



**NPDES ANNUAL REPORT  
JULY 2012 - JUNE 2013**

Charles County Government  
Department of Planning and Growth Management

CHARLES COUNTY, MARYLAND  
MUNICIPAL SEPARATE STORM SEWER DISCHARGE PERMIT

02-DP-3322 (MD0068365)

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**DIGITAL DATA (ATTACHED CD)**

GIS Data

Stormwater

swOutfall	swVirtualDrainline1
swStructures	PGM_INDEX
Streams_HydroJunctions	swBMP
swMonitoringLocations	swDrainAreas
Streams	swEasements
swCulvert	swCasing
swEasementCOGO	swESD_Parcels
swPipes	swFCDrainAreas_InProcess

Impervious

temp_lines	Patios
Sidewalks	Parking Areas
Roads	Buildings
Pools	Athletic_Fields

FederalStateOwnedLand

Chemical Monitoring Data

2012 – 2013 Sampling and Event Mean Concentration (EMC) Update (Excel)

Urban BMPs

SWM Inventory and Triennial Inspections (Access)

Illicit Discharge Data

Illicit Discharge Detection and Elimination Database (Access)

Illicit Findings Matrix 2013 (Excel)

Photos from Annual Inspections (jpg)

Other Data (pdf)

Final Report

Appendixes

## **I. Introduction**

Charles County, Maryland received its second, five-year National Pollutant Discharge Elimination System permit on July 31, 2002 for Municipal Separate Storm Sewer System Discharge Permit No. 01-DP-3322. This permit covers stormwater discharges from the municipal separate storm sewer system within the Development District. As part of this comprehensive water quality control permit, the County is required to report to the Maryland Department of the Environment, Water Management Administration (MDE/WMA) annually regarding the status and progress of the permit conditions.

On February 2, 2013, the MDE/WMA sent a letter acknowledging receipt of Charles County's 2012 Annual Report for the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4 or Stormwater) Permit Program. Enclosed with the letter was an updated series of databases, compiled as "Attachment A," which are to be included in the 2013 Annual Report. The letter also commended the County for working through many of obstacles involved with the impervious area restoration, and for showing increased financial commitment to the NPDES Stormwater Permit Program, while noting the pace of impervious restoration projects will need to significantly increase in the future.

Charles County's NPDES permit is for the five year period ending July 31, 2007. MDE/WMA has been delayed reissuing permits statewide. In June 2012 MDE/WMA submitted a fourth draft permit to Charles County, but the final permit has not yet been issued. Because the Charles County permit is not yet reissued operation continues under the current permit.

In preparation for the anticipated increase in permit requirements and the expansion of permit coverage from the Development District to the entire county, three large contracts were initiated in Fiscal Year 2012, and began implementation in Fiscal Year 2013. These include: Geographical Information Systems (GIS)-related work to expand source-identification county-wide; planning tasks to evaluate strategies for meeting the Chesapeake Bay Total Maximum Daily Loads (TMDLs); and evaluation of the stormwater level of treatment for all developed parcels.

This report summarizes the actions taken by the County to fulfill the requirements for the eleventh year of the NPDES permit. Following each permit condition is a description of the work completed during the reporting year. The sections of the report are numbered to correspond with the permit numbering.

A summary of the County's accomplishments and initiatives this year include:

- completing two impervious area restoration projects providing treatment of polluted runoff from 31.2 acres of impervious area;
- adopting Charles County Code Chapter 275 Watershed Protection and Restoration Program as required by State law (Bill 2013-11, effective June 18, 2013);

- adopting a Watershed Protection and Restoration Fund budget of \$2,133,000.
- establishing the Stormwater Remediation Fee in accordance with Chapter 275, which replaced the stormwater portion of the Environmental Service Fee;
- establishing a Stormwater Remediation Fee Credit program for on-site systems, facilities, services, or activities that reduce the quantity or improve the quality of stormwater discharged from the property, and meet or exceed the *2000 Maryland Stormwater Design Manual, Volumes I and II*.
- completing impervious surface GIS polygon data layer for the County based on 2011 aerial photographs by Spatial Systems Associates, Inc. of Columbia, MD;
- contracting with KCI Technologies, Inc. of Sparks, MD for interim, short term permit monitoring and inspection services to maintain permit compliance, until a long term contract could be put out for bid;
- kicking-off a five year contract with KCI Technologies, Inc. of Sparks, MD for permit monitoring and inspection services under Request for Proposals No. 13-08;
- completing the first phase of the expanding the County's GIS stormwater features from the Development District to the entire county, by Spatial Systems Associates, Inc. of Columbia, MD;
- publishing by the U.S. Geological Survey (USGS), of Scientific Investigations Report 2012-5265: *Summary and Interpretation of Discrete and Continuous Water-Quality Monitoring Data, Mattawoman Creek, Charles County, Maryland, 2000-11*;
- completing the *Charles County Phase II Watershed Implementation Plan Strategy*, by LimnoTech, Inc. Mid-Atlantic Regional Office;
- completing the first set of 2-Year milestones for Fiscal Years 2011 -2012, and obtaining the Charles County Commissioners approval of the 2-Year milestones for Fiscal Years 2013-2015 (April 30, 2013);
- completing initial projects under the dedicated Drainage Improvement budget for neighborhoods with flooding and severe stream erosion;
- contracting Vista Consulting, Inc. of Showell, MD to evaluate the Era of Stormwater Management for the 48,000 parcels located in the county;
- continuing design, engineering, and permitting of watershed restoration projects by Vista Consulting, Inc. of Showell, MD; and
- participating in U.S. Environmental Protection Agency (EPA) Stormwater Permit Program inspection on June 20<sup>th</sup>, 25<sup>th</sup> and 26<sup>th</sup> 2013.

Ongoing activities include: quarterly NPDES working group meetings to inform and coordinate personnel responsible for permit conditions; updating the NPDES Stormwater Permit information page on the County's website; partnering with the USGS to maintain a long-term, real-time monitoring station on the Mattawoman Creek.

**II. Definitions**

*Terms used in this permit are defined in relevant chapter of the Code of federal Regulations (CFR) or the Code of Maryland Regulations (COMAR). Terms not defined in CFR or COMAR shall have the meanings attributed by common use unless the context in which they are used clearly requires a different meaning.*

**III.A. Permit Administration**

Overview of Permit Conditions

1. *By 7/31/2003, Charles County shall provide MDE with the names, titles, addresses, phone numbers, and functions of all primary administrative and technical personnel responsible for compliance with this permit.*

2013 Status

Permit requirements are managed by staff within the Departments of Planning and Growth Management and Public Works as shown on the following table.

*Table 1: Charles County Personnel Responsible for Permit Compliance*

<i>Personnel</i>	<i>Responsibilities</i>
<b>DEPARTMENT OF PLANNING AND GROWTH MANAGEMENT (301-870-3935)</b>	
Mr. Peter Aluotto, Director Charles County Department of Planning & Growth Management <a href="mailto:aluottop@charlescountymd.gov">aluottop@charlescountymd.gov</a>	Oversees NPDES MS4 programs implemented by the Department of Planning and Growth Management.
Mr. Steven Ball, Planning Director Planning Division <a href="mailto:ballst@charlescountymd.gov">ballst@charlescountymd.gov</a>	Manages water quality monitoring programs; operating budget, annual permit reports, permit reapplication, and special programmatic tasks.
Mr. Frank Ward, Chief Construction Permits and Inspection Services <a href="mailto:wardf@charlescountymd.gov">wardf@charlescountymd.gov</a>	Manages stormwater, drainage, and sediment and erosion control, permitting, inspection, and enforcement programs.
Mr. John Stevens, Chief Capital Services <a href="mailto:stevensj@charlescountymd.gov">stevensj@charlescountymd.gov</a>	Manages impervious area evaluation, and identification and implementation of Watershed Restoration capital projects.
Mr. Jason Groth, Chief Resource Infrastructure Management <a href="mailto:grothj@charlescountymd.gov">grothj@charlescountymd.gov</a>	Manages Geographical Information Systems and water conservation education.

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DEPARTMENT OF PUBLIC WORKS (301-870-2778)	
Mr. Bill Shreve, Director Charles County Department of Public Works <a href="mailto:shreveb@charlescountymd.gov">shreveb@charlescountymd.gov</a>	Oversees NPDES MS4 programs implemented by the Department of Public Works.
Mr. Dennis Fleming, Chief Environmental Resources Facilities Division <a href="mailto:flemingd@charlescountymd.gov">flemingd@charlescountymd.gov</a>	Manages industrial stormwater permits for County properties managed by the Division, and trash, litter and recycling programs.
Mr. Stephen Staples, Chief County Roads Facilities Division <a href="mailto:stapless@charlescountymd.gov">stapless@charlescountymd.gov</a>	Manages maintenance of roads, drainage, and stormwater facilities owned by the County.
Mr. Thomas Roland, Chief Parks and Grounds Facilities Division <a href="mailto:rolandt@charlescountymd.gov">rolandt@charlescountymd.gov</a>	Manages maintenance of parks and grounds owned by the County or part of the recreational system.
Mr. Semyon Simanovsky, Chief Maintenance and Operations Division <a href="mailto:simanovs@charlescountymd.gov">simanovs@charlescountymd.gov</a>	Manages industrial stormwater permits for County wastewater treatment plants.

### III.B. Legal Authority

#### Overview of Permit Conditions

1. *By 7/31/2003, Charles County shall provide MDE with recertification from the County Attorney that it possesses the authority to directly perform the activities described in 40 CFR 122.26 (d)(2)(I), and this permit.*
2. *Charles County shall maintain adequate legal authority, in accordance with NPDES regulations 40 CFR 122.26(d)(2)(I), throughout the term of this permit. In the event that any provision of its legal authority is found to be invalid, the County shall make the necessary changes to maintain adequate legal authority.*

#### 2013 Status

Recertification was provided by the County Attorney via a letter forwarded to Mr. Brian Clevenger of the Maryland Department of the Environment, Water Management Administration, dated June 19, 2003. A copy of this letter was included in the 2003 NPDES Annual Report.

The County will maintain adequate legal authority throughout the term of this permit, and in the event that any provision of its legal authority is found to be invalid, the County will make the necessary changes to maintain adequate legal authority.

### III.C. Source Identification

#### Overview of Permit Conditions

1. *By 7/31/2003, Charles County shall submit an example of its Geographic Information System (GIS) capabilities that includes the identification of all data layers available, the stage of development, metadata, and a description of how data are stored, accessed, and used. The example shall include the following information:*
  - a. *Geologic features: topography, soils, steep slopes, etc.*
  - b. *Land use: existing and planned based on present zoning or current master plans, public and private ownership, and population density.*
  - c. *Resources: streams, stream buffer areas, floodplains, wetlands, forests, forest conservation areas, areas of special concern*
  - d. *Infrastructure: storm drain systems, including major outfalls, inlets, appurtenant conveyances, and associated drainage areas; stormwater management facilities; sanitary sewer systems within the resource areas identified in Part III.C.1.c above; and chemical, physical, and biological monitoring sites.*
  - e. *Significant discharges: sewage treatment plants, industrial operations, hazardous waste sites, landfills, NPDES permitted sites (both point source and stormwater permittees), impervious areas (e.g. roads, parking lots, and rooftops), known as problem areas (e.g. flood prone of water quality impaired areas), and estimated pollutant loads; and*
  - f. *Schedule: time-frame for completing GIS development within the Development District.*

#### 2013 Status

As required by this condition, the County submitted an example of its GIS capabilities in 2003. All coverages were in ArcView shapefile format, projected to Maryland State Plane coordinates in NAD83 datum in meters. Metadata was also included for these coverages.

2. *By 7/31/2003, Charles County shall submit its database identifying major outfalls. Data shall be submitted on CD-ROM(s) and include all major outfalls, associated inlets, appurtenant conveyances, drainage areas, and private storm drain systems.*

2013 Status

This information was included in the County's June 2002 to July 2003 annual report as required.

3. *Charles County shall compile any new source identification information on a continual basis and summarize the data collection in its annual reports.*

2013 Status

Since 2003, the County has annually submitted updated GIS data and summarized the data collection in its annual reports. The most recent GIS updates were submitted to MDE with the 2011 NPDES Annual Report. All coverages were in ArcView shapefile format, and projected to Maryland State Plane coordinates in NAD83 datum in meters.

In Fiscal Years 2012 and 2013 the County contracted with Spatial Systems Associates to expand and improve the County's stormwater GIS coverage. This project includes stormwater infrastructure and impervious surfaces. The datasets for this project include the fields specified by MDE in Attachment A of the County's June 2012 draft NPDES MS4 permit, and are attached on CD.

Previously the County's impervious surface was based on Feature Analyst, which is sophisticated computer software that can extract impervious surfaces from high quality digital aerial orthophotography. Because the image radiometry of the pixels varies due to shadows, reflections, and different pavement materials, "training" the software to accurately classify impervious surfaces, requires extensive interaction with the operator. An example of Feature Analyst results are in Figure 1.

As part of the current Spatial Systems Associates project, the County has moved from Feature Analyst to actual impervious surface. This was done by updating the County's 2007 planimetric line data to 2011 aerial photographs. The updated line data for roads, buildings, and paved areas were then converted to polygon data. From the 2011 polygon data, actual impervious surface area was calculated.

The first application of the actual impervious surface was used to generate an average impervious area for single family lots in the county, referred to as Equivalent Residential Unit, and actual impervious surface coverage for non-residential parcels for use in evaluating the alternate methods of applying the stormwater remediation fee, as required by State law.

Figure 1: Impervious Surface Delineation - Feature Analyst (left) and Actual Impervious (right)



4. *Annually, Charles County shall submit stormwater management facility construction completion data for MDE's Urban Best Management Practice database.*

#### 2013 Status

The Fiscal Year 2013 database of BMP information is included in Appendix A and on the attached CD. It shows a total of 1,259 BMPs, an increase of 61 from the 1,198 shown in the records for Fiscal Year 2012. Several of the BMPs added to the database this year have been identified by Spatial Systems Associates, Inc. during the first phase of expanding the source identification from the Development District to the entire county.

### **III.D. Discharge Characterization**

#### Overview of Permit Conditions

1. *Annually, Charles County shall perform long-term discharge characterization monitoring of an outfall and an associated in-stream monitoring station using the following minimum requirements for chemical, biological, and physical monitoring:*
  - a. *For Chemical Monitoring:*
    - i. *Monitoring shall be performed in the Zekiah Swamp watershed at the outfall and its associated in-stream station in the St. Charles area to characterize runoff from commercial land use;*
    - ii. *Continuous flow measurements shall be recorded at the in-stream monitoring station. These data shall be used to facilitate annual and seasonal pollutant load estimates;*

- iii. *Twelve (12) storm events shall be monitored per year at the outfall and in-stream monitoring locations with at least three (3) occurring per quarter. Quarters shall be based on calendar year. If extended dry weather periods occur, base flow samples shall be taken at least once per month at the in-stream monitoring station, and if flow is observed, at the outfall;*
- iv. *Discrete samples of stormwater flow shall be collected at the outfall and in-stream monitoring stations using automated or manual sampling methods. Measurements of pH and water temperature shall be taken; and*
- v. *At least (3) samples determined to be representative of each storm event shall be submitted to a laboratory for analysis according to the methods listed under 40 CFR, Part 136 and event mean concentrations (EMCs) shall be developed for the following parameters;*

<i>Biochemical Oxygen Demand (BOD<sub>5</sub>)</i>	<i>Total Cadmium</i>
<i>Total Kjeldahl Nitrogen (TKN)</i>	<i>Nitrate plus Nitrite</i>
<i>Total Petroleum Hydrocarbons (TPH)</i>	<i>Total Phosphorus</i>
<i>Total Copper</i>	<i>Total Phenols</i>
<i>Total Zinc</i>	<i>Fecal Coliform</i>
<i>Total Suspended Solids (TSS)</i>	<i>Total Lead</i>
<i>Oil and Grease (Optional)</i>	

- b. *For Biological Monitoring*
  - i. *Monitoring shall commence with the chemical monitoring; and*
  - ii. *The stream reach between the outfall and the in-stream monitoring station shall be monitored each Spring and Fall using the U.S. Environmental Protection Agency's (EPA) Rapid Bioassessment Protocol III or other method approved by MDE.*
- c. *For Physical Stream Assessment:*
  - i. *A geomorphologic stream assessment shall be conducted in the stream reach between the outfall and in-stream monitoring station. This assessment shall include, at a minimum, an annual comparison of permanently monumented stream channel cross-sections, an annual comparison of the stream profile, and a stream habitat assessment using techniques as defined by the EPA's "Rapid Bioassessment Protocol for use in Wadeable Streams and Rivers," or other similar method approved by MDE; and*
  - ii. *Annually, a hydrologic and/or hydraulic model shall be used (e.g., TR-20, HEC-RAS, HSPF, SWMM, etc.) to analyze the effects of rainfall; discharge rates; stage; and, if necessary, continuous flow on channel geometry.*

2013 Status

*Chemical Monitoring*

Charles County continued the long-term chemical monitoring program at the Arthur Middleton Elementary School during the 2012-2013 reporting year. The monitoring period for this reporting year extended from June 2012 through June 2013.

In order to meet the requirements of the Watershed Restoration section of the NPDES Stormwater Permit, Charles County had identified the Arthur Middleton Elementary School as a suitable site for the installation of a stormwater management wetland, designed to treat the flow passing through the existing storm drain prior to its discharge into the stream channel.

The chemical monitoring program was established at the Arthur Middleton Elementary School in December 2005. The sampling stations were located within an inlet upstream of the proposed wetland and at an instream station below the storm drain outfall. The sites were established prior to the construction of the wetland to develop a pre-retrofit baseline for pollutant inflow to the receiving channel. The inlet was established as Site 002, and the instream station was established as Site 001.

Sampling began at these sites on January 18, 2006, and continued until April 2, 2007, when the sampling array was removed as construction of the wetland began. Construction of the wetland was completed in April, 2008.

In August, 2008, sampling resumed at the Arthur Middleton Elementary School. The inlet was reestablished as the outfall site, and the concrete weir overflow was established as the instream monitoring station.

A sampling array was permanently secured to the storm drain pipe within the inlet to collect continuous flow data. However, during the spring of 2011, storm drain improvements were implemented along the storm drain system draining to the wetland. This included replacement of the inlet where the sampling array was installed. The sampling array was removed as a result of the project. Therefore, for the 2012-2013 reporting year, flow data is only available for sampled events.

Flow data for the instream station was calculated by measuring the flow depth at the weir control structure for the wetland and computing the discharge from a rating table. As such, flow data is only available for the instream station for sampled events.

A total of four storms were sampled during the 2012-2013 reporting year. Storm event samples were collected on April 19 and 29, 2013, May 7, 2013, and again on June 6, 2013.

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*Table 2: Number of Chemical Monitoring Samples - Middleton Elementary School Stations*

Year	Month	Wet Weather Sample		Baseflow Sample	
		Outfall	Instream	Outfall	Instream
2006	January	1	1		
	February	1	1		
	March				
	April	1	1		
	May	1	1		
	June	1	1		
	July	1	1		
	August	1	1		
	September	1	1		
	October	1	1		
	November	1	1		
	December				
2007	January	1	1		
	February	1	1		
	March	1	1		
	April			1	1
2008	August	1	1		
	September	1	1		
	October	1	1		
	November	1	1		
	December	1	1		
2009	January				
	February	1	1	1	1
	March	1	1		
	April	1	1		
	July			1	1
	August			1	1
2010	January	2	2		
	February	1	1		
	March	1	1		
	April	1	1		
	May	1	1		
	June	1	1		
	August	1	1		
	December	2	2	1	1
2013	April	2	2		
	May	1	1		
	June	1	1		

The monitoring protocol consisted of three discrete samples, representative of the rising limb, peak, and falling limb of the storm hydrograph for each storm event, collected at each monitoring station. All samples were collected manually so that fecal coliform and TPH could also be analyzed. Based on the County's draft NPDES permit, collected samples during this reporting year were not analyzed for Cadmium, Phenols, Oil and Grease, and Fecal Coliform. Hardness and E-coli were added to the list of parameters analyzed due to the County's draft NPDES permit.

Atlantic Coast Labs of Newark, Delaware performed laboratory analyses.

The combined results from the chemical monitoring for the current reporting year are contained in Appendix B and included in the NPDES database on CD.

### **Event Mean Concentrations**

Using the available flow data and laboratory results for each discrete sample collected at the sites, event mean concentrations (EMCs) were computed for each constituent.

EMCs were weighted based on the depth of flow for each limb of the storm. Depth was recorded continuously at the outfall station, and during sampling events for the instream station. The chemical concentrations were multiplied by the flow depth, summed and divided by the total flow depth to compute a weighted average for each storm event.

If the parameter was not detected in the laboratory analysis, a value of zero was used for the low end of the possible range, and the detection limit was used for the high end of the range. The flow-weighted EMCs for each storm were then averaged to determine the average EMC for each parameter at each site. Average flow-weighted EMCs by calendar year for the Arthur Middleton Elementary School (Sites 001 and 002) are provided in Tables 3 and 4.

Table 3: Annual Average Flow-Weighted EMC and Number of Events Sampled, Site 002 – Arthur Middleton Elementary School

Year	TKN	NOx	TP	TSS	BOD	Pb	Cd	Cu	Zn	TPH	Phenols	O&G	Fecal Col.	E-coli	Hardness
	mg/L Events	MPN Events	MPN Events	mg/L Events											
2006	1.73 10	0.67 10	0.29 10	24 10	16 10	0.011 10	0.001 10	0.007 10	0.062 10	2.7 10	0.03 10	3.50 10	4885 10	N/A	N/A
2007	0.95 4	1.17 4	0.13 4	72 4	5 4	0.022 4	0.001 4	0.011 4	0.049 4	3.3 4	0.03 4	3.27 4	157 4	N/A	N/A
2008	2.17 5	0.40 5	0.16 5	11 5	9 5	0.071 5	0.002 5	0.011 5	0.284 5	3.9 5	0.04 5	5.59 5	34402 5	N/A	N/A
2009	1.14 4	0.28 4	0.15 4	17 4	4 4	0.021 4	0.001 4	0.005 4	0.112 4	1.9 4	0.03 4	2.87 4	685 4	N/A	N/A
2010	1.73 8	0.71 8	0.27 8	68 8	10 8	0.006 8	0.001 8	0.009 8	0.057 8	2.6 8	0.04 8	3.15 8	18794 8	N/A	N/A
2011	1.10 3	0.42 3	0.24 3	59 3	3 3	0.007 3	0.0003 3	0.006 3	0.051 3	3 3	0.01 3	3 3	94 3	N/A	N/A
2013	1.62 4	0.31 4	0.28 4	31 4	21 4	0.002 4	N/A	0.005 4	0.036 4	2.5 4	N/A	N/A	N/A	2550 4	20.5 4
NURP	2.35	0.960	0.47	140.0	11.0	0.180		0.050	0.180						

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*Table 4: Annual Average Flow-Weighted EMC and Number of Events Sampled, Site 001 – Arthur Middleton Elementary School*

Year	TKN mg/L Events	NO <sub>x</sub> mg/L Events	TP mg/L Events	TSS mg/L Events	BOD mg/L Events	Pb mg/L Events	Cd mg/L Events	Cu mg/L Events	Zn Mg/L Events	TPH mg/L Events	Phenols mg/L Events	O&G mg/L Events	Fecal Col. MPN Events	E-coli MPN Events	Hardness mg/L Events
2006	1.05 10	0.61 10	0.14 10	19 10	4 10	0.008 10	0.001 10	0.005 10	0.055 10	2.5 10	0.03 10	2.85 10	3564 10	N/A	N/A
2007	0.52 4	1.11 4	0.06 4	27 4	3 4	0.007 4	0.001 4	0.004 4	0.080 4	2.5 4	0.03 4	2.5 4	58 4	N/A	N/A
2008	0.46 5	0.05 5	0.06 5	7 5	2 5	0.003 5	0.001 5	0.002 5	0.018 5	2.4 5	0.02 5	2.6 5	3524 5	N/A	N/A
2009	0.95 4	0.06 4	0.08 4	9 4	15 4	0.004 4	0.001 4	0.004 4	0.019 4	1.9 4	0.02 4	2.1 4	109 4	N/A	N/A
2010	0.53 8	0.44 8	0.06 8	13 8	2 8	0.006 8	0.001 8	0.003 8	0.015 8	3.0 8	0.03 8	3.0 8	4543 8	N/A	N/A
2011	0.3 3	0.39 3	0.04 3	9 3	3 3	0.001 3	0.0003 3	0.001 3	0.022 3	3 3	0.01 3	3 3	17 3	N/A	N/A
2013	0.59 4	0.08 4	0.05 4	7 4	6 4	0.001 4	N/A	0.003 4	0.014 4	2.5 4	N/A	N/A	N/A	903 4	48.5 4
NURP	2.35	0.960	0.47	140.0	11.0	0.180		0.050	0.180						

## Discussion

The results of the laboratory analysis (both individual samples and EMCs) were reviewed for the storm and base flow events during the permit period. Findings are summarized below:

### Inlet Site (002)

- A first flush effect was not observed for the sampling station. Concentrations were typically higher for rising limb samples than for peak.
- All samples collected for TPH had concentrations below the detection limit. The other contaminants were detected fairly regularly.
- The April 19, 2013 storm event had elevated concentrations of BOD, TKN, Total Phosphorus, TSS, Lead, Copper, Zinc, and E-coli.

### Instream Site (001)

- A first flush effect was not observed for the sampling station. Concentrations were typically higher for peak samples than for rising limb.
- All samples collected had concentrations below the detection limit for copper, lead, and TPH. NOx was only detected in two samples. The other contaminants were detected fairly regularly.

State and Federal acute and chronic criteria are presented in Table 5 below. The laboratory data are compared, where possible, to these criteria to assess the extent of possible pollution within this watershed. Criteria are used to protect against both short-term and long-term effects. Numeric criteria are important where the cause of toxicity is known or for protection against pollutants with potential human health impacts or bioaccumulation potential. Narrative criteria can be the basis for limiting toxicity in discharges where a specific pollutant can be identified as contributing to the toxicity.

Criteria do not exist for all parameters measured at the monitoring stations. In addition, a clear cause and effect relationship between water quality and ecological condition is difficult to determine. However, these comparisons can be used as general indicators of water quality impairment. Both State and Federal criteria are based on ambient stream conditions. Chronic criteria consider the maximum levels at which aquatic life can survive if continuously subjected to a pollutant concentration. Acute criteria reflect the maximum level at which an aquatic organism can survive if periodically subjected to a pollutant concentration. Since storm events represent a periodic condition, wet-weather samples are compared only to acute criterion.

*Table 5: State and Federal Water Quality Criteria Available for Parameters Sampled at Arthur Middleton Elementary School*

<b>Parameter (mg/L ,except as noted)</b>	<b>Chronic</b>	<b>Acute</b>	<b>Reference</b>
Metals (µg/L):			
Lead	2.5	65	COMAR 26.08.02.03-2
Copper	9	13	COMAR 26.08.02.03-2
Zinc	120	120	COMAR 26.08.02.03-2
Total P	0.10	1972 305(a) Report to Congress (EPA 440/9-74-001)	
BOD5	7	Quality Criteria for Water, EPA 1986	
Nitrate	10	Quality Criteria for Water, EPA 1986	
TSS	500	1972 305(a) Report to Congress (EPA 440/9-74-001)	
TKN	None	---	
TPH	None	---	
E. Coli(1) (MPN/100ml)	235	COMAR 26.08.02.03-3	
Hardness	None	---	

(1): Used most restrictive standard as a conservative approach: frequent full body contact recreation criterion.

The results of the laboratory analysis (both individual samples and EMCs) for the 2012-2013 reporting year were compared to the values reported in Table 5 as well as the Nationwide Urban Runoff Project (NURP) values reported in Table 3 and 4. Findings are summarized below:

Inlet Site (002)

- All individual samples and average EMC's for Lead, NOx, and TSS were below reported criteria values.
- Copper and Zinc average annual EMC values were both below reported criteria values; however, acute criteria were exceeded for a few of the 4/19/13 individual storm samples.
- The average annual EMC and a majority of individual samples for Total Phosphorus and BOD were above reported criteria values. The average annual EMC and all individual samples for E-coli were above reported criteria values.
- All the average EMCs for the sampling period were below literature values from the Nationwide Urban Runoff Project (NURP) taken in the early 1980s except for BOD.

Instream Site (001)

- All individual samples and average EMC's for Lead, Copper, Zinc, Total Phosphorus, NOx, and TSS were below reported criteria values.

- The average annual EMC and a majority of individual samples for BOD were below reported criteria values. The average annual EMC and half of the individual samples for E-coli were above reported criteria values.
- All the average EMCs for the sampling period were below literature values from the Nationwide Urban Runoff Project (NURP) taken in the early 1980s.

#### Comparison Between Sites 002 and 001

The upstream monitoring site (002) is located upstream of the wetland. Since there have not been significant changes to the watershed over the course of the monitoring program, the event mean concentrations would be expected to be comparable with data obtained prior to the wetland construction.

In fact, the EMCs are variable, but these continue to be fairly consistent for this sampling station. No significant increasing or decreasing trends are apparent.

The stormwater wetland was constructed with the intent of reducing the discharge of pollutants to receiving waters. Therefore, it is expected that the event mean concentrations present at the downstream monitoring site (001) would be reduced from previous years. Additionally, a reduction from the event mean concentrations present at the upstream station (002) would be expected for each event.

During the reporting year, EMCs at the instream station were significantly lower than those found at the outfall station, with the exception of oil and grease. This continues the trend observed in 2009 thru 2011, and indicates that the wetland is functioning to improve water quality.

Table 6 below identifies the pollutant removal efficiencies observed for each reporting year, based on the yearly average EMCs. Efficiencies published by MDE in the recent draft *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated: Guidance for National Pollutant Discharge Elimination System Stormwater Permits, June 2011* are provided for NO<sub>x</sub>, TP, and TSS. Monitoring results for all reporting years since the wetland was constructed have suggested removal efficiencies for the wetland that exceed published values for TP except 2013. Removal efficiencies for NO<sub>x</sub> exceeded published values for all years except 2011. Removal efficiencies for TSS exceeded published values in 2010 and 2011.

Table 6: Observed Pollutant Removal Efficiencies: 2012-2013 Reporting Year

Year	TKN	NOx	TP	TSS	BOD	Pb	Cd	Cu	Zn	TPH	Phenols	O&G	Fecal Col.	E-coli	Hardness
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
2008	78.8	87.5	62.5	36.4	77.8	95.8	50.0	81.8	93.7	38.5	50.0	53.5	89.8	N/A	N/A
2009	16.7	78.6	46.7	47.1	-275.0	81.0	0.0	20.0	83.0	0.0	33.3	26.8	84.1	N/A	N/A
2010	69.4	38.0	77.8	80.9	80.0	0.0	0.0	66.7	73.7	-15.4	25.0	4.8	75.8	N/A	N/A
2011	72.7	7.1	83.3	84.7	0.0	85.7	0.0	83.3	56.9	0.0	0.0	0.0	81.9	N/A	N/A
2013	36.5	24.3	17.7	23.0	28.3	0.0	N/A	0.0	38.0	0.0	N/A	N/A	N/A	35.4	-42.4
MDE		20.0	45.0	60.0											

*Biological and Physical Stream Assessments*

Beginning in the Fall of 2005, a study site has been monitored for biological and physical condition on a tributary to Mattawoman Creek. This section summarizes data collected by KCI in the Spring of 2013. The study site is located in northern Charles County between Berry Road and Acton Lane just off Timberbrook Lane. This site was previously identified as part of Charles County’s Watershed Restoration Plan and was termed Acton-Hamilton based on the two major roads in the area. The Acton-Hamilton site was ranked as the fifth highest priority for restoration and was therefore one of seven study areas selected for further investigation. The Acton-Hamilton long-term site was monitored to establish baseline values in the Fall of 2005 (geomorphic assessment) and the Spring of 2006 (bioassessment). Table 7 lists the field assessment dates including the baseline assessments.

*Table 7: Field Assessment Dates*

Year	Geomorphic Assessment	Biological Assessment
2005-2006	December 14, 2005	April 17, 2006
2006-2007	January 11, 2007	May 4, 2007
2007-2008	December 12, 2007	April 17, 2008
2008-2009	December 15, 2008	April 29, 2009
2009-2010	December 1, 2009	March 08, 2010
2011	April 26, 2011	April 26, 2011
2012	-	April 27, 2012
2013	March 8, 2013	March 8, 2013

The geomorphic assessment includes cross-sections, longitudinal profiles, and particle size analysis. Spring bioassessment monitoring involves the collection of water quality data, sampling, and analysis of the benthic macroinvertebrate community, assessment of physical and habitat features and photo-documentation of site conditions at monitoring stations on the study reach.

*Geomorphic Assessment*

The channel substrate along the assessment reach is dominated by medium and coarse gravels. There are two cross-sections located within the 358-foot profile. Cross-section 1 shows that both aggradation and erosion have occurred between the baseline and the 2013 (year 8) monitoring. Cross-section 2 shows that erosion and about a half foot of downcutting has occurred in 2013.

Tables 8 and 9 below summarize the cross-section, profile, and pebble count data for baseline and subsequent monitoring efforts. Changes in bankfull areas for the two cross-sections are primarily due to erosion and aggradation associated with typical stream processes. Full results, including graphical depictions of the profile and cross-sections and pebble count data, are included in Appendix C. In general, the substrate is highly mobile with extensive point bar formations, areas of channel aggradation and some finer sedimentation in the pools. The channel geometry remains consistent with previous years and appears to experience overbank flow in the floodprone zone regularly.

*Table 8: Bankfull Channel Dimensions – Cross Section 1*

Parameter	2005	2006	2007	2008	2009	2011	2013
	0+48.5	0+49.7	0+49.0	0+50	0+51	0+46	0+46
Top of Bank Cross section Area (ft <sup>2</sup> )	49.2	53.1	54.0	55.1	53.9	54.5	52.3
Bankfull Cross section Area (ft <sup>2</sup> )	24.1	23.5	24.3	23.8	26.2	28.1	28.4
Top of Bank Width (ft)	32.3	34.7	34.8	34.9	32.4	33.5	30.5
Bankfull Width (ft)	20.9	22.3	21.6	19.7	20.8	20.1	22.1
Mean Depth (ft)	1.2	1.1	1.1	1.2	1.3	1.4	1.3
Width-depth Ratio	18.2	21.1	19.2	16.3	16.5	14.3	17.1
Velocity (ft/s) at Bankfull	3.8	3.5	3.0	3.2	3.3	3.8	3.8
Discharge Rate (cfs) at Bankfull	92.5	82.9	73.0	76.1	85.9	107.2	106.9
Entrenchment Ratio	2.4	1.8	2.3	2.5	2.6	2.5	2.3
D50 Particle Size (mm)	14	16	18	19	23	20	17
D84 Particle Size (mm)	28	33	29	30	39	44	25
Threshold Grain Size at Bankfull (mm)	15	15	10	12	14	18	17
Channel Slope (%)	0.49	0.49	0.31	0.34	0.4	0.47	0.48

*Table 9: Bankfull Channel Dimensions – Cross Section 2*

<b>Parameter</b>	<b>2005 3+14</b>	<b>2006 3+12</b>	<b>2007 3+14</b>	<b>2008 3+21</b>	<b>2009 3+15</b>	<b>2011 3+09</b>	<b>2013 3+09</b>
Top of Bank Cross section Area (ft <sup>2</sup> )	28.6	27.1	27.6	29.6	29.8	32.5	32.6
Bankfull Cross section Area (ft <sup>2</sup> )	18.5	17.0	18.1	18.2	18.1	18.9	23.1
Top of Bank Width (ft)	19.5	19.6	19.5	19.7	19.9	21.8	19.4
Bankfull Width (ft)	15.0	14.7	14.8	14.3	15	14.9	14.3
Mean Depth (ft)	1.2	1.2	1.2	1.3	1.2	1.3	1.6
Width-depth Ratio	12.2	12.6	12.0	11.3	12.5	11.8	8.9
Velocity (ft/s) at Bankfull	4.0	3.6	3.1	3.3	3.1	3.3	4.2
Discharge Rate (cfs) at Bankfull	73.3	61.4	57.1	59.2	55.2	61.8	97.0
Entrenchment Ratio	2.7	2.4	3.0	3.1	2.2	2.3	2.5
D50 Particle Size (mm)	14	16	18	19	23	20	17
D84 Particle Size (mm)	28	33	29	30	39	44	25
Threshold Grain Size at Bankfull (mm)	17	16	11	11	13	17	20
Channel Slope (%)	0.49	0.49	0.31	0.50	0.4	0.47	0.47

*Instream Water Quality and Bioassessment*

Instream water quality was measured during the bioassessment conducted in the Spring of 2013. Water quality measurements are within the acceptable ranges for *COMAR* regulations. Table 10 summarizes the water quality and habitat assessment data. The physical habitat assessment rated the habitat for both fish and benthic macroinvertebrates at the midrange of sub-optimal. The banks were rated as moderately stable with a good riparian zone width and vegetative protection. The excessive algae noted in the previous four years was not at all present during the 2011, 2012, or 2013 assessments.

From the baseline assessment to 2013, conditions have generally degraded in the study reach. The PHI rating of “partially degraded” has stayed consistent between years, but the BIBI continued to decrease in 2013. Extensive bar formations have been observed during every monitoring event. The benthic score decreased in 2013 to 1.9, with a rating of “Very Poor” for the first time. Water quality has remained consistent with previous years and fall within the acceptable *COMAR* water quality range. The biological community received a narrative PHI habitat rating of “Partially Degraded” and IBI rating of “Very Poor” for the Spring 2013 assessment.

These ratings are typical with high flashy flows often found in suburban streams, such as this located in central Waldorf. The tributary receives flow from several residential neighborhoods as well as commercial developments, parking areas, and Maryland State Highway Route 301. A large portion of the drainage area does not have stormwater management facilities.

As mentioned in the introduction for biological and physical assessments section, this site is proposed for restoration. The restoration plans are currently under review for permitting approval. Once the project is completed, continued monitoring will be implemented to evaluate the impacts of the restoration.

Table 10: Acton-Hamilton Instream Water Quality and Habitat Assessment Data

Year/Time	Instream Water Quality						Habitat and Biological Assessment	
	pH	DO (mg/L)	Temp (°C)	Conductivity µS/cm	TDS (mg/L)	Turbidity (NTUs)	PHI	BIBI
Spring 2006 11:00AM	7.04	9.09	13.19	214.2	137.0	14.9	74 (partially degraded)	3.6 (Fair)
Spring 2007 8:30AM	7.13	3.62	13.20	214.0	139.0	4.3	74 (partially degraded)	2.7 (Poor)
Spring 2008 7:00PM	6.85	11.17	15.79	186.0	121.3	2.6	71 (partially degraded)	3.0 (Fair)
Spring 2009 11:00AM	6.73	6.97	16.33	236.9	n/a	3.49	78 (partially degraded)	2.7 (Poor)
Spring 2010 8:30AM	7.76	13.52	4.50	395.7	n/a	4.16	72 (partially degraded)	2.7 (Poor)
Spring 2011 8:30AM	6.19	8.82	18.27	174.3	n/a	8.62	73 (partially degraded)	2.4 (Poor)
Spring 2012 8:30AM	6.23	8.75	12.17	171.5	n/a	6.62	74 (partially degraded)	2.1 (Poor)
Spring 2013 8:00AM	6.57	13.13	4.17	185.3	n/a	12.70	77 (partially degraded)	1.9 (Very Poor)
COMAR Limits	6.5 - 8.5	> 5.0	< 32.0	n/a	n/a	< 150	n/a	n/a

2. *Charles County shall evaluate the effectiveness of a stormwater management system constructed in accordance with the 2000 Maryland Stormwater Design Manual for stream channel protection effectiveness. The assessment shall include:*
  - a. *By 7/31/2003, a small watershed shall be selected to adequately assess the best management practice (BMP) design criteria found in the 2000 Maryland Stormwater Design Manual. The watershed selected shall be either an area where future development is to occur, where existing BMPs control a majority of the drainage area and can be retrofitted to reflect the design manual design criteria, or a combination of both. The selection of the small watershed to be monitored shall be made in consultation with MDE.*
  - b. *Within six months of MDE's approval of the selected watershed to be monitored, Charles County shall survey the stream for the purposes of evaluating channel stability in conjunction with ensuing development or significant retrofitting. Permanently monumented cross-sections shall be established at areas where stream geometry changes and at critical areas in the flow path (e.g., restrictions, etc.). A baseline stream profile shall also be established to assess aggradation and degradation.*
  - c. *In each annual report, Charles County shall provide MDE with a comparison survey for each established cross-section and a comparison survey of the stream profile*
  - d. *A hydrologic and/or hydraulic model shall be used (e.g., TR-20, HEC-RAS, HSPF, SWMM, etc.) to analyze the effects of rainfall; discharge rates; stage; and, if necessary, continuous flow on channel geometry.*

### 2013 Status

#### *Maryland Stormwater Manual Effectiveness Study*

Since 2003, the County has been conducting stream monitoring on the tributary to Piney Branch to evaluate the effectiveness of stormwater management designed under the *2000 Maryland Stormwater Design Manual* regulations to adequately provide channel protection. This section summarizes the results of this monitoring. The full report can be found in Appendix D.

The tributary to Piney Branch study area lies between Berry Road and Middletown Road and is part of watershed 021401110785. The drainage area was historically in agricultural and forest use. The study area is located within the County's Development District and has been developing over the course of the project with the addition of North Point High School, William A Diggs Elementary School, and the residential developments of Windsor Mill and Avalon.

In the fall of 2003, at the time of the first site visits and survey, the North Point site construction was well underway with full clearing and installation of temporary storm water management (SWM) facilities. By spring of 2004 clearing and grading were complete at the Windsor Mill site and all four temporary SWM facilities were in place, three of which were in the study area. In fall of 2004, the Windsor Mill site had roadways in place and the ponds had risers installed. At the Avalon site temporary SWM ponds were in place and functioning properly. By the spring of 2005, little had changed at the Windsor Mill site and homes were beginning to be built at the Avalon site. Construction of North Point High School was complete in 2005. By 2006, the William A Diggs Elementary School was also complete. Site visits in late 2006 and early 2007 did not show major changes in the study area from the previous year. In 2008 and 2009 houses continue to be added to the western portion of the Avalon development. By 2013, even more additional homes were added to Phase II of the Avalon community and many homes have been constructed south of Avalon Phase I. Just outside of the study area, construction has continued at the Avalon West community with many new homes built since 2009.

The most recent assessment was conducted on March 18, and 19, 2013. The assessment includes survey of a longitudinal profile of the stream thalweg. The profile is conducted to locate and quantify the length and sequence of various instream features such as riffles, pools and glides. The profile surveyed in the fall of 2003 represents the baseline conditions. The 2003 survey was conducted before stormwater runoff from upstream sites was generated and is considered pre-construction. The survey is repeated yearly in the fall/winter and is compared to previous assessments for changes in stream morphology such as thalweg degradation or aggradation. Visual inspection and site photographs are also compared for changes in stability, planform, dominant substrate particle size and signs of excessive sedimentation.

There are two separate sections of longitudinal profile surveyed which include cross-sections surveyed at locations along each profile. These are compared to 2003 baseline conditions. There was also a permanent stream gauge which was installed in May of 2004, but was found vandalized in 2013 and no gauge data had been recorded since March 2010.

### **Profile 1 – station 0 to 2635**

Profile 1, between station 0 and the confluence with Profile 2 is in a confined stream valley with relatively steep valley walls. The valley has a well-developed floodplain that varies from approximately 100 to 150 feet wide while the channel meanders within the valley. Two active beaver dams and their associated ponds were located between station 0 and 2635. This portion of Profile 1 now receives stormwater runoff from both Windsor Mill and Avalon. Based on current site designs the majority of Avalon runoff flow into the segment with Profile 2 and then into Profile 1 at the confluence.

#### *Cross-section 1*

Cross-section 1 is located at station 508 with the channel adjacent to the valley wall. In 2008 and 2009 the cross-sectional area decreased due to aggradation across most of the channel bed.

However in 2009 the thalweg appears to be shifting slightly away from the right side of the channel. In 2013 the survey showed more aggradation, particularly on the left side of the channel. The increase in aggradation may be due to the increased beaver activity in the vicinity of cross-section 1.

*Cross-section 2*

Cross-section 2 is located on a generally stable reach with very good floodplain connectivity. In the fall of 2009 the cross-sectional area increased, continuing the recent trend. Overall the cross-sectional area had increased by 40%. In 2013 the area decreased and slight aggradation occurred on the right side of the channel.

*Cross-section gauge*

The section is located at station 1615 on Profile 1, just upstream of cross-section 2. In February 2009 the cross-sectional area increased from that measured in 2007 due to degradation in the channel. The banks had undercutting that was not observed in previous years. During the survey in 2010, the area increased again due to erosion occurring along the left bank and channel. In 2013, the channel experienced slight accumulation of channel material and the cross section area was more similar to 2006-2009 surveys. A series of rating curves was developed for the stream gauge section to determine the discharge per a given height as measured by the stream gauge. In 2010, the discharge at the gauge for the time period between February 2009 and March 2010 was calculated. No gauge data was collected after March 2010.

**Profile 1 – station 2635 to 4498**

Profile 1 between the confluence with Profile 2 and approximate station 3700 is characterized by steep side slopes to the southwest but little relief on the northeast terrace. The reach from station 3700 to the upstream end at station 4498 is not in a confined valley and the topography levels out even further upstream of the profile where a forested wetland currently exists. This reach includes a Maryland State Highway Administration (MSHA) right-of-way (ROW) and areas already cleared for sewer line and general access. The 2013 survey data show the slope has remained consistent with the slope of the 2009 survey. In 2013 only one active beaver dam was observed, but many relic dams remain. This portion of Profile 1 receives flow from Windsor Mill and flow from the eastern half of Avalon.

*Cross-section 4*

Cross-section 4 is located at station 3865, within the MSHA property, but downstream of the utility ROW. This reach is stable and surrounded by dense riparian vegetation dominated by shrubs in all surveys. In 2013 the cross-sectional area was slightly lower than previous years, possibly due to the debris jam located downstream of the cross-section, contributing to aggradation of the stream channel. Cross-section 4 receives flow from two of the three Windsor Mill ponds.

*Cross-section 5*

Cross-section 5 is located at station 4420 upstream of the ROW crossing. The water depth and the cross-sectional area in 2013 have remained consistent with previous years. Cross-section 5 receives flow from the one most upstream pond.

**Profile 2 – station 0 to 430**

The channel on Profile 2 is in a valley with 100-foot wide floodplain. The area upstream of Profile 2 is a very densely vegetated forested wetland. No beaver dams were located on this reach, however debris blockages were observed throughout the reach in 2013. Profile 2 receives the majority of flow from the Avalon development although it did not appear that any had been received prior to the 2005 survey. The reach also receives flow from the elementary school.

*Cross-section 3*

Cross-section 3 is located at station 235 on Profile 2, approximately halfway up the measured reach. This section had a large tree uproot on the right bank, causing cross section area to increase substantially and the wetted width to increase from 3.8 feet to 10.7 feet and the water depth to decrease from 1.4 feet to 0.84 feet.

**Subwatershed Analysis**

Subwatersheds were delineated within the study area watershed to analyze the changes in impervious areas and land use condition that have occurred during the study period that are potentially affecting the receiving channels and the main stream channel. Impervious area in all of the subwatersheds has increased since 2004 due to the development that has occurred throughout the headwaters of the watershed. The largest increases were observed in subshed 1 and 2. Subshed 1 had 0.7% impervious in 2004 and 11.4% in 2013. Subshed 2 had no impervious surface in 2004 and is now 19.4% impervious. Overall, the entire watershed drainage area, which is represented by subshed 4, saw a marked increase in imperviousness since 2004 jumping from 1.1% to 10.7%. Land use within the study area subwatersheds currently consists of forest, residential, and institutional. Land use has not changed since the 2009 analysis.

**NORTH POINT HIGH SCHOOL POND OUTFALL**

In 2011, KCI was directed to conduct a survey of an eroded outfall channel draining a stormwater management pond at the North Point High School within the Tributary to Piney Branch watershed. Monuments were established and the initial survey was completed April 26, 2011 and surveyed for a second time on March 18, 2013.

**Profile – North Point High School Pond Outfall**

The geomorphic survey begins at the pond outfall and extends 406 linear feet downstream. Riprap covers the channel and banks until station 0+34 and the trapezoidal engineered channel

extends to station 2+83 where it transitions to a natural channel. The pond profile is very stable and has a gradual slope until station 2+81 where the channel enters the existing forest and a series of minor headcuts have formed and extend for about 100 feet. The slope from station 0+00 to about 2+81 has remained relatively unchanged from 2011 to 2013 (0.79% and 0.75%, respectively). Beginning at the first headcut at 2+81, channel erosion gradually increases in severity and the channel becomes less stable. From station 2+81 to the end of the survey at station 4+06, the slope was 7.8% in 2011 and 7.5% in 2013. In 2011, a 2.5 foot headcut had formed at station 3+68. Just two years later, the headcut had migrated 51 feet upstream. Downstream from this headcut the stream becomes more stable and less incised, and meets the main channel approximately 75 feet downstream from the end of the survey at station 4+06.

*Cross Section 1 – North Point High School Pond Outfall*

Cross section 1 characterizes the reach from the outfall to approximately station 0+40. This section has steep (45% side slopes), 12-foot high banks with rip rap on the banks and channel bottom. Willows (*Salix* sp.) are dense in the channel. This segment of the channel is very stable.

*Cross Section 2 – North Point High School Pond Outfall*

Cross section 2 characterizes the reach from station 0+40 to approximately 2+00. This section has dense willows in the channel as well, but the banks are slightly less steep (35% side slopes) with shallower 9-foot banks. This segment of the channel is also very stable.

*Cross Section 3 – North Point High School Pond Outfall*

Cross section 3 characterizes the reach from station 2+00 to the end of the engineered channel at station 2+83. Willows are much less dense in this section, allowing cattails to be the dominant vegetation. Both banks are much lower (3.5 feet) and had a more gradual slope (22% side slope) than the two upstream cross sections. This cross section is also very stable.

*Cross Section 4 – North Point High School Pond Outfall*

Cross section 4 characterizes the reach from station 2+83 to the end of the survey at 4+06. This section begins at the edge of a canopied forest below the engineered channel and then transitions into a low gradient wetland. This section has a series of one foot or less headcuts. At cross section 4, station 3+73, a 2.5 foot headcut with moderately severe bank erosion is located just downstream. This cross section is much less stable and will be monitored closely in future surveys for further erosion.

## **SUMMARY**

The tributary to Piney Branch channel cross-sections and profiles indicate a relatively stable channel, with minor changes in cross-sectional area from 2003 to 2013. The greatest changes in cross-section were noted at cross-section 3, which experienced a 121% increase in area due to an uprooted tree on the stream bank. Cross section 2 and the gauge cross section also had increases in area (30 and 35 percent, respectively) when compared to 2003 measurements, but showed very little change when compared to 2009 measurements. These sections are located on a

relatively confined channel, the most likely position in the watershed for incision to occur and they receive flow from most all of the upstream development. Cross section 5 has not changed significantly since the initial survey in 2003.

The North Point High School pond outfall channel remains very stable until station 2+83 where a series of headcuts have formed. In 2011, a 2.5 foot headcut had formed at station 3+68. Just two years later, the headcut had migrated 51 feet upstream. Downstream from this headcut the stream becomes more stable and less incised, and meets the main channel approximately 75 feet downstream from the end of the survey at station 4+06. Cross section 1 and 2 remain very stable and no changes were visible. Cross section 3 had minor accumulation of sediment due to vegetation in the channel. Cross section 4 is located below a large headcut and has experienced severe bank erosion and downcutting and will be monitored closely in future surveys. It is recommended that remedial action is taken to stabilize the outfall channel. Due to the sudden slope change at the end of the engineered channel and start of the natural channel, the severe headcut will continue to migrate upstream and further degrade the channel downstream.

3. *Annually, Charles County shall describe in detail its monitoring activities for the previous year and include the following:*
  - a. *A detailed description of weather conditions and any equipment failures;*
  - b. *A detailed description of field data collection methods and documentation of any variations to the minimum requirements for chemical, biological, or physical monitoring;*
  - c. *Chemical, biological, and physical monitoring results recorded on MDE's long-term monitoring databases;*
  - d. *An analysis of monitoring data integrating the field results from the chemical, biological, and physical monitoring;*
  - e. *Annual and seasonal pollutant load estimates using the long-term monitoring data;*
  - f. *A comparison survey for each established cross-section and a comparison survey of the stream profile for the monitoring conducted to assess the stream channel protection effectiveness of a stormwater management system constructed in accordance with the 2000 Maryland Stormwater Design Manual; and*
  - g. *Any requests and accompanying justifications for proposed modifications to the monitoring program.*

2013 Status

Monitoring was significantly delayed this year. This was due to anticipation that a new NPDES stormwater permit would be issued near the beginning of the permit term, and a contract for full permit services, including monitoring tasks, could be issued early in the permit term. As the permit term progressed and it was determined a new permit would not be issued during the year, a contract for interim monitoring services was instated for a short period.

To avoid this situation in the future, separate contracts for categories of services are now being issued, instead of a single contract for full permit services. For the 2013 reporting year, an interim, short term contract was put in place with KCI Technologies, Inc. until a long term contract was bid under RFP 13-08 to complete the monitoring tasks for a five year period.

At the end of the 2013 reporting year, KCI Technologies, Inc. was selected to comprehensively manage the monitoring and outfall inspection requirements for a five year period, with an anticipated adjustment to tasks when the County's third generation permit terms are finalized.

Pollutant loading information is provided in Section III.H.

### **III.E. Management Programs**

#### Overview of Permit Conditions

1. *Charles County shall maintain an acceptable stormwater management program in accordance with the Environmental Article, Title 4, Subtitle 2, Annotated Code of Maryland. At a minimum, Charles County shall:*
  - a. *Conduct preventative maintenance inspections of all stormwater management facilities at least on a triennial basis. Documentation identifying the facilities inspected, the number of maintenance inspections, follow-up inspections, and enforcement actions(s) used to facilitate inspection order compliance, maintenance inspection schedules, and any other relevant information shall be submitted in the County's annual reports;*
  - b. *Implement the stormwater management design policies, principles, methods, and practices found in the 2000 Maryland Stormwater Design Manual and COMAR;*
  - c. *Track the progress toward satisfying Part III.E.1.b. above; and*
  - d. *Report annually the modifications needed to address problems associated with implementing the 2000 Maryland Stormwater Design Manual in Charles County.*

#### 2013 Status

##### *Stormwater Management Maintenance Inspections*

The County continues to conduct preventative maintenance inspections of all stormwater management (SWM) devices on a triennial basis. During Calendar Year 2012 the inspections were comprised of 185 first and third year inspections, 117 compliance inspections, and 41 enforcement inspections. Projects with unacceptable devices as of December 31, 2012, are listed in Appendix E. This total includes facilities outstanding from previous years' inspections. Detailed inspection reports of each inspection are maintained within the project file folder. Two certified letters were sent to initiate compliance. No major structural problems were found.

During Calendar Year 2012, 69 devices identified as unacceptable in 2012 and previous years were brought into compliance. A copy of the County's database showing inspections during Calendar Year 2012 is included in Appendix F. The entire digital inspection database is included in the Urban Best Management Practice Access database.

Since 1990 the SWM Maintenance Inspections Inventory designates "S" for satisfactorily maintained SWM devices and "U" for unsatisfactorily maintained devices. We believe that the vast majority of the issues pertaining to a "U" rating of a SWM device do not affect the function of the SWM device. Beginning in Calendar Year 2012 a "P" has been entered to indicate that the device is "performing", as a more descriptive designation so that one can easily determine if the function of the device is compromised by simply reviewing the database.

SWM devices that receive a "U" or "unsatisfactory" designation during a triennial maintenance inspection, primarily fall into this category due to the lack of maintenance of the devices. The types of maintenance that is required usually includes, but not limited to the following: mowing, fence repair, removal of woody vegetation, in-flow & out-flow protection repair and minor erosion/stabilization. While these types of maintenance issues still require the structure(s) to be classified as "unsatisfactory" it is the opinion of the Department of Planning and Growth Management (Department) that the pond performance is not substantially degraded in most cases.

A major obstacle of the Department to consistently bring "unsatisfactory" devices into compliance in a timely manner is related to the required delegation of maintenance of swm devices to Homeowners' Associations (HOAs) and private businesses that have little to no experience with the long term maintenance of these facilities. The Department has observed a continued lack of understanding of the responsible parties on how and why they should maintain these facilities. The Department has been conducting annual seminars for the public, specifically on how to properly maintain these facilities and will meet in the field when requested to assist the public to bring the facilities into compliance. However, a major hurdle the responsible parties continue to encounter is they have failed to fiscally plan for the costs of maintenance. The lack of funds requires an extended period of time for a HOA or business to bring a facility into "satisfactory" condition, where the Department works more as a facilitator to assist the HOA or business in lieu of an enforcement authority. The Department is examining additional enforcement measures, including legal action, to improve maintenance of stormwater management devices.

Beginning July 1, 2013, the County moved the source of the stormwater program funding from the Environmental Service Fund to the Watershed Protection and Restoration Fund, and implemented a Stormwater Remediation Fee as required under recent State of Maryland legislation passed by the General Assembly. As part of the increased Stormwater Remediation Fee, the County initiated improvements to the enforcement program to encourage better compliance regarding facility maintenance. Additional discussion will be needed to consider fees be imposed on property owners within the unacceptable communities to assist the County in maintaining the SWM sites, with special emphasis on stormwater control structures and secondary emphasis placed on site beautification.

The following table summarizes the information found in the database. Facilities found acceptable and unacceptable are reported based on their status at end of the calendar year.

*Table 11: Summary of Stormwater Management Device Inspections*

	2006	2007	2008	2009	2010	2011	2012
Total projects inspected	97	287	212	131	121	178	150
Total swm devices inspected	259	516	363	268	275	330	274
Total inspections performed	365	761	501	378	427	477	343
Acceptable swm devices	207 (80%)	253 (49%)	214 (59%)	140 (52%)	120 (44%)	176 (53%)	90 (33%)
Unacceptable swm devices	52 (20%)	263 (51%)	149 (41%)	128 (48%)	155 (56%)	154 (47%)	184 (67%)

\*Each project may contain more than one device. The number of inspections is higher than the number of devices, due to repeat inspections of the same device.

*Implementing the 2000 Maryland Stormwater Design Manual and Tracking Implementation Progress of the 2000 Stormwater Design Manual and Modifications Needed to Improve Deficiencies*

The County continues to implement the stormwater management design policies, principles, methods, and practices found in the 2000 Maryland Stormwater Design Manual and COMAR.

In April 2006, MDE found the County’s stormwater program acceptable.

Per the Maryland Stormwater Management Act of 2007, which requires use of environmental site design to the maximum extent practicable, the County adopted new stormwater regulations on July 13, 2010. These regulations went into effect on August 1, 2010. The Notice on the adoption of the Stormwater Management and Storm Drainage Ordinances, including Procedures on Requesting an Administrative Waiver, was included in the 2011 NPDES Annual Report.

In 2012, no projects were issued permits that had a stormwater management waiver, with the exception of those projects that qualified for the SWM Administrative Waiver to utilize the 2000 SWM regulations.

In Fiscal Year 2013, the SWM Waiver Review Fee increased to \$419 + \$84/study point, from the fiscal year 2012 fee of \$406 + \$81/study point over two. Additionally, in Fiscal Year 2013 the Stormwater Fee-in-lieu increased from \$1.31 to \$1.35/square foot disturbed.

The following is a list of the 97 SWM Administrative Waivers requested through Fiscal Year 2012. Not all requests were approved and not all projects have applied for or been issued permits.

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*Table 12: Stormwater Management Waiver Requests*

9B Applewood Center	Harvest Ridge Lots 6 & 7	Richland's Crossing
Abberly Square Apartments	Henry Ford Circle Lot 2	Ridge Grove Estates
Adams Crossing	High Pointe	Rose Hill Plantation
Albion	Highgrove Sections 7 & 8	Saddle Ridge
Aspenleigh	Holly Hall	Sailor's Retreat Entrance Plan
Autumn Hills	Hollybrook Farm	Scotland Heights
Autumn Woods	Homefield (Fieldside)	Shad Crossing (Formerly Earnshaw)
BB&T White Plains Corporate Plaza Unit "H"	Hope Park	Shops @ Waldorf Center
Beaver Creek	Hunter Springs	Southwinds Phases 2 & 3
Belmont	Hunter's Brooke	St. Charles Pumping Station 3B
Bensville Acres	Intersection of Rosewick & La Plata Parkway	Staples Addition - Festival Way
Boroughs Hall	Keswick	Stoltzfus
Brentwood	Key Point Woods	Stonebridge
Brookwood Estates II	Khan's (Fadul's) Addition to Pinefield	Stonewell
Bryans Green	Kingsview 6B	Summit Ridge Sections 1 & 2
Bryan's Road Market Place	Kleen Wave Autowash	Swan Point, The Villages of
Bryans Village	Knotting Hill	The Heritage @ St. Charles
Chandlerstown	Langley Estates	The Meadows @ Forgotten Farm
Chelsea Manor	Linden Grove Section I	The Willows Suvdivision
Coachman's Path & Woodville Road	Linden Grove section II	Timber Ridge
CPV St. Charles Gough - Parcel D	McCormick	Town Center South
CPV St. Charles Parcel B	Middletown South	Turtle Creek
Davenleigh	Mill Spring Estates	US 301 Park and Ride
Deer Park Estates	Millseat Subdivision	Waldorf Tech Park
Dorchester Landing II	Mimosa Addition to Mt. Carmel Woods	Waldorf West
Eagle Ridge	Myers Estates	Westlake Square
Fair Fountain Farm	North Pointe Phase 3	Westside Estates 2&3
Falcon Ridge Subdivision	Oliver's Crossing	White Plains Corporate Plaza
Fischer's Grant	Pinecrest Subdivision	Windsor Manor
Gleneagles Neighborhood Parcel Q	Piney Church Road South Realignment	Windsor Mill
Gleneagles Neighborhood South	Piney Grove Estates	
Gleneagles North	Pleasant Acres Lots 4-8	
Groves @ Piney Church	Potomac Metal Storage	
Hamilton Heights	Quicktree Farm	

The following Administrative Waivers were granted since last year's report: Benedict Plantation, Kingsbrook Place, Bowie Office Building, Lord's Creek, Matin Property Mosque, and Middle Business Park.

The following table summarizes the stormwater management credits applied to single family lots for Fiscal Year 2013. Rooftop runoff disconnection continues to be the most used credit, as has been demonstrated in previous years.

*Table 13: Summary of Fiscal Year 2013 SWM Credits for Residential Single Family Building Permits*

Number of approved Residential Building Permits:	413
SWM Credits Approved:	
Rooftop Runoff Disconnection	923
Rooftop Runoff Disconnection – Compensating Drywells	115
Non Rooftop Runoff Disconnection	50
Grass Channel	8
Sheet Flow to Buffer	90
Environmental Site Design	0
Standard Plan	0
Stormwater Management Facility	0
Natural Area of Conservation	1
Rain Garden	14
Rain Barrels	8

Since the County’s adoption of the stormwater management regulations requiring environmental site design to the maximum extent practicable, a total of 71 projects have submitted Concept SWM Plans, which is Step 1 of the regulation. Of those 71 projects, 37 have also submitted Site SWM Plans, which is Step 2 of the regulation.

Since the last report, 17 additional projects have submitted Concept SWM Plans and there have been 29 Site SWM Plans submitted for review. The total number of Concept SWM Plans through Fiscal Year 2013 is 100 and the total number of Site SWM Plans is 66.

The results of the chemical test performed were compared with the accepted statewide averages described in *Dry Weather Flow and Illicit Discharges in Maryland Storm Drain Systems* (MDE, 1997). Using the statewide averages, the 1997 study provides a threshold for each constituent, based on watershed land use. The results from the chemical tests performed during the 2013-reporting year were compared with this threshold to determine which results are considered abnormal for each constituent, and to make recommendations as to which storm drain systems should be investigated further as having possible illicit connections. The thresholds listed were 0.4 ppm for chlorine, and 0.5 ppm for detergents. No state-approved threshold limits exist for nitrate and ammonia. Based on EPA and USGS documentation, values of 2.0 ppm for both constituents appear reasonable. This is consistent with the high outlying values found in previous screening efforts. Review of past data shows that typical pH values in Charles County fall outside the standard threshold range of 6.5 to 8.5. Therefore, for the 2010 reporting year, the following thresholds were used to determine if an upstream investigation was necessary:

- 5.5-8.5 pH
- 0.5 ppm Detergents
- 0.4 ppm Chlorine
- 0.17 ppm Phenols
- 0.21 ppm Copper
- 2.0 ppm Nitrate
- 2.0 ppm Ammonia

When a confirmed high concentration of a contaminant was found, field crews followed the stormdrain system upstream attempting to locate the source of the contamination. Additional tests at upstream structures were conducted as needed, especially where two systems converged.

All data collected during the illicit discharge screening was recorded in a database conforming to the MDE formatting requirements.

The results show that, of the 100 sites, 55 had observed flow. Of these, 12 had observed flow that was too small for a sample to be collected. Of the remaining 43 sites where flow was able to be collected, 13 had chlorine present. None of the chlorine concentrations were above the threshold limit during the first inspection. Seven sites had detergents present, in which Outfall #41 was found to contain very high concentrations for the 1<sup>st</sup> and 2<sup>nd</sup> tests. The source of the detergents at this outfall was determined to be Kia Waldorf washing cars in their building and parking lot to the storm drain system.

Varying concentrations of ammonia were found at most of the sites where flow was able to be collected; however, none were above the threshold limit during the first inspection. Varying concentrations of nitrate were found at most of the sites where flow was able to be collected with Outfall #18, #96, #133, and #150 all exceeding the threshold concentration for the first and second tests. A specific source of nitrate was not located for any of these outfalls; however, groundwater laden with nitrate appears to be a contributing source.

Outfall #26 was submerged during the first inspection; however, detergent-laden wash water was observed flowing into nearby storm drain inlets in the Speedy Clean Car Wash parking lot off of Smallwood Drive. These inlet are directly connected to the storm drain system that outfalls at this site. Even though a sample was not able to be collected due to submerged outfall conditions, this outfall is discharging elevated levels of detergent

Outfall #74 was found to contain a turbid/cloudy and basic discharge during the first and second inspection. This outfall drains a pond within Chaney Enterprises Waldorf plant that receives runoff from concrete production activities.

Outfall #2 was found to have a turbid discharge at the time of inspection. A windshield survey of the contributing drainage area revealed a stormwater management pond along Smallwood Drive was very turbid and causing the turbid outfall condition. Other than surficial erosion in and around this facility, no other source of turbidity was located during this investigation.

Car washing operations which drain to an adjacent SWM pond located in the Ken Dixon Chevrolet/Cadillac maintenance garage parking lot off of MD 925 constituted an upland pollutant source.

Outfall #14, #31, #33, #78, #106, #178, and #206 were all corrugated metal pipes contained significant metal corrosion with major perforations or missing inverts. Moderate to severe erosion was occurring at Outfall #14, #18, #106, and #112. Outfall #106 was reported with severe erosion and CMP corrosion in 2008 and 2011.

Algae were found at 46 outfalls, which indicate excessive nutrients in the water. Except for Outfalls #2 and #74, which had a cloudy discharge, all other sites inspected had acceptable clarity. Outfalls #30, #148, and #215 contained a brown color; however, this color appeared to be from tannin processes and not indicative of turbidity or illicit connections. Except for Outfall #41, which had a sweet detergent odor, all other sites inspected had acceptable odor.

Oil sheen and trash along with sediment and iron flocculent deposits were found at many sites. The priority outfalls are listed below in Table 14. Detailed reports for each priority outfall can be found in Appendix G.

*Table 14: Field Screening Results for Priority Outfalls*

Outfall #	Description of Issue(s)	County Tracking	Status
#2	Turbid discharge from upstream SWM pond due to berm failure	RFA 130480	SWM pond repair complete 9/2013
#14	Metal corrosion and erosion	Roads Division	Repairs July 2013 (Photos below)
#18	High concentration of nitrate, severe channel erosion	Capital Services Division	Erosion and collapsing pipe repaired October 2013 (Photos below)
#26	High levels of detergent	RFA 130643	90 Day Compliance Letter
#31	Metal corrosion	RFA 130648	Investigation on ownership of facility.
#33	Metal corrosion	RFA 130647	90 Day Compliance Letter – 3/10/14

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#41	High concentration of detergent	RFA 130644	Property owner has changed wash procedures to wash bays only - 10/14/13.
#56	Excessive algae and white residue in stormdrain pipe	RFA 130484	Worked with restaurant regarding grease dumping, and replacing leaky dumpster
#74	Turbid and basic discharge	RFA 130479	Discharge information forwarded to MDE Enforcement Division – 6/19/13.
#78	Metal corrosion	RFA 130646	Investigation on ownership of facility.
#96	High concentration of nitrate	No Action	Target for education & outreach
#106	Outfall erosion and metal corrosion	Capital Services	VCI 080068
#112	Undermining of end section	RFA 130483	60 Day Compliance Letter – 2/10/14
#133	High concentration of nitrate	No Action	Target for education & outreach
#150	High concentration of nitrate	No Action	Target for education & outreach
#178	Metal corrosion and erosion	Roads Division	Scheduled for repairs
#206	Metal corrosion	Capital Services	VCI 130058
Upland	Overland car wash flow into BMP	RFA #130645	Property owner modified car wash to ensure all drains enter the sanitary sewer system. Permit issued on 10/28/13.

Repairs to several of the outfalls identified as having erosion in the previous inspections have been repaired as listed in Tables 15 and 16. Table 17 lists a stormwater pond repair and stream restoration proposed by the County. See Appendix N for the Drainage Systems Improvement Program budget.

*Table 15: Private Outfall, Culvert, and Inlet Repair Projects*

Outfall	Location	Description	Year Identified	Date Completed	Acres Treated
23	Mall Circle	Outfall Repair	2008	2010	TBD

*Table 16: County Outfall, Culvert, and Inlet Repair Projects*

Outfall	Location	Description	Cost	Date Completed	Acres Treated
179	Beechwood Drive	Outfall Repair	15,000	1-Jul-07	TBD
157	Briarwood	Outfall Repair	4,000	9-Jun-09	TBD
96	St. Charles	Outfall Repair	2,600	16-Jun-09	TBD
54	Kipling Drive	Trash Removal	2,000	9-Jun-09	TBD
139	Shiloh Church Road	Outfall Repair	1,520	1-Jul-10	TBD
14	Theodore Green Blvd.	Erosion Stabilized	1,800	1-Jul-10	TBD
212	Duckhorn Court	Inlet Repair	475	3-Jun-10	TBD
121	Holly Ave./Dogwood Dr.	Pipe & Outfall Repair	TBD	30-Jun-12	TBD
6	Hampshire Circle	Outfall Repair	4,000	30-Jun-12	TBD
18	Temi Drive	Outfall Repair	4,000	30-Jun-12	TBD
Not Devt Dist	Duval Drive	Outfall Repair	4,000	30-Jun-12	TBD
14	Theodore Green Blvd.	Bank Erosion Stabilized and Culvert Repaired	10,485	11-Sep-13	TBD
18	Temi Drive(VCI 130013)	Outfall Repair	43,000	11-Oct-13	TBD



*Outfall #14 Culvert before Repair, 2013*



*Outfall #14 Culvert after Repair with Shotcrete, 2013*



*Outfall #18 Culvert before Repair, 2013*



*Outfall #18 New End Section and Weir Wall, with Approx. 148 Linear Feet of Existing Metal Culvert Lined with Concrete and Joints Repaired, 2013*

*Table 17: Stream Restoration and Stormwater Management Pond Repairs*

<b>Outfall</b>	<b>Location</b>	<b>Description</b>	<b>Cost</b>	<b>Date Completed</b>	<b>Acres Treated</b>
106	Tanglewood Drive Pond VCI 080068 (a.k.a. Tawny Road)	Outfall Repair & 400 lf Stream Restoration	TBD	TBD	4
207	Holly Tree Lane VCI 130058 (Previously VCI 080067)	1,200 lf Stream Restoration (Regenerative Step Pool Conveyance)	TBD	TBD	48

*County Owned Facilities Requiring a NPDES Discharge Permit*

To date, the following County owned facilities requiring a NPDES discharge permit and the status of their pollution prevention plans have been identified in the following table.

*Table 18: County Facilities with NPDES Industrial Stormwater Permits*

<b>County Owned Facilities</b>	<b>NPDES Discharge Permit #</b>	<b>Pollution Prevention Plan</b>
Charles County Municipal Landfill (Landfill #2)	02SW0182 (Last Issued: March 11, 2003)	Yes
Charles County Department of Public Works Maintenance Yard	02SW2160 (Last Issued: Dec 23, 2009)	Yes
Charles County - Mattawoman WWTP	10SW1214 (Last Issued: Feb 13, 2003)	Yes

3. *Charles County shall maintain the implementation of its existing program to respond to illegal dumping and spills including procedures for public reporting and citizen complaints.*

2013 Status

On July 1, 2001 the County adopted Water Quality Control Regulations which provides the Department of Planning and Growth Management (PGM) the authority to find and stop illicit discharges into the County’s storm drainage and stream system. Subsequently, PGM adopted an implementation method entitled, “Policy/Procedure: Water Quality Violation Notification, Remediation, Case Documentation and Annual Review for Program Effectiveness and Reporting,” as attached in the appendix of the 2003 Charles County NPDES Annual Report.

On July 13, 2010 the County adopted separate Stormwater Management and Storm Drainage Ordinances, to replace the previously combined Stormwater Management and Drainage Ordinance. At this time Water Quality Regulations were adopted in the *Storm Drainage Ordinance, Section 19.2 Illicit Discharge*.

Under the Policy/Procedure, a Water Quality Control Coordinator is established within PGM to route cases of suspected pollutant discharges to the responsible agency and maintain records of cases for the County’s annual NPDES stormwater permit report.

Cases of suspected pollutant discharges, which are the responsibility of PGM, such as odors or unusual discharges in streams or from the storm drain system are managed by the County’s Stormwater Management Engineer.

Discharges to the Storm Drain System - The County received one citizen report of suspected pollutant discharges in Fiscal Year 2013.

Date Received	Location	Description	Date Completed	Action
17-Jun-13	BJs Waldorf	Dumping Grease in Stormdrain	18-Jun-13	Utilities Division investigated, and determined no dumping occurred

Construction Related Discharges - In 2000 the County initiated a procedure where County construction inspectors note sediment discharges onto county roads from construction sites. The procedure allows the County to issue a stop work order until the sediment discharge problem is remedied.

4. *Charles County shall consider applying to MDE for delegation of erosion and sediment control enforcement authority. Erosion and sediment control activities in Charles County currently are the responsibility of MDE’s Compliance Program. In addition, erosion and sediment control education activities, specifically “responsible personnel” certification classes, are currently conducted by MDE.*

- a. *By 7/15/04, Charles County shall complete a report evaluating the potential for implementing an erosion and sediment control program. This report shall be submitted to MDE and include feasibility of applying to MDE for delegation of erosion and sediment control enforcement authority in accordance with Environment Article, Title 4, Subtitle 1, Annotated Code of Maryland, benefits, and local support.*
- b. *Beginning 7/15/03, report quarterly, information regarding earth disturbances exceeding one acre or more. Data submitted as a result of this permit condition shall include site, name, site owner and address, disturbed area, local grading permit number*

### 2013 Status

- a) The County's NPDES annual report for June 2003 through July 2004 includes the report evaluating the potential for implementing an erosion and sediment control program. Final delegation by MDE occurred in June 2006.

In October and November 2007, MDE performed field reviews of active construction sites to evaluate the program. Significant improvements and the progress made toward addressing violations were noted at that time. Every two years since, MDE has evaluated Charles County's program. MDE's reviews include recommendations for continued improvements related to proper installation of controls and on-site stabilization. Overall, the reviews show continued progress by Charles County and the erosion and sediment control program continues to be acceptable. In February 2012, MDE granted continued sediment and erosion control enforcement authority for the period July 1, 2012 through June 30, 2014.

- b) For the period July 1, 2012 through June 30, 2013 the County issued 137 Development Services permits, of which 11 were revisions and 76 were blanket permits. Additionally, 503 Single Family Dwelling Building permits and 134 Residential Addition permits were issued. Of the permits issued, 36 Development Services permits and 7 Single Family permits propose to disturb greater than one acre. Appendix H includes the Fiscal Year 2013 data for earth disturbances greater than one acre.
- 5) *Charles County shall implement and maintain a public education and outreach program to reduce stormwater pollutants. Public outreach and education efforts are to be integrated with the discharge characterization monitoring, watershed restoration, illicit connection detection, erosion and sediment control, and stormwater management program implementation requirements of this permit. These efforts are to be documented and summarized in the County's annual reports. At a minimum, Charles County shall:*

- a. *Provide information regarding the following water quality issues to the general public:*
  - i. *Water conservation;*
  - ii. *Stormwater management facility maintenance;*
  - iii. *Erosion and sediment control;*
  - iv. *Lawn care and landscape management (e.g., the proper use of herbicides, pesticides, and fertilizers, ice and snow control, cash for clippers, etc.);*
  - v. *Household hazardous waste;*
  - vi. *Litter control, recycling, and composting;*
  - vii. *Car care, mass transit, and alternative transportation;*
  - viii. *Private well and septic system management;*
  - ix. *Pet waste management;*
  - x. *Procedures for public identification and reporting of illicit discharges.*
  
- b. *Provide information when requested regarding the following water quality issues to the regulated community:*
  - i. *NPDES permitting requirements;*
  - ii. *Pollution prevention plan development;*
  - iii. *Proper housekeeping; and*
  - iv. *Spill prevention and response.*

### 2013 Status

- a) The County provides information regarding water quality issues to the general public in various ways, including the website, brochures, news media, and one-on-one. Many of these public outreach programs are spearheaded by Charles County's Recycling & Litter Control Superintendent and the University of Maryland Extension Agent.

#### *Website:*

In July 2012, the County began the tenth year of a water quality monitoring project for the Mattawoman Creek with the U.S. Geological Survey. This project funds an existing monitoring station previously funded by the Maryland Department of the Environment. The purpose of this station is to develop a long term record of water quality data for determining trends in the watershed. The station is part of the Chesapeake Bay Programs' Long Term Status and Trends Network.

The County posts information on the NPDES MS4 permit program under the Department of Planning and Growth Management's webpage. Included are a summary of the program, Annual Reports, and numbers to call for suspected pollutant discharges. This webpage was updated in fiscal year 2012. The link to the new webpage is:

[www.charlescountymd.gov/pgm/planning/npdes-municipal-separate-storm-sewer-system-permit](http://www.charlescountymd.gov/pgm/planning/npdes-municipal-separate-storm-sewer-system-permit)

The Charles County Government website also provides information on the local VanGo which provides public transit service within the County:

[www.charlescountymd.gov/cs/vango/vango](http://www.charlescountymd.gov/cs/vango/vango)

Because Southern Maryland has very high ridership rates on the commuter express bus into Washington, D.C., citizens access the Maryland Mass Transit Authority(MTA) for route schedules via the Tri-County Council for Southern Maryland website for the available Commuter and Regional Ridesharing Programs:

[www.tccsmd.org/index.cfm?Content=72&Menu=27](http://www.tccsmd.org/index.cfm?Content=72&Menu=27)

Or link directly to MTA's website for bus schedules:

<http://mta.maryland.gov/commuter-bus>

Updated information is posted on county website regularly detailing recycling opportunities, oil/antifreeze collection sites, volume based tag-a-bag sticker locations, etc. Residents can also request recycling bin delivery and other type information through this website: [www.charlescountymd.gov/pw/recycling/recycling](http://www.charlescountymd.gov/pw/recycling/recycling)

The County operates a dog park and subsequently provides etiquette rules for using the park including scooping and disposing of pet waste appropriately

[www.charlescountyparks.com/parks/turkey-hill-white-plains-dog-parks](http://www.charlescountyparks.com/parks/turkey-hill-white-plains-dog-parks)

Water conservation and other natural resource conservation topics are on the University of Maryland Cooperative Extension Service website:

<http://extension.umd.edu/topics/environment>

County environmental planning initiatives including the Mattawoman Creek Watershed Management Plan and the Port Tobacco River Watershed Restoration Action Strategy:

[www.charlescountymd.gov/pgm/planning/watershed-planning](http://www.charlescountymd.gov/pgm/planning/watershed-planning)

*Brochures and news media:*

In addition to internet, information is provided by handouts and news media outlets. Educational literature on recycling and composting is periodically mailed to residents, placed in local papers and homeowners's associations' newsletters, and made available in frequently visited locations such as libraries, government building, etc.

The University of Maryland Cooperative Extension Service in Charles County distributes handouts on septic maintenance, lawn care and other topics.

Each year at the County Fair the County distributes information on recycling as well as natural resources and low impact development techniques. As part of the Charles County Commissioners' Environmental Program, several brochures are distributed by the Department of Public Facilities. These include, "Reduce Reuse Recycle Directory" and "It is Easy Being Green." In addition, coloring and activity books titled, "Learn About Water Conservation" and "Keep Our Environment Clean" are provided for children.

*One-on-one:*

University of Maryland Extension in Charles County promotes environmental stewardship by providing information and educational programs on environmental horticulture, water quality, appropriate and safe fertilizer and pesticide use, and other issues directly to the public, often face-to-face with our citizens, and through mass media.

Extension staff members and trained volunteers answer questions from homeowners and farm operators visiting the Extension office in Charles County, answer telephone inquiries from the public, as well as analyze plant and insect samples submitted by county residents and provide fact sheets and other educational materials as needed.

The Agriculture and Natural Resources Extension Agent promotes water conservation, storm water management, and wise use of pesticides and fertilizers through personal appearances on the county cable station. Recent topics have included proper lawn care.

The Extension Agent and Extension staff provide training to commercial landscapers, and farm operators on proper use of fertilizers and pesticides. This training includes managing storm water and farm ponds, pest control, maintaining good turf to prevent erosion, and an array of other natural resource conservation issues. Extension faculty also train volunteers to become part of the Charles County Master Gardeners, a University of Maryland outreach program providing educational information on environmental horticulture to the public.

Master Gardeners encourage maintaining the quality of our landscapes and environment through the Maryland Bay Wise Yardstick certification program, as well as through field visits throughout the County to assist citizens with their gardening problems. The volunteers also create timely educational displays and hold plant clinics at public events, such as the Charles County Fair. They continue to investigate new environmental education opportunities with local schools.

In 2009 through 2013, Extension faculty worked via a public/private partnership with County Government and a local lawn service business, to provide eight 2-hour community workshops on environmentally sound lawn care.

*Potomac River Watershed Cleanup*

Over 6,000 volunteers have collected tons of debris from Charles County's waterways over the past 15 years. Held annually, on the first Saturday of April from 9:00 a.m. to 12:00 noon, items collected over the years have included cans, bottles, appliances, furniture, toys, boats, and cars! See Section IV. Special Programmatic Conditions for annual data on the cleanup.

*Next steps for improving water quality education:*

The County will continue working to publicize methods to report illicit discharges, and water conservation techniques, as well as improving distribution of other water quality information as needed.

- b) The County provides the following information when requested regarding NPDES permitting requirements, pollution prevention plan development, proper housekeeping and spill prevention response:

- 1) Maryland Department of the Environment websites:  
[www.mde.state.md.us/Programs/Permits/Pages/index.aspx](http://www.mde.state.md.us/Programs/Permits/Pages/index.aspx)  
[www.mde.state.md.us/programs/Permits/Documents/2008permitguide/WMA/3.23.pdf](http://www.mde.state.md.us/programs/Permits/Documents/2008permitguide/WMA/3.23.pdf)  
[www.mde.state.md.us/programs/Permits/WaterManagementPermits/Pages/Permits/WaterManagementPermits/index.aspx](http://www.mde.state.md.us/programs/Permits/WaterManagementPermits/Pages/Permits/WaterManagementPermits/index.aspx)
- 2) Maryland Center for Environmental Training located at the College of Southern Maryland, LaPlata branch: [www.mcet.org/](http://www.mcet.org/)

*Charles County shall develop and implement a plan to reduce pollutants associated with road maintenance activities. At a minimum, an annual progress report shall be submitted that documents the following activities:*

- a. *Cleaning storm drain inlets;*
- b. *Reducing the use of pesticides, herbicides, fertilizers, and other pollutants associated with roadside vegetative management practices through the use of integrated pest management; and*
- c. *Controlling the overuse of winter weather deicing materials through continual testing and improvement of materials and effective decision-making.*

2013 Status

The Road Division receives several dozen complaints annually, and will clean out silt/trash when the drain is not operating properly. In Fiscal Year 2013, storm drains and catch basins in were cleaned using a vacuum truck. The vacuum truck removed 14.58 tons of debris at a cost of \$20,000. Approximately 129.65 miles were swept one time in Fiscal Year 2013, removing 99.27 tons of debris at a cost of \$50,000. The lists of storm drains and catch basins, and streets swept are in Appendix I.

### **III.F. Watershed Restoration**

#### Overview of Permit Conditions

1. *Within 12 months of the issuance of this permit, data gathered as a result of prior NPDES activities shall be used to prioritize all watersheds within Charles County in the context of water quality. The methods and scale used to prioritize watersheds shall be determined by Charles County but must include, at minimum, documented water quality problems and the ability to address them. In Charles County's first annual report, the results of this prioritization shall be provided and shall include the methods and scale used as well as the watershed rankings for all land area in the County.*

#### 2013 Status

This task was completed in the June 2002 to July 2003 NPDES Annual Report.

2. *Within 12 months of the issuance of this permit, Charles County shall select a watershed, or a combination of watersheds, to be restored. The selection of the watershed to be restored shall be based upon Charles County's ability to monitor the progress of all those activities identified in PART III.F.3 below to improve water quality. At least one of the following options for watershed selections shall be used:*
  - a. *A combination of the drainage area above the in-stream monitoring station identified in PART III.D. above and additional contiguous areas equaling ten percent of Charles County's untreated impervious area;*
  - b. *A watershed or combination of watersheds equaling ten percent of Charles County's untreated impervious area where surrogate parameters can be used to determine progress toward watershed restoration; or*
  - c. *A combination of PART III.F.2.a. and PART III.F.2.b. above equaling ten percent of Charles County's untreated impervious area.*

#### 2013 Status

In an October 2003 Addendum to the June 2002 - July 2003 NPDES Annual Report, the procedure for identifying the study areas and determining imperviousness was described and is summarized here. County staff and consultants determined that the best method for selecting restoration areas was (b) above.

The 12-digit subwatershed prioritization conducted in 2003 identified part or all of the top nine lowest quality/highest priority for restoration subwatersheds within the Development District.

Thus, the Development District was used as the study area for which untreated impervious calculations were made and where specific study areas for potential restoration/retrofits were identified.

Over the course of preparing watershed restoration studies in 2004, 2007 and 2011, the method for calculating impervious surface has been updated to use the latest available data and technology. In 2004, impervious percentages were calculated for the treated and untreated areas using the 1997 Maryland Department of Planning Land Use/Land Cover GIS data and the recommended imperviousness conversion factors.

In 2007, the impervious coverage was digitized from 2004 aerial photographs using Feature Analyst, a software package that uses ArcGIS and iterative methods to identify color differences on aerial photographs associated with impervious versus open space areas. This method provided a much more accurate measurement of impervious area within the County than was calculated for the 2004 study. In 2010, the impervious area was calculated again using the same ArcGIS software package, and the most recent 2007 aerial photography.

Treated and untreated impervious areas were calculated for the Development District using the following procedure.

- BMP drainage areas were delineated using existing locations of outfalls and their associated drainage areas where data was available. Where data was not available, the remaining BMP drainage areas were delineated using topography and storm drain mapping.
- Areas draining to BMPs were tagged as ‘treated.’ Areas that did not drain to a BMP were tagged as ‘untreated.’

In 2013, the County began developing the necessary data for the anticipated expansion of the restoration requirement from the current permit area (Development District) to the entire County. Vista Design, Inc. was contracted to complete an Impervious Area Assessment of the entire County.

Earlier studies had attempted to estimate the County’s impervious areas within the Development District, but Vista’s work effort will seek to establish the limits of the entire County’s true impervious areas, and determine the level of existing water quality treatment currently provided to those areas. In the performance of their work, Vista will utilize current County and State GIS mapping data, as well as limited field observations, to review each developed area, and categorize it as having occurred within one of three Stormwater Management Eras: 1) Prior to 1985 (no water quality provided), 2) between 1985 & 2002 (partial water quality provided), or 3) after 2002 (water quality treatment per current required levels). After all parcels are properly categorized, Vista Design will prepare the Impervious Surface Area Assessment in accordance with MDE guidelines.

As part of the Impervious Surface Area Assessment, Vista Design, Inc. and County staff will seek to identify areas which appear feasible for retrofit water quality restoration areas for use in satisfying the County's anticipated requirement to treat 20% of the County's currently untreated impervious areas. Potential restoration areas will be rated based upon the amount of currently untreated impervious areas which the facility could treat and assessed for possible impacts a new/enlarged facility would have on surrounding land owners. Highly rated areas will then progress to conceptual design, and potentially final engineering design and construction.

3. *Within 24 months of the issuance of this permit, Charles County shall complete and submit for MDE approval a detailed assessment of the watershed or combination of watersheds selected in PART III.F.2.above. At a minimum, the assessment shall:*
  - a. *Determine current water quality conditions;*
  - b. *Identify and rank water quality problems;*
  - c. *Identify all structural and non-structural water quality improvement opportunities;*
  - d. *Include the results of a visual watershed inspection;*
  - e. *Specify how the restoration efforts will be monitored; and*
  - f. *Provide an estimated cost and a detailed implementation schedule for those improvement opportunities identified in PART III.F.3.c. above.*

*After completing the assessment of its selected watershed, Charles County shall submit a detailed watershed assessment for an additional watershed equaling ten percent of the County's untreated impervious area to MDE by the end of this permit term.*

### 2013 Status

Three watershed restoration studies, dated 2004, 2007, and 2011, have been prepared each to address 10% of the untreated impervious area. In 2013, the County initiated a five-year schedule to perform detailed watershed assessments in anticipation of the expanding permit coverage to the entire County. Brief summaries of these work efforts are summarized below.

#### *2004 Watershed Restoration Study*

Per the 2004 Watershed Restoration Study, the total treated and untreated impervious acres for the entire Development District, were 2,250.12 acres and 3,456.96 acres respectively. Ten percent of the Development District's untreated impervious surface was 345.70 acres.

To ensure that an adequate number of sites and untreated impervious acres would be selected that would be eventual candidates for restoration/retrofit design, the study areas were selected to be much larger than the 345.70 acre goal. Seven study areas were ultimately selected that together equal 645.45 acres of untreated impervious area, as shown below.

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Study Area Name	Total Study Area (acres)	Area Untreated (acres)	Area of Untreated Impervious Cover (acres)
Acton/Hamilton	865.40	577.43	131.42
Briarwood	51.88	51.86	13.30
Bryans Road	16.24	16.24	11.84
Carrington	1,388.95	1,276.45	212.93
Marbella Delight	103.64	101.95	61.13
Pinefield	687.49	686.62	192.75
Pinefield South	95.23	89.21	22.08
Total	3,208.83	2,799.76	645.45

The complete Watershed Restoration Study was provided in the June 2003-July 2004 NPDES Annual Report. The Study found potential improvements that could be applied to restore watershed hydrology and water quality were identified from literature review and prior experience. The improvement alternatives fall into the following six categories, in the preferred order of implementation.

- Source Control      Pollution prevention and non-stormwater discharge control programs
- Land Use              Land conservation and site design measures. Low Impact Development (LID) site planning measures are included here.
- BMP Retrofits        Conversion of existing quantity controls to water quality BMPs
- Multi-site BMPs      End-of-pipe structures, such as ponds, wetlands, and outfall treatments
- Onsite BMPs          Systems designed to reduce stormwater impact at the lot level. LID structural BMPs are included here.
- Stream Restoration   In-stream projects, such as channel stabilization or riparian buffer restoration.

Capital cost estimates were developed for structural BMPs in the form of unit costs, so that an estimate of the cost of retrofitting a large area can be derived from the size of the systems needed to provide treatment. The costs include design, permitting, and construction, but not land or right-of-way acquisition. Annualized costs for BMP maintenance or outreach programs were not included in the costs, either, due to their highly variable nature.

Finally, the approach to developing restoration alternatives for each study area was as follows:

1. Identify the primary impairment in the drainage area.
2. Identify constraints
3. Select potential improvements which address the impairment within the constraints, in the order listed above in Section 3.0
4. Develop cost estimates
5. Prioritize projects based on cost-effectiveness

Feasible alternatives were developed for the seven restoration areas. When combined, they provided treatment for 418.7 acres of impervious area. The prioritization goal was to treat the amount of area required by the permit with the most cost-effective means, measured by the cost to treat one impervious acre. With this measure, the most expensive options were deleted first.

The following table shows a summary of the remaining prioritized management practices to meet the permit goal. The total cost estimate from the 2004 Watershed Restoration Study is approximately \$6,277,440 at about \$18,173 per treated impervious acre.

*Table 19: Prioritized Management Practices for Watershed Restoration*

Management Practice	Treated Area (ac)	Impervious Area (ac)	Unit of Measure	No. Of Units	Unit Cost	Total Cost	Cost/ Impervious Acre
Lawn Care Education	270.6	81.2	House	687	Varies	Unknown	Unknown
Pet Waste Education	270.6	81.2	House	687	Varies	Unknown	Unknown
Rain Barrels	270.6	81.2	House	687	\$250	\$171,750	\$2,116
Easements	31.0	1.6	Acre	7	\$2,000	\$13,800	\$8,903
Pond Retrofit	59.2	17.8	CF	163,860	NA	\$132,518	\$7,445
Wet Pond	168.3	59.9	CF	226,077	NA	\$192,373	\$3,212
Wetland 1	96.1	31.1	CF	118,883	NA	\$132,004	\$4,244
Wetland 2	67.1	30.3	CF	111,136	NA	\$125,879	\$4,154
Dry Swale- Filtration	117.7	35.6	SY	13,800	\$68	\$938,400	\$26,360
Dry Swale- Infiltration	35.0	10.5	SY	4,066	\$39	\$158,574	\$15,102
Wet Swale	0.0	0.0	SY	0	\$51	\$0	
Grasspave/Infiltration	23.2	7.0	SY	342	\$83	\$28,386	\$4,055
Grasspave/Filtration	0.0	0.0	SY	0	\$146	\$0	
Filtrerra Bioretention	146	44.0	Each	176	\$6,000	\$1,056,000	\$24,000
Sidewalk Bioretention	0.0	0.0	SY	0	\$194	\$0	
Median Bioretention	0.0	0.0	SY	0	\$174	\$0	
Parking Lot Bioretention	75.3	57.6	SY	18,694	\$174	\$3,252,756	\$56,471
Green Roofs	0.0	0.0	SY	0	\$135	\$0	
Stream Restoration	0.0	0.0	LF	300	\$250	\$75,000	
<b>TOTAL</b>	<b>993.9</b>	<b>345.4</b>				<b>\$6,277,440</b>	<b>\$18,173</b>

NOTE: Wetland 1 treats some of the same area in Carrington as a wet pond, so this area was removed from the total area treated. Similarly, education and rain barrels treat the same area, so this area was included only once in the total.

The Watershed Restoration Study was presented to the Charles County Commissioners in November 2004, and was approved for implementation. To further refine the proposed projects and the implementation schedule the County separated capital improvements projects (CIP) and outreach projects. See Part III.G. below for further information on the CIP budget.

The following prioritization list includes the three study areas with the greatest amount of impervious surface for restoration: Carrington, Pinefield, and Acton-Hamilton. In addition, Bryans Road is included as a county initiative under the Bryans Road Sub-Area Plan.

The prioritization is based on meeting the 10% restoration goal with the fewest areas of impact, which will enable the County to focus outreach, land acquisition, and management efforts, minimize time and cost of construction, and to completely address water quality in the areas of concentration.

The estimated costs and areas treated have been refined since 2004 and the following table has been updated to reflect this. The updated total areas treated have decreased significantly from original estimates and the average cost per impervious acre treated is now estimated at \$51,350.

*Estimated Cost and Implementation Schedule for the 2004 Watershed Restoration Plan\*:*

		Description	Design	Right-of-Way & Construction	Impervious Treated (acres)
FY06-FY09	Carrington	Shallow Marsh	\$126,675		
	Carrington	Shallow Marsh		\$ 1,502,277	45
FY10-FY11	Bryans Road	Underground Storage	\$64,110		
	Pinefield	Wetpond 1 and Filterrras**	\$214,490		
	Acton-Hamilton	Bio-Swales (not feasible)	\$96,860		
FY12-FY13	Bryans Road	Underground Storage		\$ 1,302,005	9
	Pinefield	Wetpond 1		\$ 632,269	23
	Pinefield	Wetpond 2	\$50,000		
	Pinefield – Temi Dr.	Submerged Gravel Wetland	\$52,200		
	Acton-Hamilton	Submerged Gravel Wetland	\$86,000		
FY14-FY15	Pinefield	Wetpond 2		\$500,000	13
	Pinefield – Temi Dr.	Submerged Gravel Wetland		\$650,000	13
	Acton-Hamilton	Submerged Gravel Wetland		\$ 2,000,000	40
		<b>TOTALS</b>	\$640,335	\$6,086,551	131

*\*Updated in 2012. \*\* The Pinefield filterrras have been designed to treat 13 impervious acres at a cost of \$1,187,731, but have been put on hold. Additional explanation is under item 4 below.*

*2007 Watershed Restoration Study*

For the 2007 study, impervious coverage was digitized from 2004 aerial photographs using Feature Analyst, a software package that uses ArcGIS and iterative methods to identify color differences associated with impervious versus open space areas. This method provided a much more accurate measurement of impervious area within the County.

Since the goal of the 2004 and 2007 studies was to provide restoration alternatives for a combined total of twenty percent of the untreated impervious area in the Development District, it was important to analyze existing untreated impervious area and impervious area within the study areas using the same methodology. Therefore, the impervious area within the seven study areas discussed in the 2004 Watershed Restoration Study were recalculated using the delineated impervious area values. The results are as follows:

Study Area Name	Total Study Area (acres)	Area Untreated (acres)	Area of Untreated Impervious Cover (acres)
Acton/Hamilton	865.40	577.43	90.07
Briarwood	51.88	51.86	9.93
Bryans Road	16.24	16.24	11.57
Carrington	1388.95	1276.45	151.66
Marbella Delight	103.64	101.95	41.02
Pinefield	687.49	686.62	165.78
Pinefield South	95.23	89.21	18.32
<b>Total</b>	<b>3208.83</b>	<b>2799.76</b>	<b>488.35</b>

The total impervious area within the Development District was approximately 4,581 acres, based on the digitized impervious boundaries. Of that amount, 2,607 acres is currently untreated. The improvement recommendations outlined in the 2004 study addressed the treatment of 402.58 acres of untreated impervious area, as recalculated with the new impervious coverage. This is approximately 15% of the total untreated area in the Development District. Meeting the 20% restoration goal would require an additional 119 acres treated.

For the 2007 Watershed Restoration Study, ten study areas were identified that contained a large percentage of untreated impervious area within an impaired stream system. To ensure that an adequate number of sites and untreated impervious acres would be selected that would be eventual candidates for restoration/retrofit design, the study areas were selected to be much larger than the 119 acre goal. The ten study areas that were ultimately selected equal 276.16 acres of untreated impervious area, as shown below.

Study Area Name	Total Study Area (acres)	Area Untreated (acres)	Area of Untreated Impervious Cover (acres)
Fox Run	33.82	33.82	9.40
Lancaster	42.90	40.84	13.06
West Lake Village	267.59	261.45	63.81
Ryon Woods	140.39	136.80	27.08
White Plains	327.97	231.04	31.21
St. Charles	1609.18	409.67	77.21
Wakefield	49.20	49.20	12.94

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Bannister	28.33	28.33	6.30
Hunt Club Estates	135.61	131.55	15.39
Northwood	107.72	61.11	19.76
<b>Total</b>	<b>2742.71</b>	<b>1383.81</b>	<b>276.16</b>

These study areas include impervious area from state highways, which are subject to Maryland State Highway Administration’s (MSHA) Statewide NPDES permit and not part of the County's responsibility. As highway projects are constructed, there may be an opportunity to share funding for BMP construction, along with credit for pollutant removal from runoff subject to both MSHA and County permits.

Of the nine selected areas, three were selected for stream walks (West Lake Village, White Plains, and St. Charles). The inspection consisted of a walk-through of approximately 7,400 linear feet of perennial/ephemeral streams. The inspection included physical and habitat assessment and documentation of problem areas, including:

- Storm drain outfalls
- Stream channel lateral and vertical erosion
- Channel blockages and/or fish obstructions
- Dumping
- Failing septic or sewer systems
- Buffer impairments or encroachments
- Exposed utilities

<b>Study Area</b>	<b>Type of Monitoring</b>
Fox Run	Habitat, geomorphic assessment
Lancaster	Habitat, geomorphic assessment
West Lake Village	Biomonitoring, physical water quality, habitat, water quality grab
Ryon Woods	Geomorphic assessment
White Plains	Biomonitoring, physical water quality, habitat, water quality grab
St. Charles	Physical water quality, habitat, water quality grab, geomorphic assessment
Wakefield	Physical water quality, habitat, water quality grab
Hunt Club Estates	Habitat, geomorphic assessment
Northwood	Physical water quality, habitat, geomorphic assessment

**POTENTIAL MANAGEMENT ALTERNATIVES**

The improvement alternatives identified to address some of the issues described above fall into the following six categories:

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- Source Control: Pollution prevention and non-stormwater discharge control programs
- Land Use: Land conservation and site design measures. Low Impact Development (LID) site planning measures are included here.
- BMP Retrofits: Conversion of existing quantity controls to water quality BMPs
- Multi-site BMPs: End-of-pipe structures, such as ponds, wetlands, and outfall treatments
- Onsite BMPs: Systems designed to reduce stormwater impact at the lot level. LID structural BMPs are included here.
- Stream Restoration: In-stream projects, such as channel stabilization or riparian buffer restoration

Several categories of restoration measures have already been put in place through the County's NPDES permit. These are municipal pollution prevention measures, some residential source controls, and reduction of non-stormwater discharges.

Currently, forty-two restoration opportunities have been identified within the study areas, which combined would treat approximately 142 untreated impervious acres. These include construction of bioretention areas, small wet ponds, water quality swales, and performing stream restoration or stabilization of failing outfalls. Site-specific discussions and concept plans are included in the 2007 Watershed Restoration Study Report for the priority projects. Prioritization was based on the level of impairment within the receiving waters, amount of impervious drainage to the project limits, and estimated cost of the project. This Study is included with the 2007 NPDES Annual Report.

The estimated costs and areas treated have been refined since 2007 and the following table has been updated to reflect this. The updated total areas treated have decreased from original estimates, some projects were not feasible, and the estimated cost per acre treated is \$57,418.

*Estimated Cost and Implementation Schedule for the 2007 Watershed Restoration Plan\*:*

		Description	Design	Right-of-Way & Construction	Impervious Treated (acres)
FY12-FY13	Bannister	Retention Pond (not feasible)	\$281,860		
	Fox Run	Regenerative Step Pool Conveyance			
	Lancaster	Stream Restoration (not feasible)			
	Northwood	Regenerative Step Pool Conveyance			
	Ryon Woods	Grass Channel			
	White Plains	Gravel Wetland			
	St. Charles	Retention Pond & Stream Restoration	\$100,000		
FY14-FY15	Fox Run	Regenerative Step Pool Conveyance		\$600,000	10
	Northwood	Regenerative Step Pool Conveyance		\$800,000	23
	Ryon Woods	Grass Channel		\$50,000	1
	White Plains	Gravel Wetland		\$530,000	6
	St. Charles	Retention Pond & Stream Restoration		\$1,600,000	29
		<b>TOTALS</b>	\$381,860	\$3,580,000	69

\*Updated in 2012.

*2011 Watershed Restoration Study*

In January 2010 the County contracted with KCI Technologies, Inc. to prepare a third watershed restoration study for an additional 10% untreated impervious surface. It was determined that the total impervious area within the Development District, based on the 2007 data, was 5,508 acres. Of this 2,863 acres have been identified as untreated. Therefore, the restoration goal for the 2011 study was 286.3 acres, which represents 10% of the untreated impervious area.

A variety of study areas were identified for retrofit. These areas were identified based primarily on the amount of untreated area in the development draining to the sites. The study areas include impervious area from state highways, which are subject to Maryland State Highway Administration’s (MSHA’s) Statewide NPDES permit and not part of the County’s responsibility. As highway projects are constructed there may be an opportunity to share funding for BMP construction, along with credit for pollutant removal from runoff subject to both MSHA and County permits.

The potential project areas were identified in ArcGIS using the treated area polygon and aerial photography. These areas were printed on maps and compared against known proposed development to narrow down the areas most likely for retrofits. 75 individual retrofit sites were identified within the 28 study areas. The proposed impervious area to be treated was approximately 50% of the 286 acre goal. Design and construction of such a large number of sites would be prohibitively expensive. Therefore the majority of sites, with modest to minimal treatment benefits, were eliminated from consideration.

Concept plans were developed for a final list of 17 proposed projects within 9 study areas treating approximately 37 acres of impervious surface. The study estimates the average restoration cost is \$129,000 per impervious acre. See the following table for the list of projects.

<b>Study Area</b>	<b>Number of Proposed Projects</b>
Marbella Delight	3 (Dry Swales, Bioretention)
Northwood	2 (Bioretention, Filterra)
Jenifer Elementary School	1 (Shallow Marsh)
Berry Road North	2 (Bioretention, Dry Swales)
Briarwood	1 (Step Pool Stormwater Conveyance)
Leonardtwn Road	2 (Pond Retrofit, Dry Swales)
Pinefield Center	1 (Retention Pond/ Improved Drainage System)
Potomac Branch Library	1 (Bioretention)
MD-301 Commercial Corridor	4 (Bioretention, Pavement Removal)

The estimated costs and impervious areas treated have been refined since 2011 per the following table.

*Estimated Cost and Implementation Schedule for the 2011 Watershed Restoration Plan\*:*

		Description	Design	Construction	Impervious Treated (acres)
FY12-FY13	Northwood (a.k.a. Holly Station)	Retention Pond, Bioretention & Swale	\$50,000		
FY14-FY15	Northwood (a.k.a. Holly Station)	Retention Pond, Bioretention & Swale		\$450,000	9
		TOTALS	\$50,000	\$450,000	9

\*Updated in 2012.

*2013 Detailed Watershed Assessments*

In April 2013 the County contracted with KCI Technologies, Inc. to prepare detailed watershed assessments for the 10 major watersheds in the County. Following is the watershed assessment completion schedule.

Contract Year	MD 8-digit Watersheds	Number of 12-digit Subsheds	Area (sq mi)	Stream Length (mi)	Synoptic Sampling Sites
1	Port Tobacco River	5	43.9	104.5	51
2	Potomac River Upper Tidal	1	3.2	4.6	2
2	Potomac River Middle Tidal	3	30.1	59.2	22
2	Potomac River Lower Tidal	5	44.3	65.9	24
2	Wicomico River	5	27.3	49.3	18
3	Mattawoman Creek	9	69.9	140.1	51
3	Nanjemoy Creek	5	73.0	134.0	49
4	Gilbert Swamp	10	39.0	93.2	34
4	Patuxent River Lower	4	28.2	37.9	14
4	Zekiah Swamp	16	102.0	195.5	72

As described in section III.F.2. above, in 2014 the limits of the entire County’s true impervious areas based on polygons will be calculated, and the level of existing water quality treatment currently provided to those areas will be calculated to determine the best approach to achieve the watershed restoration goal.

4. *Within 30 months of the issuance of this permit, Charles County shall begin to implement restoration efforts according to the schedule outlined in PART III.F.3.f. above. Annual reports shall document:*
  - a. *The progress toward meeting the schedule identified in PART III.F.3.f. above;*
  - b. *The estimated cost and the actual expenditures for program implementation; and*
    1. *The monitoring data or surrogate parameter analyses used to determine water quality improvements.*

## 2013 Status

### *Carrington Watershed Restoration Projects*

In fiscal year 2005 the County began the first three CIP watershed restoration projects in Carrington Neighborhood. Two of these are wetland habitat projects on elementary school sites and the third is a water quality feature on neighborhood association property. Success of the proposed Carrington watershed restoration projects depended on support and interest from the community and the schools.

Charles County issued a request for proposals in the Fall of 2005 to have the three Carrington projects designed. Two bids were received, and A. Morton Thomas, Inc. was selected to design and engineer the projects. Design began January 2006, and was completed in the Fall of 2006. Construction of the project was bid in November 2006 and awarded to Environmental Quality Resources, LLC in February 2007.

A ribbon-cutting event for both wetland projects was held on April 16, 2008. The event was titled, "Connecting Children to Nature – Schoolyard Habitat Celebration and Fishing Derby." This event was videotaped for running on the County's and the School's cable channels and was aired in 2008. The Charles County Department of Planning and Growth Management received the *2010 Grand Award* and the *2010 Outstanding Project Award in Environmental* for the projects by the American Council of Engineering Companies of Maryland.

See permit Section III.D.3 for chemical monitoring of the restoration project at Middleton Elementary School.

### *Pinefield Watershed Restoration Project*

Request for Proposals (RFP) 08-36 for the design and engineering of Pinefield and Acton-Hamilton projects was released in April 2008. The RFP was for full concept and engineering, which was determined to be too open-ended and causing inflated bid pricing. To address the inflated bid pricing, Addendum #1 was issued in May 2008, postponing bids, until the County could have 25% design completed and remove the uncertainty in project scope. In July 2009, RFP 09-40 was released which included completed concepts. Bids were received in August 2009. Vista Design, Inc. was awarded the contract and began work November 2009. The County's permit for Pinefield is VCI 090111.

Improvements in Pinefield included expanding a wet pond, adding filterbars, as well as pipe repair and outfall replacement of the pipe on Dogwood Drive that daylighted behind Holly Avenue and an outfall pipe on Temi Drive.

In 2012, Dogwood Drive Drainage Improvements were bid for construction under RFP 12-04 and completed. This consisted of partially replacing and rehabbing a major drainage pipe that was failing in several locations. In 2013 the Temi Drive outfall pipe repair was complete. See permit Section III.E.2 for photos of the Temi Drive outfall repair.

Due to the completion of the U.S. Army Corps of Engineers' *Stormwater Improvement Plan for Pinefield*, July 2011, the filterras that had been previously designed and issued construction permits, were put on hold to be potentially superseded or done in conjunction with the U.S. Army Corps of Engineers stormwater drainage improvements. The U.S. Army Corps of Engineers' plan included treating much of the drainage area to the filterras via a less costly retention pond. However designing the retention pond was dependent upon the County obtaining access to the property. Permission to access project sites and property acquisition continue to be a significant time consuming part of the watershed restoration process.

Construction to enlarge the pond to treat an additional 22 acres of untreated impervious area began under RFP 12-18 in August 2012 and completed in May 2013 by Sandy Excavating, Inc. Photos taken during construction are included in the 2012 NPDES Annual Report. Following are photos of the completed project.

In 2012, Vista Design, Inc. completed a watershed restoration concept for an additional portion of Pinefield called Temi Drive that will reroute drainage from a corroded steel pipe and eroded outfall, to a gravel wetland that will provide water quality treatment for approximately 18 acres of untreated impervious area. In 2013 engineering of the gravel wetland began under County permit VCI 130063. The engineering plans are currently at 90% completion of design.

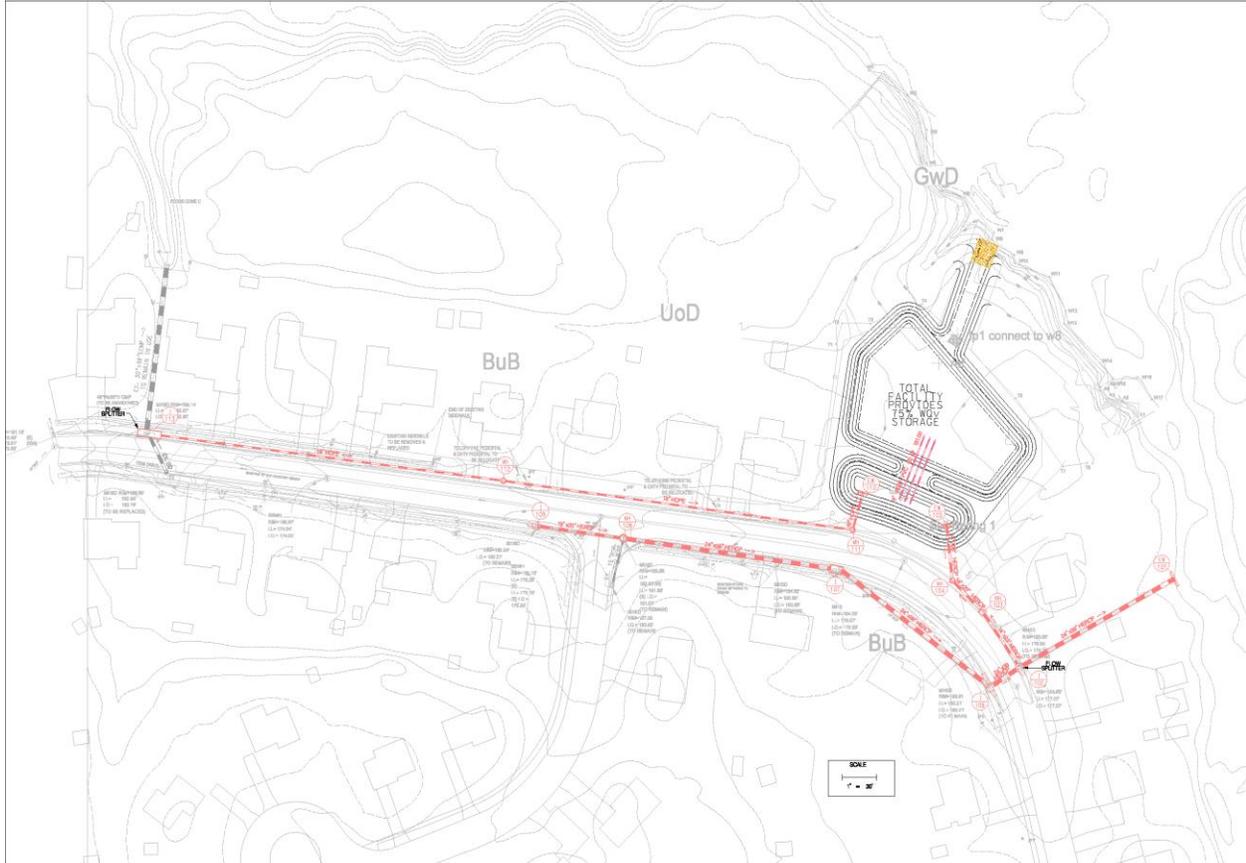
The gravel wetland facility is proposed in the Pinefield Civic Association open space along Temi Drive at the lowest elevation. Obtaining access and easement agreements with the Civic Association is still ongoing through 2013. Following is a graphic of the proposed facility.



*Pinefield Watershed Restoration Project - Completed*



*Pinefield Watershed Restoration Project - Completed*



*Temi Drive Watershed Restoration Project*

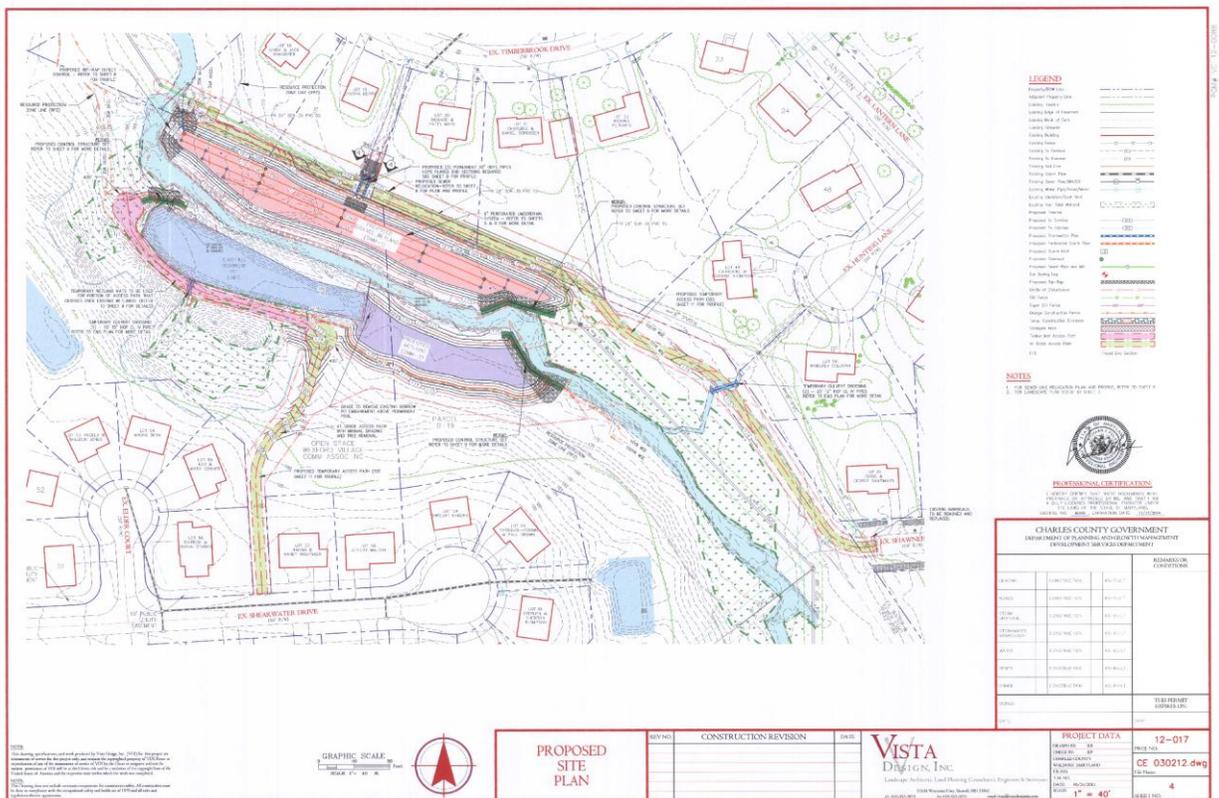
*Acton-Hamilton Watershed Restoration Project*

Request for Proposals (RFP) 08-36 for the design and engineering of Pinefield and Acton-Hamilton projects was released in April 2008. The RFP was for full concept and engineering, which was determined to be too open-ended and causing inflated bid pricing. To address the inflated bid pricing, Addendum #1 was issued in May 2008, postponing bids, until the County could have 25% design completed and remove the uncertainty in project scope. In July 2009, RFP 09-40 was released which included completed concepts. Bids were received in August 2009. Vista Design, Inc. was awarded the contract and began work November 2009. The County's original permit for Acton-Hamilton is VCI 090112.

See permit Section III.D.3 for biological and physical monitoring of the restoration project at Acton-Hamilton.

Improvements in Acton-Hamilton were subject to re-evaluation in 2010. This included issuing change orders to (1) delete proposed bioretention facilities and replace with filterrras, (2) delete dry swales and replace with bioretention, and (3) preliminary surveying, engineering and permitting services in support of a regional stormwater concept. Due to the complete revamp of the project, a new permit for the regional stormwater facility was initiated under VCI 120088.

Staff and the consultant met with Maryland Department of the Environment (MDE) regarding the regional stormwater concept, which MDE supported. A large submerged gravel wetland and wetland facility was under design during the 2013 permit year. The facility is being designed to treat over 40 acres of untreated impervious area from areas near Route 301. Minimum disturbance to the existing stream is proposed. In 2013, the permit is 100% complete with the Charles Soil Conservation District and MDE approval is imminent. There is a small list of easements to be acquired prior to the project being constructed. Additional delays to construction include the necessary engineering to reroute a sewer line from running through the center of the proposed facility, which had not been known to exist in the area. Designing and rerouting the sewer line around the proposed facility began in 2012. Final permitting and construction is anticipated in 2014. Following is a graphic of the Acton Hamilton project.



Acton Hamilton Watershed Restoration Project

*Bryans Road Watershed Restoration Project*

In June 2007, the County hired Johnson, Mirmiran and Thompson (JMT) to develop a preliminary design study report for the Bryans Road Town Common to incorporate stormwater management for the site. On June 11, 2008 JMT presented the final concept to the County Commissioners who agreed to take the project to the Bryans Road Improvement Committee for discussion and proceed with land acquisition and engineering. The project proposes to treat approximately 9+ acres of untreated impervious surface and also serve as a Bryans Road Town Square to help revitalize the town center and attract new mixed use development.

In July 2009 the engineering of the Bryans Road Town Common was awarded to Vista Design, Inc. The owner of the property did not allow soil borings during the County's acquisition process, which delayed the engineering until June 2010, when the property was finally acquired. The engineering under permit VCI 090078 was completed in late 2011.

The Bryans Road Town Common includes underground detention pond for treating runoff from the shopping center parking area, and a dry swale along Matthews Road that treats the roadway and a portion of the rooftop of the shopping center. Additional features include landscape islands to delineate traffic lanes through the parking area, pedestrian linkages (including a bridge) from senior housing to nearby restaurants, and new underground drainage infrastructure to the facility. In June 2012 the construction of Bryans Road NPDES project was bid under RFP 12-15 and in August 2012 was awarded to Sandy Excavating, Inc. Construction began in the fall of 2012 and completed in October 2013. Photos of the construction and placement of the underground arches can be found in the 2012 NPDES Annual Report. Following are photos of the completed project.





*Potomac Heights Community Watershed Restoration Project*

Potomac Heights is a 126 acre site in the County’s Development District along the Potomac River just north of the Town of Indian Head. The community is owned by the Potomac Heights Mutual Homeowner's Association (HOA) with no individual home lots. The community was constructed long before codes regulating stormwater were in place. The existing stormwater treatment and drainage system includes improperly placed and non-standard structures, under-sized pipes, lack of appropriate cover, flat or negligible slopes and no means for treating stormwater runoff for quality. In many areas stormwater runoff from the roadways is directed towards homes causing flooding and property damage.

The project includes road improvements, swales, pipes and stormwater facilities to address the flooding problems and water quality management for 20.5 acres of untreated impervious surface. The HOA is primarily interested in drainage improvements, however the County offered to fund any water quality improvements that could be achieved through the proposed drainage improvements.

The project was submitted to the County for permit review in August 2009 under VR 090077. The total cost for water quality improvements is estimated at \$614,405. This is proposed to be funded through the NPDES program at an average of \$30,000 per treated acre. In early 2010 the project was submitted to MDE for funding assistance. Currently the County is working to negotiate a Memorandum of Understanding for cost sharing the project.

*Bannister, Fox Run, Lancaster, Northwood, Ryon Woods and White Plains*

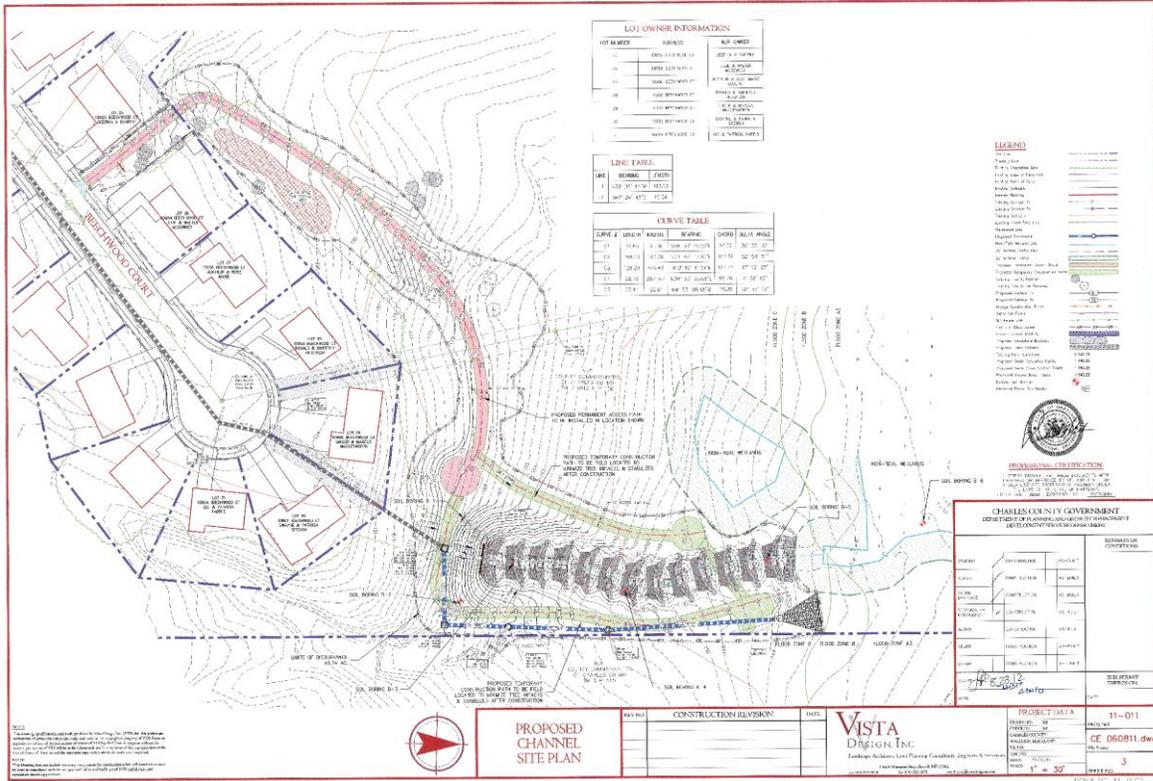
The RFP 11-09 for design and engineering of watershed restoration projects was issued for response in January 2011. The County received 17 bids and selected Vista Design, Inc. The project consists of field and research reconnaissance of site-specific data, conceptual, preliminary, semi-final, and final design phases. Public information meetings with stakeholders and coordination with property owners of the four affected neighborhoods and or locations to solicit input and address concerns took place during fiscal year 2013. The conceptual projects for each community proposed to address 54.6 acres of untreated impervious area, however as described below the acreage has been revised based on engineering plans.

Community	Project Type	Treated Impervious Area
Bannister	Retention Pond	6.3(On hold, not currently feasible)
Fox Run	Outfall Stabilization, Channel Restoration	9.4
Lancaster	Channel Restoration	12.5(On hold, not currently feasible)
Northwood	Channel Restoration portion only (Retention Pond, Infiltration, Bioretention on hold)	48 (Revised from 12.3 acres)
Ryon Woods	Channel Restoration, Infiltration	1 (Revised from 4.7 acres)
White Plains	Infiltration/Shallow Wetland	5 (Revised from 9.4 acres)



Fox Run

Fox Run NPDES project was issued a construction permit to treat over 9 acres of untreated impervious area in the neighborhood of Fox Run. This project also improves issues with the outfall pipe and severe erosion at the outfall channel was well. The project has been designed as a step pool storm conveyance stream restoration project. No right-of-way is needed. The project was publicized under Invitation to Bidders (ITB) 13-24 in May 2013. A contract was awarded to Reliable Contracting in the amount of \$823,015. Notice to Proceed was issued on September 10, 2013 and the project is currently under construction. Below is a graphic of the step pool conveyance system to be built.

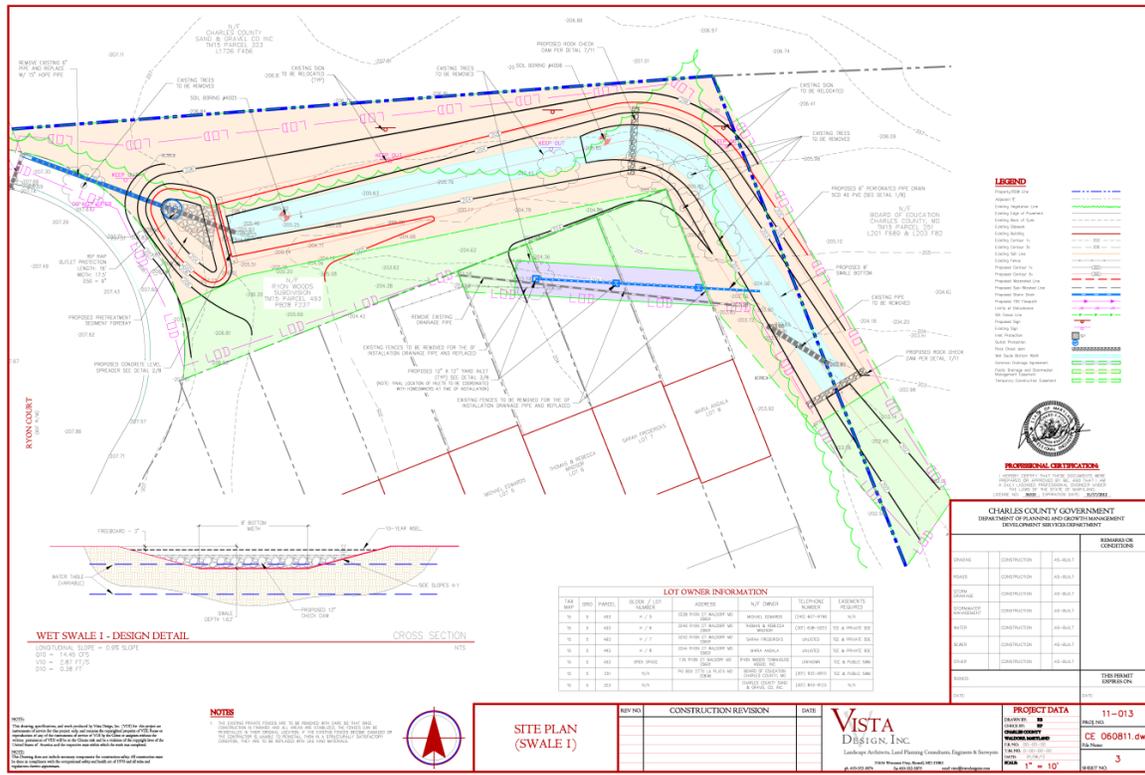


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Ryon Woods

Ryon Woods NPDES project (VCI 110099) was designed to treat over 1 acre of untreated impervious area and also correct serious drainage issues for the neighborhood of Ryon Woods. The project consists of two separate grass swales with check dams designed for water quality. In addition, drainage was redirected from homeowners' yards.

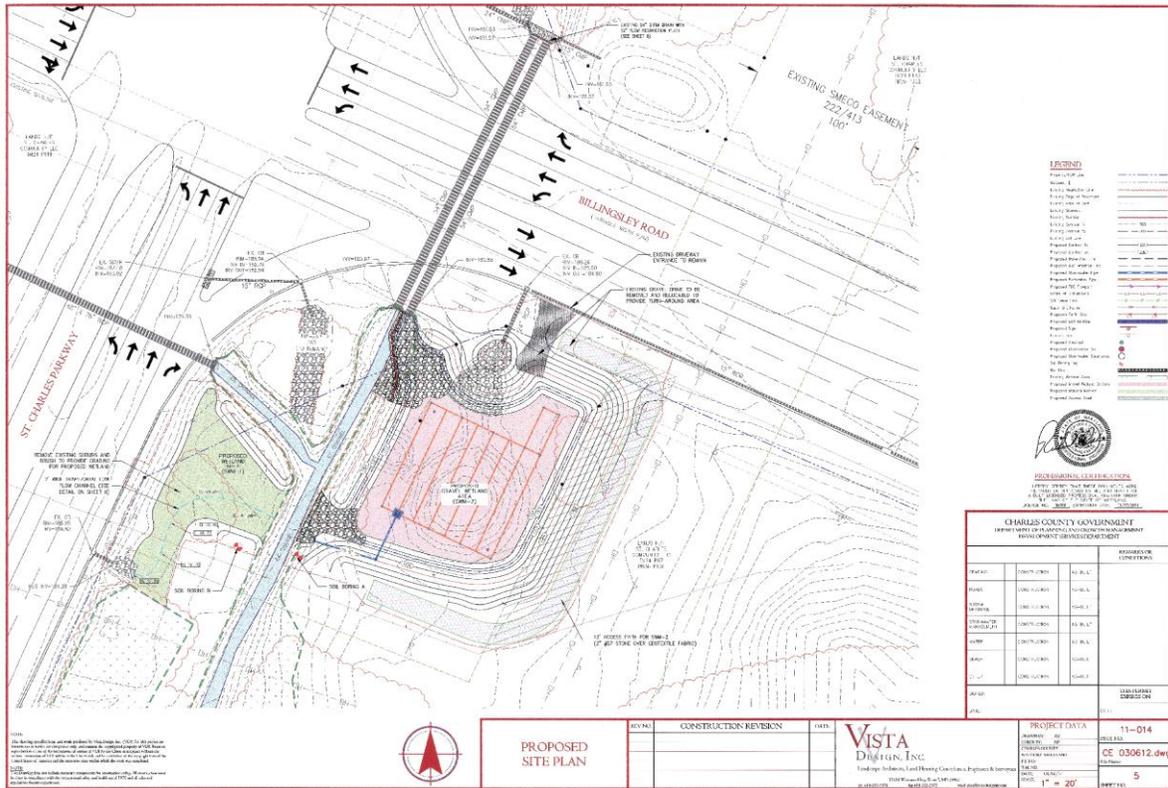
Right of way acquisitions were completed early in 2013. In September 2013, a purchase order was awarded to Macia Construction in the amount of \$25,550 to construct the project. The project is currently under construction. Below are graphics of the design.





White Plains

The White Plains NPDES project VCI 120067 is being designed to treat over 5 acres of impervious surfaces from the White Plains area. This project is designed as a shallow gravel wetland with minimum disturbance to the existing stream. Currently, the engineering plans are 100% complete with Charles Soil Conservation District approval and MDE permit approval imminent. There is a small list of easements required before this project can be constructed. Below is a graphic of the project.



*Strawberry Hills Stormwater Management and Stream Improvements*

In March 2011, the US Army Corps of Engineers, completed the final *Stormwater and Stream Improvement Plan for Strawberry Hills*, under the Floodplain Management Services (FPMS) Program. In April 2011 the final plan was presented to the County Commissioners. This plan was requested by the Department of Planning and Growth Management to be the first step in taking corrective action to address stream erosion and flooding issues in this neighborhood, which was constructed in the early 1970s. The objectives were to: (1) determine the locations and causes of stream instability causing property loss; (2) determine the causes of flooding and the extent and depth, and; (3) develop alternatives and an improvement plan to correct stream instability and eliminate flooding during the 10-year storm event. In July 2011, the County issued RFP 12-13 for construction of the project under permit VCI 100093. During this process it was determined that the cause of flooding could not be corrected, and the Maryland Department of the Environment would not permit any disturbance in the stream corridor. The final project consists of outfall improvements, inlet improvements, and additional culverts, with minimal disturbance to the stream. Staff continues to pursue this project in terms of a potential stormwater quality project downstream, below an existing stormwater pond.

*County Road Projects*

As the County improves or expands existing roads there is the opportunity to treat existing untreated impervious surface. Previously the County was pursuing the widening of Acton Lane Phase 3, and Phases 5-7 of the Cross County Connector, however in Fiscal Year 2013 both projects were cancelled. In Fiscal Year 2014 the Acton Lane Phase 3 sediment basin, located at the end of Tred Avon Court will be bid for conversion to a stormwater management facility effectively treating 8 impervious acres.

In Fiscal Year 2013, water quality was added in the Stavors Road Improvement Plan at a cost of \$200,000 to provide stormwater management for 4 acres of untreated impervious area. In November 2012, engineering of Stavors Road is at 95% completion, under permit VCI 110060. The County is also pursuing a concept on Billingsley Road south of Carrington.

Table 20: Watershed Restoration Action Plan and Progress

	Description	Design	Right-of-Way & Construction	Acres Treated (proposed)	Acres Treated (complete)	Balance
						<b>286</b>
FY06-FY07	Carrington	<b>126,675</b>				
FY08-FY09	Carrington		<b>1,502,277</b>		<b>45</b>	<b>241</b>
FY10-FY11	Bryans Road	<b>64,110</b>				
	Pinefield	<b>214,490</b>				
	Acton-Hamilton Bioswales (not feasible)	<b>96,860</b>				
FY12-FY13	Bannister (not feasible)	<b>281,860</b>				
	Fox Run					
	Lancaster (not feasible)					
	Holly Tree Lane					
	Ryon Woods					
	White Plains					
	Bryans Road		<b>1,302,005</b>		<b>10.22</b>	<b>230.78</b>
	Pinefield – Pond Retrofit		<b>632,269</b>		<b>22.3</b>	<b>208.48</b>
	Pinefield – Temi Drive	<b>52,200</b>				
	Acton-Hamilton – Submerged Gravel Wetland	<b>86,000</b>				
Stavors Road Improvements	<b>5,000</b>					
FY14-FY15	Fox Run		<b>823,015</b>		<b>9.5</b>	<b>198.98</b>
	Ryon Woods		<b>23,550</b>		<b>1</b>	<b>197.98</b>
	Acton Lane Roadway		<b>250,000</b>		<b>8</b>	<b>189.98</b>
	Holly Tree Lane		800,000	48		141.98
	White Plains		530,000	6		135.98
	Stavors Road Improvements		200,000	4		131.98
	Pinefield – Temi Drive		650,000	13.62		118.36
	Acton-Hamilton – Submerged Gravel Wetland		1,000,000	40		78.36
	Tanglewood	Complete	140,000	4		74.36
	Jenifer Elementary School	50,000				
	St. Charles	100,000				
Billingsley Road	20,000					
FY16-FY17	Jenifer Elementary School		173,000	3		71.36
	St. Charles		1,600,000	29		42.36
	Billingsley Road		75,000	25		17.36

Bold indicates final number.

Table 21: Watershed Restoration Details for Completed Projects – July 31, 2013

	Type of BMP	Drainage Area (ac.)	Impervious Area (ac.)	Impervious Area Treated (%)	Impervious Area Treated (ac.)
Gustavus Brown Elementary School Wetland VCI 060034	Shallow Marsh	75.5	25.33	100	25.3
Arthur Middleton Elementary School Wetland VCI 060035	Shallow Marsh	36.4	13.1	92	12.1
Arthur Middleton Elementary School Weir VCI 060035	Existing Channel	60.5	18.1	24	4.5
Fillmore Road Weir VCI 060036	Existing Channel	33.7	10.1	27.8	2.8
Bryans Road VCI 090078	Storm Filter, Filterra, Dry Swales	18.6	10.22	100	10.22
Pinefield VCI 090111	Wetpond Expansion	51	22.3	100	22.3
					75.9

Table 22: Watershed Restoration Details for Projects In Permitting and Construction Phases

	Type of BMP	Drainage Area (ac.)	Impervious Area (ac.)	Impervious Area Treated (%)	Impervious Area Treated (ac.)
Pinefield – Temi Drive VCI 130063	Submerged Gravel Wetland	47.82	18.17	75	13.62
Holly Tree Lane (a.k.a. Northwood) VCI 130058	Regenerative Step Pool Conveyance	106.6	49.22	100 (However, 20.92 ac. already treated)	49.22 (28.3 new)
Acton-Hamilton VCI 120088	Submerged Gravel Wetland	393	91.34	40	36.8
Fox Run VCI 110102	Regenerative Step Pool Conveyance	23.1	9.5	100	9.5
Ryon Woods VCI 110099	Grass Swales with Check Dams	4.7	1.4	71.4	1
White Plains VCI 120067	Submerged Gravel Wetland	192.5	45.4	12.8	5.8
Stavors Roads Improvements VCI 110060	Infiltration Pond	11.6	3.9	100	3.9
Tanglewood Drive VCI 080068	Regenerative Step Pool Conveyance	51.4	31	14	4 (estimated)
					123.84

*Table 23: Education and Outreach Projects*

<b>Location</b>	<b>Description</b>	<b>Cost</b>	<b>Date Completed</b>	<b>Acres Treated</b>
Carrington	Community Watershed Restoration Outreach, BayScapes, & Enviro. Technical Assistance	27,520	12-Apr-08	TBD
Pinefield	Rain Barrel Distribution	TBD	TBD	TBD
Acton-Hamilton	Rain Barrel Distribution	TBD	TBD	TBD

### III.G. Program Funding

#### Overview of Permit Conditions

1. *Annually, Charles County shall submit a fiscal analysis of the capital, operation, and maintenance expenditures necessary to comply with all conditions of this permit.*
2. *Charles County shall maintain adequate program funding to comply with all conditions of this permit.*

#### 2013 Status

##### *Funding Sources*

In June 2013, Charles County adopted legislation (Bill 2013-11), establishing the County’s Watershed Protection and Restoration Program and associated Stormwater Remediation Fee. This program is now Chapter 275 of the Charles County Code. The Stormwater Remediation Fee replaces the portion of the Environmental Service Fee, which was previously allocated to the NPDES Stormwater Permit Program. As detailed below, the Stormwater Remediation Fee continues to be part of a two-pronged funding approach in order to ensure that adequate funds are available for carrying out permit program conditions.

1. Charles County Environmental Service Fund (ESF) and Watershed Protection and Restoration Fund (WPRF): In 1997 the County adopted a \$2.00 increase to its existing annual ESF for all improved properties county-wide, including in the towns, and allocated the increase to the NPDES Stormwater Permit budget. The chart below shows the increase in this allocation from 1998 through 2013. In Fiscal Year 2014, the NPDES Stormwater allocation from the ESF fund was stopped, and replaced by the WPRF, which charges a flat Stormwater Remediation Fee to all improved properties county-wide, except towns which assess their own fees, and otherwise exempt properties.

Fiscal Year	1998-2007	2008	2009	2010	2011	2012	2013	2014
ESF NPDES Allocation	\$ 2	\$ 4	\$ 5	\$ 6	\$ 8	\$ 12	\$ 14	\$0

Fiscal Year	2014
WPRF Stormwater Remediation Fee	\$43

2. Recordation Fee: In 1997 the County also implemented a NPDES per lot recordation fee of \$81.25 per lot, for all new lots recorded in the Development District. Due to the variation in the number of lots recorded per year the amount collected fluctuates annually.

Fiscal Year	1998-2000	2001-2004	2005-2008	2009-2012	2013-2014
NPDES Lot Recordation Fee	\$ 81.25	\$ 84.50	\$ 87	\$ 117	\$ 121

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*Fiscal Year 2013*

Table 24 contains a description of the revenue and expenses to the Environmental Service Fund, NPDES Stormwater permit dedicated program, extending through Fiscal Year 2013. A full spreadsheet is in Appendix J.

*Table 24: Dedicated NPDES Stormwater Permit Program Funding- Fiscal Years 2005 through 2013*

	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
<b>Budget:</b>	153,000	163,000	151,100	160,600	163,800	184,500	184,500	306,700	396,600
<b>Revenue:</b>									
Collected ESF	85,277	70,802	88,989	181,787	230,212	278,528	375,789	613,290	727,956
Collected RF	80,102	86,906	84,748	54,246	33,705	35,928	80,847	83,187	76,956
Fund Balance	115,915	157,543	155,765	153,932	171,255	130,341	81,627	47,700	227,900
Total	281,294	321,715	329,502	389,965	435,172	444,797	538,263	744,177	1,032,527
<b>Expenditures:</b>									
Salary & Fringe	0	0	0	0	0	0	49,525	102,358	267,351
NPDES Consult	72,691	81,302	85,639	40,853	112,595	89,926	42,140	22,927	64,838
WIP Consult	0	0	0	0	0	0	0	71,413	129,197
Legal Consult	0	0	0	0	0	0	7,500	7,500	5,040
USGS	47,500	73,235	64,090	68,393	71,603	90,389	117,527	41,764	41,746
Monitoring	0	0	0	0	0	0	0	0	45,110
GIS Consult	0	0	177	0	0	0	16	0	125
County	3,559	4,949	25,666	109,463	120,633	182,855	217,865	262,259	327,851
Debt Service									5,761
Misc									
<b>Balance:</b>	157,543	155,765	153,932	171,255	130,341	81,627	103,656	235,957	145,507
Adjustment of ESF:							124,125		

ESF-Environmental Service Fee, RF-Recordation Fee, WIP-Watershed Implementation Plan, GIS –Geographical Information System

Consultant expenses in Fiscal Year 2013 include KCI Technologies, Inc.(NPDES consultant), LimnoTech (Watershed Implementation Plan consultant), AquaLaw (legal consultant), Spatial Systems Associates, Inc. (GIS consultant), and the County’s partnership agreement with USGS to perform water quality monitoring of the Mattawoman Creek.

KCI consulting expenses include: stream monitoring, illicit discharge inspections, BMP monitoring, and pollutant load estimates. Limnotech consultanting expenses include: preparing the Charles County Phase II Watershed Implementation Plan Strategy to achieve the Chesapeake Bay TMDL for nutrients.

For Fiscal Years 2011 and 2012, fifty percent of one planner staff salary and fringe was funded by the NPDES Stormwater Permit Program. Beginning in Fiscal Year 2013, the Department of Planning and Growth Management funded: 80% of one planner salary, 50% of two stormwater engineers, 30% of one administrative stormwater staff, and 50% of a resource manager by the dedicated funding.

*Fiscal Year 2014*

As required by Maryland House Bill 987 (2012 session) the County developed a Watershed Protection and Restoration Program (WPRP). In order to develop an appropriate fee structure, three options were reviewed and considered by the Charles County Commissioners. These options included:

- (1) Flat Fee: The total cost of the program would be divided evenly among all eligible properties. The pro of this method is that since all properties are charged the same, it's fairly easy to administer with few potential accounting errors. The con of this method is that properties with a lot of impervious surface and those with a little impervious area pay the same amount, so there is no incentive to reduce impervious surface.
- (2) 500 Square Feet Unit: All properties, including residential would be evaluated to determine the number of 500 square feet units of impervious surface on the property, which would be multiplied by the fee per unit. The pro of this method is that every property is charged fairly according to the amount of impervious surface. The con of this method is that because of the detail involved in measuring each individual property, the chance of mapping and mathematical errors is extremely high.
- (3) Equivalent Residential Unit (ERU): The average impervious surface is calculated for single family residential lots. The average is the deemed one ERU and assigned a rate charged. Townhouses, condominiums, and other non-commercial housing types are calculated to be a portion or multiple of one ERU. For example, townhouse may be uniformly assigned ½ of an ERU and thus charged ½ of the ERU rate. Impervious surface on non-residential properties are calculated individually as multiples of an ERU. The pro of this method is that the rates for the highest number of lots in the county would be standard, while still being fair.

For options 2 and 3, the County had to develop impervious surface data prior to preparing the analysis. This effort took several months, delaying the full evaluations until March 2013. The County Attorney's Office, and Departments of Fiscal and Administrative Services and Planning and Growth Management worked with Spatial Systems Associates, Inc. to develop the fee structure and implementation and billing frameworks. The County Commissioners first full briefing on the development of the fee and proposed fee structure took place on April 2, 2013, followed by introduction of Watershed Protection and Restoration Program legislation Bill 2013-10 on April 16, 2013. A public hearing was held on May 1, 2013 followed by work sessions on May 7, 2013 and May 21, 2013. On June 12<sup>th</sup>, the first bill was pulled, and two new bills were submitted for the County Commissioners' consideration. Bill 2013-11 proposing a flat fee, and Bill 2013-12 proposing a fee based on ERUs. A public hearing on the two new bills was held directly following introduction. A final work session and adoption Bill 2013-11 occurred on June 18, 2013.

The Watershed Protection and Restoration Fund supports applicable programs per Maryland House Bill 987 (2012 session) from two County Departments: Planning and Growth Management, and Public Works. In Table 25 below, is an overview of the total fund. The adopted legislation and full fiscal spreadsheet are included in Appendix K.

Table 25: Estimated WPRF Budget - Fiscal Year 2014

	Estimated FY14
<b>Budget:</b>	2,133,000
<b>Revenue:</b>	
Stormwater Remediation Fee	2,313,700
Lot Recordation Fee	50,000
Low Income Tax Credit	(2,000)
Incentive Credit	(231,400)
Interest	2,700
Total Operating Revenues	2,133,000
<b>Expenditures:</b>	
Salary & Fringe	248,900
Operating	1,214,100
Contingency	194,200
Debt Service	475,800
Balance:	0

In Fiscal Year 2014, the Department of Planning and Growth Management will fund: 80% of a planner, 100% of an additional planner, and 100% of a contractual stormwater management maintenance inspector from the WPRF. The Department of Public Works will fund: one environmental compliance officer at 100% from the WPRF.

Funding necessary to implement the Watershed Restoration requirement of the permit is provided through the County's Capital Improvements Program (CIP) budget. This funding was originally approved to begin in Fiscal Year 2003 at the rate of \$200,000 per year for a five year period totaling \$1 million, and was to cover permit retrofit requirements of the County's first NPDES MS4 permit. Shortly after this approval, the County was issued a new NPDES MS4 permit which increased the retrofit requirements and identified the requirements as Watershed Restoration.

In November 2004 the County Commissioners reviewed and supported the Charles County Watershed Restoration Study and the projects needed to meet the new permit requirements. Subsequently, the County Commissioners increased the Fiscal Years 2006 - 2011 CIP budget to \$7.69 and the Fiscal Years 2010 – 2014 budget to \$12.04 million to implement the proposed projects.

#### *Capital Improvement Projects Budgets*

In February 2004 the County began issuing bonds for the Capital Improvements Projects (CIP) budget. In March 2007 construction was initiated on the County's first watershed restoration projects, which is reflected by the increased expenditures shown in the table below. In Fiscal Year 2011 the County funded a \$25,000 watershed restoration study from the NPDES CIP fund. This study is to identify additional watershed restoration projects for construction. In Fiscal Year 2012, the County funded \$455,540 to expand GIS mapping of the County's stormwater infrastructure. See Appendix L for approved capital budgets.

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*Table 26: NPDES Capital Improvements Program Expenditures through Fiscal Year 2013*

Bonds	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	TOTAL
Issued	40,000	0	100,000	1,000,000	400,000	471,800	500,000	1,400,000	700,000	1,700,000	6,311,800
Expended	40,000	0	100,000	1,000,000	400,000	471,800	500,000	1,399,998	511,479	1,025,040	5,448,317

*Table 27: Fiscal Year 2013 Capital Improvement Program for NPDES Retrofits*

	Budget	Spent	Balance
Carrington (8014)	1,867,230	1,867,219	Complete
Pinefield (8023)	1,219,630	1,024,483	195,147
Acton/Hamilton (8024)	308,760	276,467	32,293
Bryans Road (8025)	2,009,810	1,590,089	419,721
NPDES Study (8028)	24,740	24,738	2
Fox Run (8030)	115,210	110,020	5,190
Lancaster (8031)	85,360	63,546	21,814
Northwood (8032)	28,830	28,830	Complete
Ryon Woods (8033)	89,860	79,264	10,596
White Plains (8034)	147,600	126,708	20,892
NPDES Mapping (8035)	513,800	23,082	490,718
GIS Mapping (8036)	455,540	291,099	164,441
Pinefield Temi Drive (8037)	620,300	26,572	593,728
Holly Tree Stream Restoration	46,100	24,550	21,550
To Be Determined (8019)	14,642,230	11,460	14,630,770
<b>TOTAL</b>	<b>22,175,000</b>	<b>5,568,126</b>	<b>16,606,863</b>

*Table 28: Capital Improvements Program Appropriation per Year*

FY03	214,000	FY 09	2,127,000
FY 04	220,000	FY 10	2,409,000
FY 05	224,000	FY 11	2,409,000
FY 06	72,000	FY 12	1,505,000
FY 07	778,000	FY 13	5,657,000
FY 08	1,452,000	FY14	5,108,000

*Maryland Phase II Watershed Implementation Plan (Phase II WIP)*

Fiscal Year 2013 marked the first year, in which County funding was allocated to enhance project pace for the Phase II WIP. A total of \$100,000 was allocated for the purpose of fully funding installation of nitrogen removal technology on septic systems. At that time the BRF grants fund only a portion of the installation based on income, so full grant funding regardless of income, was anticipated to stimulate the number of grant applications. However, by the end of Fiscal Year 2013 the State's BRF grant program was modified to provide full funding to most applicants for upgrade. To date a program has not been established to use the funding, and no money has been spent.

**III.H. Assessment of Controls**

Overview of Permit Conditions

1. *Annually, Charles County shall submit estimates of expected pollutant load reductions as a result of its proposed management programs.*

2013 Status

One key component of Charles County’s pollution reduction program is the identification of current pollution loads. This enables the County to identify current trends in water quality within receiving waters and evaluate the success of the overall NPDES Stormwater Permit Program. The pollutant loading estimate is prepared annually and is determined based on two factors: loads produced from current land uses within the County and reductions from existing stormwater controls.

Beginning late in 2011 through 2012, the County began work on a local evaluation of the Chesapeake Bay Phase II Watershed Implementation Plan (WIP), for the purposes of determining the necessary stormwater controls, also known as urban best management practices (bmps), to achieve the target loads. Part of this work involved using Maryland’s Assessment Scenario Tool (MAST). More discussion of this project is included under Section IV. Special Programmatic Conditions.

It was determined urban nutrient loading rates from MAST were lower than the County’s previous estimates, and the urban sediment loading rates from MAST were higher than the County’s previous estimates. Loads were calculated to edge of stream (EOS), not delivered to the Bay.

	Nitrogen, EOS Lbs/yr	Phosphorus, EOS Lbs/yr	Sediment, EOS Lbs/yr
MAST (urban regulated and non-regulated, impervious and pervious)	246,166.30	25,958.40	6,677,150.30

Because of the work related to the County’s Phase II WIP, the pollutant loading rates were not updated using previous years’ methods, and instead efforts focused on coordinating the County’s Phase II WIP and NPDES Stormwater permit data to develop a single baseline for nutrients and sediment.

Some of the pollutant loading calculations will still be based on assumptions, until final mapping of urban bmps and their drainage areas is completed. This will allow land use and bmp types to be verified. Additionally, compilation of additional bmps not previously counted is occurring. This includes Environmental Site Design (ESD) bmps, single family dwelling bmps, and alternative bmps, such as street sweeping and inlet vacuuming. Following is a discussion of how pollutant loading estimates have been done in previously, however these estimates are being revised to be consistent with the Phase II WIP.

*Pollutant Load Calculations in 2011*

In the County's 2011 NPDES Annual Report, the pollutant loading rates were updated from the 2010 calculations based off of several methods and sources. Loading rates for residential and institutional land uses continued to be based off of chemical monitoring results from the Arthur Middleton Elementary School sampling stations. Loading rates for total nitrogen, total phosphorus, and total suspended solids were taken from Chesapeake Bay Program literature in lbs/acre/year, for all other land use categories, except "extractive" and "agricultural buildings", which were developed from the PLOAD manual. Loading rates for biological oxygen demand and lead for commercial, industrial, and transportation land uses were unchanged from 2010, and were taken from the Maryland Department of the Environment's published monitoring results from 1997. Loading rates for the remaining constituents were taken from the National Stormwater Quality Database (2004).

Loading rates for residential and institutional land uses were calculated from sampling event mean concentrations (EMCs) using the Simple Method, which integrates drainage areas, land use, pollutant concentrations, and types of BMPs to determine annual loading and load reductions for each watershed or drainage area. It uses the following parameters:

- Rainfall, P, is the average long-term annual rainfall amount of 39 inches
- Land use coverage for the 2011 estimate was determined from the 2007 Maryland Department of Planning coverage
- Drainage area, A, is based on the coverage of each land use coverage within the County boundary
- Event mean concentrations (EMCs)

Pollutant loads are calculated using A, Rv, and the pollutant concentration, C, which is the Event Mean Concentration (EMC) for a particular pollutant. Because removal efficiencies for nitrogen removal are only reported for TN, the loads have been reported similarly, using the relationship  $TN = TKN + NOx$ . EMCs are shown in Table 29.

The expected pollutant load computations use chemical monitoring data developed by Charles County as part of the monitoring component of the NPDES MS4 permit. The watershed currently being chemically monitored consists primarily of residential and institutional drainage. Therefore, the event mean concentrations (EMCs) developed as part of the monitoring program are used as pollutant loading rates for the residential and institutional land uses throughout the County.

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*Table 29: EMC Data (mg/l)*

Land Use	LU Code	TN	TKN	NO3+ NO2	TP	TSS	BOD	Cu	Zn	Pb
Low Density Residential	11	4.21	2.46	1.75	0.42	79.26	25.6	0.02	0.12	0.02
Medium Density Res'l	12	4.21	2.46	1.75	0.42	79.26	25.6	0.02	0.12	0.02
High Density Residential	13	4.21	2.46	1.75	0.42	79.26	25.6	0.02	0.12	0.02
Institutional	16	4.21	2.46	1.75	0.42	79.26	25.6	0.02	0.12	0.02

Spreadsheets showing the pollutant load results are attached as Appendix K of the 2011 NPDES Annual Report, and a summary is shown in Table 30 below.

*Table 30: Estimates of Pollutant Loading (lb/yr)*

	TN	TP	TSS	BOD	Cu	Zn	Pb
Entire County FY 2011***	2,708,902	1,817,089	22,707	1,817,089	2,639	31,151	3,731
Entire County FY 2010**	487,937	73,413	11,712,911	2,115,516	1,705	15,278	2,204
Entire County FY 2009	427,474	71,437	10,344,933	1,770,138	1,395	12,718	1,821
Entire County FY 2008*	429,412	72,216	10,694,197	1,876,824	1,396	11,437	1,206
Entire County FY 2007	429,412	72,216	10,694,197	1,876,824	1,396	11,437	1,206
Entire County FY 2006	429,205	72,376	11,009,554	1,954,360	1,401	11,414	884
Entire County FY 2005	423,309	72,137	10,893,776	2,061,298	1,338	11,233	908
Entire County FY 2004	398,653	72,963	10,159,796	853,772	1,161	10,769	1,001

\*Pollutant loads unchanged from previous reporting year due to no chemical monitoring being performed, and land use data input being unchanged.

\*\*Updated 2007 land use data, generated by the Maryland Department of Planning, was used in FY10 and subsequent years.

\*\*\*Significant changes to loads result from updates to loading rates in FY11.

As can be seen from Table 30 above, the pollutant loads have increased significantly from the 2010 results. This is a result of the updated loading rates that were used in the model. The pollutant load calculations will continue to be updated as land use information is updated.

The loads presented in Table 30 are those that occur in the storm runoff itself. No attempt was made to estimate pollutants from baseflow or stream erosion outside of what was taken into account by developing the rates. Similarly, the load reductions were not estimated for the volume of runoff which flows to natural wetlands. Wetlands would effectively reduce the pollutants to receiving waters, particularly the Potomac River and the Chesapeake Bay.

*Pollutant Load Reductions*

Pollutant load reductions resulting from installation of best management practices (BMPs) were calculated by applying the loading rate discussed above to the drainage area to the facility, and multiplying by the pollutant removal efficiency. The pollutant removal efficiencies were developed for BMPs in each category contained in the draft MS4 permits, including: dry detention ponds, hydrodynamic structures, dry extended detention ponds, wet ponds and wetlands, infiltration practices, filtering practices, vegetated open channels, and erosion and sediment control practices.

The pollutant removal efficiencies for each of these categories was taken from the recent MDE publication *Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated: Guidance for National Pollutant Discharge Elimination System Stormwater Permits, June 2011* for total nitrogen, total phosphorus, and total suspended solids. Pollutant removal efficiencies for other contaminants were developed from the Center for Watershed Protection (2000) or the International Stormwater BMP Database (2008). Pollutant removal efficiencies used for each BMP category are included in the spreadsheet computations in Appendix K of the 2011 Annual Report.

The BMPs used for the reduction modeling were taken from Charles County's 2011 Urban BMP Database. There were 1,183 BMPs recorded in the database, an increase of 102 facilities over what was used in the calculations in 2010. Not all of the BMPs contained in the database had enough information to be included in the model, such as land use, drainage area, and BMP type. The County is continually refining its data, and as such, the pollutant load reduction computations are improved as more data is available.

Pollutant load reductions were summed for each BMP that had the required data. The total reductions for each contaminant are provided in Appendix K of the 2011 Annual Report and summarized in Table 31 below.

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*Table 31: County-Wide Pollutant Loading Reductions (Lb/Yr)*

		<b>TN</b>	<b>TP</b>	<b>TSS</b>	<b>BOD</b>	<b>Cu</b>	<b>Zn</b>	<b>Pb</b>
		<b>lbs/yr</b>	<b>lbs/yr</b>	<b>tons/yr</b>	<b>lbs/yr</b>	<b>lbs/yr</b>	<b>lbs/yr</b>	<b>lbs/yr</b>
<b>FY 2011</b>	Total Load	2,708,902	284,403	22,707	1,817,089	2,639	31,151	3,731
	Reductions	9,014	2,508	590	0.00	76	814	150
	Percent Reduced	0.3%	0.9%	2.6%	0.0%	2.9%	2.6%	4.0%
<b>FY 2010</b>	Total Load	487,937	73,413	11,712,911	2,115,516	1,705	15,278	2,204
	Reductions	19,881	2,594	1,096,399	0	154	1,598	0
	Percent Reduced	4.1%	3.5%	9.4%	0.0%	9.0%	10.5%	0.0%
<b>FY 2009</b>	Total Load	427,474	71,437	10,344,933	1,770,138	1,395	12,718	1,821
	Reductions	17,982	2,475	992,584	0	152	1,516	0
	Percent Reduced	4.2%	3.5%	9.6%	0.0%	10.9%	11.9%	0.0%
<b>FY 2008</b>	Total Load	429,412	72,216	10,694,197	1,876,824	1,396	11,437	1,206
	Reductions	18,479	2,543	1,039,673	0	151	1,413	0
	Percent Reduced	4.3%	3.5%	9.7%	0.0%	10.8%	12.4%	0.0%
<b>FY 2007</b>	Total Load	429,412	72,216	10,694,197	1,876,824	1,396	11,437	1,206
	Reductions	17,009	2,384	967,809	0	145	1,352	0
	Percent Reduced	4.0%	3.3%	9.0%	0.0%	10.4%	11.8%	0.0%
<b>FY 2006</b>	Total Load	429,205	72,376	11,009,554	1,954,360	1,401	11,414	884
	Reductions	14,286	1,946	817,645	0	126	1,189	0
	Percent Reduced	3.3%	2.7%	7.4%	0.0%	9.0%	10.4%	0.0%
<b>FY 2005</b>	Total Load	423,309	72,137	10,893,776	2,061,298	1,338	11,233	908
	Reductions	3,438	579	190,951	113	20	207	0
	Percent Reduced	0.8%	0.8%	1.8%	0.0%	1.5%	1.8%	0.0%
<b>FY 2004</b>	Total Load	436,758	77,826	10,477,051	1,019,049	1,187	11,290	929
	Reductions	1,682	314	97,703	54	11	114	0
	Percent Reduced	0.4%	0.4%	1.0%	0.0%	1.0%	1.1%	0.0%

#### **IV. Special Programmatic Conditions**

##### Overview of Permit Conditions

*...this NPDES permit requires Charles County to assist with the implementation of the strategy designed to meet the nutrient reduction goals of the Lower Potomac River basin. Coordination between and among other jurisdictions is a major requirements and the identification of those appropriate jurisdictions will occur jointly with MDE. Additionally, deadlines, priorities, and scheduling to satisfy specific conditions will be determined in conjunction with MDE. In any case, progress toward meeting these conditions shall be reported to MDE.*

##### 2013 Status

###### *Tributary Strategy Teams*

The Lower Potomac Tributary Team did not meet in Fiscal Year 2013 however, the County continued participating on the Patuxent River Commission. On June 9, 2013, the 26<sup>th</sup> annual Patuxent River Wade-In was held at Jefferson Patterson Park, and hosted 225 attendees.

###### *NPDES Permitted Jurisdiction Meetings*

The Maryland Department of the Environment hosts quarterly meetings for the NPDES permitted jurisdictions to provide a network for communication that solves permit issues. Meetings were not held from Fiscal Year 2006 through Fiscal Year 2010. In Fiscal Year 2011 a monthly meeting schedule resumed in preparation for the Department's guidance document titled, "Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated." The draft was circulated in June 2011. No meetings were held from June 2011 until May 9, 2013, when MDE hosted a GIS meeting to review a proposed geodatabase design. The phases to improve NPDES reporting and associated data submission process include: new database design, new database intake application and an internal MDE data management application. MDE accepted comments on the draft database design through Fiscal Year 2013. Appendix M contains a copy of the presentation and the draft NPDES Geodatabase Design VI.2.

###### *State Water Quality Advisory Committee*

The County continues to maintain membership on this committee and the Watershed Restoration subcommittee. The committee continued to focus on the Chesapeake Bay TMDL, and sediment trapped at Conowingo Dam, among other issues.

*US Army Corps of Engineers 2003 Mattawoman Creek Watershed Management Plan*

A partnership agreement between the County and the U.S. Army Corps of Engineers was signed in 1998 to calibrate a computer model that would evaluate several “what-if” scenarios analyzing management options to reduce nitrogen, phosphorus, and sediment to the Mattawoman Creek.

In February 2004 the U.S. Army Corps of Engineers presented the Plan to the County Commissioners. Three recommendations were included in the plan: (1) Stream Valley Protection; (2) Best Management Practices for Future Development; and (3) Best Management Practices for Existing Development. In summary the Plan states, “planned development in the Mattawoman Creek watershed should include local and regional efforts for the purpose of creating an economically developed and environmentally protected area. Balancing these seemingly opposing measures was considered when developing the management scenarios.”

The Planning Division received a Coastal Community Initiative (CCI) Grant through the Maryland Department of Natural Resources to draft ordinance amendments to implement best management practices for future development. Bill 2008-1 addresses reduced parking, use of pervious parking, conservation landscaping and increased shading over parking areas, and became effective May 17, 2008. In 2008, 2009 and 2010 County staff continued to work on draft zoning text to implement the refined Mattawoman Creek Stream Valley delineation prepared by the Maryland Department of Natural Resources under a Coastal Community Initiative (CCI) Grant.

*Port Tobacco River Watershed Restoration Action Strategy Grant*

The Charles County Commissioners applied for a Port Tobacco River Watershed Restoration Action Strategy (WRAS) Grant through the Maryland Department of the Environment (MDE), which was approved in the Fall of 2004 and continued through 2006. The main focus of the WRAS is to identify and prioritize water quality improvement opportunities to meet the Port Tobacco River Watershed nutrient TMDL and reduce bacteria levels to ranges that are safe for recreational uses in the River.

In the first year of the WRAS grant, the State agencies provided water quality analysis, a stream corridor assessment, a biological stream survey and a watershed characterization report.

Stakeholders which participated on the WRAS Steering Committee, include the Town of LaPlata, the College of Southern Maryland, the Charles County Chamber of Commerce, the Port Tobacco River Conservancy, the Charles County Health Department, the Charles Soil Conservation District, the Maryland Extension Service, and the Southern Maryland Resource Conservation and Development Office.

On June 20, 2006 the County Commissioners adopted the WRAS for implementation. In August 2008, the La Plata Town Council adopted the WRAS for implementation. The full WRAS can be linked to from the County's new watershed planning webpage at:

<http://www.charlescountymd.gov/pgm/planning/watershed-planning>

To implement the WRAS, Charles County has been working under four grants/partnerships. These include: (1) The Bay Restoration Fund to install nitrogen removal septic targeted in the watershed FY2007-present; (2) DNR Coastal Communities Initiative grant to develop a commercial component to the County's existing residential transfer of development rights program in FY2009; (3) National Fish and Wildlife Chesapeake Small Watershed grant to revise the County's stormwater management code and to better implement best management practices on new development in FY2008-FY2010; and (4) USGS partnership agreement titled, "Surface-Water and Pore-Water Sampling in Port Tobacco River Watershed, Charles County, MD," for the purpose of better identifying the contaminant source using wastewater compounds in FY2009. The USGS abstract for this project and Open File Report are on <http://pubs.usgs.gov/of/2010/1071/>.

In August 2008, Charles County Government partnered with the Town of La Plata, the Charles Soil Conservation District and the Port Tobacco River Conservancy to apply for a \$3.7 million Local Implementation Grant (LIG) through the Maryland Department of Natural Resources. This proposal is to restore water quality in the La Plata Subwatershed using stormwater retrofits, septic connections, stream restoration, and agricultural best management practices. The project was not awarded funding.

The fiscal year 2013 County approved CIP projects include a project from the Port Tobacco River Watershed Restoration Action Strategy: (1) Upper Port Tobacco River Watershed Sewer Connection Study to be funded in FY2014 from the Sewer Connection Fee. See Appendix N for the approved capital budget.

#### *Mattawoman Creek Monitoring Station*

In July 2013, the County began the eleventh year of a water quality monitoring project for the Mattawoman Creek with the U.S. Geological Survey.

This project funds a monitoring station that was previously initiated and funded by the Maryland Department of the Environment in 2000. The purpose of this station is to develop a long term record of water quality data for determining trends in the watershed. The station is part of the Chesapeake Bay Programs' Long Term Status and Trends Network. An advantage of this station is that USGS posts the data on their website for public access: <http://md.waterdata.usgs.gov>

In summer/fall of 2010 the USGS prepared a draft Scientific Investigations Report (SIR) to document the ten years of data. **USGS Scientific Investigations Report 2012–5265: Summary and Interpretation of Discrete and Continuous Water-Quality Monitoring Data, Mattawoman Creek, Charles County, Maryland, 2000–11**, was finalized in November 2012 and can be accessed at: <http://pubs.usgs.gov/sir/2012/5265/>.

Beginning in the summer/fall of 2012 monitoring continues in the same location, but with an emphasis on collecting integrated samples from the full cross-section of the creek. The purpose is to minimize the dominant influence of Old Woman’s Run over the Mattawoman Creek mainstem in the samples.

#### *Bay Restoration Fund Grant*

In 2008 the County completed installation of the first 32 nitrogen-reducing septic system technology under the \$604,000 grant from Maryland Department of the Environment, received in December 2006. In July 2009 The Charles County Department of Health received an additional grant of \$900,000 from MDE to install an additional 65 nitrogen reducing units, of which 23 have been installed prior to May 2010. As of May 2011, a total of 91 nitrogen units are installed. In fiscal year 2013 the Charles County Health Department received a grant in the amount of \$485,000. In Fiscal Year 2014 an additional grant in the amount of \$517,000 was awarded. As of the close of close of Fiscal Year 2013, 117 systems have been installed at a cost of \$2,117,339.

#### *Water Resources Element*

Charles County began work on the Water Resource Element, which is a part of the County’s Comprehensive Plan, with the assistance of a consultant, Environmental Resources Management, Inc. A draft of the Water Resources Element was completed early in 2009. The Water Resources Element began the public adoption process in the Fall/Winter of 2010, and was adopted by the Charles County Commissioners on May 24, 2011. It is an amendment to the 2006 Charles County Comprehensive Plan. The full plan may be viewed on-line at:

<http://www.charlescounty.org/webdocs/pgm/publications/resourceinfrastructure/wre2006.pdf>

In fiscal year 2012 the County began an extensive public process to update the Comprehensive Plan, including the Water Resources Element. This effort is ongoing through July 2013.

#### *Environmental Site Design*

The County pursued adoption of Environmental Site Design (ESD) Regulations beginning with a public kick-off meeting in January 2009 held at the Government Building and as described in the

2009 NPDES Annual Report. Subsequent ESD training workshops were held in February 2010. The public adoption process for ESD began with a County Commissioner briefing on January 26, 2010, and was followed by a public hearing held on February 9, 2010, at which time the project was put on hold until the State adopted new grandfathering provisions. After the grandfathering was approved, the County approved the ordinance with an effective date of August 1, 2010.

### *Watershed Resources Registry*

The Watershed Resources Registry (WRR) is a tool developed as part of a collaborative effort between Maryland state agencies (Environment, Natural Resources and Highways) and federal agencies (EPA, Fish and Wildlife Service, Army Corps of Engineers, National Marine Fisheries Service, Natural Resources Conservation Service, Federal Highway Administration). The goal in developing the WRR is to identify suitable sites that meet multiple agency priorities and sites that meet multiple environmental goals (i.e. habitat protection and stormwater management). The development of the WRR signals a shift from issuing permits that limit impacts, to proactive preservation and restoration of our most valuable and threatened natural resources. It also serves as a publicly accessible tool in map format that shares the same data between permit applicants that the agency evaluating the application. Currently, the tool has been expanded from Prince George's and Charles County to the entire state of Maryland. The WRR is web-based and can be accessed at <http://watershedresourcesregistry.com/>

### *Phase II Watershed Implementation Plan (WIP)*

In February 2011, the Maryland state agencies held a Lower Western Shore Maryland Phase II Watershed Implementation Plan (WIP II) workshop. At this meeting the State designated liaison for the Charles County WIP II met with County representatives and a Team Leader for each County was identified. The purpose of the local WIP II teams, is to develop local strategies to meet the local pollution targets for addressing the Chesapeake Bay Total Maximum Daily Load (TMDL) for nutrients. The local pollution targets were assigned to each jurisdiction by the State.

March 8, 2011, Dr. Rich Eskin, Maryland Department of the Environment, presented the background and process for the Phase II Watershed Implementation Plan to the Charles County Commissioners. The Charles County Commissioners supported staff in proceeding with an open meeting process to develop the County's Phase II WIP. The open meetings with County staff, environmental organizations, developer organizations, attorneys, state agencies, federal land holders, and the State liaison began in March 2011 and continued monthly through November 2011, which was the original deadline for localities to submit their Phase II WIPs to the State. Charles County submitted its Phase II WIP by the November 18, 2011 due date. This can be found in Appendix M of the County's 2012 NPDES Annual.

In August 2011 the County began work with LimnoTech, Inc. to analyze the County's currently planned projects to determine how far these projects advanced the County toward target loads. LimnoTech presented their findings to the County's Phase II WIP workgroup. During the analysis of the pipeline projects and further work on the development of alternate scenarios to bridge the remaining gap to reach the target, LimnoTech coordinated several staff meetings. In November 2012 LimnoTech is continuing their work towards identifying the lowest cost scenarios for the County to achieve the target loads. By February 2012, Charles County's Phase II Watershed Implementation Plan (WIP) Strategy was completed.

February 28, 2013 the Charles County Phase II workgroup was reconvened for a briefing on the proposed WIP Strategy and to solicit the workgroup's comments. April 30, 2013 the proposed WIP Strategy and 2-year milestones for 2014-2015 were presented to the County Commissioners, who adopted the 2-year milestones for implementation. On May 14 and September 23, 2013 the WIP Strategy and 2-year milestones were presented as educational briefings for the Charles County Board of Appeals and Planning Commission, respectively.

The County's progress report on the first set of 2-year milestones for 2012-2013 was submitted to the Maryland Department of the Environment July 2013. The County's WIP Strategy and the County's progress report on the first set of 2-year milestones for 2012-2013 is in Appendix O.

#### *WIP Ongoing Educational and Coordination Meetings*

County staff continued to participate in the State's WIP coordination webinars and meetings during the permit period. Following is a list of these meetings:

##### Quarterly Local Engagement Sessions:

- Kick-off Webinar on November 28, 2013
- Winter Webinar on February 26, 2013

##### Local WIP Technical Meeting Webinars:

- Series #1 – January 25, 2013
- Series #2 – April 8, 2013
- Series #3- July 8, 2013 (staff missed)

##### WIP Regional Workshops:

- College of Southern MD – May 7, 2013
- College of Southern MD – November 4, 2013

*WIP Funding Workshops and Meetings*

Additionally County planning and fiscal staff participated in the following meetings regarding how to fund stormwater projects to achieve WIP pollution reduction targets:

June 5, 2012 – “Stormwater Utility Workshop - What HB 987 Means for MS4 Permit Holders” held in Laurel, Maryland, by AECOM and Water Resource Associates, Inc.

November 2, 2012 – “Stormwater Financing Strategies” workshop in Annapolis, Maryland, sponsored by Maryland Association of Counties, Chesapeake Bay Foundation, and Restore Capital.

December 14, 2012 – “MS4 Phase I Forum on Funding” held in Landover, Maryland and sponsored by the Environmental Finance Center of the University of Maryland.

August 1, 2013 – Met with representatives from the NatLab Team on *Crediting Conservation - Accounting for the Water Quality Value of Conserved Lands Under the Chesapeake Bay TMDL* by the Chesapeake Bay Commission, June 2013

September 26, 2013 – “Green Infrastructure Driven Urban Stormwater Retrofits Workshop - Community Based Public Private Partnerships” in Annapolis, Maryland, sponsored by the U.S. Environmental Protection Agency, the Maryland Department of the Environment, and Maryland Environmental Service.

*Accounting for Growth*

County planning staff also participated in the following Accounting for Growth local workshops. Accounting for Growth is a component of Maryland’s strategy to continue to meet the goals of the Chesapeake Bay nutrient TMDL as new development occurs.

September 13, 2012 – Growth Offset Meeting – presentation and panel discussion, La Plata, Maryland sponsored by the Maryland Departments of Environment and Agriculture, and the Harry R. Hughes Center for Agro-Ecology.

August 29, 2013 – Maryland’s Proposed Accounting for Growth Progress Report webcast to review the recommendations of the Accounting for Growth Workgroup. Satellite location in La Plata, Maryland. Sponsored by the Maryland Departments of Environment and Agriculture, and the Harry R. Hughes Center for Agro-Ecology.

*Additional Local Activities Related to Water Quality Improvement Coordination.*

- Turf management workshops for homeowners titled, *Secrets of a Green Lawn*, were held on August 20, 2012 and March 19, 2013. These are sponsored by the University of Maryland Cooperative Extension, MRW Lawns, Inc, and Charles County Government. The seminar topics include setting expectations for home turf, calculating the correct fertilizer rates, controlling pests and weeds, and the downstream impacts from lawn care practices.
- November 2, 2012, Hurricane Sandy caused wastewater treatment plant overflow into Mattawoman Creek. An article on this event is included in Appendix P.
- Charles County Department of Public Facilities continued to hold Hazardous Waste days on the first Saturday of each month April through December.
- April 6, 2013, the Annual Potomac River Watershed Clean-up was held.
- June 28, 2013 participated in the Potomac Conservancy's project working with of nine Maryland counties and the District of Columbia located within the Potomac River watershed to provide a review of local codes and ordinances to identify opportunities and barriers to using Environmental Site Design (ESD) to the maximum extent practicable. The final report is expected by the end of calendar year 2013. Charles County's section is included in Appendix P.
- October 24, 2013, Maryland State Highway Association held the first meeting with the County Department of Planning and Growth Management to coordinate potential partnering opportunities to implement restoration projects to achieve the Chesapeake Bay pollutant reduction targets.
- October 29, 2013, staff of the County Department of Planning and Growth Management attended the Central Maryland Stormwater Seminar, held in Laurel, Maryland, and sponsored by the Maryland Department of the Environment. The target audience for the seminar was local government staff performing the new three step stormwater review, and implementing Environmental Site Design to the Maximum Extent Practicable.