

PART THREE

Stormwater Management Facilities Program

3.1 Introduction

This section of the report summarizes the Maryland SHA Stormwater Management (SWM) Facilities Program activities between October 2008 and October 2009.

Based on the latest estimates SHA owns about 2,023 stormwater management (SWM) facilities statewide that were constructed since the mid 1970's. Since 1999, SHA has managed a comprehensive program to locate, inspect, evaluate, maintain and remediate BMPs to sustain their functionality, improve water quality, and protect sensitive water resources.

The program's primary goal is to maintain SHA's stormwater facilities to operate as designed and to strategically enhance their functions to meet today's stormwater standards. The SWM Facilities Program consists of four major components:

- Identification, inspection and database development to manage SHA assets,
- Maintenance and Remediation of BMPs,
- Visual and environmental quality enhancements, upgrades and retrofits,
- Monitoring, research and technology tools development.

The program focuses on the remediation and enhancement of BMPs. This effort requires continuous improvement of the BMP inspection procedures, data management system, tools to track the performance and remediation actions. SHA has developed a prioritization system for remedial activities, and to develop new technologies for repairing or retrofitting BMPs including visual and functional enhancement projects. A part of the SWM Facilities Program is research on performance and efficiency of commonly used BMPs.

3.2 Inventory and Inspection

The following section summarizes the inspection system and inventory results to provide a status of SHA-owned SWM facilities.

3.2.1 Inspection Protocol

The key to an efficient maintenance program is a detailed and consistent inspection assessment. Therefore, SHA has updated the BMP inspection manual that became Chapter 3 of the NPDES Standard Procedures Manual.

Performance Rating

The initial assessment of a SWM facility is a field inspection where individual parameters are *scored* (on a scale 1 to 5) then used to establish an overall BMP performance rating:

- A No Issues** – BMP functioning as designed with no problem conditions identified. There are no signs of impending deterioration.
- B Minor Problems** are observed, however, BMP is functioning as designed.
- C Moderate Problems** are observed, however BMP is functioning as designed, but some parameters indicate the performance and functionality are compromised.
- D Major Problems** are observed, and the facility is not functioning as designed. Several issues may exist that have compromised the BMP performance or indicate failure
- E Severe Problems** exist, and the facility is not functioning as designed with several critical parameters having problem conditions. BMP facility shows signs of deterioration and/or failure. Remedial action should be performed immediately.

The inspection protocol is summarized in the recently updated guidance document “*Best Management Practice Field Inspection & Collection Procedures*”, dated January 2008. The manual documents the methodologies used in the field for identifying, locating, and inspecting SWM facilities statewide. SHA has expanded the protocol to include criteria for visual quality as well as inspection for potential water quality and visual enhancements.

SHA Remediation Rating

SHA performs qualitative evaluation for maintenance and remediation by assigning the remedial rating. This is based on the overall initial inspection rating, performance, functionality, integrity and visual appearance; and also scope and complexity of the potential remedial work:

- I No Response Required** – schedule for multi-year inspection.
- II Minor Maintenance** – perform as necessary to sustain BMP performance. Upon remedial action and re-inspection, can be candidate for multi-year inspection.
- III Major Maintenance or Repair** – is needed to return the site to original functionality within the existing footprint of the facility. Structural defects require repair and/or restoration.
- IV Retrofit Design** – is required on-site or at another location, since BMP cannot be returned to its original functionality within its existing footprint.
- V Immediate Response** – is mandatory to address any public safety hazards regardless of the functionality of the BMP.
- VI Abandonment** – of the BMP when the facility is not maintainable and will not provide sufficient benefits if retrofitted due to the lack of access for construction and maintenance, limited space or minimum impervious area treated.

3.2.2 Inventory

BMP Inventory is being performed countywide on SHA’s roadways in Maryland jurisdictions with Phase I and II MS4 permits, and on a district-level. Table 3-1 summarizes the total number of BMPs identified in each County and SHA District. Figure 3-1 provides a statewide status of the SWM Program in terms of identification, inspection and remediation as of October 2009.

Table 3-1 Current Statewide SWM Facilities

District	County	No. BMPs	Totals
1	Dorchester	24	150
	Somerset	13	
	Wicomico	46	
	Worcester	67	
2	Caroline	4	139
	Cecil	11	
	Kent	6	
	Queen Anne’s	102	
	Talbot	16	
3	Montgomery	266	456
	Prince George’s	190	
4	Baltimore	167	277
	Harford	110	
5	Anne Arundel	422	590
	Calvert	41	
	Charles	100	
	St. Mary’s	27	
6	Allegany	40	68
	Garrett	12	
	Washington	16	
7	Carroll	35	343
	Frederick	62	
	Howard	246	
State			2,023

BMP inventories are being constantly updated as remediation and retrofit projects are completed. In some instances, SWM may be replaced, consolidated, retrofitted, constructed or re-constructed by a private developer to serve as a Joint Use facility. In order to track pending changes in BMP inventory, SHA keeps improving the internal process and database management tools. As the inventory spans statewide, major efforts of inspection and maintenance are strategically expedited in NPDES counties.

3.2.3 Field Inspection

The BMP inventories in counties listed under Phase I and II MS4 jurisdictions in the SHA

NPDES Permit are being performed as part of the source identification. In addition, SHA is inventorying and inspecting BMP in non-MS4 counties. SHA previously completed the inspections in Montgomery, Howard, Anne Arundel, Prince George's, Kent, Queen Anne's, Baltimore, Harford, Garrett, Allegany, Washington, Carroll, Charles, and Frederick Counties.

Inventory and inspections have been completed in Calvert, St. Mary's, Cecil, Caroline, and Talbot Counties. Re-inspections are currently being performed in Anne Arundel, Baltimore, Howard and Prince Georges Counties. The remedial rating for each inspected county is summarized in the Table 3-2.

Table 3-2 SWM Facilities Remedial Ratings Summary by County

Type of SWM Facility	Number Inspected	Rating			
		I	II	III	IV
Allegany County					
Detention	13	6	0	7	0
Extended Detention	13	10	0	0	3
Retention	4	2	2	0	0
Infiltration Basin	0	0	0	0	0
Infiltration Trench	5	5	0	0	0
Shallow Marsh	0	0	0	0	0
Other	5	5	0	0	0
Totals	40	28	2	7	3
Anne Arundel County					
Detention	45	40	0	3	2
Extended Detention	6	6	0	0	0
Retention	45	41	2	1	1
Infiltration Basin	56	35	2	2	17
Infiltration Trench	264	171	42	16	35
Shallow Marsh	2	2	0	0	0
Other	4	3	1	0	0
Totals	422	298	47	22	55
Baltimore County					
Detention	28	22	4	2	0

Table 3-2 SWM Facilities Remedial Ratings Summary by County

Type of SWM Facility	Number Inspected	Rating			
		I	II	III	IV
Extended Detention	4	3	0	1	0
Retention	17	15	0	2	0
Infiltration Basin	35	25	0	3	7
Infiltration Trench	70	42	7	7	14
Shallow Marsh	8	6	1	1	0
Other	5	4	1	0	0
Totals	167	77	9	11	21
Caroline County					
Detention	1	0	1	0	0
Extended Detention	0	0	0	0	0
Retention	2	0	1	1	0
Infiltration Basin	0	0	0	0	0
Infiltration Trench	0	0	0	0	0
Shallow Marsh	0	0	0	0	0
Other	1	0	0	1	0
Totals	4	0	2	2	0
Carroll County					
Detention	0	0	0	0	0
Extended Detention	0	0	0	0	0
Retention	3	2	1	0	0
Infiltration Basin	2	2	0	0	0
Infiltration Trench	19	18	1	0	0
Shallow Marsh	0	0	0	0	0
Other	11	7	3	1	0
Totals	35	29	5	1	0
Cecil County					
Detention	0	0	0	0	0
Extended Detention	0	0	0	0	0
Retention	5	1	3	1	0
Infiltration Basin	0	0	0	0	0
Infiltration Trench	2	0	2	0	0
Shallow Marsh	0	0	0	0	0
Other	4	0	3	1	0
Totals	11	1	8	2	0

Table 3-2 SWM Facilities Remedial Ratings Summary by County

Type of SWM Facility	Number Inspected	Rating			
		I	II	III	IV
Charles County					
Detention	5	2	3	0	0
Extended Detention	1	1	0	0	0
Retention	14	3	11	0	0
Infiltration Basin	7	2	1	3	1
Infiltration Trench	43	6	8	21	8
Shallow Marsh	0	0	0	0	0
Other	30	22	8	0	0
Totals	100	36	31	24	9
Frederick County					
Detention	14	14	0	0	0
Extended Detention	0	0	0	0	0
Retention	15	15	0	0	0
Infiltration Basin	2	2	0	0	0
Infiltration Trench	12	11	1	0	0
Shallow Marsh	1	1	0	0	0
Other	18	16	2	0	0
Totals	62	59	3	0	0
Garrett County					
Detention	2	1	1	0	0
Extended Detention	2	2	0	0	0
Retention	2	1	1	0	0
Infiltration Basin	0	0	0	0	0
Infiltration Trench	4	4	0	0	0
Shallow Marsh	0	0	0	0	0
Other	2	2	0	0	0
Totals	12	10	2	0	0
Harford County					
Detention	15	11	3	1	0
Extended Detention	6	4	1	1	0
Retention	9	8	1	0	0
Infiltration Basin	18	15	3	0	0
Infiltration Trench	59	30	11	1	17
Shallow Marsh	3	3	0	0	0

Table 3-2 SWM Facilities Remedial Ratings Summary by County

Type of SWM Facility	Number Inspected	Rating			
		I	II	III	IV
Other	0	0	0	0	0
Totals	110	71	19	3	17
Howard County					
Detention	11	11	0	0	0
Extended Detention	27	27	0	0	0
Retention	27	24	1	2	0
Infiltration Basin	18	9	0	1	8
Infiltration Trench	126	113	0	0	13
Shallow Marsh	16	16	0	0	0
Other	21	18	1	2	0
Totals	181	156	1	3	21
Kent County					
Detention	0	0	0	0	0
Extended Detention	4	3	1	0	0
Retention	1	1	0	0	0
Infiltration Basin	0	0	0	0	0
Infiltration Trench	0	0	0	0	0
Shallow Marsh	0	0	0	0	0
Other	1	1	0	0	0
Totals	6	5	1	0	0
Montgomery County					
Detention	29	26	1	0	2
Extended Detention	27	25	0	2	0
Retention	43	35	3	3	2
Infiltration Basin	18	14	1	1	2
Infiltration Trench	120	104	7	5	4
Shallow Marsh	6	6	0	0	0
Other	23	21	2	0	0
Totals	266	231	14	11	10
Prince George's County					
Detention	12	11	0	0	1
Extended Detention	4	2	1	0	1
Retention	40	34	5	0	1
Infiltration Basin	15	12	0	3	0
Infiltration Trench	89	46	18	15	10

Table 3-2 SWM Facilities Remedial Ratings Summary by County

Type of SWM Facility	Number Inspected	Rating			
		I	II	III	IV
Shallow Marsh	23	21	1	0	1
Other	7	6	0	1	0
Totals	190	132	25	19	14
Queen Anne's County					
Detention	2	2	0	0	0
Extended Detention	0	0	0	0	0
Retention	16	12	0	3	1
Infiltration Basin	1	1	0	0	0
Infiltration Trench	8	6	0	1	1
Shallow Marsh	11	9	0	2	0
Other	64	1	63	0	0
Totals	102	31	63	6	2
Talbot County					
Detention	0	0	0	0	0
Extended Detention	0	0	0	0	0
Retention	0	0	0	0	0
Infiltration Basin	2	1	0	0	1
Infiltration Trench	1	1	0	0	0
Shallow Marsh	0	0	0	0	0
Other	3	2	1	0	0
Totals	6	4	1	0	1
Washington County					
Detention	8	7	1	0	0
Extended Detention	0	0	0	0	0
Retention	2	2	0	0	0
Infiltration Basin	2	1	1	0	0
Infiltration Trench	2	2	0	0	0
Shallow Marsh	0	0	0	0	0
Other	2	2	0	0	0
Totals	16	14	2	0	0

**STORMWATER MANAGEMENT FACILITIES
INSPECTION AND REMEDIATION PROGRAM**

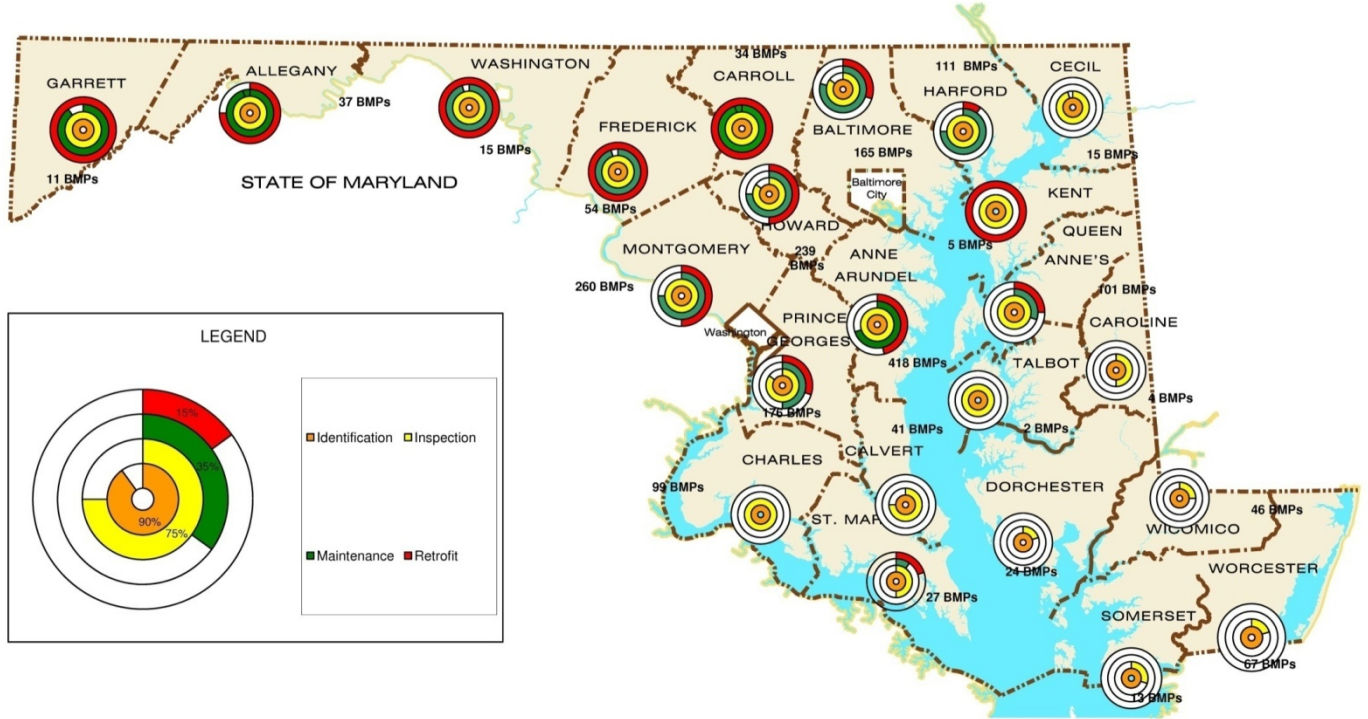


Figure 3-1 SWM Facilities Inspection and Remediation Program

3.3 Maintenance & Remediation

This section summarizes the status of SHA maintenance and remedial responses to deficiencies identified through the inspections of SWM facilities. The program's primary goal is to keep SHA stormwater facilities operating as designed and to strategically enhance their functions. The responses are separated between routine maintenance major maintenance and retrofit projects. Figure 3-1 shows the status of the remediation responses by either maintenance or retrofit/enhancement design.

3.3.1 Routine Maintenance

Routine maintenance or preventive maintenance is generally considered a repair activity that addresses minor issues. The objective is to maintain performance of a BMP and/or to avoid deterioration of specific BMP elements. SWM facilities that require routine maintenance are assigned "II" rating by SHA.

SHA has currently completed most of routine maintenance in many of the inspected counties using several HHD Open Ended Maintenance contracts that as well as District Maintenance Shops Forces in District 7 , specifically in Carroll and Howard Counties. The maintenance crews perform both routine and major/remedial maintenance.

Upon completion the statewide inventory database and one cycle of remedial maintenance in each county, the SWM routine and preventive maintenance tasks may be managed by individual SHA District Maintenance Shops within their jurisdiction as part of the roadside maintenance. SHA is currently developing maintenance guidelines and procedures to strategically schedule statewide SWM maintenance.

Table 3-3 lists the number of facilities requiring routine maintenance based on the 2009 inventory data and the total number that were maintained since the last report to this date. The Table 3-3 also summarizes the routine maintenance cost by county between October 2008 and October 2009.

In order to perform SWM facilities maintenance more effectively, SHA is implementing an innovative contracting approach by advertising SWM Facilities Design, Operate and Maintain Project (DBOM) for Charles County. The project was advertised in September 2008 and the notice to proceed will be given in August 2009 to the selected winning team composed of an engineering company partnering with a construction firm with SWM maintenance experience. During the next three years, the team is responsible for a countywide SWM remedial and routine maintenance performed twice a year, as well as BMP inspections, inventory database updates. Nine previously identified SWM retrofits will designed and constructed by the end of this 3 year contract.

Table 3-3 Minor Maintenance Summary

County	District	BMPs for Maintenance	BMPs Maintained 10/2008 to 10/2009	Cost
Anne Arundel	5	58	14	\$120,879
Carroll	7	11	6	\$16,596
Total		69	20	\$137,475

3.3.2 Major Maintenance

SHA performs major maintenance tasks that address significant deficiencies at BMPs through the time & material open ended contract lead by Highway Hydraulics Division. The intent is to restore performance of a BMP and/or to avoid failure of specific elements. SWM facilities that require major or remedial maintenance are assigned a "III" rating by SHA. Figure 3-2 shows an example of SWM Facility requiring major maintenance in terms of excavating of accumulated sediments in infiltration trench and replacing the media to restore its functionality.



Figure 3-2 BMP 020186 – Removal of Sediment from Infiltration Trench

SHA continues performing detailed field assessments for BMPs identified for major maintenance. A workorder and a summary report is prepared for each BMP that provides sketches using as-built plans, photographs, cost estimate, repair recommendations, specifications and MOT. Figures 3-3 and Figure 3-4 show very typical remediation activity – SWM pond vegetative management, slope stabilization and inflow channel stabilization in Howard County.

Major maintenance is underway in all inspected counties but the focus in the past year has been on Anne Arundel, Baltimore, Howard and Carroll Counties. Table 3-4 lists the total number of facilities requiring major maintenance and the total number that were maintained with the associated cost between October 2008 and September 2009.



Figure 3-3 Inflow Channel Stabilization (BMP130292) - during construction



Figure 3-4 Inflow Channel Stabilization (BMP13007) – After Construction

Table 3-4 BMP Major Maintenance Summary

County	District	BMPs for Maintenance	BMPs Maintained 10/2008 to 10/2009	Cost
Anne Arundel	5	80	2	\$34,535
Baltimore	4	40	7	\$64,756
Carroll	7	14	10	\$18,587
Howard	7	32	14	\$184,964
Total			302,842.00	

3.3.3 Infiltration Trench Remediation

SHA continues remedial actions for infiltration trenches since they represent almost half of SHA's current SWM facilities inventory. The infiltration trenches were originally designed to provide water quality treatment for the first 1/2 in runoff based on the older MDE design standards. Nearly half of inspected the trenches have been identified as failed or requiring remediation.

Field inspections indicate large number of infiltration trenches without an observation well. SHA continuously installs the missing or broken observation wells in order to identify and

monitor the trench functionality. The failed infiltration trenches are grouped into individual retrofit projects by which the sites are being redesigned and replaced by more suitable and efficient BMPs. Those retrofit projects are listed in Table 3-5. However, many sites do not allow retrofit to another BMP type due to the topographic and other site restrictions. Those infiltration trenches are replaced in-kind by removal of the existing media and excavating of the accumulated sediment from the trench bottom. In the past year, most of the trenches that have been replaced are located along MD 43 in Baltimore County and along major highways throughout Anne Arundel County. This initiative is demonstrated in Figures 3-5 to 3-7.



Figure 3-5 Excavation of Infiltration Trench 020191



Figure 3-6 Infiltration Trench 020193 In-Kind Replacement



Figure 3-7 Infiltration Trench 210013 In-Kind Replacement

3.3.4 SWM Retrofits, Visual and Functional Enhancement Projects

MD SHA has actively continued design as well as construction phases of *SWM Functional Enhancement Projects* funded through State Fund for drainage improvements. When appropriate, SHA seeks partial funding match from the Transportation Equity Act for the 21st Century (TEA-21) Enhancement Funds. The projects have been initiated with the intention to improve the pollutant removal efficiency and bring the functional parameters up to the current standards required by the MDE 2000 *Maryland Stormwater Design Manual*, Volumes I and II and MDE *Guidelines for State and Federal Projects*, dated July 1, 2001. The new design

criteria include groundwater recharge volume, and water quality volume. In addition to the functionality upgrades, the enhancement projects are intended to improve aesthetic value, provide refuge to local wildlife and increase the water quality benefits.

In previous reports, SHA provided a list of BMP retrofit/enhancement sites proposed in Anne Arundel and Prince Georges Counties. As the previously listed project have been constructed, new retrofit project are being initiated. The status of the current SWM Enhancement and Retrofit projects is summarized in Table 3-5. Figures 3-8 through 3-12 include recently completed enhancement projects in AA County.

Table 3-5: BMP Enhancement and SWM Retrofit Projects Summary

No	Project	County	No. of BMPs	Contract Number	Construction Cost Estimate	Status
1	Functional Enhancement of SWM Facilities – Phase 1	AA	4	AA3495174	\$998,821	Construction completed in November 2008
2	Functional Enhancement of SWM Facilities - Phase 2	AA	7	AA5535174	\$1,961,326	Construction completed in June 2009
3	MD 8- SWM Retrofit of BMO 170011 and 170012	QA	2	QA2835174	Preliminary \$100,000	Under Design Preliminary Investigation
4	I-97 SWM Facilities Functional Upgrades	AA	12	AA5355174	\$990,570	Bids Opened on September 17, 2009
5	Glen Burnie SHA Maint. Shop Bioretention Retrofit	AA	1	AA2735174	\$300,000	Advertisement Date March 9, 2010
6	MD 235 - SWM Facility Retrofit	SM	1	SM356A21	PI Estimate \$289,000	Under Design Semi- Final Review
7	MD 4 - Retrofit of Failed Infiltr. Basins & Trenches	AA	3	AA5515174	PI Estimate \$400,000	Under Design Semi-Final Review
8	MD 355 – Retrofit of SWM Facility 150012	MO	1	MO410A21	\$50,000	Will be constructed through Open End Contract
9	MD 32 and US 50 – Failed Infiltration Basins Retrofit	AA	10	AT560A21	Preliminary \$1,800,000	Field Investigation, Concept design
10	I-270 SWM Retrofit of BMP 150059 and 150556	MO	2	AT650A21	Preliminary \$200,000	Will be constructed through Open End Contract
Total			43		\$7,089,717	



Before the construction (11/2002)

After construction (07/2009)

Figure 3-8 Reconstruction of Failed Infiltration Basin into Sand Filter at MD 32 (BMP 020121)



Before the construction (11/2002)



After construction (07/2009)

Figure 3-9 Functional Enhancement of Infiltration Basin at MD 100 into Shallow Wetland (BMP 020120)



During Construction (10/2008)



After construction (07/2009)



Before the construction (11/2002)



During Construction (10/2008)



After construction (07/2009)



Figure 3-10 Reconstruction of Infiltration Basin at MD 32 into Pocket Pond (BMP020029)



Before construction (11/2002)



After construction (07/2008)

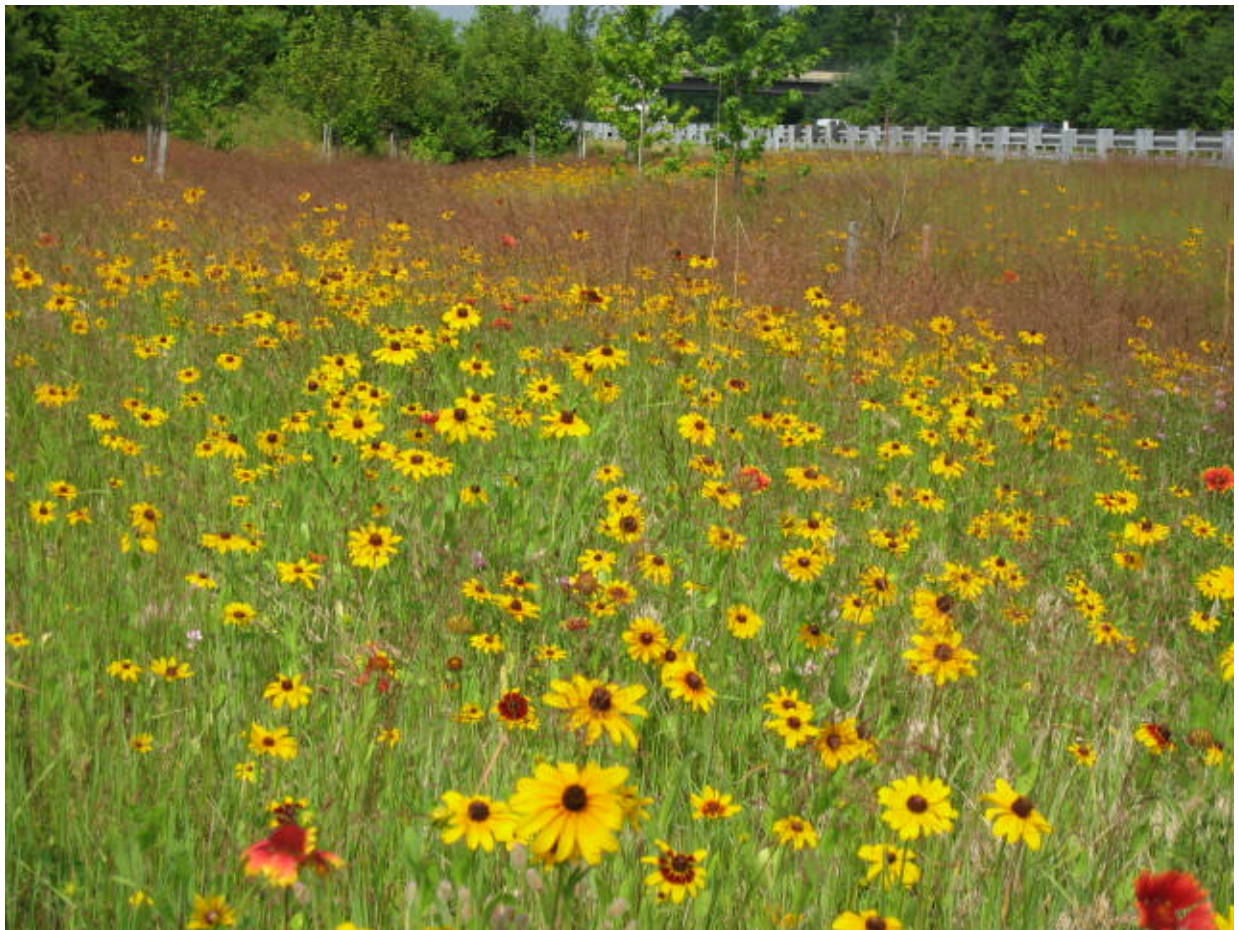


Figure 3-11 Reconstruction of failed Infiltration Basin at MD 100 into Sand Filter (BMP 020122)



Before construction (11/2002)



After Construction (07/2008)



After construction (07/2008)



Figure 3-12 Reconstruction of Failed Infiltration Basin at MD 100 into Micro-pool Extended Detention Pond (BMP 020111)

The design process of all SWM facilities included Visual Quality review as a part of the landscaping design to assure not only functional and sustainable BMP, but also aesthetically pleasing facility with successful establishment of the aquatic and upland plantings.

SHA continues the final design efforts with SWM Functional Upgrades project in Anne Arundel County – 12 failed infiltration trenches along I-97 and MD 100 listed in the previous report will be reconstructed. The project has been advertised in August 2009 and awaits Notice to Proceed in November 2009.

SHA continue develop retrofit design plans for number of SWM sites in Anne Arundel, St. Mary's and Queens Anne Counties to upgrade the existing BMP facilities. The new standard elements and criteria include channel protection volume, groundwater recharge volume, water quality volume, micropools, aquatic benches with wetland plantings, pre-treatment forebays, appropriate riser control structures to provide water quantity control and to minimize downstream adverse impacts, as well landscaping and visual enhancement to increase the aesthetic value of highly visible BMPs.

SWM retrofit project of failed bioretention at SHA Glen Burnie maintenance shop includes drainage improvements, outfalls stabilization as well as replacement of the existing BMP with more suitable BMP type for the site – sand filter. The project will be advertised in spring 2010 for construction Figure 3-13 shows the existing condition of the project site.



Figure 3-13 Failed Bioretention at SHA Glen Burnie Maintenance Shop

In summary, the proposed SWM retrofit and enhancement projects will contribute to improvement of water quality of highway runoff in the environmentally sensitive watersheds of Chesapeake Bay.

3.4 Other Topics

3.4.1 Data Management

To-date SHA has performed inventory of SWM drainage infrastructure in all NPDES counties and BMP inspections in all twenty-three counties with the intent to finalize statewide BMP inventory database by December 2009. SHA has preceded with the second cycle re-inspection in four counties. This effort involves continuous creation and updating of GIS data for source identification and database records for inspections and remediation activities.

SHA has finalized the structure of ESRI geodatabase and detailed schema that allows for the establishment and enforcement of topologic and/or network rules and unique data entry. The new database format resulted in improved data intelligence and integrity.

In order to stream line geodatabase updates procedure, SHA is developing automated Office Tool for quality assurance (QA) checks. In addition, a Field Tool has been developed for new field data collection, downloads and merging with main database. See Figure 1-14.



Figure 3-14 GPS and Field Tool Used for Efficient Data Entry During BMP Inspections

Along with the new database format, a new data viewer tool – NPDES Viewer- is being further enhanced. The functionality of this tool allows the user to view the spatial information as well as digital images associated with each BMP including as-built plans, photographs, inspection reports and other documents. BMP Viewer will be used to view data from various levels such as a highway corridor, MSHA district, County, or watershed.

The new component for BMP maintenance tracking called Remediation Tool is being added to the NPDES Viewer. This application will allow tracking maintenance activities, and associated cost as well retrofit project progress and current functionality of SHA owned SWM facilities.

The NPDES Viewer is being designed to provide functions that will help SHA staff to manage the overall SWM Program, as well as allow wide range of users to access the available BMP and drainage system data more efficiently in order to administer day-to-day activities.

The most recent tool incorporating BMP geodatabase that is used for quick data viewing, reporting and spatially displaying is a web application named iMap. (Screen captures are shown on Figure 3-15). The application can be found at <http://www.mdimap.com/sha/>

This tool was developed by SHA primarily for reporting the current status and progress of SHA Business Plan objectives to StateStat Committee. This tool was also used to present SHA SWM program at the Lt. Governor’s meeting in July 2009.

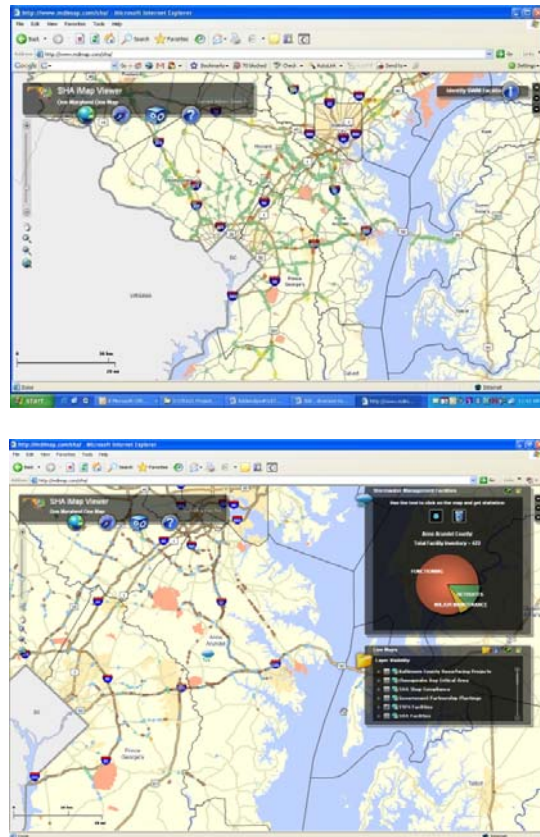


Figure 3-15 iMap Screen Captures

3.4.2 Standard Procedures

In order to maintain consistency and compatibility of the data collected during source identification and BMP inspections, SHA continues conducting NPDES Standard Procedures Workshop for outfall inspections, BMP inspections and illicit discharge screening. (Figure 3-16)

Approximately 25 consultants and SHA engineers completed the 2 day training in September 2009. Part of the workshop was also an overview of procedures summarized in Chapter 7 of NPDES Standard Procedures for SWM maintenance work order development.



Figure 3-15 SWM Inspection Workshop (September 2009)

technology to manage and utilize BMP data more efficiently. Tools are being developed to facilitate timely decisions on remedial actions, and meet NPDES permit requirements.

The SHA Business Plan goes beyond the NPDES permit jurisdiction by promoting the statewide inventory and a high-level of BMPs performance. The goal is to bring 90 percent of all SHA owned SWM facilities to their functionality by FY 2012. Currently 84.9 % of SHA inventoried facilities function as designed. Figure 3-17 summarizes the progress.

3.5 Summary

SHA continues improving protocols and standard procedures for inventorying and inspecting SMW facilities. This leads to the development of a responsive maintenance program to sustain BMP performance, and also includes functional and visual enhancements to upgrade SWM to the today's standards. SHA researches SWM facilities performance through monitoring and research studies. SHA continues development data management

SWM Facilities Program has shown environmental stewardship in the areas of innovative state-of-the-art inspection and data management technology as well as BMP remediation techniques. The program components and structure demonstrate strategic approach to meet the NPDES Permit requirements and enhance the performance efficiency of SWM facilities to improve water quality in the sensitive watersheds of Chesapeake Bay.

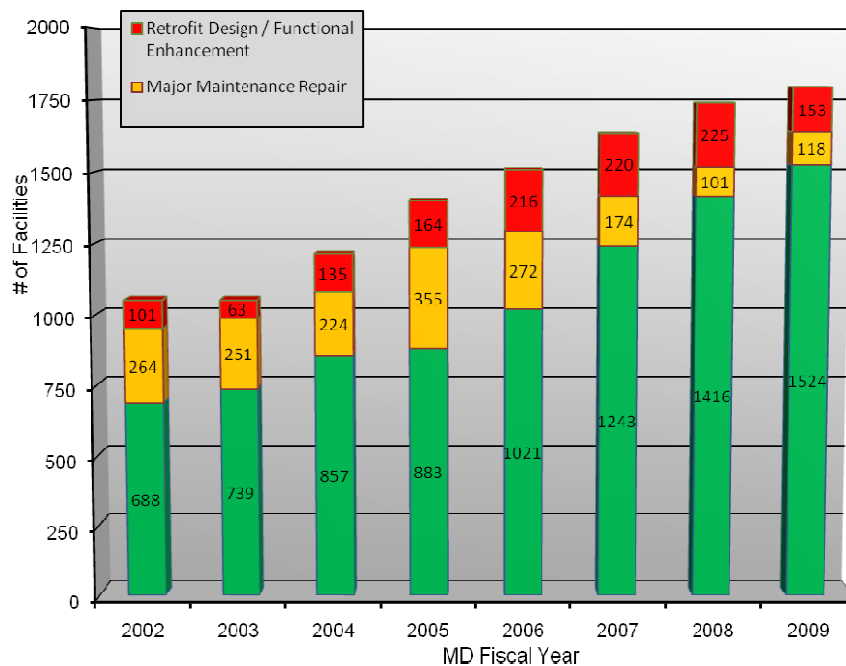


Figure 3-17 Progress in SWM Facilities Program