_load_summaries.aspx. Shown are the loads targets for nitrogen and phosphorus for the MS4 Phase I and Phase II County and Municipal sources. Based on conversations with MNCPPC, MDE indicated that the County Phase I/II MS4 includes some MNCPPC parkland as well as the County MS4 permit area.

The Municipal Phase II MS4s include the cities of Gaithersburg, Rockville, and Takoma Park and the MNCPPC-Parks.

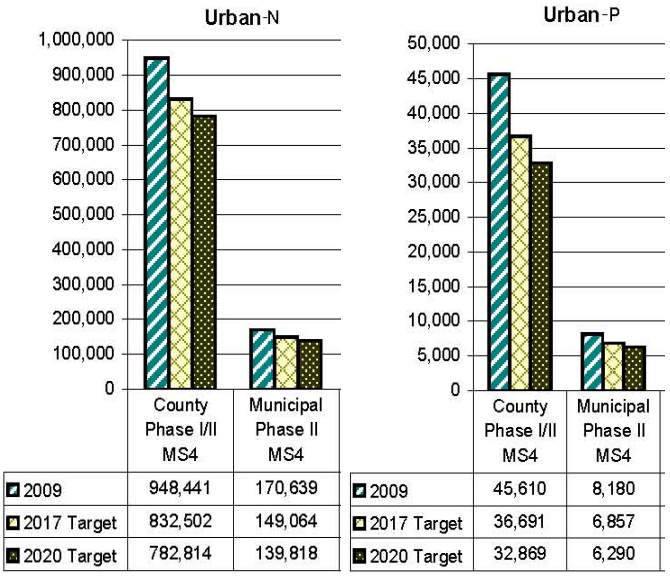


Figure 2. Nitrogen (N) and Phosphorus (P) Loads and Targets

For purposes of comparison, it was assumed that the required percent reduction will be the same for the two sectors represented as 'County Phase I/II MS4'. Based on the Countywide Strategy, the estimated percent nutrient reductions for expected project implementation will exceed the calculated percent reductions to meet the loads targets shown in the MDE WIP Phase 2 allocations published in October, 2011. Table 2 shows the calculated reductions from 2009 baseline loads to meet the 2017 and 2020 targets.

Table 2. Calculated Percent Reductions in Nutrients.

From 2009 baseline	WIP Phase 2 (2011)		Countywide Strategy (2011)	
Nutrient to be reduced	TN	TP	TN	TP
2017	11.65%	21.28%	25%	23%
2020	16.64%	30.40%	36%	34%

2012-2013 Milestones

During FY12, the County continues to move forward with restoration project planning and implementation and identifying funding sources to support project implementation. The six-year Capital Improvement Program (CIP) budget for FY2013-2018 is being developed to reflect the significant increase in implementation that will be needed to meet the MS4 permit requirement for adding runoff management. As shown in Table 3, the currently approved amount for FY12 is $11,445,000 and for FY13 is $20,695,000.

Table 3. Department of Environmental Protection
Current Approved FY11-16 Stormwater Management CIP (in $000s)

Projects	CIP Cycle Total	FY11	FY12	FY13	FY14	FY15	FY16
SWM Retrofit	52,010	*1,785*	*2,425*	*11,000*	*11,500*	*14,400*	10,900
Public Property LID	27,975	*3,475*	*4,900*	*4,900*	*4,900*	*4,900*	4,900
Miscellaneous Stream Valley Improvement	8,370	*1,395*	*1,395*	*1,395*	*1,395*	*1,395*	1,395
SWM Facility Planning	7,025	*925*	*1,200*	*1,350*	*1,350*	*1,100*	1,100
SWM Retrofit Anacostia	1,645	*0*	*175*	*450*	*510*	*510*	0
Major Structural Repair	9,250	*1,300*	*1,350*	*1,600*	*1,650*	*1,650*	1,700
Total	**$106,275**	***$8,880***	***$11,445***	***$20,695***	***$21,305***	***$23,955***	**$19,995**

Simultaneously, the DEP is completing an evaluation of its stormwater utility (the Water Quality Protection Charge) and means to equitably increase the assessments and revenue from that funding source. In FY12, the charge was $70.12 per assessed unit, which raised approximately $17 million in funding. In an October, 2011 presentation to a key County Council subcommittee, the DEP indicated the following possible changes.

1. Charge all properties based on their actual imperviousness rather than the current approach based on 'equivalent residential unit'

2. Charge all commercial and nonprofit properties rather than the current approach with only residential and "Associated Non-Residential" properties

3. Provide incentives to residential, commercial and nonprofit properties to encourage installation and maintenance of stormwater controls:

    - Rebates (currently exists through the RainScapes Program www.rainscapes.org)
    - Grants (requires new program)
    - Credits (requires new program)

Area Implementation Tracking, Verification and Reporting Methods

The County's implementation actions will be tracked in the required databases and included in the MS4 permit annual report submissions to MDE. These annual submissions include GIS coverages and database information to document location, type of BMPs being implemented and estimated pollutant reductions. In addition, the County provides an extensive narrative section each year on its programmatic, 'directionally correct' activities, being those that may not have direct quantifications for nutrient reductions. These include watershed-specific stream resource monitoring, monitoring development-related BMPs in Special Protection Areas, inspections and maintenance of stormwater management BMPs, detection and elimination of illicit discharge and illegal connections, and results from its increased watershed outreach program. The annual report for the year 2010 can be found on the County's web site at http://www.montgomerycountymd.gov/dectmpl.asp?url=/content/dep/water/npdes.asp#reports.

Technical Concerns

When comparing results from the Countywide Strategy with those used in the Maryland Assessment and Scenario Tool (MAST), a number of data issues were identified. As shown in Table 4, these include differences in acres assigned for the MS4 permit area, in impervious and pervious acres, and in acres with BMP control.

Table 4. Acres within County MS4 permit area		
	Strategy	MAST
Total Acres	138,649	113,328
Impervious acres	25,119	25,624
Pervious acres	113,530	87,703
Acres with BMP Control		
	Strategy	MAST
Total County	30,641	36,922
Impervious	8,877	8,348

Technical issues were also noted in differences for assigning loads per acre, categories of BMPs, and BMP nutrient reduction efficiencies. The differences for total loads per year for the year 2009 are shown in Table 5. The Countywide Strategy shows more acres within the MS4 permit area, fewer TN pounds per year, and much greater TP pounds per year than information extracted from MAST. Due to the unreconciled technical issues, the County is not submitting MAST scenarios at this time.

Table 5. Differences in total loads	Acres	TN lbs/yr	TP lbs/yr
Countywide Strategy Subject to Stormwater Permit	138,649	838,489	114,123
MAST Subject to Stormwater Permit delivered	113,328	858,364	39,607
WIP allocation from MDE web page (2009 baseline, includes MNCPPC-Parks land)		948,441	45,610

Next Steps

Next steps include more detailed comparisons of base data layers to determine why there are differences in total acres and BMP acres with control, and how the loads per acre per land use type used in the WTM and BMP by category efficiencies may be reconciled.

Additional items for consideration include:

- Enhancing coordination among the sectors as the implementation plans are finalized to assure advantage of opportunities for joint projects or working together in target areas. This type of coordination is likely to lead to greater efficiencies for project planning, design, and construction.
- Evaluating septic allocations and considering what strategies would be cost-effective to reduce those loads. The DEP convened an initial meeting with those agencies involved in planning and permitting septic systems in the County (DEP, DPS, and the Health Department) to begin gathering data on numbers of systems to compare with Chesapeake Bay Program assumptions. Based on preliminary review of County data there are approximately 15,321 properties with septic systems. The MAST estimates show approximately 31,913 properties on septic. The County is moving forward to determine why there is such a difference in the MAST estimates and the extent of resources necessary and potential sources of funding to develop a comprehensive approach to address issues associated with County septic systems.

2. City of Gaithersburg

There are over 24 miles of streams within the boundaries of the City of Gaithersburg which consists of approximately 10 square miles. According to our current SWM inventory there are approximately 400 stormwater management facilities within the City, 5,000 inlets, 700 outfalls, and 140 linear miles of pipe. The watersheds that fall within City boundaries include Muddy Branch and Middle and Lower Great Seneca.

The City has made significant progress in implementing its stormwater management program in order to satisfy our NPDES Phase II permit requirements and achieve our measurable goals. During the time period of 2009-2012, the City retrofitted an average of 12.43 acres annually.

Recent projects include the following:

- Green streets were constructed in 2009/2010 with more budgeted in coming years including a Green Streets Prioritization project currently underway.

- The Rainscapes Rewards program provides rebates to homeowners for the installation of rain barrels and conservation landscaping. Rainscapes Rewards to date has provided rebates to residents for over 30 rain barrels.

- Hydrologic analyses of the Muddy Branch and Great Seneca were completed in January 2009 to prioritize stream restoration designs and stormwater management retrofit designs to improve water quality, stream health, and habitat.

- The Park Summit retrofit project is underway and consists of updating two ponds to meet current stormwater management standards. Currently in design review, the Woodland Hills retrofit project is scheduled to begin construction in 2012 and also consists of an update to meet current stormwater standards. In addition, a stream restoration project at Asbury Methodist Village has been completed.

The City also signed a Memorandum of Understanding (MOU) with Montgomery County to receive funds from the County's Water Quality Protection Charge. These funds provide an annual revenue stream of approximately $600,000 (at current rates) to implement a stormwater management facility inspection and maintenance program.

2013 Milestones

Looking towards the future, available funds in fiscal years 2012 and 2013 will support the construction of a stream restoration project, the cleaning and maintenance of City SWM facilities, an expansion of the green streets program, the Rainscapes reimbursement program, street sweeping, as well as other miscellaneous construction projects. These funds will also support a bathymetric study, SWM facility inspection, culvert cleaning and repair, the design of a SWM retrofit for a pond, the design of a stream stabilization project, and construction of Watershed Implementation Plan projects. In the future, the City may consider adopting its own water quality fee, which could potentially apply to commercial impervious area in addition to residential.

3. City of Rockville

Developed October 21, 2011

The City of Rockville has 32.2 miles of surface streams within its 13.54 square miles. These streams flow through three watersheds – Rock Creek, Cabin John Creek and Watts Branch. On average, the City has over 30 percent impervious surface coverage and has approximately 660 publicly and privately maintained SWM facilities. These facilities were constructed between the late 1970s and the present and range from extended detention ponds and underground sand filters to bioretentions and pervious pavement. The City has an extensive storm drainage system with approximately 162 linear miles of pipe and more than 2,560 inlets.

The City also has extensive programmatic initiatives including education and outreach activities like Adopt-A-Stream, Save Our Streams, and Rainscapes Rebate programs. The City carries out good housekeeping practices like street sweeping on commercial streets and existing public stormwater management (SWM) facility maintenance. The stormwater program also carries out a range of enforcement actions including inspection and maintenance of private SWM facilities and enforcement of its own Water Quality Protection Ordinance designed to prevent contamination of storm drains and streams.

To meet the Chesapeake Bay wide TMDL, the City of Rockville is committed to fulfilling all requirements of its current NPDES MS4 Phase II permit and in good faith striving to meet all requirements agreed upon in the future Notice of Intent (NOI) supporting the City's expected permits.

2013 Milestones

The City will continue to implement Capital Improvement Projects (CIP) as outlined in its FY2012 budget (Attachment A) and pursue the following programmatic milestones during calendar year 2012 and 2013.

1) *Preserve the City's current stormwater management utility fee structure*. Successfully lobby to preserve the City's equitable, polluter-pays fee structure implemented in 2008 and protect our property owners from double charges associated with a state-wide stormwater tax. Explore options to collect fees from other governmental institutions.

2) *Identify untreated impervious areas within Rockville City limits.* Upon Mayor and Council approval in FY2013, the City will identify untreated impervious surface by geo-locating SWM facilities and their associated drainage areas. In addition to this initiative, the City will continue implementing comprehensive watershed studies including, in FY2012, the Rock Creek watershed study and, in FY2013, the Watts Branch watershed study. These studies are designed to measure the health of the watershed, determine the cause or source of impairment and identify the most effective stormwater management tool for addressing the issue.

3) *Develop detailed NOI.* Develop a Notice of Intent (NOI) in response the new Phase II permits that demonstrates how the City of Rockville will efficiently and effectively achieve its requirements.

Strategy Schedule

City of Rockville	
Strategy Schedule	2013 Program Enhancement Milestones
2012 Lobby to preserve current funding system.	2012 Lobby to preserve current funding system.
2012 Negotiate Notice of Intent under next round of Phase II permits.	2012 Develop detailed NOI; Identify untreated Impervious area.
2012 Plan and budget for near term projects listed in the current CIP plan.	2012 Implement projects planned in the FY2012 CIP budget.
2013 Annual Update SWM Enterprise Fund Cash flow model to reflect any additional funding needs required to fulfill new NPDES permit requirements. Recommend to Mayor and Council to adjust fee rate accordingly.	
2013 Initiate design work for near term retrofit projects.	
2015 Complete initial project design.	
2015 Bid the initial project(s) construction and start the work.	
2016 Complete the design of next project(s).	

4. CITY OF TAKOMA PARK

WIP STRATEGY DESCRIPTION

The City of Takoma Park occupies 1280 acres of land located in the southeastern corner of Montgomery County, Maryland. Takoma Park borders Prince George's County to the east, and Washington D.C. to the South. The majority of Takoma Park lies within the Sligo Creek Sub-watershed to the Anacostia River. For this reason, much of the City's Watershed Implementation Plan is designed in response to pollutant pressures to Sligo Creek and the Anacostia. The Sligo Creek sub-watershed represents one of the oldest constructed portions of the Anacostia watershed, having been largely developed during the 1930's - 50's; well before the advent of stormwater management controls. Although there have been many various restoration projects constructed in Sligo Creek since 1990, water quality and aquatic habitat and terrestrial habitat remains degraded. Specifically, Sligo Creek exhibits moderate to high TSS, nutrient and bacteria loadings, and one of the worst trash problems in the Anacostia watershed.

The City of Takoma Park aims to achieve the goal to meet the Chesapeake Bay TMDL through fulfilling the requirements of our current National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) – Phase II Permit. We anticipate that our renewed permit would call for a 20% retrofit of impervious area for which runoff is not currently managed to the maximum extent practicable (MEP). Our plan is to achieve this goal mainly using Environmental Site Design as well as structural techniques. WIP –phase II strategy also includes striving to attain TMDL reduction targets through programmatic means.

The components of the strategy plan are include the following steps:

- Identify feasible best management practices (BMPs)
- Quantify the area they treat and the amount of pollutants they can remove from Stormwater runoff before entering into the Sligo Creek, Long Branch, and Takoma Branch
- Determine the restoration potential for sub-watershed and evaluate the ability to meet applicable TMDLs.
- Provide a schedule and cost estimate for meeting the requirements

The City's MS4 Phase II Permit requirements include participation in watershed restoration in coordination with Montgomery County's Countywide Coordinated Implementation Strategy. The City of Takoma Park's Watershed Implementation Plan is adapted from this previously coordinated effort of the County, in particular with objectives geared toward Sligo Creek and the Anacostia Watershed.

5. M-NCPPC Department of Parks
November 7, 2011

The M-NCPPC Department of Parks has over 466 miles of surface streams within its over 55 square miles of parkland. These streams flow through Potomac, Patuxent and Anacostia watersheds. The M-NCPPC Department of Parks has less than 2% impervious surfaces, with over 40 square miles of natural landscape which is primarily forest.

The M-NCPPC Department of Parks has an operational program which includes staff training in pollution prevention and environmental best management practices, storm drain mapping, and stream monitoring. A full list can be found in the NPDES Annual Report found in Appendix 1.

The M-NCPPC Department of Parks is committed to fulfilling its WIP requirements through compliance with its Phase II MS4 permit obligations. M-NCPPC will develop a detailed Notice of Intent when the new Phase II permit is released.

2013 Milestones

The M-NCPPC Department of Parks will continue to implement its Capital Improvement Project (CIP) as is outlined in the FY12 budget (see page 21 of Section IV- Appendix C). The Department of Parks will also continue to fulfill its NPDES permit requirements following the schedule laid out in its annual NPDES report (Section IV-Appendix C).

In FY12 M-NCPPC Department of Parks received funding for 5 new NPDES-related positions (4.6 work years) through the Montgomery County Water Quality Protection Fund. This additional staff will help to advance the NPDES program and integrate a comprehensive stormwater strategy across the organization.

M-NCPPC Department of Parks will continue to map its storm drain system and stormwater facilities and continue to develop its inventory of potential retrofit projects. M-NCPPC will increase its training program for stormwater related issues. Besides constructing its own projects, M-NCPPC will continue to coordinate stormwater and stream restoration projects which take place on parkland.

Strategy Schedule

MNCPPC-Parks	
Strategy Schedule	FY13 Program Enhancement Milestones
FY12 - Hire 5 new positions (4.6 work years) in Department of Parks for NPDES compliance using additional funding from the Water Quality Protection Fund.	FY12 - Hire 5 new positions (4.6 work years) in Department of Parks for NPDES compliance using additional funding from the Water Quality Protection Fund.
FY12 - Increase NPDES coordination both internally and externally to the organization.	FY12 - Increase NPDES coordination both internally and externally to the organization.
FY12 - Increase staff training in environmental Best Management Practices, sustainable landscaping and ecological land management.	FY12 - Increase staff training in environmental Best Management Practices, sustainable landscaping and ecological land management.
FY12 – Develop Notice of Intent under next round of Phase II NPDES permits.	FY12 – Develop Notice of Intent under next round of Phase II NPDES permits.
FY12 - Conduct storm drain mapping and GIS analysis to better define the current storm drain network, impervious surface and potential restoration sites.	FY12 - Conduct storm drain mapping and GIS analysis to better define the current storm drain network, impervious surface and potential restoration sites.
FY12 - Plan and build stormwater retrofits and stream restoration projects as funded by the CIP budget.	
FY13 - Continue NPDES coordination both internally and externally to the organization.	FY13 - Continue NPDES coordination both internally and externally to the organization.
FY13- Continue staff training in environmental Best Management Practices, sustainable landscaping and ecological land management.	FY13 - Continue staff training in environmental Best Management Practices, sustainable landscaping and ecological land management.
FY13 - Continue to conduct storm drain mapping and GIS analysis to better define the current storm drain network, impervious surface and potential restoration sites.	FY13 - Continue to conduct storm drain mapping and GIS analysis to better define the current storm drain network, impervious surface and potential restoration sites.
FY13 - Continue to plan and build stormwater retrofits and stream restoration projects as funded by the CIP budget.	

Section IV: Appendices

A. Montgomery County summary of implementation type and rate by watershed.

Scenario Category	Description
Completed and High Priority Projects	These include projects already completed or high priority structural BMPs scheduled for retrofit in the FY11-FY16 Capital Improvements Program (CIP)
Low Priority Projects	These include FY11-FY16 CIP projects that for various reasons are considered a lower priority.
Other Potential Projects	These include other projects in existing inventories that were not listed in the previous two categories. For the Anacostia, they include projects in Anacostia Restoration Plan (ARP) prepared by the Army Corp of Engineers.
Public ESD retrofits	These include small scale ESD practices applied to County-owned buildings, streets and parking lots and rights of way. Examples include rainwater harvesting, green roofs, upland reforestation, soil compost amendments, rooftop disconnection “green street” retrofits and converting drainage ditches to dry swales. These are Code 4 structures. This category also includes other structural BMP upgrades to existing County BMPs which were designated as under-performing or non-performing.
Private ESD retrofits	These projects include ESD on commercial property and residential property and include green roofs, rain gardens, and permeable pavement.
Riparian Reforestation	Focuses primarily on tree planting for riparian buffer restoration.
Stream Restoration	Includes the use of natural materials such as rocks, logs, and native vegetation to reduce pressure on eroded banks, prevent down-cutting of the streambed, and restore the natural meander patterns and slope profiles found in stable reference streams.
Programmatic Practices	This category deals with potential pollutant reduction that can be attributed and quantified through MS4 stormwater pollution prevention improvements and better housekeeping on County land and facilities. Also includes any pollutant reductions due to product substitution (e.g., nitrogen and phosphorus limits in fertilizer), operational programs (e.g., recycling) and enforcement. This category also deals with reduced pollutants that can be attributed and quantified through MS4 stormwater education (e.g., lawn care) and outreach aimed at pollution prevention, better housekeeping, and increased stewardship.

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FY2015 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
Anacostia	*Completed and High Priority Projects*	315	$16	5.8%	5.9%	1.9%	315	$15.8	100.0%	30%	9%
	Low Priority Projects	194	$5	2.0%	2.1%	0.7%	194	$5.1	100.0%	61%	8%
	Other Potential Projects	732	$82	7.7%	8.0%	2.6%	2,217	$249.2	33.0%	24%	20%
	Public ESD Retrofits	96	$24	1.1%	1.1%	0.4%	956	$237.8	10.0%	100%	100%
	Private ESD Retrofits	86	$21	1.0%	1.0%	0.3%	857	$213.0	10.0%	100%	100%
	Riparian Reforestation	-	$0	0.0%	0.0%	0.0%	6	$1.4	0.0%	0%	0%
	Stream Restoration	-	$11	5.0%	6.6%	38.1%	-	$93.7	11.7%	0%	0%
	Programmatic Practices	-	$0.9	2.2%	2.1%	2.6%	-	$3.6	25.0%	0%	0%
	Subtotal	***1,421***	***$160***	***24.8%***	***26.8%***	***46.6%***	***4,544***	***$819.6***	***31.3%***	***45.4%***	***26.3%***
Rock Creek	*Completed and High Priority Projects*	585	$13	4.0%	5.0%	6.0%	585	$13.3	100.0%	13%	1%
	Low Priority Projects	665	$9	3.9%	3.9%	6.2%	665	$8.8	100.0%	7%	1%
	Other Potential Projects	48	$1	0.3%	0.3%	0.4%	193	$2.0	25.0%	0%	0%

FY2015 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Public ESD Retrofits	102	$25	1.3%	1.3%	1.4%	1,020	$247.1	10.0%	100%	100%
	Private ESD Retrofits	141	$34	1.7%	1.7%	1.9%	1,407	$341.2	10.0%	100%	100%
	Riparian Reforestation	-	$0	0.0%	0.0%	0.0%	119	$23.8	0.0%	0%	0%
	Stream Restoration	-	$4	2.0%	1.5%	21.9%	-	$20.1	21.8%	0%	0%
	Programmatic Practices	-	$1	11.0%	11.0%	0.0%	-	$1.2	100.0%	0%	0%
	Subtotal	***1,541***	***$87***	***24.1%***	***24.7%***	***37.8%***	***3,989***	***$657.6***	***38.6%***	***70.4%***	***16.5%***
Cabin John	*Completed and High Priority Projects*	88	$2	2.9%	3.0%	3.3%	88	$1.6	100.0%	19%	2%
	Low Priority Projects	10	$2	0.2%	0.2%	0.2%	10	$1.6	100.0%	98%	78%
	Other Potential Projects	1	$0	0.0%	0.0%	0.0%	5	$0.1	25.0%	0%	0%
	Public ESD Retrofits	40	$9	1.0%	1.0%	1.1%	403	$87.8	10.0%	100%	100%
	Private ESD Retrofits	47	$10	1.2%	1.2%	1.3%	473	$103.1	10.0%	100%	100%
	Riparian Reforestation	-	$0	0.0%	0.0%	0.0%	39	$7.8	0.0%	0%	0%
	Stream Restoration	-	$0	0.0%	0.0%	0.0%	-	$16.2	0.0%	0%	0%

FY2015 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Programmatic Practices	-	$0	15.3%	14.4%	0.0%	-	$0.5	100.0%	0%	0%
	Subtotal	***187***	***$23***	***20.7%***	***19.9%***	***6.0%***	***1,018***	***$218.7***	***18.4%***	***92.0%***	***52.0%***
Muddy Watts	*Completed and High Priority Projects*	211	$4	6.0%	6.0%	6.0%	211	$4.4	100.0%	8%	1%
	Low Priority Projects	26	$2	0.2%	0.3%	1.2%	26	$2.0	100.0%	84%	33%
	Other Potential Projects	-	$0	0.0%	0.0%	0.0%	-	$0.0	0.0%	0	0%
	Public ESD Retrofits	-	$0	-	-	-	-	$0.0	0.0%	100%	100%
	Private ESD Retrofits	-	$0	-	-	-	-	$0.0	0.0%	100%	100%
	Riparian Reforestation	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Stream Restoration	-	$0	0.0%	0.0%	0.0%	-	$24.2	0.0%	0%	0%
	Programmatic Practices	-	$0	-	-	-	-	$0.0	100.0%	0%	0%
	Subtotal	***237***	***$6***	***6.2%***	***6.3%***	***7.2%***	***237***	***$30.6***	***100.0%***	***31.6%***	***4.3%***
Great Seneca (inclusive of Clopper Lake)	*Completed and High Priority Projects*	800	$19	20.0%	20.0%	21.0%	800	$18.9	100.0%	6%	1%
	Low Priority Projects	87	$7	3.7%	3.7%	4.3%	87	$6.6	100.0%	41%	15%

FY2015 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Other Potential Projects	13	$0	0.6%	0.6%	0.7%	53	$0.2	25.0%	0%	0%
	Public ESD Retrofits	-	$0	-	-	-	-	$0.0	0.0%	100%	100%
	Private ESD Retrofits	-	$0	-	-	-	-	$0.0	0.0%	100%	100%
	Riparian Reforestation	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Stream Restoration	-	$0	0.0%	0.0%	0.0%	-	$25.9	0.0%	0%	0%
	Programmatic Practices	-	$0	-	-	-	-	$0.0	100.0%	0%	0%
	Subtotal	***901***	***$26***	***24.3%***	***24.3%***	***26.0%***	***941***	***$51.6***	***95.8%***	***15.2%***	***2.2%***
Lower Monocacy	*Completed and High Priority Projects*	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Low Priority Projects	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Other Potential Projects	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Public ESD Retrofits	-	$0	0.0%	0.0%	0.0%	40	$8.6	0.0%	100%	100%
	Private ESD Retrofits	1	$0	0.4%	0.4%	0.4%	13	$2.9	10.0%	100%	100%
	Riparian Reforestation	-	$0	0.0%	0.0%	0.0%	5	$1.1	0.0%	0%	0%

FY2015 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Stream Restoration	-	$0	0.0%	0.0%	0.0%	-	$7.3	0.0%	0%	0%
	Programmatic Practices	-	$0.0	0.0%	0.0%	0.0%	-	$0.1	0.0%	0%	0%
	Subtotal	***1***	***$0.29***	***0.4%***	***0.4%***	***0.4%***	***58***	***$20.0***	***2.3%***	***100.0%***	***100.0%***
Patuxent (Rocky Gorge)	*Completed and High Priority Projects*	5	$0	0.7%	0.7%	0.8%	5	$0.4	100.0%	77%	27%
	Low Priority Projects	5	$1	8.4%	8.2%	8.3%	5	$0.9	100.0%	100%	100%
	Other Potential Projects	-	$0	0.0%	0.0%	0.0%	-	$2.0	25.0%	0%	0%
	Public ESD Retrofits	-	$0	0.0%	0.0%	0.0%	179	$31.2	0.0%	100%	100%
	Private ESD Retrofits	1	$0	0.1%	0.1%	0.1%	106	$18.6	1.0%	100%	100%
	Riparian Reforestation	-	$0	0.0%	0.0%	0.0%	12	$2.5	0.0%	0%	0%
	Stream Restoration	-	$0	0.3%	0.2%	0.9%	-	$19.1	2.5%	0%	0%
	Programmatic Practices	-	$0	38.0%	8.2%	0.3%	-	$0.1	100.0%	0%	0%
	Subtotal	***11***	***$3***	***47.5%***	***17.4%***	***10.4%***	***307***	***$74.7***	***3.6%***	***54.5%***	***64.5%***
Patuxent (Triadelphia)	*Completed and High Priority Projects*	-	$0	-	-	-	-	$0.0	100.0%	0%	0%

FY2015 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Low Priority Projects	2	$0	0.5%	0.5%	0.6%	2	$0.4	100.0%	100%	100%
	Other Potential Projects	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Public ESD Retrofits	-	$0	0.0%	0.0%	0.0%	17	$4.1	0.0%	100%	100%
	Private ESD Retrofits	1	$0	0.3%	0.3%	0.3%	19	$4.7	5.0%	100%	100%
	Riparian Reforestation	-	$0	0.0%	0.0%	0.0%	1	$0.1	0.0%	0%	0%
	Stream Restoration	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Programmatic Practices	-	$0	23.4%	3.5%	0.0%	-	$0.01	100.0%	0%	0%
	Subtotal	***3***	***$0.6***	***24.2%***	***4.3%***	***0.9%***	***38***	***$9.3***	***7.6%***	***99.1%***	***100.0%***
Countywide Totals		***4,302***	***$305***	***17.8%***	***17.1%***	***22.7%***	***11,154***	***$1,884***	***38.6%***	***53.4%***	***17.9%***
	Completed and High Priority Projects	***2,004***	***$54***								
	Low Priority Projects	***988***	***$25***								
	Other Potential Projects	***794***	***$83***								
	Public ESD Retrofits	***238***	***$57***								

FY2015 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Private ESD Retrofits	***277***	***$66***								
	Riparian Reforestation	*-*	***$0***								
	Stream Restoration	*-*	***$16***								
	Programmatic Practices	*-*	***$3***								
Assumptions:											
1. 100% Completed and High Priority Projects											
2. 25-33% Other potential projects											
3. 100% of Public Outreach Potential for all TMDL watersheds											
4. 10% of ESD potential in urban watersheds, ~1 acre ESD goal for rural watersheds											
5. No riparian reforestation, Completed stream restoration											
6. Used watershed area weighing to calculate countywide total pollutant removals											

FY2017 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
Anacostia	*Completed and High Priority Projects*	315	$16	5.8%	5.9%	1.9%	315	$15.8	100.0%	30%	9%
	Low Priority Projects	194	$5	2.0%	2.1%	0.7%	194	$5.1	100.0%	61%	8%
	Other Potential Projects	1,474	$166	15.5%	16.0%	5.3%	2,217	$249.2	66.5%	48%	41%
	Public ESD Retrofits	215	$54	2.4%	2.5%	0.8%	956	$237.8	22.5%	100%	100%
	Private ESD Retrofits	193	$48	2.2%	2.2%	0.7%	857	$213.0	22.5%	100%	100%
	Riparian Reforestation	2	$1	0.0%	0.1%	0.0%	6	$1.4	37.5%	0%	0%
	Stream Restoration	-	$17	7.6%	10.1%	58.4%	-	$93.7	17.9%	0%	0%
	Programmatic Practices	-	$1	3.3%	3.2%	3.9%	-	$3.6	37.5%	0%	0%
	Subtotal	***2,393***	***$307***	***38.9%***	***42.1%***	***71.7%***	***4,544***	***$819.6***	***52.7%***	***61.7%***	***44.2%***
Rock Creek	*Completed and High Priority Projects*	585	$13	4.0%	5.0%	6.0%	585	$13.3	100.0%	13%	1%
	Low Priority Projects	665	$9	3.9%	3.9%	6.2%	665	$8.8	100.0%	7%	1%
	Other Potential Projects	121	$1	0.7%	0.7%	1.1%	193	$2.0	62.5%	0%	0%

FY2017 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Public ESD Retrofits	229	$56	2.8%	2.8%	3.1%	1,020	$247.1	22.5%	100%	100%
	Private ESD Retrofits	317	$77	3.9%	3.9%	4.3%	1,407	$341.2	22.5%	100%	100%
	Riparian Reforestation	45	$9	0.7%	0.7%	0.8%	119	$23.8	37.5%	0%	0%
	Stream Restoration	-	$6	2.6%	2.0%	29.0%	-	$20.1	28.9%	0%	0%
	Programmatic Practices	-	$1	11.0%	11.0%	0.0%	-	$1.2	100.0%	0%	0%
	Subtotal	***1,961***	***$172***	***29.7%***	***30.1%***	***50.5%***	***3,989***	***$657.6***	***49.2%***	***78.5%***	***28.5%***
Cabin John	*Completed and High Priority Projects*	88	$2	2.9%	3.0%	3.3%	88	$1.6	100.0%	19%	2%
	Low Priority Projects	10	$2	0.2%	0.2%	0.2%	10	$1.6	100.0%	98%	78%
	Other Potential Projects	5	$0	0.1%	0.1%	0.1%	5	$0.1	100.0%	0%	0%
	Public ESD Retrofits	121	$26	3.1%	3.1%	3.4%	403	$87.8	30.0%	100%	100%
	Private ESD Retrofits	142	$31	3.6%	3.6%	4.0%	473	$103.1	30.0%	100%	100%
	Riparian Reforestation	15	$3	0.4%	0.6%	0.4%	39	$7.8	37.5%	0%	0%
	Stream Restoration	-	$1	1.2%	0.7%	5.9%	-	$16.2	7.4%	0%	0%

FY2017 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Programmatic Practices	-	$0	15.3%	14.4%	0.0%	-	$0.5	100.0%	0%	0%
	Subtotal	***380***	***$65***	***26.8%***	***25.7%***	***17.4%***	***1,018***	***$218.7***	***37.4%***	***90.8%***	***71.6%***
Muddy Watts	*Completed and High Priority Projects*	211	$4	6.0%	6.0%	6.0%	211	$4.4	100.0%	8%	1%
	Low Priority Projects	26	$2	0.2%	0.3%	1.2%	26	$2.0	100.0%	84%	33%
	Other Potential Projects	-	$0	0.0%	0.0%	0.0%	-	$0.0	0.0%	0%	0%
	Public ESD Retrofits	-	$0	-	-	-	-	$0.0	0.0%	100%	100%
	Private ESD Retrofits	-	$0	-	-	-	-	$0.0	0.0%	100%	100%
	Riparian Reforestation	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Stream Restoration	-	$1	0.7%	0.3%	0.6%	-	$24.2	4.5%	0%	0%
	Programmatic Practices	-	$0	-	-	-	-	$0.0	100.0%	0%	0%
	Subtotal	***237***	***$8***	***6.9%***	***6.6%***	***7.8%***	***237***	***$30.6***	***100.0%***	***27.0%***	***4.3%***
Great Seneca (inclusive of Clopper Lake)	*Completed and High Priority Projects*	800	$19	20.0%	20.0%	21.0%	800	$18.9	100.0%	6%	1%
	Low Priority Projects	87	$7	3.7%	3.7%	4.3%	87	$6.6	100.0%	41%	15%

FY2017 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Other Potential Projects	33	$0	1.4%	1.4%	1.7%	53	$0.2	62.5%	0%	0%
	Public ESD Retrofits	-	$0	-	-	-	-	$0.0	0.0%	100%	100%
	Private ESD Retrofits	-	$0	-	-	-	-	$0.0	0.0%	100%	100%
	Riparian Reforestation	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Stream Restoration	-	$22	16.0%	7.0%	13.8%	-	$25.9	84.5%	0%	0%
	Programmatic Practices	-	$0	-	-	-	-	$0.0	100.0%	0%	0%
	Subtotal	***921***	***$48***	***41.1%***	***32.1%***	***40.8%***	***941***	***$51.6***	***97.9%***	***8.2%***	***2.2%***
Lower Monocacy	*Completed and High Priority Projects*	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Low Priority Projects	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Other Potential Projects	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Public ESD Retrofits	10	$2	2.6%	2.8%	2.8%	40	$8.6	25.0%	100%	100%
	Private ESD Retrofits	4	$1	1.1%	1.1%	1.1%	13	$2.9	30.0%	100%	100%
	Riparian Reforestation	3	$1	1.5%	1.5%	1.5%	5	$1.1	50.0%	0%	0%

FY2017 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Stream Restoration	-	$0	0.0%	0.0%	0.0%	-	$7.3	0.0%	0%	0%
	Programmatic Practices	-	$0	0.0%	0.0%	0.0%	-	$0.1	0.0%	0%	0%
	Subtotal	***16***	***$3.57***	***5.2%***	***5.4%***	***5.4%***	***58***	***$20.0***	***28.3%***	***84.7%***	***84.8%***
Patuxent (Rocky Gorge)	*Completed and High Priority Projects*	5	$0	0.7%	0.7%	0.8%	5	$0.4	100.0%	77%	27%
	Low Priority Projects	5	$1	8.4%	8.2%	8.3%	5	$0.9	100.0%	100%	100%
	Other Potential Projects	-	$1	0.0%	0.0%	0.0%	-	$2.0	62.5%	0%	0%
	Public ESD Retrofits	45	$8	4.1%	4.3%	5.0%	179	$31.2	25.0%	100%	100%
	Private ESD Retrofits	27	$5	2.5%	2.6%	3.0%	106	$18.6	25.5%	100%	100%
	Riparian Reforestation	6	$1	0.6%	0.9%	0.8%	12	$2.5	50.0%	0%	0%
	Stream Restoration	-	$0	0.3%	0.2%	0.9%	-	$19.1	2.5%	0%	0%
	Programmatic Practices	-	$0	38.0%	8.2%	0.3%	-	$0.1	100.0%	0%	0%
	Subtotal	***88***	***$17***	***54.5%***	***25.1%***	***19.1%***	***307***	***$74.7***	***28.6%***	***81.5%***	***88.6%***
Patuxent (Triadelphia)	*Completed and High Priority Projects*	-	$0	-	-	-	-	$0.0	100.0%	0%	0%

FY2017 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Low Priority Projects	2	$0	0.5%	0.5%	0.6%	2	$0.4	100.0%	100%	100%
	Other Potential Projects	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Public ESD Retrofits	4	$1	1.2%	1.2%	1.3%	17	$4.1	25.0%	100%	100%
	Private ESD Retrofits	5	$1	1.5%	1.5%	1.6%	19	$4.7	27.5%	100%	100%
	Riparian Reforestation	0	$0	0.1%	0.1%	0.1%	1	$0.1	50.0%	0%	0%
	Stream Restoration	-	$0	-	-	-	-	$0.0	0.0%	0%	0%
	Programmatic Practices	-	$0	23.4%	3.5%	0.0%	-	$0.01	100.0%	0%	0%
	Subtotal	***12***	***$2.8***	***26.6%***	***6.8%***	***3.6%***	***38***	***$9.3***	***30.4%***	***97.9%***	***97.8%***
Countywide Totals		***6,014***	***$622***	***25.1%***	***23.3%***	***34.0%***	***11,154***	***$1,884***	***53.9%***	***65.7%***	***33.7%***
	Completed and High Priority Projects	***2,004***	***$54***								
	Low Priority Projects	***988***	***$25***								
	Other Potential Projects	***1,633***	***$168***								
	Public ESD Retrofits	***624***	***$146***								

FY2017 Permit Cycle											
Watershed	***Strategies***	***Impervious Treated (acres)***	***Cost (Million $)***	***Nitrogen Reduction***	***Phosphorus Reduction***	***Sediment Reduction***	***Total Restoration Potential (acres)***	***Total Potential Cost***	***% Implementation in Permit Cycle***	***ESD (% Cost)***	***ESD (% Impervious)***
	Private ESD Retrofits	***688***	***$163***								
	Riparian Reforestation	***70***	***$14***								
	Stream Restoration	*-*	***$47***								
	Programmatic Practices	*-*	***$3***								

B. City of Rockville FY12 SWM CIP

Stormwater Management (SWM) Program Overview

Description:
The Stormwater Management (SWM) Program Area studies, designs, and constructs stormwater management facilities, stream restoration projects, and storm drain conveyance projects. These projects are identified through watershed assessments and storm drain preventative maintenance inspections. They are designed to restore, protect, and maintain the physical, chemical, and biological integrity of the City's streams. Projects in this program are funded through the Stormwater Management Fund. The SWM Program Area supports the Mayor and Council Vision 2020 of Rockville as a "green city" in all areas and fulfills our signatory support of Maryland's Chesapeake Bay 2000 Agreement. In addition, our current program ensures the City complies with its Federal Clean Water Act (CWA) permit requirements referred to as the National Pollutant Discharge Elimination Systems (NPDES) permit. The City anticipates more stringent SWM requirements as a result of an updated NPDES permit (anticipated in June 2011) and new CWA pollution load limits or Total Maximum Daily Loads (TMDL) for the Chesapeake Bay (established in December 2010), which will be incorporated into the City's new permit. If these more stringent requirements are incorporated into the new permit, the City will need to increase the number of projects constructed and the rate of project implementation.

Goals:

- To comply with NPDES permit requirements.
- To enhance the environment and provide a sense of community that is responsive to the diverse cultural, social, and physical needs of Rockville residents as well as maintain Rockville's image of being a pleasant and desirable City in which to live, work, and play.
- To enhance Rockville's streams by improving stream water quality and reducing stream bank erosion.
- To include community involvement as an integral part of the Department of Public Works' SWM implementation, beginning in watershed management planning and continuing throughout project design and construction.
- To ensure SWM facilities are designed to preserve our streams and minimize the adverse effects of development on local and state ecosystems and waterways.
- To find opportunities to provide SWM to areas of the City developed without modern SWM.

Objectives:

- Plan, design, and construct SWM facilities and stream restoration projects based on adopted watershed studies with community involvement, which will improve the aquatic habitat, reduce stream bank erosion, and improve the quality of water in Rockville's streams and the Chesapeake Bay.
- Continue to integrate Environmental Site Design (ESD) opportunity investigation into City watershed studies and explore options for project implementation, understanding that ESD is most applicable to smaller-scale development and retrofit projects.
- Plan, design, and construct storm drain extensions and rehabilitation projects based on the preventative maintenance program which will reduce neighborhood flooding and ensure structural integrity of existing underground piping infrastructure.

Project Status:
The following projects in the Stormwater Management Program Area are new entries for FY 2012:

- Stream Restoration (330-850-2K59)..... Page 81
- SWM Facility Retrofit (330-850-2L59) ..... Page 82

The following projects have been closed. These projects do not appear in the FY 2012 - 2016 CIP:

- College Gardens Park SWM Pond (330-850-2B59)
- Glenora SWM Pond (330-850-9B59) - incorporated into the SWM Facility Retrofits project.
- Lakewood SWM Pond (330-850-5A59)
- Storm Sewer Rehabilitation (420/330-850-8A41) - incorporated into the Storm Drain Rehab and Improv. project.
- Welsh Park SWM Pond (330-850-2F59) - incorporated into the SWM Facility Retrofits project.
- Woottons Mill Park - Lower (330-850-5D59) - incorporated into the Stream Restoration project.

FY 2012 - 2016 SWM Appropriation and Funding Schedules

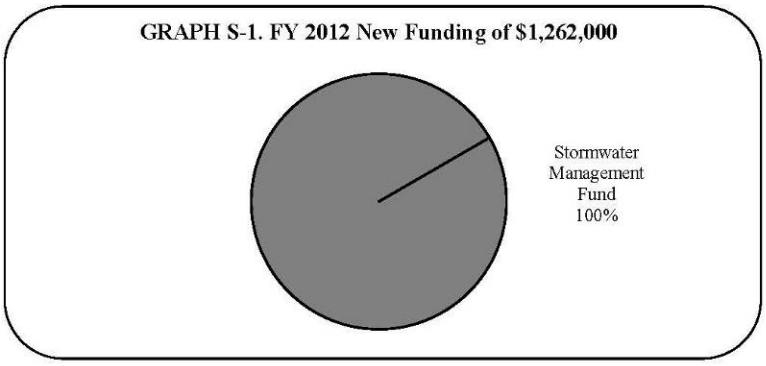
TABLE S-1. Appropriation Schedule

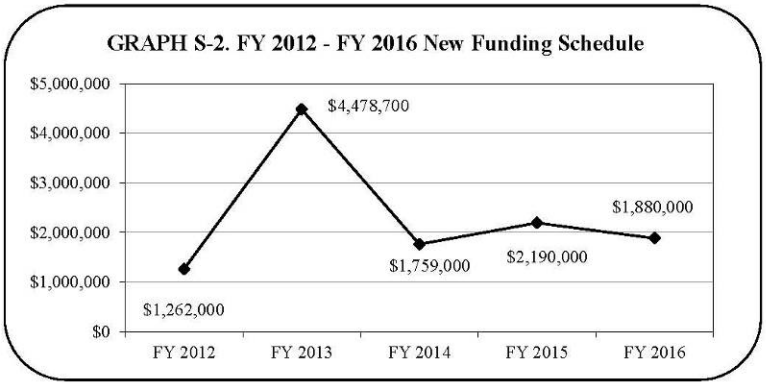
	Prior Approps	New Approps	Future Appropriation Schedule					Current Total
			FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	
Glenora Tributary — Middle	202,251	590,000	-	-	-	-	-	792,251
Horizon Hill SWM Ponds	460,000	-	2,008,700	-	-	-	-	2,468,700
Storm Drain Rehab & Improvements	550,000	380,000	380,000	380,000	380,000	380,000	on-going	2,450,000
Stream Restoration	-	-	280,000	-	1,810,000	-	on-going	2,090,000
SWM Facility Retrofit	-	292,000	-	1,379,000	-	1,500,000	on-going	3,171,000
Watts Branch — Upper Stream	330,000	-	1,810,000	-	-	-	-	2,140,000
Woodley Gardens — Stream	1,311,840	-	-	-	-	-	-	1,311,840
Total	**2,854,091**	**1,262,000**	**4,478,700**	**1,759,000**	**2,190,000**	**1,880,000**	**on-going**	**14,423,791**

TABLE S-2. Funding Schedule

	Prior Funding	New Funding	Future Funding Schedule					Current Total
			FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	
Stormwater Management Fund	1,794,251	1,262,000	4,478,700	1,759,000	2,190,000	1,880,000	on-going	13,363,951
Federal Grant (SWM)	61,740	-	-	-	-	-	-	61,740
State Loan (SWM)	998,100	-	-	-	-	-	-	998,100
Total	**2,854,091**	**1,262,000**	**4,478,700**	**1,759,000**	**2,190,000**	**1,880,000**	**on-going**	**14,423,791**

FY 2012 - 2016 Stormwater Management Funding Schedule





FY 2012 Stormwater Management Appropriation Summary

TABLE S-3. Total FY 2012 Appropriations

	Capital Projects	Water	Sewer	SWM	Refuse	Golf	Speed	Current Total
Prior Year Appropriations	-	-	-	2,854,091	-	-	-	2,854,091
Less Expended as of 04/01/11	-	-	-	(1,268,873)	-	-	-	(1,268,873)
Prior Year Funds Carried Over	-	-	-	1,585,218	-	-	-	1,585,218
Add New Appropriations	-	-	-	1,262,000	-	-	-	1,262,000
Total	**-**	**-**	**-**	**2,847,218**	**-**	**-**	**-**	**2,847,218**

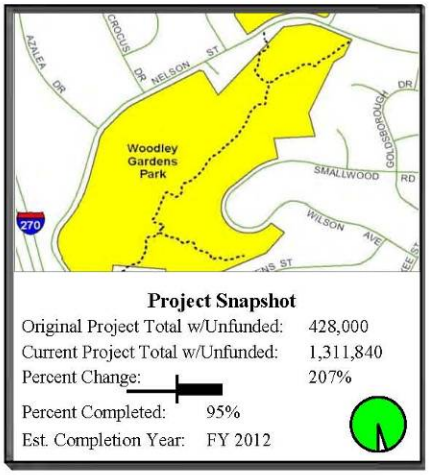
TABLE S-4. Appropriations by Project

	Capital Projects	Water	Sewer	SWM	Refuse	Golf	Speed	Current Total
Glenora Tributary — Middle	-	-	-	782,681	-	-	-	782,681
Horizon Hill SWM Ponds	-	-	-	365,433	-	-	-	365,433
Storm Drain Rehab & Improvements	-	-	-	910,260	-	-	-	910,260
Stream Restoration	-	-	-	-	-	-	-	-
SWM Facility Retrofit	-	-	-	292,000	-	-	-	292,000
Watts Branch — Upper Stream	-	-	-	330,000	-	-	-	330,000
Woodley Gardens — Stream	-	-	-	166,845	-	-	-	166,845
Total	-	-	-	**2,847,218**	-	-	-	**2,847,218**

Project Name:	Woodley Gardens — Stream
Project Number:	330-850-2G59
Program Area:	Stormwater Management

Prior Appropriations:	1,311,840
Add New Appropriations:	-
Add Future Appropriations:	-
Current Project Total:	1,311,840
Add Unfunded:	-
Current Project Total with Unfunded:	1,311,840

Status of Prior Year Appropriations as of 04/01/11:	
Prior Year Appropriations:	1,311,840
Less Expended:	1,144,995
Prior Year Funds Carried Over:	166,845
Add New Appropriations:	-
Total FY 2012 Appropriations:	166,845
Percent Expended:	87%



Project Snapshot

Original Project Total w/Unfunded:	428,000
Current Project Total w/Unfunded:	1,311,840
Percent Change:	207%
Percent Completed:	95%
Est. Completion Year:	FY 2012

Description: This project funds repairs to specific stream valley erosion problems identified in the *2001 Watts Branch Watershed Study*. The work area is within Woodley Gardens Park along the main stem of Watts Branch and a side tributary near Wilson Avenue. This project will address 5,100 linear feet of stream. In addition, implementing this watershed improvement project supports Rockville's contribution to Maryland's Chesapeake Bay 2000 Agreement, as well as supports mandatory compliance with National Pollutant Discharge Elimination System (NPDES) requirements.

Appropriation Schedule	Prior Approps	New Approps	Future Appropriation Schedule					Current Total
			FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	
Plan/Design/Insp	313,740	-	-	-	-	-	-	313,740
Construction	998,100	-	-	-	-	-	-	998,100
Total	1,311,840	-	-	-	-	-	-	1,311,840

Funding Schedule	Prior Funding	New Funding	Future Funding Schedule					Current Total
			FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	
Stormwater Mgmt Fund	280,000	-	-	-	-	-	-	280,000
Federal Grant (SWM)	33,740	-	-	-	-	-	-	33,740
State Loan (SWM)	998,100	-	-	-	-	-	-	998,100
Total	1,311,840	-	-	-	-	-	-	1,311,840

Unfunded Schedule	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Total
Unfunded	-	-	-	-	-	-	-

Operating Cost Impact	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs
General Fund	30,700	-	-	-	-	-
Stormwater Mgmt Fund	10,000	-	-	-	-	-

Explanation of impact: The completion of this project will add $40,700 to the FY 2012 operating budget for the continued management of non-native invasive species plants ($30,700) and monitoring required by regulatory agencies ($10,000).

Schedule: Prior years work to be completed — Grant administration.

Status: Grant administration. This project first appeared in the FY 2002 CIP. Design started in summer 2008.

Coordination: Neighborhood Civic Associations and Adjacent Landowners; Army Corps of Engineers; Maryland Department of the Environment; Maryland Department of Natural Resources; Neighborhood Resource Team; Department of Recreation and Parks.

Staff contact: Department of Public Works. John Scabis, Engineering Supervisor, 240-314-8514.

FY 2012 - 2016 Stormwater Management Program Area Summary

TABLE S-5. General Fund Operating Cost Impact

	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs
Glenora Tributary — Middle	-	-	8,100	-	-	-
Horizon Hill SWM Ponds	-	-	1,500	-	-	-
SWM Facility Retrofit	-	-	-	1,500	-	on-going
Watts Branch — Upper Stream	-	-	-	22,400	-	-
Woodley Gardens — Stream	30,700	-	-	-	-	-
Total	**30,700**	**-**	**9,600**	**23,900**	**-**	**on-going**

TABLE S-6. Stormwater Management Fund Operating Cost Impact

	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs
Glenora Tributary — Middle	-	-	5,000	-	-	-
Horizon Hill SWM Ponds	-	-	36,500	-	-	-
Storm Drain Rehab & Improvements	1,000	500	500	500	500	on-going
Stream Restoration	-	-	-	-	-	27,500
SWM Facility Retrofit	-	-	-	19,000	-	on-going
Watts Branch — Upper Stream	-	-	-	5,000	-	-
Woodley Gardens — Stream	10,000	-	-	-	-	-
Total	**11,000**	**500**	**42,000**	**24,500**	**500**	**27,500**

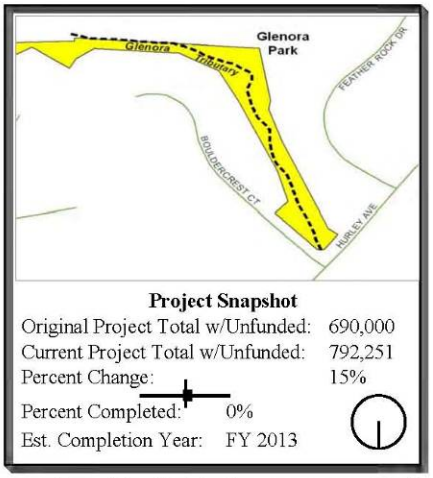
TABLE S-7. Stormwater Management Fund Unfunded Schedule

	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs
Total	-	-	-	-	-	-

Project Name:	Glenora Tributary — Middle
Project Number:	330-850-9C59
Program Area:	Stormwater Management

Prior Appropriations:	202,251
Add New Appropriations:	590,000
Add Future Appropriations:	-
Current Project Total:	792,251
Add Unfunded:	-
Current Project Total with Unfunded:	792,251

Status of Prior Year Appropriations as of 04/01/11:	
Prior Year Appropriations:	202,251
Less Expended:	9,570
Prior Year Funds Carried Over:	192,681
Add New Appropriations:	590,000
Total FY 2012 Appropriations:	782,681
Percent Expended:	1%



Project Snapshot

Original Project Total w/Unfunded:	690,000
Current Project Total w/Unfunded:	792,251
Percent Change:	15%
Percent Completed:	0%
Est. Completion Year:	FY 2013

Description: This project funds repairs to specific stream valley erosion problems identified in the *2001 Watts Branch Watershed Study*. Approximately 1,100 linear feet of stream between Hurley Avenue and the northern end of Bouldercrest Court will be assessed. A major threat to the health of our local watersheds and to the Chesapeake Bay is sediments and nutrients. A major source of these contaminants is stream bank erosion resulting from increased runoff from our urban landscape. Stream restoration and stabilization greatly reduces the amount of erosion occurring and, therefore, ensures the City's compliance with its NPDES permit. Staff will work closely with the community and the Department of Recreation and Parks in the concept development and design phases to reduce the impact on the forest, wetland, and recreation areas.

Appropriation Schedule	Prior Approps	New Approps	Future Appropriation Schedule					Current Total
			FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	
Plan/Design/Insp	202,251	-	-	-	-	-	-	202,251
Construction	-	590,000	-	-	-	-	-	590,000
Total	202,251	590,000	-	-	-	-	-	792,251

Funding Schedule	Prior Funding	New Funding	Future Funding Schedule					Current Total
			FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	
Stormwater Mgmt Fund	202,251	590,000	-	-	-	-	-	792,251
Total	202,251	590,000	-	-	-	-	-	792,251

Unfunded Schedule	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Total
Unfunded	-	-	-	-	-	-	-

Operating Cost Impact	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs
General Fund	-	-	8,100	-	-	-
Stormwater Mgmt Fund	-	-	5,000	-	-	-

Explanation of impact: The completion of this project will add $13,100 to the FY 2014 operating budget for the management of non-native invasive species plants ($8,100) and stream monitoring ($5,000).

Schedule: Prior years work to be completed — Design. FY 2012 — Construction.

Status: Design. This project was created mid-year in FY 2009.

Coordination: Neighborhood Civic Associations and Adjacent Landowners; Maryland Department of Natural Resources; Army Corps of Engineers; Maryland Department of the Environment; Neighborhood Resource Team; SWM Facility Retrofit project (330-850-2L59); Sewer Rehabilitation project (220-850-9G34) in Utilities Program Area.

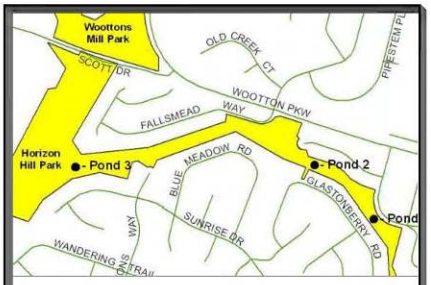
Staff contact: Department of Public Works. Jim Woods, Civil Engineer II, 240-314-8521.

Project Name: Horizon Hill SWM Ponds
Project Number: 330-850-2C59
Program Area: Stormwater Management

Prior Appropriations:	460,000
Add New Appropriations:	-
Add Future Appropriations:	2,008,700
Current Project Total:	2,468,700
Add Unfunded:	-
Current Project Total with Unfunded:	2,468,700

Status of Prior Year Appropriations as of 04/01/11:

Prior Year Appropriations:	460,000
Less Expended:	94,567
Prior Year Funds Carried Over:	365,433
Add New Appropriations:	-
Total FY 2012 Appropriations:	365,433
Percent Expended:	4%



Project Snapshot

Original Project Total w/Unfunded:	650,000
Current Project Total w/Unfunded:	2,468,700
Percent Change:	280%
Percent Completed:	4%
Est. Completion Year:	FY 2014

Description: This project funds the concept development, design, and construction to the Horizon Hill Park stream valley, including modifying three existing Stormwater Management (SWM) dry ponds. This project will treat 80.5 acres of impervious surface (with a drainage area of 165.3 acres), whose runoff flows directly to the stream without passing through modern SWM facilities. SWM facilities are needed to slow down flow, reduce stream bank erosion, and filter contaminants from the runoff. By reducing impacts of development on our streams, SWM helps the City comply with its NPDES permit. This project was recommended in the *2001 Watts Branch Watershed Study*. The project also will provide reforestation/afforestation, where appropriate. Community outreach will be an integral part of this project.

Appropriation Schedule	Prior Approps	New Approps	Future Appropriation Schedule FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Current Total
Plan/Design/Insp	230,000	-	-	-	-	-	-	230,000
Construction	230,000	-	2,008,700	-	-	-	-	2,238,700
Total	460,000	-	2,008,700	-	-	-	-	2,468,700

Funding Schedule	Prior Funding	New Funding	Future Funding Schedule FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Current Total
Stormwater Mgmt Fund	432,000	-	2,008,700	-	-	-	-	2,440,700
Federal Grant (SWM)	28,000	-	-	-	-	-	-	28,000
Total	460,000	-	2,008,700	-	-	-	-	2,468,700

Unfunded Schedule	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Total
Unfunded	-	-	-	-	-	-	-

Operating Cost Impact	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs
General Fund	-	-	1,500	-	-	-
Stormwater Mgmt Fund	-	-	36,500	-	-	-

Explanation of impact: The completion of this project will add $38,000 to the FY 2014 operating budget to fund routine pond maintenance and lawn mowing ($5,000), major pond maintenance ($30,000), and continued management of non-native invasive species plants ($3,000) as detailed in the operating cost impact table above.

Schedule: Prior years work to be completed — Begin design. FY 2012 — Complete design. FY 2013 — Construct SWM facilities.

Status: Design. This project first appeared in the FY 2002 CIP. Note: Park upgrades will be explored with the community although they are beyond the scope of this SWM project. If appropriate a separate project will be created in the Recreation and Parks Program Area for park upgrades.

Coordination: Neighborhood Civic Associations and Adjacent Landowners; Development Review Committee; Army Corps of Engineers; Maryland Department of the Environment; Natural Resource Conservation Service; Neighborhood Resource Team; Department of Recreation and Parks.

Staff contact: Department of Public Works. John W. Hollida, Civil Engineer III, 240-314-8526.

Project Name: Storm Drain Rehab & Improvements
Project Number: 330-850-0A59
Program Area: Stormwater Management

Prior Appropriations:	550,000
Add New Appropriations:	380,000
Add Future Appropriations:	1,520,000
Current Project Total:	2,450,000
Add Unfunded:	-
Current Project Total with Unfunded:	2,450,000

Status of Prior Year Appropriations as of 04/01/11:

Prior Year Appropriations:	550,000
Less Expended:	19,740
Prior Year Funds Carried Over:	530,260
Add New Appropriations:	380,000
Total FY 2012 Appropriations:	910,260
Percent Expended:	1%

Project Snapshot

Original Project Total w/Unfunded:	N/A
Current Project Total w/Unfunded:	2,450,000
Percent Change:	N/A
Percent Completed:	N/A
Est. Completion Year:	On-going

Description: This project funds rehabilitation and/or design and construction of storm drain pipes, structures, and outfalls. Projects to improve, upgrade, or extend pipes are required to eliminate localized flooding in the public right-of-way and adjacent private properties. Funds also are used to develop and implement a Preventative Maintenance Program (PMP) to systematically inspect and assess the condition of the City storm drain system and to complete repairs as issues are identified. A pilot program will identify the most effective assessment equipment and decision-making framework for the City's storm drain PMP. Projects will be identified through the implementation of the PMP and as the City identifies issues that pose a safety risk or immediate risk to private and public property.

Appropriation Schedule	Prior Approps	New Approps	Future Appropriation Schedule					Current Total
			FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	
Plan/Design/Insp	55,000	110,000	80,000	80,000	80,000	80,000	on-going	485,000
Construction	495,000	270,000	300,000	300,000	300,000	300,000	on-going	1,965,000
Total	550,000	380,000	380,000	380,000	380,000	380,000	on-going	2,450,000

Funding Schedule	Prior Funding	New Funding	Future Funding Schedule					Current Total
			FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	
Stormwater Mgmt Fund	550,000	380,000	380,000	380,000	380,000	380,000	on-going	2,450,000
Total	550,000	380,000	380,000	380,000	380,000	380,000	on-going	2,450,000

Unfunded Schedule	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Total
Unfunded	-	-	-	-	-	-	-

Operating Cost Impact	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs
Stormwater Mgmt	1,000	500	500	500	500	on-going

Explanation of impact: The completion of this project will add $1,000 to the FY 2012 operating budget to fund storm drain pipe and structure cleaning and contracted maintenance and $500 for additional fiscal years to fund maintenance of storm drain pipe extensions.

Schedule: Prior years work to be completed — Design and construct Southlawn Lane drainage improvements at its intersections with both ends of Lofstrand Lane. FY 2012 — Preventative maintenance planning pilot and repair of prioritized storm drains; design Maple Alley drainage improvement. FY 2013 — Construct Maple Alley drainage improvement. FY 2014 through FY 2016 — Continue to repair storm drains identified from the storm drain PMP and complete storm drain improvements as identified.

Status: Implementation. This project, formally called Storm Drain Improvements, first appeared in the FY 2010 CIP. In FY 2012 the Storm Sewer Rehabilitation (330/420-850-8A41) project was incorporated into this project.

Coordination: Neighborhood Civic Associations and Adjacent Landowners; Army Corps of Engineers; Maryland Department of the Environment; Southlawn Lane project (420-850-6A11) and Asphalt Repair and Replacement (420-850-0A11) in the Transportation Program Area; and Southlawn Lane Water Main project (210-850-3E45) in the Utilities Program Area.

Staff contact: Department of Public Works. Jim Woods, Civil Engineer II, 240-314-8521.

Project Name: Stream Restoration
Project Number: 330-850-2K59
Program Area: Stormwater Management

Prior Appropriations:	-
Add New Appropriations:	-
Add Future Appropriations:	2,090,000
Current Project Total:	2,090,000
Add Unfunded:	-
Current Project Total with Unfunded:	2,090,000

Status of Prior Year Appropriations as of 04/01/11:

Prior Year Appropriations:	-
Less Expended:	-
Prior Year Funds Carried Over:	-
Add New Appropriations:	-
Total FY 2012 Appropriations:	-
Percent Expended:	0%

Project Snapshot

Original Project Total w/Unfunded:	N/A
Current Project Total w/Unfunded:	2,090,000
Percent Change:	N/A
Percent Completed:	N/A
Est. Completion Year:	On-going

Description: This project funds the design and construction of stream restoration projects. A major threat to the health of our local watersheds and to the Chesapeake Bay is sediments and nutrients. A major source of these contaminants is stream bank erosion resulting from increased runoff from our urban landscape. Stream restoration and stabilization greatly reduces the amount of erosion occurring and, therefore, ensure the City's compliance with its NPDES permit. Stream restoration projects are identified and prioritized through the City's watershed study and planning process or through identification of areas that pose an immediate risk to public safety and/or public or private property. Staff will work closely with the community and the Department of Recreation and Parks in the concept development and design phases to reduce the impact on the forest, wetland, and recreation areas. Projects include: Woottons Mill Park lower, Dogwood Park tributary, Derbyshire storm drain outfall, Cabin John middle and lower mainstem, Stratton Drive outfall, North Farm Park stream, Tower Oaks Blvd outfall, and Calvin Park Tributary.

Appropriation Schedule	Prior Approps	New Approps	Future Appropriation Schedule					Current Total
			FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	
Plan/Design/Insp	-	-	280,000	-	360,000	-	on-going	640,000
Construction	-	-	-	-	1,450,000	-	on-going	1,450,000
Total	-	-	280,000	-	1,810,000	-	on-going	2,090,000

Funding Schedule	Prior Funding	New Funding	Future Funding Schedule					Current Total
			FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	
Stormwater Mgmt Fund	-	-	280,000	-	1,810,000	-	on-going	2,090,000
Total	-	-	280,000	-	1,810,000	-	on-going	2,090,000

Unfunded Schedule	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Total
Unfunded	-	-	-	-	-	-	-

Operating Cost Impact	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs
Stormwater Mgmt Fund	-	-	-	-	-	27,500

Explanation of impact: In general, completion of this project will add $3,000 to the operating budget per acre impacted for the continued management of non-native invasive species plants and $5,000 per stream for on-going effectiveness monitoring in future years. Specifically, the completion of the Woottons Mill Park Lower restoration will add $5,000 for on-going effectiveness monitoring and $22,500 for non-native invasive species plants to the FY 2017 operating budget.

Schedule: FY 2013 — Design stream restoration at Woottons Mill Park Lower. FY 2015 — Design Dogwood Park Tributary stream restoration; construct stream restoration at Woottons Mill Park Lower. Future Years — Address the remaining streams.

Status: Concept. This is a new project for FY 2012. In FY 2012 the Woottons Mill Park Lower project (330-850-5D59) was incorporated into this project.

Coordination: Neighborhood Civic Associations and Adjacent Landowners; Development Review Committee; Army Corps of Engineers; Maryland Department of the Environment; Natural Resource Conservation Service; Neighborhood Resource Team; Department of Recreation and Parks.

Staff contact: Department of Public Works. Jim Woods, Civil Engineer II, 240-314-8521.

Project Name: SWM Facility Retrofit
Project Number: 330-850-2L59
Program Area: Stormwater Management

Prior Appropriations:	-
Add New Appropriations:	292,000
Add Future Appropriations:	2,879,000
Current Project Total:	3,171,000
Add Unfunded:	-
Current Project Total with Unfunded:	3,171,000

Status of Prior Year Appropriations as of 04/01/11:

Prior Year Appropriations:	-
Less Expended:	-
Prior Year Funds Carried Over:	-
Add New Appropriations:	292,000
Total FY 2012 Appropriations:	292,000
Percent Expended:	0%

Project Snapshot

Original Project Total w/Unfunded:	N/A
Current Project Total w/Unfunded:	3,171,000
Percent Change:	N/A
Percent Completed:	N/A
Est. Completion Year:	On-going

Description: This project funds the design, retrofit, construction, and decommissioning of stormwater management (SWM) facilities. In older parts of the City, stormwater runs off impervious surface and flows directly to streams without passing through modern SWM facilities. SWM facilities are needed to slow down flow, reduce stream bank erosion, and filter contaminants from the runoff. By reducing impacts of development on our streams, SWM helps the City comply with its NPDES permit. SWM facility projects are identified and prioritized through the City's watershed study and planning process. They are evaluated based on water quality monitoring, stream condition assessment, and pollution track back efforts. Projects are prioritized by considering technical feasibility of project, degree of water quality improvements, stream impacts, ease of implementation, safety or property risks, and project cost. Projects include the following publicly maintained facilities: Glenora SWM pond, RedGate Golf Course pond 5, Montgomery County detention center pond, Arlive Court, North Farm, Broadcrest Court, Currier Court, Gerard Court, and Welsh Park pond.

Appropriation Schedule	Prior Approps	New Approps	Future Appropriation Schedule FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Current Total
Plan/Design/Insp	-	292,000	-	300,000	-	300,000	on-going	892,000
Construction	-	-	-	1,079,000	-	1,200,000	on-going	2,279,000
Total	-	292,000	-	1,379,000	-	1,500,000	on-going	3,171,000

Funding Schedule	Prior Funding	New Funding	Future Funding Schedule FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Current Total
Stormwater Mgmt Fund	-	292,000	-	1,379,000	-	1,500,000	on-going	3,171,000
Total	-	292,000	-	1,379,000	-	1,500,000	on-going	3,171,000

Unfunded Schedule	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Total
Unfunded	-	-	-	-	-	-	-

Operating Cost Impact	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs
General Fund	-	-	-	1,500	-	on-going
Stormwater Mgmt Fund	-	-	-	19,000	-	on-going

Explanation of impact: The completion of this project will add $20,500 to the FY 2015 operating budget to fund routine pond maintenance and lawn mowing ($2,500), major pond maintenance ($15,000), and continued management of non-native invasive species plants ($3,000).

Schedule: FY 2012 — Design Glenora SWM pond. FY 2014 — Construct Glenora SWM pond; study RedGate Golf Course pond 5. FY 2016 — Implement RedGate Golf Course pond 5 recommendations; design Montgomery County detention center pond. Future Years — Construct Montgomery County detention center pond (FY 2018).

Status: Implementation. This is a new project for FY 2012. In FY 2012 the Glenora SWM Pond (330-850-9B59) and Welsh Park SWM Pond (330-850-2F59) projects were incorporated into this project.

Coordination: Neighborhood Civic Associations and Adjacent Landowners; Development Review Committee; Army Corps of Engineers; Maryland Department of the Environment; Natural Resource Conservation Service; Neighborhood Resource Team; Department of Recreation and Parks.

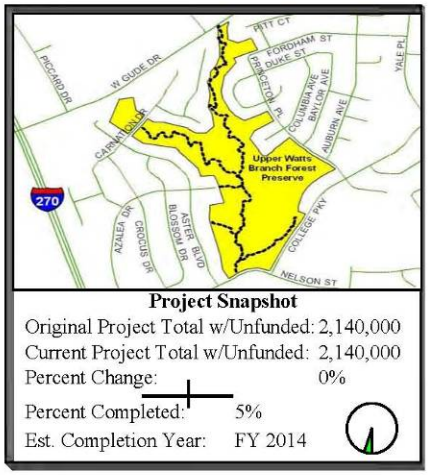
Staff contact: Department of Public Works. John W. Hollida, Civil Engineer III, 240-314-8526.

Project Name: Watts Branch — Upper Stream
Project Number: 330-850-2E59
Program Area: Stormwater Management

Prior Appropriations:	330,000
Add New Appropriations:	-
Add Future Appropriations:	1,810,000
Current Project Total:	2,140,000
Add Unfunded:	-
Current Project Total with Unfunded:	2,140,000

Status of Prior Year Appropriations as of 04/01/11:

Prior Year Appropriations:	330,000
Less Expended:	-
Prior Year Funds Carried Over:	330,000
Add New Appropriations:	-
Total FY 2012 Appropriations:	330,000
Percent Expended:	0%



Project Snapshot

Original Project Total w/Unfunded:	2,140,000
Current Project Total w/Unfunded:	2,140,000
Percent Change:	0%
Percent Completed:	5%
Est. Completion Year:	FY 2014

Description: This project funds repairs to specific stream valley erosion problems identified in the *2001 Watts Branch Watershed Study*. The work area is between Nelson Street and Gude Drive along the main stem of Watts Branch. This project will assess the entire stream and three eroded storm drain outfalls (9,500 linear feet total) near Azalea Drive, Aster Boulevard and Princeton Place. A major threat to the health of our local watersheds and to the Chesapeake Bay is sediments and nutrients. A major source of these contaminants is stream bank erosion resulting from increased runoff from our urban landscape. Stream restoration and stabilization greatly reduces the amount of erosion occurring and, therefore, ensure the City's compliance with its NPDES permit. Additional investigation will be completed to evaluate Native American artifacts within the project limits. Staff will work closely with the community in the concept-refinement phase to evaluate project goals and construction access to minimize the impacts on the forest, and active and passive recreational areas.

Appropriation Schedule	Prior Approps	New Approps	Future Appropriation Schedule FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Current Total
Plan/Design/Insp	330,000	-	-	-	-	-	-	330,000
Construction	-	-	1,810,000	-	-	-	-	1,810,000
Total	330,000	-	1,810,000	-	-	-	-	2,140,000

Funding Schedule	Prior Funding	New Funding	Future Funding Schedule FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Current Total
Stormwater Mgmt Fund	330,000	-	1,810,000	-	-	-	-	2,140,000
Total	330,000	-	1,810,000	-	-	-	-	2,140,000

Unfunded Schedule	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs	Total
Unfunded	-	-	-	-	-	-	-

Operating Cost Impact	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	Future Yrs
General Fund	-	-	-	22,400	-	-
Stormwater Mgmt Fund	-	-	-	5,000	-	-

Explanation of impact: Completion of this project will add $27,400 ($3,000 per acre impacted) to the FY 2015 operating budget to fund continued management of non-native invasive species plants ($22,400) and on-going effectiveness monitoring ($5,000).

Schedule: Prior years work to be completed — Design. FY 2013 — Construction.

Status: Design. This project first appeared in the FY 2002 CIP.

Coordination: Neighborhood Civic Associations and Adjacent Landowners; Army Corps of Engineers; Maryland Department of the Environment; Maryland Department of Natural Resources; Washington Suburban Sanitary Commission; Neighborhood Resource Team; Historic Preservation staff; Department of Recreation and Parks; Sewer Rehabilitation project (220-850-9G34) in Utilities Program Area.

Staff contact: Department of Public Works. John W. Hollida, Civil Engineer III, 240-314-8526.

C. M-NCPPC Department of Parks Annual Report

MONTGOMERY COUNTY DEPARTMENT OF PARKS
THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

September 29, 2011

Mr. Brian S. Clevenger
Water Management Administration
Sediment, Stormwater and Dam Safety Program
FL 4, STE 440
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230-1708

Dear Mr. Clevenger:

Attached is the Annual Report for M-NCPPC - Department of Parks Phase II NPDES Permit for Discharges from State and Federal Small Municipal Separate Storm Sewer Systems. Since we applied for coverage in November 2009, we have put many Best Management Practices into effect under the Six Minimum Control Measures (Personnel Education and Outreach, Public Involvement and Participation, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post Construction Stormwater Management, and Pollution Prevention and Good Housekeeping). In this first reporting period, some of our most notable accomplishments are the environmental improvements from stormwater management and stream restoration projects, as well as the removal of over 40 tons of trash from our streams and parks by volunteers. We are also proud that our outreach efforts to the Montgomery Stormwater Partners have yielded significant benefits to our organization throughout the process.

We look forward to hearing your thoughts about the progress that we have made.

Sincerely,

Mary R. Bradford
Director of Parks

cc: Mike Riley, Deputy Director
Gene Giddens, Deputy Director
John Hench, Chief, Park Planning and Stewardship Division
Mitra Pedoeem, Chief, Park Development Division
David Vismara, Chief, Horticulture, Forestry and Environmental Education Division
John Nissel, Chief, Management Services Division
Mike Horrigan, Chief, Northern Parks Division
Brian Woodward, Chief, Southern Parks Division
Kate Stookey, Chief, Public Affairs and Community Partnerships Division
Darien Manley, Chief, Park Police Division
MaryEllen Venzke, Chief, Management Services Division
Christine Brett, Chief, Enterprise Division

MB:GM

9500 Brunett Avenue, Silver Spring, Maryland 20901 **www.MontgomeryParks.org** General Information: 301.495.2595

Maryland Department of the Environment (MDE)
Water Management Administration (WMA)
FY 2010-2011 ANNUAL REPORT
National Pollutant Discharge Elimination System (NPDES)
General Permit for Discharges from Small Municipal Separate Storm Sewer Systems

This annual reporting form is intended for those agencies covered under General Discharge Permit No. 05-SF-5501. Submitting this report constitutes notice that the entity identified below is making progress to comply with all terms and conditions of the general permit. Annual reports shall be submitted to:

Maryland Department of the Environment, Water Management Administration
Sediment, Stormwater and Dam Safety Program, FL 4, STE 440
1800 Washington Boulevard, Baltimore, MD 21230-1708
Phone: 410-537-3543 FAX: 410-537-3553
Web Site: www.mde.state.md.us

Maryland-National Capital Park and Planning Commission,
Department of Parks, Montgomery County

Reporting Period

This report covers all work done having to do with the NPDES permit for the period from the date that the Department of Parks applied for its Phase II NPDES permit on 11/3/2009 through 6/30/2011. Therefore it covers approximately 20 months and spans Fiscal Year 2010 and Fiscal Year 2011.

1. Contact Information

Agency Name: M-NCPPC Department of Parks
Contact Person: Geoffrey Mason
Mailing Address: M-NCPPC Department of Parks, 9500 Brunett Avenue, Silver Spring, MD 20901
Phone Number: 301-962-1349
Email address: geoffrey.mason@montgomeryparks.org

Signator: Mary Bradford, Director of Parks
Mailing Address: M-NCPPC Department of Parks, 9500 Brunett Avenue, Silver Spring, MD 20901
Phone Number: 301-495-2500
Email address: mary.bradford@montgomeryparks.org

Mary R Bradford 9/30/2011

Mary Bradford, Director of Parks Date

2. Progress with Implementing Minimum Control Measures

Part V. C. of the General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (No. 05-SF-5501) specifies the annual reporting information that needs to be submitted to MDE by agencies. This information includes the status of compliance with permit conditions, an assessment of appropriateness of the identified best management practices (BMP), and the progress toward achieving the identified measurable goals for each of the minimum control measures. In addition, any changes in these measurable goals shall along with activities planned for the next annual reporting period shall be highlighted.

Report Organization: A table of BMPs selected for each Minimum Control Measure begins on the next page (Table 1: BMP Matrix). Embedded in Table 1 is "Table 2: Trash Cleanups in 2011". Following the BMP Matrix is "Table 3: Post Construction Stormwater Management and Stream Restorations". Following that is "Table 4: Planned and Potential Stormwater and Stream Restoration Projects". Finally there is a section entitled "Fiscal Statement" detailing the funding for the program.

Table 1: BMP Matrix

Minimum Control Measures	BMPs Selected	Measurable Goals	Implementation and Completion Date	FY 2010-2011 Progress	Responsibility
Personnel Education and Outreach	Train operational staff in Pollution Prevention every year.	Hold four annual Pollution Prevention trainings (1 each) for Northern Region, Southern Region, Horticultural Services and Central Maintenance operational staff.	Ongoing, FY 2011-2015	Held four Pollution Prevention trainings each winter.	Park Planning and Stewardship Division, Resource Analysis Unit
Personnel Education and Outreach	Develop training materials and educational program for Best Environ. Practices including sustainable landscaping, ecological land management and stormwater reduction practices. Will explore developing a web-based certification program for Best Environmental Practices.	Training materials developed and educational program in place.	FY 2011 Develop training materials. FY 2012-2013 Do educational outreach to operational staff.	Brought together sustainable landscaping workgroup to plan workshop on maintenance of bioretention areas. Planning continues for 2012 training.	Park Planning and Stewardship Division, Natural Resources Stewardship and Park Development Division

Minimum Control Measures	BMPs Selected	Measurable Goals	Implementation and Completion Date	FY 2010-2011 Progress	Responsibility
Personnel Education and Outreach	Train operational staff in Best Environmental Practices including sustainable landscaping, ecological land management and stormwater reduction practices.	Hold four annual Best Environmental Practices Workshops (1 each) for Northern Region, Southern Region, Horticultural Services and Central Maintenance operational staff.	FY 2011 Develop training materials. FY 2012-2013 Hold Annual Workshops.	Held InService Training on Maintenance of Stormwater Facilities and Sustainable Landscaping for approximately 150 people in March 2010. Held Non-Structural Stormwater Facility Maintenance training for operational workers in March 2010. Session was taught by MCDEP.	Park Planning and Stewardship Division, Resource Analysis Unit
Public Involvement and Participation	Meet with Stormwater Partners quarterly to discuss NPDES permit progress	Meet four times per year with Stormwater Partners. This goal is being restated to say meet with Stormwater Partners as needed.	FY 2011-2015	Met with Stormwater Partners various times during permit development. Since that time one formal meeting has been held with the Stormwater Partners (12/13/2010) and informal communication has been ongoing.	Park Planning and Stewardship Division, Park Development Division

Minimum Control Measures	BMPs Selected	Measurable Goals	Implementation and Completion Date	FY 2010-2011 Progress	Responsibility
Public Involvement and Participation	Stream Trash Cleanups	Each year Volunteer Services will participate in four major trash cleanup days. Do ten additional regular cleanups.	Ongoing, FY 2011-2015	Conducted 121 stream cleanups in FY 2011. Approximately 84,684 lbs. of trash removed from park watersheds. See details in Table 2 below.	Special Programs Division, Volunteer Services

Table 2: Trash Cleanups in 2011:

	Number of projects	Bags of trash	Pounds of trash (25 pounds per bag)	Loose trash	Bags of Recyclables	Tires	Pounds of Tires (22 pounds per tire)	Total Pounds of trash and tires removed	# of Volunteers	# of Hours
Stream cleanups	99	2,278		17,074 lbs	540	169			3,248	7,468
Park cleanups	22	248		302 lbs	20	20			572	1,603
TOTALS	**121**	**2,526**	**63,150 lbs**	**17,376 lbs**	**560**	**189**	**4,158 lbs**	**84,684 lbs**	**3,820**	**9,071**

Bags of Trash are estimated at 25 lbs. each and tires are estimated at 22 lbs.

Minimum Control Measures	BMPs Selected	Measurable Goals	Implementation and Completion Date	FY 2010-2011 Progress	Responsibility
Public Involvement and Participation	Put Pollution Prevention information including pet waste management on MNCPPC public webpage.	Assemble and post Stormwater Pollution Prevention info on Montgomery Parks website.	FY 2011	Stormwater Pollution Prevention information was posted on the M-NCPPC Parks website at http://www.montgomeryparks.org/ PPSD/Natural_Resources_Stewardship/ stormwater/stormwater.shtm.	Park Planning and Stewardship Division
Public Involvement and Participation	Storm Drain Labeling Program for Park Storm Drains.	Establish volunteer labeling program. Dependent on volunteer labor, label at least 100 stormdrains each year.	FY 2011Start Program, FY2012-2015	Storm Drain labeling was deferred pending storm drain mapping.	Special Programs Division, Volunteer Services
Illicit Discharge Detection and Elimination	Map park storm drain system over a five year period.	Create a GIS map that includes the entire parks storm drain system.	FY 2011-2015	The Park Development Division developed a task order and awarded the mapping of the storm drain system in the Sligo Creek watershed in FY2011. Early challenges include addressing data management issues in order to ensure data quality and compatibility with Montgomery County's existing storm drain information.	Park Development Division Montgomery Parks will work with county DEP to extract existing info on parks stormwater system.

Minimum Control Measures	BMPs Selected	Measurable Goals	Implementation and Completion Date	FY 2010-2011 Progress	Responsibility
Illicit Discharge Detection and Elimination	Develop process with County DEP to use the County Hotline. Create internal Standard Operation Procedure (SOP) for responding to spills or illicit discharges on Park lands.	Establish SOP and agreement with County DEP.	FY 2011 M-NCPPC will begin development of SOP upon permit issuance with an expected completion within first year.	Met with County DEP to discuss Illicit Discharge Program and other issues. No formal SOP has been established yet. However County DEP responds to reports of illicit discharges across the entire county despite property ownership.	All Divisions
Illicit Discharge Detection and Elimination	Develop a stormwater outfall monitoring program to detect illicit discharges in the park storm drain system that is consistent with Montgomery County DEP program.	Create Program. Determine appropriate number of outfalls to visit each year.	FY 2011-2012 Start coordination with DEP. FY 2013-2015 Do monitoring.	Met with County DEP to discuss Illicit Discharge Program. Two Parks staff went in field with DEP staff and their consultants from the Center for Watershed Protection to learn about County's Illicit Discharge monitoring program.	Park Planning and Stewardship Division

Minimum Control Measures	BMPs Selected	Measurable Goals	Implementation and Completion Date	FY 2010-2011 Progress	Responsibility
Construction Site Runoff Control	Develop comprehensive erosion and sediment control plans to reduce erosion from construction sites.	All projects over 5,000 sq. ft. will receive required erosion and sediment control permits from the Montgomery County Department of Permitting Services (DPS). In addition to regular inspections of construction sites by DPS, MNCPPC construction inspectors make regular visits to construction sites on parkland to inspect erosion and sediment control devices, limit of disturbance fencing, and tree protection measures.	Ongoing, FY 2011-2015	All projects greater than 5,000 sq. ft. either in design or under construction in FY11 met these requirements. Projects were designed to meet or exceed strict DPS erosion and sediment control standards. MNCPPC construction inspectors continue to make regular visits to construction sites.	Park Development Division
Minimum Control Measures	**BMPs Selected**	**Measurable Goals**	**Implementation and Completion Date**	**FY 2010-2011 Progress**	**Responsibility**

Minimum Control Measures	BMPs Selected	Measurable Goals	Implementation and Completion Date	FY 2010-2011 Progress	Responsibility
Post Construction Stormwater Management	Ensure all stormwater management (SWM) facilities on Parkland are monitored and properly maintained to provide maximum stormwater treatment efficiency.	All SWM facilities on parkland must be accepted into the County DEP SWM program. Once accepted DEP monitors and maintains facilities in accordance with DEP Guidelines. MNCPPC is notified of inspection results and must address maintenance issues in order to stay in the DEP Program.	FY 2011- 2015 All facilities currently inspected on a rotational basis developed by DEP	HFEE Division continues as the contact for DEP to address maintenance issues from inspections. Maintenance issue notifications are forwarded to the appropriate Division Chief for action.	DEP is responsible for structural maintenance and M-NCPPC is responsible for non-structural maintenance. HFEE Division coordinates non-structural maintenance among Park Divisions
Minimum Control Measures	**BMPs Selected**	**Measurable Goals**	**Implementation and Completion Date**	**FY 2010-2011 Progress**	**Responsibility**
Post Construction Stormwater Management	Develop Scope of Maintenance for Stormwater Structures	Develop and adopt written policies for Maintenance for Storm Water Structures.	FY 2011-2015	Parks follows Montgomery County maintenance schedule for SWM structures. Individuals responsible for maintaining SWM structures have been given Montgomery County's maintenance schedule.	Park Development Division

Post Construction Stormwater Management	Design new projects to reduce impacts to water resources and the environment.	New projects will be based on Environmental Site Design (ESD) according to State and local stormwater and other regulations under the Stormwater Management Act of 2007.	FY 2011-2015	New projects are based on Environmental Site Design (ESD) according to State and local stormwater and other regulations under the Stormwater Management Act of 2007.	Park Development Division
Post Construction Stormwater Management	Provide stormwater management for untreated impervious surfaces on parkland.	All untreated parkland areas will be cataloged during the mapping process and untreated areas will be prioritized.	FY 2011 ID and prioritize sites for retrofits. FY 2012-2015 Initiate stormwater retrofits.	Initiated list of retrofit sites. Began incorporating recharge chambers into playground renovation designs. Began coordination of SWM retrofits with County DEP. See Table 4 below for Planned and Potential Stormwater Retrofits.	Park Development Division
Pollution Prevention and Good Housekeeping	All 12 Maintenance Yards currently under general permit for Industrial Sites. The SWPPPs identify operational and CIP improvements for each site.	All 12 Park Maintenance Yards under Storm Water Pollution Prevention Plans. Annual inspections and reviews are conducted.	Ongoing, FY 2011-2015	Annual inspections and updates conducted.	NPDES Coordinator/ Park Development Division Environmental Engineering Section

Minimum Control Measures	BMPs Selected	Measurable Goals	Implementation and Completion Date	FY 2010-2011 Progress	Responsibility
Pollution Prevention and Good Housekeeping	All 5 equestrian centers applying for Nutrient Management Plans to reduce nutrient runoff to waterways.	Maintain Nutrient Management Plans for Ag leases and equestrian centers	Ongoing, FY 2011-2015	4 of 5 equestrian centers have Nutrient Management Plans and one is the process of renewal.	Facilities Management Division
Pollution Prevention and Good Housekeeping	Equestrian Centers Sediment Control Projects to reduce sediment and nutrient runoff to streams.	Equestrian Centers- Complete Maryland Agricultural Water Quality Cost-Share Program (MACS) water quality improvements at five equestrian centers.	In process, at various stages, FY 2011-2015	Waste Storage Facilities have been completed at Callithea Special Park and Wheaton Riding Stables at Wheaton Regional Park. Heavy Use Areas have been established at Wheaton Riding Stables. Waste Storage and Composting Facility has been in operation at Potomac Horse Center for 2 years. One or more waste storage facilities and multiple heavy use areas will be completed in FY12 at Rickman Farm Horse Park.	Facilities Management Division
Pollution Prevention and Good Housekeeping	Pesticide Safety and Integrated Pest Management	Staff adheres to State and Federal regulations and M-NCPPC "Pesticide Safety and IPM" procedures.	Ongoing, FY 2011-2015	Integrated Pest Management is practiced at Pope Farm, Brookside Gardens, McCrillis Gardens and with all projects in the Landscape and Arboriculture Sections	HFEE Division, Northern and Southern Regions.

Minimum Control Measures	BMPs Selected	Measurable Goals	Implementation and Completion Date	FY 2010-2011 Progress	Responsibility
Pollution Prevention and Good Housekeeping	Reforestation Program	Plant 5-10 acres of trees per year to reduce and filter stormwater runoff.	Ongoing, FY 2011-2015	Only about 3.2 acres of reforestation was completed in FY2011 due to poor weather and budget shortfalls.	Park Planning and Stewardship, HFEE Division, Northern and Southern Regions and contractors.
Pollution Prevention and Good Housekeeping	Develop Pet Waste Management Program to reduce pet waste runoff to waterways.	Install 20 pet waste bag dispensers in parks over permit cycle.	Ongoing, FY 2011-2015 Two installations per year where community organizations will take responsibility for stocking and maintenance. Dispensers will be obtained through Public-Private Partnership.	Due to current budgetary and staffing constraints, no new dispensers have been installed. However, existing dispensers are being maintained.	Northern and Southern Region Staffs
Pollution Prevention and Good Housekeeping	Original goal: Educate Park Police staff about the environmental impacts of pet waste. Restated BMP: Educate Public about the environmental impacts of pet waste.	Original goal: Hold three trainings. Restated Goal is to provide Park Police with informational materials about pet waste to distribute to their community groups.	Hold three trainings by 2015. Restated Implementation Date: Begin distribution to community groups in FY 2012.	Goal is being restated and will be ongoing starting in FY 2012.	Park Planning and Stewardship Division

Minimum Control Measures	BMPs Selected	Measurable Goals	Implementation and Completion Date	FY 2010-2011 Progress	Responsibility
Pollution Prevention and Good Housekeeping	Salt Management Practices	Use environmentally friendly salt on sidewalks and walkways to reduce salt impact on streams.	FY 2011-2015	Used environmentally friendly salt on sidewalks and walkways to reduce salt impact on streams.	Northern and Southern Region, Central Maintenance Staff
Pollution Prevention and Good Housekeeping	Canada Geese population control	Oil Canada Geese eggs in four parks under federal permit to control population to reduce goose manure in waterways.	Ongoing, FY 2011-2015	In FY 2011 over 120 nests containing approximately 500 eggs were oiled this year at Black Hill and Rock Creek Regional Parks, and Sligo Creek Stream Valley Park.	Park Planning and Stewardship Division, Natural Resources Stewardship
Pollution Prevention and Good Housekeeping	Deer population control	Hold managed hunts and sharpshooting in 15 to 20 parks to, reduce deer populations, manure runoff to waterways and to increase forest vegetation and improve stream buffers.	Ongoing, FY 2011-2015	Over 1,400 deer were harvested from parkland in FY2011	Park Planning and Stewardship Division, Natural Resources Stewardship
Pollution Prevention and Good Housekeeping	Review lease agreements and concessionaire's agreements to ensure compliance with this permit.	Create new guidelines for lease agreements and concessionaires on pollution prevention.	FY 2011-2012 Review lease and concessionaire agreements and draft new guidelines	Initial discussions have taken place to address leases for equestrian centers to ensure that bioretention areas and other stormwater management facilities are properly maintained.	Facilities Management Division

Minimum Control Measures	BMPs Selected	Measurable Goals	Implementation and Completion Date	FY 2010-2011 Progress	Responsibility
Other: Stream Monitoring	Stream monitoring in support of the Countywide Stream Protection Strategy; M-NCPPC and MC DEP work as a team for monitoring purposes.	All County watersheds are monitored during the 5-year permit duration.	Ongoing, FY 2011-2015	During FY2011, M-NCPPC monitored in Great Seneca Creek, Little Seneca Creek, Northwest Branch, Muddy Branch, Watts Branch, Little Bennett Creek, Hawlings River, Lower Patuxent River, Paint Branch, Sligo Creek, and Rock Run watersheds.	M-NCPPC, Park Planning and Stewardship Division and MC DEP.
Other: Stream Restoration Projects	Reduce Erosion by Stabilizing Stream Banks in Parks	Completion of planned restoration projects.	Ongoing, FY 2011-2015	See Table 3 below.	Park Development Division
Other: Total Maximum Daily Loads (TMDL)	Coordinate with Montgomery County DEP on TMDL Watershed Implementation Plan and Trash-Free by 2013 Potomac Watershed Treaty	Hold meetings with DEP to coordinate on TMDL Watershed Implementation Plan and Trash-Free by 2013 Potomac Watershed Treaty.	Ongoing, FY 2011-2015	Met with DEP about Trash TMDL. Removed approximately 84,684 lbs. of trash removed from park watersheds as described above.	Park Planning and Stewardship Division and Park Development Division
Other: Wetland Creation	Wetland/vernal pool creation	Inventory and prioritize sites for wetland/vernal pool creation.	Ongoing, FY 2011-2015. Will be done as part of the park master planning process. Schedule will be dependent on Park Master Plan Process	Met with MDE about cost share program in spring of 2011.	Park Planning and Stewardship Division

le 3: Post Construction Stormwater Management and Stream Restorations

Post-Construction Stormwater Management					
Location	**Lead Agency**	**Type of Retrofit**	**Watershed**	**Built Date**	**Notes**
May dale Nature Center	MNCPPC	Removed about 2000 sq. ft. of asphalt, installed digressional area and gravel trench to treat parking lot runoff; increased stream buffer	Paint Branch	Nov-10	
Tilden Woods Local Park	MC DOT	Bio infiltration trench	Cabin John Creek	2010	Project constructed by others on parkland via a Park Permit.
Flora Lane Tributary to Sligo Creek	MNCPPC	Restore functioning of a parallel pipe system designed to allow cold water to provide stream base flow and warmer stormwater to bypass in a parallel pipe.	Sligo Creek	Jan-11	
Cabin John MY Retrofit	MNCPPC	Retrofit SWM system, install covered storage bins, construct vehicle wash	Cabin John Creek	2010	
Lay hill Local Park	MNCPPC	Improved swale and drainage at park entrance. Added a small wet pool area on left side of entrance.	NAB	Sep-10	

Stream Restoration Projects

Location	Lead Agency	Watershed/Location	Linear Feet	Built Date	Notes
May dale Nature Center	MNCPPC	Paint Branch SPA	1600	Fall 2010	bank stabilization, fish blockage removal, protect infrastructure
Watkins Mill HS/Great Seneca SUVA 1	MCPS	Middle Great Seneca Creek	380	Fall/Winter 2010	Constructed via Park Permit; regenerative outfall/sewer repair/stream repair
Dewberry Drive/Longwood LP	MNCPPC	Hawlings River	125	Fall 2010	Pond outfall/ephemeral wash stabilization
Woodstock/Jeb-Stewart	MNCPPC	Little Monocacy River	50	Fall 2010	Remove old fish blockages by installing a new bridge and providing stream stabilization
Piney Branch bank stabilization	WSSC	Sligo Creek	150	Nov-10	Constructed via Park Permit; installed riffle grade control and stone toe to stabilize stream over new water main
Aspen Hill debris removal	MNCPPC	Rock Creek	150	2010	Remove large debris jam that was resulting in sever bank erosion
NWB WSSC emergency repair	WSSC	NWB	400	Oct-10	Constructed via Park Permit; stabilize eroding bank and protect exposed sewer
Lake Needwood	MNCPPC	Rock Creek	100	Winter 2010/2011	Stabilize Rock Creek to prevent future headcuts near mouth of forebay
Rock Creek SVU1	MNCPPC	Rock Creek	200	Spring 2011	Remove large debris jam that was resulting in severe bank erosion and downed trees.

Location	Lead Agency	Watershed/Location	Linear Feet	Built Date	Notes
Mathew Henson Trail	MNCPPC	Matthew Henson State Park Unit #2	250	Mar-11	Stabilize erosion at bridge L-09-09 abutment and realign and improve and stabilize a 230 foot long stormflow channel to mainstem
Wheaton Regional	MNCPPC	NWB-Wheaton Regional	100	Feb 2011	Repaired severe headcuts resulting from undersized and failing culverts. Stabilized headcuts and replaced culverts with adequately sized pipes. The repairs included replacing 3 culverts pipes along two stream channels which drain into Pine Lake. Provided outfall stabilization at all three culverts.
Brookmont NP	MNCPPC	Little Falls	50	Feb/March 2011	Removed a damaged 40' end section of a stormdrain pipe and replaced it with a regenerative outfall using bank run gravel and woodchips below 2 new step pools/rock weir stabilization structures. Raise tops of 3 inlets around tennis court to improve drainage and cleaned the inlets of all debris. Planted 15 native trees and replaced fence at edge of field and removed invasive plants. Added a small drainage swale at edge of basketball court to filter and treat runoff.

Table 4: Planned and Potential Stormwater and Stream Restoration Projects

Stormwater Management Retrofits

Location	Lead Agency	Type of Retrofit	Watershed	Planned Date	Notes
Wheaton Claridge Park	MNCPPC	Bioretention/rain garden	Lower Rock Creek	FY13	
Woodlawn Cultural SP	MNCPPC	impervious removal; curb cut and treat parking lot; rain gardens	Northwest Branch	FY15 or FY16	
Kensington Cabin LP	MNCPPC	Swales	Lower Rock Creek	FY13 or FY14	
Good Hope LP	MNCPPC	TBD	Paint Branch	TBD	
Henderson Ave/Wheaton RP	MCDOT	Retrofit 4 bioretention cells	Northwest Branch	2011	Facilitate via Park Permit; under construction
Stoney Brook	MNCPPC	TBD	Lower Rock Creek	TBD	
Avenel LP	MNCPPC	TBD	Rock Run	TBD	
Plumgar LP	MNCPPC	TBD	Middle Great Seneca Creek	TBD	
West Fairland LP	MNCPPC	TBD	Paint Branch	TBD	
Various Playground renovations	MNCPPC	Various SWM improvements	Various	Various	
Various Impervious Removal	MNCPPC	Remove impervious surfaces and deconsolidate soils	Various	Various	

Stream Restoration Projects

Location	Lead Agency	Watershed/ Location	Planned Date	Notes
Sligo Creek SVU 3 (Flora Ln Trib)	MNCPPC	Sligo Creek	Fall/Winter 2011	Replace collapsed culvert, stabilize banks, fish passage
Lower Booze Creek	DEP	Northwest Branch	Summer 2011	Facilitate via Park Permit; under construction
Upper Northwest Branch	DEP	Northwest Branch	Summer 2011	Facilitate via Park Permit; under construction
Bachelors Run East	DEP	Northwest Branch	Winter 2010/2011	Facilitate via Park Permit; under construction
Bachelors Run #2	ACE	Northwest Branch	2012/2013	Facilitate via Park Permit
Sherwood Run	ACE	Northwest Branch	2012/2013	Facilitate via Park Permit
Woodlawn Site	ACE	Northwest Branch	2012/2013	Facilitate via Park Permit
NW-160	SHA	Northwest Branch	2010/2011	Facilitate via Park Permit; under construction
NW-170	SHA	Northwest Branch	2010/2011	Facilitate via Park Permit; under construction
Northwest GC	MNCPPC	Northwest Branch	Winter 2011	Remove concrete weir, fish passage, bank stabilization, wetland creation
Valley Mill Park Tributary to Paint Branch	MNCPPC	Paint Branch	2012	fish passage, bank stabilization, grade control

Location	Lead Agency	Watershed/ Location	Planned Date	Notes
Ken-Gar Palisades LP	MNCPPC	Lower Rock Creek	2012	culvert repair/replacement, stream and wetland enhancements
Little Bennett RP	MNCPPC	Little Bennett Creek	Fall 2011	Reduce erosion in overflow channel of stream and stabilize road and stream crossing
Cabin John RP near Coddle Harbor Ln	WSSC	Cabin John Creek	2011/2012	Facilitate via Park Permit; Project exposed forced water main, stabilize banks, improve geometry, grade control
Northwest Branch SVU4--Loxford Terr	WSSC	Northwest Branch	2011/2012	Facilitate via Park Permit; Project exposed forced watermain, stabilize banks, improve geometry, grade control
Wheaton Claridge Park	MNCPPC	Lower Rock Creek	TBD	
West Fairland LP	MNCPPC	Paint Branch	TBD	
Reddy Branch	MNCPPC	Hawlings River/Patuxent River	TBD	
Bucks Branch Park (Sleepy Hollow Ln near Bells Mill)	MNCPPC	Cabin John Creek	TBD	Bridge replace, outfall stabilization, stream restoration

Financial Statement

The majority of work done to comply with the NPDES Permit comes from the Pollution Prevention and Repairs to Ponds and Lakes Fund Number 078701 which was funded at $664,000 in FY 2010 and $725,000 in FY 2011. At the end of FY 2011 funding was secured from the Montgomery County Water Quality Fund for four and a half positions in FY 2012 supporting the NPDES permit. The need for these positions was identified in the original Notice of Intent submitted in November 2009.

Pollution Prevention and Repairs to Ponds & Lakes -- No. 078701

Category	M-NCPPC	Date Last Modified	May 16, 2011
Subcategory	Development	Required Adequate Public Facility	No
Administering Agency	M-NCPPC	Relocation Impact	None
Planning Area	Countywide	Status	On-going

EXPENDITURE SCHEDULE ($000)

Cost Element	Total	Thru FY10	Rem. FY10	Total 6 Years	FY11	FY12	FY13	FY14	FY15	FY16	Beyond 6 Years
Planning, Design, and Supervision	1,351	0	116	1,235	250	242	293	150	150	150	0
Land	0	0	0	0	0	0	0	0	0	0	0
Site Improvements and Utilities	4,633	0	548	4,085	475	1,175	1,010	475	475	475	0
Construction	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0
Total	**5,984**	**0**	**664**	**5,320**	**725**	**1,417**	**1,303**	**625**	**625**	**625**	*

FUNDING SCHEDULE ($000)

G.O. Bonds	1,950	0	0	1,950	325	325	325	325	325	325	0
Current Revenue: General	2,414	0	664	1,750	300	250	300	300	300	300	0
State ICC Funding (M-NCPPC Only)	1,620	0	0	1,620	100	842	678	0	0	0	0
Total	**5,984**	**0**	**664**	**5,320**	**725**	**1,417**	**1,303**	**625**	**625**	**625**	**0**

OPERATING BUDGET IMPACT ($000)

Energy				37	7	6	6	6	6	6
Program-Staff				60	7	8	10	12	12	11
Program-Other				67	4	7	11	15	15	15
Net Impact				**164**	**18**	**21**	**27**	**33**	**33**	**32**
WorkYears					0.1	0.1	0.2	0.2	0.2	0.2

DESCRIPTION

This PDF funds continuing efforts to update and maintain our existing facilities to meet today's standards and enhance environmental conditions throughout the park system. M-NCPPC operates 12 maintenance yards (MY) throughout Montgomery County that are regulated as "industrial sites" under NPDES because bulk materials storage and equipment maintenance have the potential to pollute surface waters. Each MY is subject to NPDES regulations, and must have a Stormwater Pollution Prevention Plans (SWPPPs) in place. SWPPPs are generally a combination of operational efforts and capital projects, such as covered structures for bulk materials and equipment, vehicle wash areas, or stormwater management facilities. In addition, M NCPPC has identified between 60 and 70 existing farm ponds, lakes, constructed wetlands, irrigation ponds, recreational ponds, nature ponds, and historic dams on park property that do not qualify for funding through Montgomery County's Water Quality Protection program. Based on the results of field inspections, projects are prioritized for design, permitting, and construction. M NCPPC is currently working with MDE to enter into a countywide NPDES Phase II to establish pollution prevention measures to mitigate stormwater runoff that originates on parkland. This new permitting requirement will involve additional efforts to identify untreated areas and develop appropriate Best Management Practices (BMPs) to control stormwater runoff and enhance water quality.

ESTIMATED SCHEDULE

In FY11 and FY12, construct vehicle wash unit sewer connections at Black Hill and S. Germantown maintenance facilities; construct new vehicle wash facility at Meadowbrook and Little Bennett; on-going inspections of farm ponds.

COST CHANGE

Cost increase due to addition of NPDES permit requirements to the scope of this project.

JUSTIFICATION

The NPDES "General Discharge Permit for Stormwater Associated with Industrial Facilities, Permit No. 02 SW" issued by the Maryland Department of the Environment (MDE), requires implementation of the SWPPPs at each maintenance yard. The MDE Dam Safety Program requires regular aesthetic maintenance, tri-annual inspection, and periodic rehabilitation of all pond facilities to maintain their function and structural integrity.

FISCAL NOTE

In April 2011: Reduce current revenue by $50,000 in FY12 for fiscal capacity

In FY10, $142,000 (General Obligation Bonds) was transferred in from Lake Needwood Dam Remediation PDF 078710

OTHER DISCLOSURES

- M-NCPPC asserts that this project conforms to the requirements of relevant local plans, as required by the Maryland Economic Growth, Resource Protection and Planning Act.
- * Expenditures will continue indefinitely.

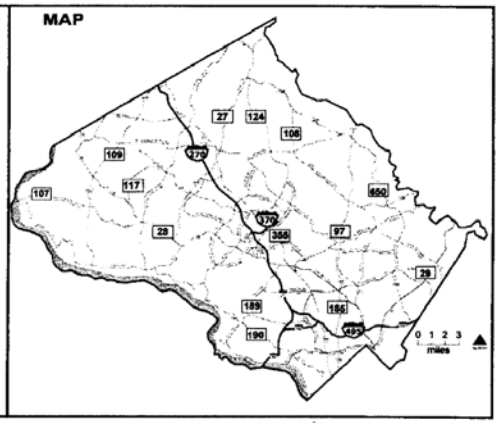
APPROPRIATION AND EXPENDITURE DATA

Date First Appropriation	FY07	($000)
First Cost Estimate Current Scope	FY07	3,000
Last FY's Cost Estimate		4,912
Appropriation Request	FY12	575
Supplemental Appropriation Request		0
Transfer		0
Cumulative Appropriation		2,909
Expenditures / Encumbrances		649
Unencumbered Balance		2,260
Partial Closeout Thru	FY09	980
New Partial Closeout	FY10	498
Total Partial Closeout		1,478

COORDINATION

Montgomery County Department of Permitting Services (MCDPS)
Montgomery County Department of Environmental Protection (MCDEP)
Maryland Department of the Environment
Washington Suburban Sanitary Commission (WSSC)

MAP



CITY OF TAKOMA PARK
WATERSHED IMPLEMENTATION PLAN
NARRATIVE REPORT SUBMITTAL

November 18, 2011

Takoma Park WIP Strategy Description

The City of Takoma Park occupies 1280 acres of land located in the southeastern corner of Montgomery County, Maryland. All of this land is defined as Urban Land, and only the Urban Land Use sector is planned for within the WIP submittal. Takoma Park borders Prince George's County to the east, and Washington D.C. to the South. Takoma Park lies within the Sligo Creek Subwatershed to the Anacostia River. The Sligo Creek subwatershed is one of the oldest developed areas of the Anacostia watershed, having been largely developed during the 1930's - 50's; well before the advent of modern stormwater management controls. Although there have been many various restoration projects and numerous stormwater BMPs (Best Management Practices) constructed in the Sligo Creek subwatershed, water quality and aquatic habitat and terrestrial habitat remains degraded. Sligo Creek exhibits moderate to high TSS, nutrient and bacteria loadings, and one of the worst trash problems in the Anacostia watershed.

The City of Takoma Park aims to achieve the goal to meet the Chesapeake Bay Total Maximum Daily Load (TMDL) through fulfilling the requirements of our current National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) – Phase II Permit. We are expecting future permits to call for a 20% retrofit of impervious area for which runoff is not currently managed to the maximum extent practicable (MEP). Our plan is to achieve this goal mainly by employing Environmental Site Design (ESD) techniques in future Capital Improvement Projects (CIP) and Stormwater Management (SWM) projects. Also we plan to promote other structural and nonstructural BMPs for retrofit projects. Additionally other programmatic means to achieve pollution reduction such as public education and outreach campaigns will be intensified in the coming years.

The City's MS4 Phase II Permit requirements include participation in watershed restoration in coordination with Montgomery County's Countywide Coordinated Implementation Strategy. The City of Takoma Park's Watershed Implementation Plan is adapted from this previously coordinated effort of the County, in particular with objectives geared toward Sligo Creek and the Anacostia Watershed.

The Countywide Coordinated Implementation Strategy presents the restoration strategies that are needed to meet the watershed-specific restoration goals and water quality standards as specified in the current County MS4 permit. Specifically, the Strategy will provide the planning basis for the County to:

1. Meet TMDL Wasteload Allocations (WLAs) approved by EPA.
2. Provide additional stormwater runoff management on impervious acres equal to 20% of the impervious area for which runoff is not currently managed to the maximum extent practicable (MEP).
3. Meet commitments in the *Trash Free Potomac Watershed Initiative 2006 Action Agreement* that include support for regional strategies and collaborations aimed at reducing trash, increasing recycling, and increasing education and awareness of trash issues throughout the Potomac Watershed.

4. Educate and involve residents, businesses, and stakeholder groups in achieving measurable water quality improvements.
5. Establish a reporting framework that will be used for annual reporting as required in the County's NPDES MS4 Permit.
6. Identify necessary organizational infrastructure changes needed to implement the Strategy.

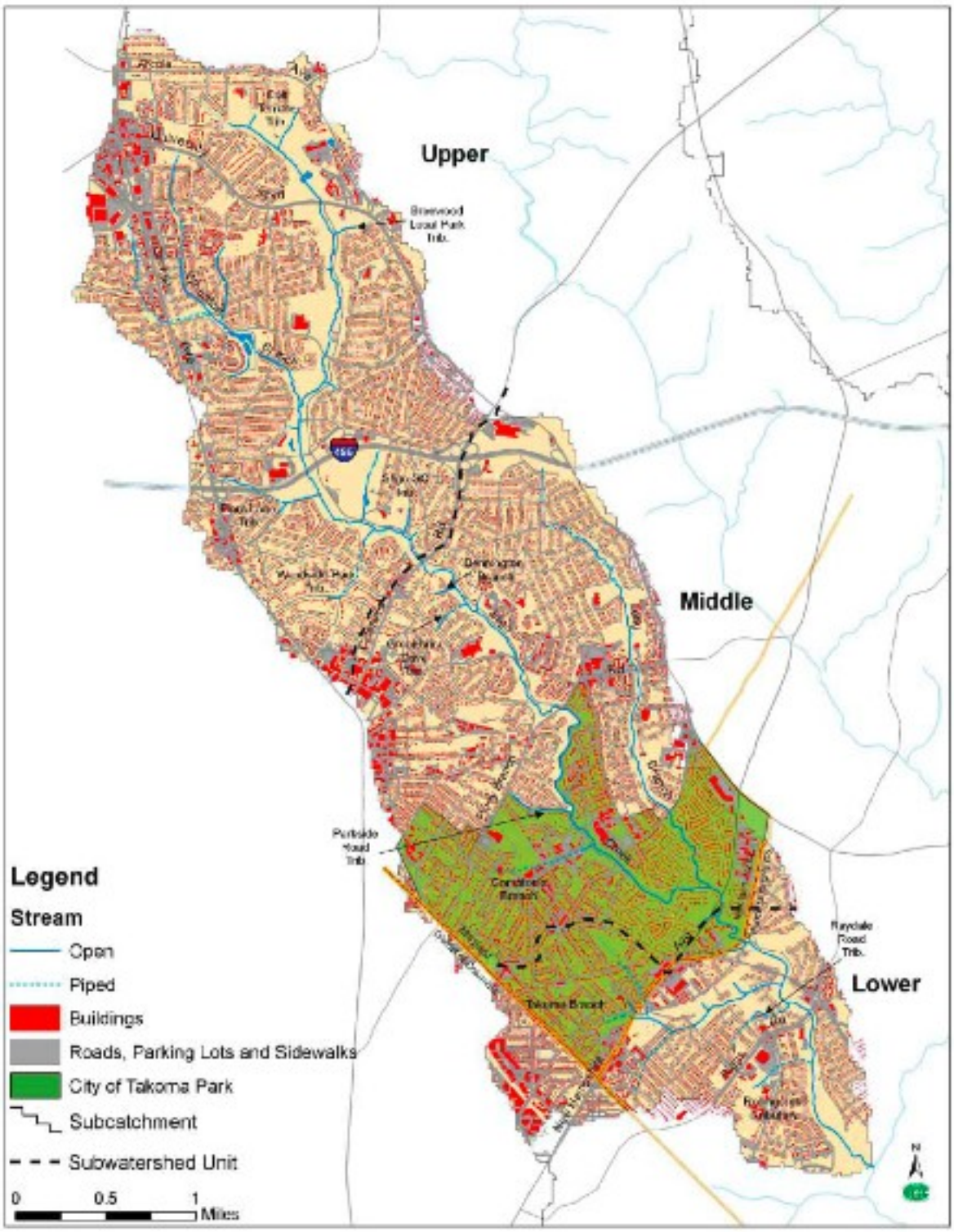


Figure 1: Takoma Park and Sligo Creek Impervious Features, Sligo Creek Sub-Watershed

Current Capacity Analysis for Takoma Park

The following Response Table (Table 1) supports the development of Maryland's Phase II WIP. Specifically, it supports an assessment of Takoma Park's current capacity to conduct implementation actions to help achieve nutrient and sediment reductions.

Takoma Park, as a Phase II municipality will respond to the questions that directly relate to our jurisdiction. In some cases, the County will address the larger issues. We also understand that for some small municipalities such as Takoma Park there might be no information response necessary. In that case, we would like to state that we have reviewed the worksheets (found in MDE WIP Deliverable Guidance, 10-1-11) and have concluded that no responses are necessary.

Program	Program Organization and Description	Budget	Staffing	Estimated Pace of Implementation	Options for Building Capacity	Other
Stormwater Restoration Programs	The City Engineer, Arborist, and Public Works Director identify developed areas that do not have stormwater management or that have inadequate stormwater management controls and prioritize those areas for restoration. When older inadequate stormwater management facilities are present, these facilities are retrofitted. In areas without stormwater management, ESD/LID practices are installed to the Maximum Extent Practicable. A Stormwater Fee in Takoma Park is used to support the Stormwater Program, which includes CIP Project Funding, maintenance of the drainage infrastructure; protecting properties from flooding; protecting our streams and wetlands from erosion and pollution; and complying with state and federal regulatory mandates.	- FY 2012 Stormwater Utility Budget: $454,500 (based on SWM Fee of $48/ERU) - SWM components for other Capital Projects (traffic calming, sidewalks) also funded through separate Budget - Describe Expenditures: Personnel $80,500; Maintenance and repair $207,000; Capital Projects $167,000 Expenditure projections for 2013: $450,000 - $500,000	Number of Full Time Employees: .75 Contractors supplement staffing: $80,000 - $100,000 average Other: Some maintenance activities funded through General Fund	Provide an estimation of the average annual pace of stormwater retrofit implementation (ESD): Approximately 3 impervious acres/year	Intentions for stormwater fee system to be reconsidered and possibly raised. Currently the Fee is based on FY2007 needs. Grant options are evaluated as they become available.	Collaboration with SHA, MGC, and Chesapeake Bay Trust for Flower Ave. Green Streets Project with a budget of $916,000 total.
Urban Nutrient Management Program	Programs that account for local educational and outreach programs to promote fertilizer management. In addition to this, the Maryland Department of Agriculture regulation of lawn care companies and the State's new Fertilizer Use Act of 2011 will be coming into effect. *The State plan will address the later two forms of urban nutrient management in the WIP on behalf of local teams.	N/A, State's new Fertilizer Use Act of 2011 is expected to greatly reduce fertilizer use and promote proper application timing.				
Watershed Management Planning	Takoma Park has adopted the County's Plan for the Anacostia (and Sligo Creek Subwatershed). Additionally, watershed management and land use programs are described in City of Takoma Park Master Plan.					
Land Use Planning	The City Housing and Community Development office actively participates with land use planning coordinated by MNCPPC.					
Land Conservation	City has purchased designated areas for Open Space Preservation and retains a list of potential sites for future procurement. The City of Takoma Park Open Space Plan was adopted in December 12, 1994 and is the primary document providing policies and guidelines for planning vacant land.					
Forest Conservation Programs	The City has an Urban Forest Office that oversees the public tree canopy and implements the tree removal permit process, requiring replanting for any live tree removal. In addition the City funds new tree planting (100-120 trees per year) to increase canopy in the right of way. The City also administers a program for residents to purchase reduced cost trees for private property planting (50-100 trees per year).	FY2012 budget of 250,000 Describe Expenditures: $22,000 tree planting $20,000 public rebate program $91,000 personnel/training $115,500 subcontractor costs $1,500 postage	1 FTE	100-120 trees per year on public space 50-100 trees per year private property	Capacity has been increased in FY2012, with $20,000 being added to the budget for private tree planting within the Urban Forest Office.	

Table 1. Responses to Current Capacity Analysis Questions

Current Status of Retrofitting Effort (BMPs installed since 2006)

As stated previously in our *WIP Strategy Description*, the City of Takoma Park aims to achieve the goal to meet the Chesapeake Bay Total Maximum Daily Load (TMDL) through fulfilling the requirements in the current National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) – Phase II Permit.

Responding to our current NPDES MS4 Phase II Permit, while striving toward the 20% retrofit goal for impervious surfaces, the City has used Geographic Information System (GIS) tools to better understand our overall impervious surface quantities, and the implications of a possible 20% retrofit, which are **approximated** as follows:

Total City Area: **1280 Acres**
Total Area Impervious: **397 Acres**
- Roads: 138 Acres
- Buildings: 158 Acres
- Parking Lots: 85 Acres
- Sidewalks: 16 Acres

Total retrofit effort to meet possible 20% goal: **79 Acres**

Since 2006 Takoma Park has planned, designed, and installed several ESD Stormwater Best Management Practices (BMPs), mainly as Capital Improvement Projects funded through the SWM Fund. Our current ESD BMP retrofitting effort for impervious surfaces, through Permitted BMPs and City BMPs is **14 Acres** (detailed in Table 2).

Additionally, Takoma Park has been working toward the TMDL goals through Alternative Restoration Credits. These credits are given for alternative BMPs that give jurisdictions greater flexibility toward meeting stormwater permit requirements. The BMPs that Takoma Park employs in this category include street sweeping, stream restoration, and tree planting. Totals for these categories are listed below (calculations for Equivalent Impervious Acres Treated from MDE's *Accounting For Stormwater Wasteload Allocations and Impervious Acres Treated, Guidance for NPDES Stormwater Permits June (Draft) 2011), page 12, 22, and 26*).

Total Regenerative Street Sweeping: 40 Acres per Year at 0.13 Impervious Acres Equivalent yields **5 Acres.**

Total Stream Restoration/Stabilization: 550 Linear Feet (LF) at 0.01 Impervious Acres Equivalent yields **6 Acres.**

Total Tree Planting: 5 Acres on Pervious Urban (500 trees, assuming tree planting typically occurs piecemeal across the urban landscape and that 100 trees per acre or greater is necessary with at least 50% of the trees being 2 inches or greater in diameter at 4 ½ feet above ground level.) at 0.38 Impervious Acres Equivalent yields **2 Acres.**

The sum of Impervious Acres Treated via ESD BMPs (14 Acres) and Alternative Restoration Credit (13 Acres) is **27 Acres Treated of 79 total Impervious Acres,** yielding at this point **52 Impervious Acres** that currently has no stormwater treatment.

A comprehensive list and description of currently installed City Stormwater BMPs is described in *Appendix A.*

2013 Milestones and Strategy to achieve the Final Target Loads (2020) and Interim Target Loads (70% of Final Load by 2017)

An outline of The City of Takoma Park's *2013 Milestones* are presented in this section, followed by a detailed *Strategy to achieve the Final Target Loads (2020) as well as Interim Target Loads (70% of Final Load by 2017).* Both Milestones and Strategies will address two categories of action: Implementation Actions and Program Development Actions.

Implementation Actions are designed and installed structural actions (i.e. restoration activities or ESD/LID SWM Projects) resulting in direct pollution load reductions. The quantities can be expressed in various units, such as "acres implemented," and converted to an associated nutrient and sediment load reduction in pounds.

The Program Development category is defined as measures that will increase our capacity and thereby accelerating implementation actions in the medium-term future. Such program enhancement milestones will, in most cases, coincide with scheduled strategy implementation steps to be described in the Phase II WIP to address funding needs, the need for additional legal authority, enhancing existing programs, and designing and establishing new programs.

2013 Milestones

Fiscal Year 2012 and FY2013 will bring about several Implementation Actions for stormwater projects. It is notable that two of these projects will be funded from other sources, in addition to projects already scheduled within the Stormwater Restoration Program. Both the Wildwood Ave. and Flower Ave. Projects are expected to add several Impervious Acres Treated to our current capacity.

In FY2012, Programmatic Actions include continuing to refine our strategy for achieving TMDL goals, refining our cost estimates, and beginning to evaluate whether our stormwater fee system rates are adequate. In 2013, we will complete the refinement of our strategy, implement change to the fee rate if needed and look into other potential funding options for stormwater retrofits in the form of grants.

A descriptive list of 2013 Milestone Implementation Actions follows:

<u>Prince George's Ave. and Circle Ave. Bioretention Project</u> –

Strategy: A Green Infrastructural Retrofit to capture runoff from a residential neighborhood. The project will add a bioretention BMP to catch Water Quality Volume, and include a recharge zone

to infiltrate stormwater for groundwater recharge. Many trees (and shrubs) will be added to the Cities Urban Tree Inventory.

Funding: $25,000. The city SWM Fund will cover costs, as this is a targeted stormwater project.

Schedule:
– 2011: Design completed and construction being sourced.
– 2012: Begin and complete project installation and planting

Wabash Ave. Bioretention and Erosion Control Project –

Strategy: A Green Infrastructural Bioretention and Erosion Control Project to eliminate runoff problems from the street before the stormwater can reach Sligo Creek. The project will add a bioretention BMP to catch Water Quality Volume, and a swale to slow runoff velocities.

Funding: $25,000. The city SWM Fund will cover costs, as this is a targeted stormwater project.

Schedule:
– 2011: Conceptual design
– 2012: Complete design phase, installation and planting

Circle Woods Stream Restoration and Stabilization Project –

Strategy: Stabilize the stream where the culvert daylights, using bioengineering and vegetation plantings. Approximately 400 LF of restoration is anticipated.

Funding: $35,000. Subject to availability.

Schedule:
– 2011: Conceptual design
– 2012: Complete design phase, installation and planting

Wildwood Green Streets Project –

Strategy: A Green Streets Retrofit to capture runoff from new sidewalks that will be installed, while adding capacity to capture street runoff and other runoff from neighboring properties.

Funding: Up to $200,000

Schedule:
– 2011: Assess and identify initial retrofit project sites, or equivalent nutrient/sediment reductions; plan and budget funding through General Fund and SWM Fund if necessary.
– 2012: Begin project designs and installation

Flower Ave. Green Streets Project –

Strategy: Flower Avenue, between Carroll Avenue and Piney Branch Road, is Maryland State Highway 787, and runs north-south along the City of Takoma Park border with unincorporated Silver Spring. The road does not function as a State Highway and Maryland would like to remove it from their State Highway inventory. The Maryland State Highway Administration (SHA) will pay the City $696,000 if the City makes street and sidewalk improvements as a "green street." These funds would have otherwise been spent by SHA on the scheduled repaving of Flower Avenue. Once the project is complete, Flower Avenue will no longer be a State Highway.

Montgomery County is also contributing funds to the project – $200,000. Montgomery County had wanted to undertake a study to see if a sidewalk could be installed on the east side of Flower Avenue and had expected to allocate money in a future year for this study. Funds it would have spent on the study have been allocated towards this project.

The Chesapeake Bay Trust has granted the City of Takoma Park $20,000 towards this project as it will help address stormwater runoff into Sligo Creek and Long Branch creek that ends up in the Chesapeake Bay, along with the contaminants the stormwater picks up along the way.

Together, these funds will pay for a community planning process, engineering design work, construction of a sidewalk on the east side of the roadway, installation of rain gardens and vegetated swales (to slow and filter stormwater), new crosswalks, and repaving of Flower Avenue. If funds are available after these improvements are made, additional improvements to bus stops, street lighting and stormwater facilities will be made.

Funding: see above

Schedule:
– 2011: Community Meetings, Survey
– 2012: Bid Project Design, award design contract, schedule community input sessions to review design.
– 2013: Begin construction

Urban Tree Planting Projects –

Strategy: Over 500 public space trees have been planted in the past 5 years, and Takoma Park's Urban Forest Office is planning to continue expanding the urban forest at 120+ public trees per year. Additionally, Takoma Park citizens have averaged planting 50-100 "bulk buy" trees per year on private property.

Funding: The Urban Forest Office has an annual budget of $250,000 that is used to cover all costs.

Strategy to achieve the Final Target Loads (2020) and Interim Target Loads (70% of Final Load by 2017), Implementation Actions

Although it has not been formally communicated to the City of Takoma Park, it is possible that our future NPDES MS4 Phase II Permit renewal conditions may include a stipulation to retrofit 20% of impervious urban area that currently has no stormwater treatment. With this in mind, we forecast that we may be required to retrofit **52 Impervious Acres** that currently has no stormwater treatment, as defined in the *Current Status of Retrofitting Effort* above.

At our current capacity we will treat 3 Impervious Acres through ESD BMPs, 1 Impervious Acre through Stream Restoration, and 1 Impervious Acre through our Urban Forest plantings each year. This 5 Impervious Acres Treated each year, over the course of 9 years until 2020, is estimated to yield a total of **45** Impervious Acres Treated. This estimate is only **7 Acres** short of our goal. With a potential SWM Fee hike, funded Green Streets Projects, and other Stormwater retrofit projects that are funded from our General Fund or other sources, we feel confident that we have the potential to reach the TMDL goals.

The focus of our future retrofitting effort will be on ESD stormwater BMPs (constructed wetlands, filtering practices, infiltration practices, etc.). Where erosion is a problem, and when site problems justify effort, we will be constructing stream restoration projects, much of which will be installed downstream of ESD BMP projects to reduce the hydrologic energy to the streams. The remainder of projects will be a combination of street sweeping, micro-projects on City and residential properties (down-spout disconnects, rain barrels, rain gardens, etc.), removal of impervious cover, urban nutrient management, and urban tree plantings on residential and public property.

An outline of Capital Improvement Projects scheduled through FY2017 is presented below in Table 3.

Strategy to achieve the Final Target Loads (2020) and Interim Target Loads (70% of Final Load by 2017), Program Development Actions

The following Programmatic Actions will be taken by the City of Takoma Park to increase our capacity and thereby eventually accelerate implementation in the medium-term future. These program enhancement milestones will, in most cases, coincide with scheduled strategy implementation steps described in the section above, *Implementation Actions*, and in more detail in the previous section, *2-Year Milestones*.

In FY2012, we will continue to refine our strategy for achieving TMDL goals, refine our cost estimates, and begin to evaluate whether our stormwater fee system rates are adequate. In FY2013, we will complete the refinement our strategy, implement change to the fee rate if needed and look into other potential funding options for stormwater retrofits in the form of grants. From FY2013-FY2015, we will maintain the current pace of retrofits, which is about 3 acres treated per year. We hope to accelerate project identification and project design and permitting in the period of FY2015 – FY2017 as new resources become available. Between FY2018 and FY2020 we will retrofit as needed to achieve our 2020 TMDL allocations.

Additionally, Takoma Park is committed to pursuing revenue sources in coordination with the State. Given the anticipated costs, we expect that a combination of federal, State and local

revenue sources will likely be needed. We will work with the State in 2012 and coming years, as needed, to refine cost estimates and identify funding options including the possible crafting of State legislation. If State and federal funding is insufficient, we will conduct contingency planning beginning in 2013 for potential adoption of revenue sources as we deem necessary to meet our current and future anticipated permit obligations.

PERMITTED BMP NAME/LOCATION	BMP TYPE	DATE COMPLETED	DRAINAGE AREA TOTAL (ACRE)	DRAINAGE AREA IMPERVIOUS (ACRE)	LINEAR FEET STABILIZED/RESTORED
Takoma Park Fire Station	Sand Filter	2008	0.723	0.67	
Takoma Piney Branch Park, Grant and Darwin	Shallow Pond	2011	3.4	0.52	
Takoma Piney Branch Park, Grant and Darwin	Grass Swale	2011	1.6	0.54	
Takoma Piney Branch Park, Grant and Darwin	Bio-filtration	2011	1.44	0.14	
Takoma Piney Branch Park, Grant and Darwin	Bioretention #1	2011	0.86	0.06	
Takoma Piney Branch Park, Grant and Darwin	Bioretention #2	2011	1.22	0.23	
Orchard Ave. Office	Bioretention	2007	0.25	0.25	
Takoma Park Elementary School, Philadelphia and Holly Ave.	BaySaver Filter, Swale, Storage	2010	3.97	2.61	
Costa (Cristo) Ray High School, Larch Ave.	Bioretention, Filtration Basin	2009	0.37	0.2	
Laurel Ave Shopping, Laurel and Eastern Ave.	2 Filterras	2008	1.63	0.32	
Maple Tower Apartments, 7610 Richie Ave	3 Filterras, 120 LF trench	2010	1.04	0.52	
Washington Adventist University Music Bldg, Greenwood	Sand Filter	2011	0.43	0.2	
Walgreens Store, University Blvd.	Green Roof (.13 acre)	2010	1.05	0.82	
6400 5th Ave. (2 houses)	Dry Well (1600 SF)	2008	0.15	0.15	
123 Ritchie Ave.	Dry Well	2008	0.15	0.15	
125 Ritchie Ave.	Dry Well	2008	0.23	0.13	
8411 Piney Branch	Dry Well	2007	0.473	0.12	
DPW 31 Oswego Ave	Filters	2011	1.631	0.79	
		TOTALS	20.617	8.424	
CITY BMP NAME/LOCATION					
Library and City Parking Bioretentions, 7500 Maple Ave	Bioretention	2010	1.04	0.43	
Grant and Holly	Bioretention	2008	1.2	0.23	
Forest Park	Bioinfiltration	2006	1.38	0.26	
Spring Park	Daylighted stream	2007	0	0	150
Spring Park	Wetland	2007	0	0	
Spring Park	Bioretention	2007	1.21	0.04	
4 Cleveland Ave	Bioretention	2008	0.6	0.31	
Comstock Branch, Mississippi Ave.	Stream Stabilization	2009	0	0	
519 New York Ave	Outfall Stabilization, Step Pool	2008	0	0	50
Maple Ave Bridge	Stream Stabilization	2010	0	0	100
Flower Ave Bridge	Stream Stabilization	2010	0	0	75
Old Carroll Ave	Bioretention		0.26	0.2	
City Green Roof, Maple Ave.	Green Roof		0	0.07	
Linden Ave	Bioretention, step pool		1.34	0.98	
Hancock Ave	Bioretention		3.4	1.31	175
Public Works Yard, 31 Oswego	Filters, Roof Catchment				
Westmoreland Ave.	Bioretention		0.07	0.07	
Kennewick, Kirklynn and Hammond Avenues Circle	Bioretention		2.67	1.26	
Glengarry Ave.	Swale		2.01	0.8	
		TOTALS	**15.18**	**5.96**	**550**
		GRAND TOTALS	**35.797**	**14.384**	

Table 2. Current Restoration Effort

No.	FY 2012 Project List CIP	Summary Description	Preliminary Cost Estimate	Status
1	Prince Georges' And Circle Bio Retention Pond	Bioretention within parcel NE of Intersection	$25,000.00	Concept Developed/ Build Ready
2	Wabash Filtration Erosion Control.	Above Sligo Creek inlet infiltration or bioretention	$25,000.00	Initial Concept
3	Wildwood Ave.	Bioretention/Streetscape	$200,000.00	Initial Concept
4	Circle wood Outfall Stabilization	400 LF	$35,000.00	Initial Concept
No.	FY 2013 Project List CIP	Summary Description	Preliminary Cost Estimate	Status
5	Flower Ave. Green Streets Project	Bioretention/Streetscape	$200,000.00	
6	End Of Grant Ave.	Bioretention Intersection within Green	$ 15,000.00	Concept
7	Flower near Cherry Ave to Sligo Creek	Erosion Control rip rap	$ 20,000.00	
8	Outfall at Sligo Poplar Mill	Trash collection Filter	$ 20,000.00	
9	Flower near Cherry Ave to Sligo Creek	Above Sligo Creek In let infiltration Or Bio	$ 20,000.00	
No.	FY 2014 Project List CIP	Summary Description	Preliminary Cost Estimate	Status
10	Sligo Mill Stream Restoration	Remove debris in Installment	$ 50,000.00	
11	Maplewood & Maple Ave	Large run off from apartment buildings retention.	$ 15,000.00	
12	7436 Baltimore Culvert Plugging Over Lot Flood	Settling Basin at Culvert Intake	$ 30,000.00	
13	Columbia and Carroll Coop Parking	Bioretention at Sycamore Coop Parking	$ 30,000.00	
14	6504 Fourth Ave frequent flooding (100-year)	Inlet Improvements/Bio retention	$ 30,000.00	
15	Behind 6719 Convey /Circle	Erosion	$ 30,000.00	
16	Jackson & Long Branch	Erosion Control	$ 20,000.00	
No.	FY 2015 Project List CIP	Summary Description	Preliminary Cost Estimate	Status
17	Davenshire and Glizwood	Bio retention	$ 25,000.00	
18	John Andrews/ Spring Park Slopes Erosion	Erosion Control	$ 30,000.00	
No.	FY 2016 Project List CIP	Summary Description	Preliminary Cost Estimate	Status
19	Eastern-Tulip-Barclay	Realignment/Bio retention	$ 50,000.00	
20	Hayward and Larch to Sligo Creek Parkway	Bioretention - Erosion Control	$ 50,000.00	
21	Larch and Glizwood	Bioretention/Streetscape	$ 50,000.00	
No.	FY 2017 Project List Repair	Summary Description	Preliminary Cost Estimate	Status
22	Richie and Oswego	Curb extension Bioretention	$111,000	Plans ready to go
23	Elm Forest Park and Wood land Stream Bank	Stabilization 400 LF	$ 35,000.00	
		Total Cost thru 2017:	**$1,081,000.00**	

Table 3. FY 2012 – FY 2017 Planned BMP Project List

APPENDIX A

A comprehensive list of currently installed Urban Stormwater BMPs is described below:

1. Takoma Park Municipal Complex Bioretention

The bio-retention gardens constructed at Takoma Park Municipal Complex parking lot at 7500 Maple Ave. attain a twofold objective; removal of non-source pollution while addressing a chronic inlet clogging problem that caused flooding at the back entrance to the Takoma Park Library. A second inlet situated alongside the southern edge of parking lot, adjacent Philadelphia Avenue receives runoff from the southern half of the parking lot. Both bio-retention ponds were constructed adjacent to existing inlets so as to utilized both filtration and infiltration principals. The pond areas were excavated to a depth of 4 feet. Bio-retention soil mix is separated from the sand filter media by a filter fabric. A perforated PVC pipe conveys the water reaching the filtering media into the adjacent catch basin. Water from storm events flows into the bioretention facilities. Once the facilities are saturated both have an overflow outlet to enable water to enter directly into the storm system and avoid flooding. The twin bio-retention ponds were sized to capture and treat the first flush of any storm. Sufficient storage capacity was provided to eliminate the potential for system overloading in intense storm events. The two bioretention facilities encompass a total of 800 SF of infiltration area.

2. Grant and Holly Bioretention

Excess pavement and non-point source pollution from impervious surfaces created problems with stormwater at the corner of Grant and Holly Ave. While working on the Grant Ave. Safe Routes to School project, community members voiced a desire to reduce the amount of asphalt at the intersection. To provide a solution, the Engineering Department removed pavement from the area in front of an existing stormwater inlet and regraded the area to create a planting bed that catches and holds storm runoff to collect pollutants and allow the water to percolate into the soil.

3. Forest Park Bio-Infiltration

Forest Park was experiencing problems with runoff from developments uphill. Compacted soils caused erosion channels through the lower park area. The City and Friends of Sligo Creek formed a partnership on this project to install a rain-garden infiltration basin. The infiltration basin will recharge the water table, reduce flow velocities, and retain silt and suspended solids.

4. Spring Park Daylighted Stream, Rain Garden, Wetland

Spring Park is a City maintained park, which includes a natural spring, recreational facilities, tree covered slopes, pathways and several gardens. Long-standing problems related to spring water control include erosion, wet grounds and seepage over the sidewalks.

Neighborhood Associations participated in planning and development of the project from the early stages. Through collaboration with City staff and landscape architects from Natural Resources Design, Inc. several community meetings were held and participants views were

incorporated in to the design scheme. Once the plans were prepared, City staff undertook the execution of the project directly. Then design was informed by the Spring Park patrons' input this addressed the priority issues so identified. Two bogs were created to simulate a wetland eco-system. Then the spring was day-lighted into a streambed lined with natural river wash gravel and cobbles. The stream crosses the park grounds with trees, a footbridge and natural rock placed over the banks. A rain garden was created at the end where stream infiltrates and enters into a curbside inlet. This project was completed in the spring of 2007.

5. Cleveland Ave. Bioretention (900sf) and Cleveland Ave Bio-Infiltration

The City successfully installed a sustainable stormwater management alternative to standard storm drainpipes within a neighborhood with no stormwater management. The properties located at the end of Cleveland Ave. were recipients of runoff, sediment and to some extent water intrusion into basements.

Conventional stormwater conduction would have required installation of 1,000 LF of pipe through difficult and heavily forested terrain, private property and along a State Highway right-of-way. The City held several public outreach meetings where environmentally sensitive solutions versus conventional pipe placement were discussed.

A landscaping architectural firm Natural Resources Design, Inc. in conjunction with the City Engineer developed the concept of a low impact stormwater management system for the neighborhood (Phase I).

The residents participated in partnership with the City to construct an approximately 1,300 SF bioretention (rain garden) within one of the end properties. The facility will be maintained cooperatively. The rain garden is designed with a capacity sufficient for retention of a 25-yr storm event. This phase was completed in July 2007.

Phase II of the Cleveland Ave. Stormwater Management Project consisted of constructing an infiltration basin to capture, detain, and filter runoff from the pavement and sidewalks. The basin is installed beneath the pavement at the down gradient end of the street. The existing asphalt and concrete base street pavement structure was removed and replaced with permeable pavers to allow the run-off to enter the underlying infiltration basin. The sidewalk adjacent to the basin was reconstructed using porous concrete.

The infiltration basin includes 36 Rainstore3 Units embedded in gravel underlain by a layer of geo-grid to reinforce granular sub-base material and provide a pavement structure capable of withstanding H-20 (heavy trucks) vehicular loading. If the storm event generates runoff sufficient to fill the infiltration basin's reservoir, the overflow is discharged through a series of pipes into an abutting collection trench, which in turn discharges into a 1,300 SF rain garden (Phase I).

The infiltration basin is capable of retaining runoff generated from a 2-year storm event (3.2"). The Phase II project was designed and overseen by ATR Associates, Inc.

In combination, the Phase I and II Stormwater Management System at Cleveland Ave. is designed to store runoff generated by a 100-year storm event.

6. Comstock Branch Restoration and Streambed Stabilization

Erosion of the stream bank caused the edge of the road to fail along Mississippi Ave. Erosion caused increased sediment transport into Sligo Creek. The solution to the problem was for stabilization of the roadside streambank with imbricated rip-rap for road support and bioengineering and installation of crossvane structures to prevent further erosion and down-cutting of the stream bed.

7. 519 New York Ave. Outfall Stabilization and Step-pool

At the storm drain outfall at 519 New York Avenue, the storm drain pipe daylighted into a large undermined broken concrete structure flowing over an eroded streambed. The intermittent stream flows over a steeply sloping streambed located in the backyard of residential lots and ends in a culvert near Baltimore Avenue, where it joins the storm drain system. As a result of erosion, the storm drain channel that leads into the stream channel was badly deteriorated. The City developed a plan to construct an environmentally sensitive structure to dissipate the energy of the water entering the stream channel, thereby eliminating the erosion problem and stabilizing the outfall area. The plan consist of creating a series of short, step pools at the end of the stormwater channel to receive the stormwater and provide an energy dissipating transition zone for the water as it enters the stream channel. The remnants of the concrete structure and large imbricated rock and class II ripraps were used to stabilize the outfall area and create the step pools.
The project aimed to improve the water quality and address the erosion problems associated with the stream channel. The project plans were developed so as to minimize impact on mature trees in the area. The work area is located in the back yards of properties that front on Baltimore Avenue, Takoma Avenue and Philadelphia Avenues.

8. Maple Ave. Bridge and Flower Ave. Bridge Stream Stabilizations

Two bridges, crossing Sligo Creek, were built in the 1930's and were undergoing structural decay along with streambed scouring, erosion and foundation undermining. A rehabilitation program was developed by the City Engineer with technical help from Montgomery County Engineers. The repairs were carried out through a jointly funded program between the City and Montgomery County. Issues of concern noted for the Maple Avenue bridge included spall, exposed corroded reinforcement in concrete beams, abutment and deck elements, as well as progressive undermining of the central pier. The major structural concerns at the Flower Avenue Bridge included scouring and severe deterioration of concrete encased steel beams, the abutment and the deck.

9. Old Carroll Bioretention

The purpose of the project was to create a vegetated area that can absorb water run-off from the street and filter out the sediment and pollution before the water enters Sligo Creek. This bio-

retention area is about 35 feet long and 5 feet deep, placed inside the curb. The curb was removed in several areas to enable water from the street to enter into the bio-retention area.

10. Municipal Green Roof

The green roof project was completed in several phases. The deck itself was constructed as part of a renovation to the City's community center. The deck was then covered with a waterproof membrane in preparation for the green roof. The City received a grant through the Maryland Department of the Environment for the installation of the green roof. The green roof includes a lightweight system with 4 -inch thick media layer. This limits plants to low-growing, hardy herbaceous varieties. The roof has an assortment of 8 different types of sedum currently thriving there.

Stormwater management benefits of the green roof include pollution removal as well as storage of rainwater as it enters the system. This green roof, with its 4-inch deep blanket of sedum plants covering approximately 2,800 square feet of the 4,000 square foot area, will reduce up to 50 percent of runoff compared to impervious roof texture of gravel over waterproofed concrete.

The plants in a green roof filter pollutants from rainwater, like phosphorus and nitrogen. The plants remove particles from the air, like metals, and CO2. In addition, plants absorb water that would otherwise go directly into a storm drain system. On average a green roof could retain about 70% of the rain that falls on the roof. Stormwater quality improvements by installation of green roof has been researched and documented by EPA "Green roofs for Stormwater run off Control" publication EPA/600/R09/026.

11. Linden Ave Modular Wetland and Step Pools

Stormwater inlets and discharge pipes at the end of Linden Avenue had collapsed due to severe erosion. Linden Avenue dead-ends above the banks of a meandering segment of Sligo Creek. The turnabout and parking area included a failed storm inlet structure supported by an "L" shaped retaining wall of about 150 feet in length and 15 feet in height. This brick façade concrete retaining wall was severely distressed and the riprap apron at the outfall was covered with debris. The area houses a large garden style multi-family apartment complex with 96 units (115EDU). The project consisted of reconstruction of the retaining wall, stormwater inlet and pipe work and the addition of a treatment structure known as "Modular™ Wetland System".

This "Modular Wetland System™" (MWS) treats the first flush of runoff by removing debris, sediment and hydrocarbon pollution. The inlet is equipped with sediment collection baskets, which require periodic inspection and cleaning. The Modular Wetland System contains granular shale chips that serve as a filtering media intended for pollution removal. According to the manufacturer, the MWS utilizes both physical and biological mechanisms to capture and filter oil and grease. The primary filtration media, Bio Media Green, utilized in the perimeter and drain filters, has excellent hydrocarbon removal abilities. Within the wetland filter biological processes break down oil and grease. Much of the breakdown and transformation of oil and grease is performed by naturally occurring bacteria.

Water quality testing of the discharge is planned to evaluate the efficiency of this pollution treatment system at Linden Avenue. This project was funded by an ARRA grant in 2009 provided through the Maryland Department of the Environment. The project design and construction management was funded through the City's Stormwater Management Fund.

12. Hancock Bioretention and Outfall Step Pool (Opal Daniel Park), online MS4, catches all Sheridan and Hancock

The site is located at the intersection of Hancock Avenue and Sheridan Avenue, adjacent to the main entrance to Opal Daniels Park. An 18-inch concrete storm line discharged stormwater from the surrounding neighborhood on to the top of the steep slopes. Hancock Avenue project was launched to address the erosion problem as well as provide treatment of the street run-off. The project created a series of step pools to dissipated run-off energy and to eliminate erosion while allowing stormwater to infiltrate the sand layers below the step pools and recharge the ground water. Additionally, a stormwater bio-retention garden was constructed directly adjacent to the top of the slope to capture and treat the first 1-inch of run-off. Due to presence of fill, a slope stability evaluation of the area was undertaken prior to commencing the project. A weir structure was constructed at the concrete swale, directing street run off through the curb to deflect the first flush (1inch) of run-off into the 1,000 square foot bio-retention area. The storm-drain pipe outfall, bio-retention spillway and excess street runoff are directed into the step pools serving as infiltration and recharge basins.

The neighborhood has been an integral partner in the development of this project. The residents participated in planting many of the native plants for the bio-retention garden and cared for them during the summer drought. The combined effect of the bio-retention pond and step pool conveyance will provide enormous water quality improvements.

13. Public Works Yard, Hydrocarbon Filters and Rooftop Catchment

The original Public Works Facility was constructed in 1959 and included three buildings—an Administration office; a three-bay garage; locker room, equipment storage and staff office building; and a small storage building. In the mid 1960s, two additional storage bays were added, one for sanitation vehicles and repair parts storage and another for street maintenance equipment storage. Minimal improvements had been made to the Public Works Facility over the years and this area is considered a pollutant hotspot due to the high traffic, high impact activity. In Fiscal Year 2009, the City Council agreed to proceed with a renovation of the Public Works Facility and retained Bignell Watkins Hasser Architects as the project architect in the spring of 2009.

The project design included a rainwater recycling system, where a rooftop catchment is used for irrigation and other non-potable water uses. Also, stormwater filters on site to filter hydrocarbons using a proprietary filter media called Smart Sponge. The filter also removes other pollutants such as sediment, debris, and trash before discharge flows enter Sligo Creek.

14. Westmoreland Ave Bioretention

This project was a collaboration between the local commercial business association (Old Takoma Business Association, an art group (Art for the People) and the City. The City provided the site preparation for the rain garden by removing a section of concrete sidewalk and installing an underdrain approximately 50 feet long to serve as the connection to a nearby storm inlet. A 2-foot wide rain garden was placed directly adjacent to a retaining wall along a sloping wide sidewalk. The rain garden was sited to receive runoff from the steep sidewalk as well as an adjacent parking area above. The trench was excavated to a depth of 2 to 3 feet. The underdrain system consisted of a 6 inch perforated PVC pipe wrapped in free draining gravel covered in filter fabric. The underdrain was covered by a minimum of 12 inches of a bio-retention soil mix. The soil was topped with a 4 to 6 inch layer of leaf mulch. The plant selection and planting was done by the association and art group. The maintenance of the garden is also to be undertaken by the same.

15. Traffic Circle Bioretention at Kennewick, Kirklynn and Hammond Avenues

A traffic calming measure was developed to address speeding traffic near a commercial zone in proximity to New Hampshire Avenue and University Boulevard. The 36-foot diameter roundabout is situated at the intersection of Kennewick, Kirklynn and Hammond Avenues. The center of the circle was designed to act as a bio-retention garden for receiving sheet flow from the street. The 800 SF bio-retention garden at center of the roundabout coupled with the addition of several hundred feet of added green space along the right of way resulted in a substantial amount of impervious surface reduction through removal of the existing asphalt.

16. Glengarry Ave. Swale and Erosion Control

Glengarry Avenue is a paved alley off Sligo Creek Parkway providing access to residences on Sligo Creek parkway and Heather Avenue. The street has a westward slope of 8 percent and an intermittent drainage swale that runs the length which channels run-off from Heather Avenue, a dead-end street. Several attempts to partially stabilizing the eroded water pathway have been made. Reoccurrence of high velocity flow had partially undermining the pavement on Glengarry Avenue while continually transporting sediment into the creek. Re-grading, re-alignment and riprap lining of the swale was done to dissipate run-off energy to eliminate erosion and reduce sediment transport into the stream.