

CHESAPEAKE BAY TMDL ACTION PLAN

Chesterfield County, Virginia
VSMP Permit No. VA0088609

Prepared November 2016

Last Revised: January 31, 2019

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— Department of —
**ENVIRONMENTAL
ENGINEERING**



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List of Abbreviations

BMP	Best Management Practices
BOS	Board of Supervisors
CIP	Capital Improvement Program
DEE	Chesterfield County Department of Environmental Engineering
DEQ	Virginia Department of Environmental Quality
EOS	End of Stream
FY	Fiscal Year
GIS	Geographic Information System
GUIDANCE MEMO	Guidance Memo No. 15-2005
INVENTORY	Stormwater Asset Inventory
LTC	Little Tomahawk Creek
MG	Million Gallons
MS4	Municipal Separate Storm Sewer System
MS4PP	MS4 Program Plan
PER	Preliminary Engineering Report
PERMIT	Chesterfield County MS4 Permit
PLAN	TMDL Action Plan
POC	Pollutant(s) of Concern
SWM	Stormwater Management
TBD	To Be Developed
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
VDOT	Virginia Department of Transportation
VGIN	Virginia Geographic Information Network
VPDES	Virginia Pollutant Discharge Elimination
VSMP	Virginia Stormwater Management Program
WWTP	Wastewater Treatment Plant

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A	Estimating Pollutant Loadings to the MS4 Service Area
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Preface

Chesterfield County's Municipal Separate Storm Sewer System (MS4) Permit No. VA0088609 (Permit) was reissued to the county on December 17, 2014. The permit authorizes the discharge of stormwater from the MS4 and requires the implementation of programs which control and manage stormwater to reduce the discharge of pollutants to surface waters. The Chesterfield County Department of Environmental Engineering (DEE) is responsible for overall implementation of the Permit and reporting requirements.

The purpose of this document, the Chesapeake Bay Total Maximum Daily Load (TMDL) Action Plan (Plan), is to comply with the requirements of Chesapeake Bay Special Condition (Part I.D.1.) of the Permit. The section provides the framework for the development of a Plan that details the county's program to reduce the loadings of nutrients and sediment from existing MS4 sources consistent with Phase I and II Watershed Implementation Plans in agreement with the Commonwealth of Virginia's commitment to reduce pollutant(s) of concern (POC) to the Chesapeake Bay.

The Virginia Department of Environmental Quality (DEQ) Chesapeake Bay TMDL Action Plan Guidance Memo No. 15-2005 (Guidance Memo) was used to prepare the contents included in this Plan. This Plan is the first of three Chesapeake Bay TMDL Action Plans to be developed by the county over the next three permit cycles. This Plan documents the planned reductions of total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) in order to achieve compliance with permit-required load reduction targets.

The organization of this document follows the structure of the permit addressing the components required for the implementation of the Plan as outlined in the TMDL Action Plan and Implementation Part I.D.



Part I.D.1.b)1)(a)

1. Current Program and Existing Legal Authorities

SPECIFIC REPORTING REQUIREMENTS

- **A review of the current MS4 Program Plan including existing legal authorities and the permittee's ability to ensure compliance with this special condition.**

Chesterfield's MS4 Program Plan (MS4PP) and existing legal authorities provide the county with the necessary means to ensure compliance with this special condition. Please refer to the sections entitled "DOCUMENTATION" of the MS4PP for, by reference, specific operational controls, legal authorities, policies, procedures, checklists, plans, and documents that apply to the MS4PP element. The MS4PP can be found on the DEE website at:

<https://www.chesterfield.gov/DocumentCenter/View/434/Municipal-Separate-Storm-Sewer-System-MS4-Program-Plan-PDF?bidId>.

Part I.D.1.b)1)(b)

2. New or Modified Legal Authorities

SPECIFIC REPORTING REQUIREMENTS

- **Identifies any new or modified legal authorities, such as ordinances, permits, orders, contracts and inter-jurisdictional agreements, implemented or needing to be implemented to meet the requirements of this special condition.**

In April 2016, the Chesterfield County Board of Supervisors (BOS) amended Article IV to Chapter 8 of the Code of the County of Chesterfield to establish a stormwater utility and associated fee in order to provide the necessary funding for the implementation of the projects identified in this Plan. There are no additional planned, new, or modified legal authorities beyond that described in the MS4PP, which is considered necessary to meet the requirements of this special condition.



Part I.D.1.b)1)(c)

3. Means and Methods to Address Discharges from New Sources

SPECIFIC REPORTING REQUIREMENTS

- **The means and methods utilized to address discharges into the MS4 from new sources.**

Chesterfield has required development projects, by regulation since 1991, to implement both nonstructural and structural stormwater controls to meet construction and post-construction site runoff requirements. In 2014, the DEQ approved amendments to county ordinance, Chapter 8 Section(s) 8-1 through 8-16, in accordance with the Virginia Stormwater Management Program (VSMP) Regulations (9VAC25-870). Compliance for post-development phosphorous runoff loads from new sources, after the adoption, must comply with the following:

- 1) Land-disturbing activities that obtained an initial state permit or commenced land disturbance prior to July 1, 2014, are conducted in accordance with the Part II C technical criteria of the regulations. Such projects shall remain subject to the Part II C technical criteria for two additional state permit cycles. After such time, portions of the project not under construction shall become subject to any new technical criteria adopted by the state board.
- 2) Land-disturbing activities that obtain an initial state permit on or after July 1, 2014 are conducted in accordance with the Part II B technical criteria of the regulations unless otherwise grandfathered and subject to Part II C technical criteria. Land-disturbing activities conducted in accordance with the Part II B technical criteria shall remain subject to the Part II B technical criteria for two additional state permit cycles. After such time, portions of the project not under construction shall become subject to any new technical criteria adopted by the state board.



Part I.D.1.b)1)(d)

4a. Estimated Existing Source Loads

SPECIFIC REPORTING REQUIREMENTS

- An estimate of the annual Pollutant of Concern (POC) loads discharged from the existing sources as of June 30, 2009 based on the 2009 progress run. The permittee shall utilize Table 1 and multiply the total existing acres served by the MS4 on June 30, 2009 progress run.

Using the James River Basin source load calculations for MS4 discharges, Table 1 provides an estimate of the total required pollutant load reductions, by source, for nitrogen, phosphorus, and suspended solids. Over the next three permit cycles, these totals will be reduced in order to maintain compliance with the county's current and future permits. The methodology for defining the MS4 service area and determining the land cover is described in Appendix A—Estimating Pollutant Loadings to the MS4. Table 1 provides the estimated pollutant loads associated with the total existing acres served by the MS4.

Table 1. Calculation Sheet for Estimating Existing Source Loads for the James River Basin

<u>Subsource</u>	<u>Pollutant</u>	<u>Total Existing Acres Served by MS4 (6/30/09)</u>	<u>2009 EOS Loading Rate (lbs/ac/yr)</u>	<u>Estimated Total POC Load Based on 2009 Progress Run (lb/yr)</u>
Regulated Urban Impervious	Nitrogen	6,659	9.39	62,528.17
Regulated Urban Pervious		33,390	6.99	233,395.13
Regulated Urban Impervious	Phosphorus	6,659	1.76	11,719.87
Regulated Urban Pervious		33,390	0.5	16,694.93
Regulated Urban Impervious	Total Suspended Solids	6,659	676.94	4,507,755.08
Regulated Urban Pervious		33,390	101.08	3,375,047.23



Part I.D.1.b)1)(e)

4b. Calculated Total POC Required Reductions

SPECIFIC REPORTING REQUIREMENTS

- **A determination of the total pollutant load reductions necessary to reduce the annual POC existing loads using Table 2 by multiplying the Total Existing Acres Served by the MS4 by the First Permit Cycle Reductions.**

Using the more accurate load reduction rates for the James River Basin, from the Guidance Memo, Table 2 provides an estimate for the first permit cycle of the required reductions for nitrogen, phosphorus, and suspended solids. The reductions from the annual pollutant loading rates vary for each pollutant and land cover. As specified in the *Virginia Phase I Watershed Improvement Plan*, the reductions for the first permit cycle is 5 percent of the total required reductions from existing sources as of June 30, 2009.

Table 2. Calculation Sheet for Determining Total POC Reductions Required During this State Permit Cycle for the James River Basin

<u>Subsource</u>	<u>Pollutant</u>	<u>Total Existing Acres Served by MS4 (6/30/09)</u>	<u>First Permit Cycle Required Reduction Loading Rate (lbs/ac/yr)</u>	<u>Total Reduction Required During First Permit Cycle (lbs/yr)</u>
Regulated Urban Impervious	Nitrogen	6,659	0.042255	281.38
Regulated Urban Pervious		33,390	0.02097	700.19
Regulated Urban Impervious	Phosphorus	6,659	0.01408	93.76
Regulated Urban Pervious		33,390	0.0018125	60.52
Regulated Urban Impervious	Total Suspended Solids	6,659	6.7694	45,077.55
Regulated Urban Pervious		33,390	0.442225	14,765.83



Part I.D.1.b)1)(f)

5. Means and Methods to Meet the Required Reductions and Schedule

SPECIFIC REPORTING REQUIREMENTS

- **The means and methods, such as the management practices and retrofit programs that will be utilized to meet the required reductions identified in Part.I.D.1.b)(1)(e) and a schedule to achieve those reductions. The schedule should include annual benchmarks to demonstrate the on-going progress in meeting the reductions. The means and methods implemented prior to July 1, 2009 shall not be credited towards meeting the required reductions identified in Part I.D.1.b)1)(e).**

Implementation of stormwater management practices and a retrofit program for compliance under this Special Condition was initiated in part, through Chesterfield's Stormwater Capital Improvement Program (CIP). The proposed projects improve stormwater management and reduce pollutants discharged from the MS4 to the receiving waters. The Stormwater CIP formed the basis of the means and methods to meet this special condition and also provides a tentative schedule for project implementation. The types of stormwater management practices were selected from the list of BMPs approved by DEQ and/or the Chesapeake Bay Program. Site selection of a project is based on a cost-benefit analysis which includes the number of acres treated by the BMPs, impervious area draining into BMPs, condition of the downstream channel, amount of pollutant reduction, feasibility for implementation, the unit costs for pollutant reduction, and other benefits from the proposed BMP.

During this first permit cycle, Chesterfield County has implemented or expects to implement a combination of retrofits and practices to achieve the required reductions. This includes regional stormwater treatment facilities, stream restoration and stabilization projects, existing structural BMP enhancements and outfall retrofits, conversion of existing ponds, installation of treatment facilities, and land cover conversions.

Table 3 includes a summary of the projects expected to be completed within the first permit cycle and the total calculated nutrient and sediment reduction credits by project.



Table 3. Means and Methods to Meet Required Reductions During the First Permit Cycle

<u>Project Name</u>	<u>TN Reductions (lbs/yr)</u>	<u>TP Reductions (lbs/yr)</u>	<u>TSS Reductions (lbs/yr)</u>
Mid-Lothian Mines Stream Restoration	112.09	109.47	73,711.83
Wrens Nest Stream Restoration	83.41	77.71	51,414.36
Regional Stormwater Facility Little Tomahawk Creek (LTC) 20/25	763.25	129.16	50,840.59
Proctors Creek Outfall Retrofits	164.59	18.60	6,282.11
James River High School BMP Retrofits	70.67	26.11	7,480.10
Pocoshock Creek Stream Restoration	295.79	295.40	199,729.03
County Safety Complex BMP Retrofits ¹	129.48	13.25	3,950.64
Bailey Bridge Middle School Outfall Retrofits	194.41	25.11	12,292.45
Total Reductions	1,684.21	681.56	40,1750.47

1. Construction of this project has been discontinued until further notice. Project specific pollutant reductions are not reflected in the "Total Reductions" above.

Appendix B provides detailed information and discussion of each project. This includes the status of implementation, POC credit calculations, and a schedule for completion for each practice over the first permit cycle. Table 4 provides a list of control measures implemented during the permit reporting period and the cumulative progress towards meeting the 1st permit cycle compliance targets for total nitrogen, phosphorus, and suspended soils. All reductions above the required first permit cycle totals will be applied to the second permit cycle reduction requirements.

Table 4. Control Measures Implemented for the Chesapeake Bay TMDL in PY4

<u>Control Measure</u>	<u>TN Reductions (lbs/yr)</u>	<u>TP Reductions (lbs/yr)</u>	<u>TSS Reductions (lbs/yr)</u>
BMP Retrofits	70.6	26.1	7,480.1
Outfall Retrofits	164.6	18.6	6,282.1
Stream Restoration	195.5	187.2	125,126.2
Stormwater BMPs	763.2	129.2	50,840.6
Total Reductions Achieved	1,194.0	361.0	189,729.0
Compliance Targets	981.6	154.3	59,843.4
Percent Compliance	121.64%	234.02%	317.04%

Additional reductions not part of the CIP program, include redevelopment based reductions, land use conversion, and historical (2006-2009) BMPs. These credits are in the process of being evaluated and/or confirmed and are not credited towards meeting



the required 5 percent reductions of the first permit cycle. Estimates of the reductions are shown in Table 5 and details of each element can be found in Appendix C—Additional Reduction Credits.

Table 5. Additional Reduction Credits Outside of the CIP Program and Not Credited in the First Permit Cycle

<u>Project Name</u>	<u>TN Reductions (lbs/yr)</u>	<u>TP Reductions (lbs/yr)</u>	<u>TSS Reductions (lbs/yr)</u>
Redevelopment-based Reductions	0.0	0.0	0.0
Nonpoint Source Nutrient Trading	0.0	0.0	0.0
Land Use Conversion	5.2	15.0	420.9
Historical BMPs	1,743.2	420.9	169,526.0
Total Reductions Achieved/Projected	1,748.40	435.90	169,946.90

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Part I.D.1.b)1)(g)

6. Means and Methods to Offset Increased Loads From New Sources Initiating Construction Between July 1, 2009 and June 30, 2014

SPECIFIC REPORTING REQUIREMENTS

- The means and methods to offset the increased loads from new sources initiating construction between July 1, 2009 and June 30, 2014 that disturb one acre or greater as a result of the utilization of an average land cover condition greater than 16% impervious cover for the design of post development stormwater management facilities. The permittee shall utilize Table 3 to develop the equivalent pollutant load for nitrogen and total suspended solids. The permittee shall offset 5% of the calculated increased load from these new sources during the permit cycle.

In accordance with Chesterfield County regulations, construction projects that were initiated between July 1, 2009 and June 30, 2014 were required to utilize an average land cover condition of 16% or less impervious cover in the design of post-development stormwater management plans. Therefore, construction projects during this period would not require additional pollutant load reductions under this Special Condition.



Part I.D.1.b)1)(h)

7. Means and Methods to Offset Increased Loads From Grandfathered Projects that Began Construction After July 1, 2014

SPECIFIC REPORTING REQUIREMENTS

- The means and methods to offset the increased loads from grandfathered projects in accordance with 9VAC25-870-48, that disturb one acre or greater that begin construction after July 1, 2014 where the project utilized an average land cover condition greater than 16% impervious cover in the design of post development stormwater management facilities. The permittee shall utilize Table 3 to develop the equivalent pollutant load for nitrogen and total suspended solids.

In accordance with Chesterfield County regulations, construction projects determined to be grandfathered are required to utilize an average land cover condition of 16% or less impervious cover in the design of post-development stormwater management plans. Therefore, grandfathered construction projects after July 1, 2014 would not require additional pollutant load reductions under this Special Condition.



Part I.D.1.b)1)(i)

8. A List of Future Projects, and Associated Acreage that Qualify as Grandfathered

SPECIFIC REPORTING REQUIREMENTS

- **A list of future projects and associated acreage that qualify as grandfathered in accordance with 9VAC25-870-48.**

Appendix D—Potential Future Projects Qualifying as Grandfathered, contains a list of new development projects and the associated acreage. These projects received county approval for construction prior to July 1, 2012, and have not received, prior to July 1, 2014, coverage under the General Permit for Discharges of Stormwater from Construction Activities.

While the projects listed meet the statement in the Guidance Memo, as outlined above, it does not necessarily mean that any of the projects will ultimately be considered, or request to be considered, grandfathered. In Chesterfield County, construction projects that are grandfathered may continue to utilize Part II C of the technical criteria of the VSMP regulations to meet post-construction stormwater management requirements. The county still requires the construction projects to utilize an average impervious land cover condition of 16% for the design of post-construction controls. As indicated in Part I.D.1.b)1)(h), there would be no new sources to require additional pollutant load reductions under this Special Condition.



Part I.D.1.b)1)(j)

9. An Estimate of the Expected Cost to Implement the Necessary Reductions

SPECIFIC REPORTING REQUIREMENTS

- An estimate of the expected cost to implement the necessary reductions during the permit cycle.

Table 6 contains a summary of the estimated expected costs for implementation of the requirements of this Special Condition during the first permit cycle. These costs are associated with planning, development, and funding of the program as well as design and construction of stormwater management projects.

Table 6. Costs to Implement the Necessary Reductions During the First Permit Cycle

Permit Cycle of the Special Condition	Estimated Cost
TMDL Planning	\$440,468
Mid-Lothian Mines Stream Restoration	\$670,903*
Wrens Nest Stream Restoration	\$1,038,766*
Regional Stormwater Facility Little Tomahawk Creek (LTC) 20/25	\$1,792,563*
Proctors Creek Outfall Retrofits	\$393,821*
James River High School BMP Retrofits	\$853,835*
Pocoshock Creek Stream Restoration	\$3,051,832
County Safety Complex BMP Retrofits	\$221,201
Bailey Bridge Middle School Outfall Retrofits	\$786,148
Total Estimated Costs	\$9,249,537

*Actual Cost - Project Completed



Part I.D.1.b)1)(k)

10. Opportunity for Public Comments on Draft Action Plan

SPECIFIC REPORTING REQUIREMENTS

- **An opportunity for receipt and consideration of public comment on the draft Chesapeake Bay TMDL Action Plan.**

During November 2016, Chesterfield announced and publicized a copy of the draft Plan on the county's website and presented an overview of the Plan and its components to the Chesterfield County Board of Supervisors at a public meeting held on November 16th, 2016. The Plan can be found on the county's website at:

<https://www.chesterfield.gov/DocumentCenter/View/444/Chesapeake-Bay-TMDL-Action-Plan-PDF?bidId>

In 2013, Chesterfield contracted with Arcadis to develop a document providing information on cost estimates for the recommended stormwater treatment strategies. This document assisted in planning for future capital costs of potential stormwater projects. In Fiscal Year (FY) 2014 staff initiated, through the budget and planning process, the Chesterfield's Chesapeake TMDL program to address the costs associated with the future requirements of the stormwater permit and water quality improvements. This budget process included meetings with county residents, public hearings, and final approval through adoption of the budget by the BOS. Prior to the public process, each department's proposed budget requires a rigorous internal review and an assessment of the appropriateness of the proposed allocation of resources to a program based on a thorough examination of the program's alternatives and justifications. Therefore, the major components of this Plan, which includes funding, design, and construction of the recommended stormwater projects, have been reviewed by the County's Budget and Management staff, the County Administrator, and the BOS prior to public hearing and adoption.



Part I.D.1.b)1)(I)

11. Public Comments Received on Draft Action Plan

SPECIFIC REPORTING REQUIREMENTS

- **An opportunity for receipt and consideration of public comment on the draft Chesapeake Bay TMDL Action Plan.**

A summary of comments received as a result of public comment period can be found in Appendix E. Included with each public comment, is the county's response as well as any revisions made to the Plan as result of the comment. A summary of the public comments received to date on the Plan can be found on the county's website at:

<https://www.chesterfield.gov/DocumentCenter/View/444/Chesapeake-Bay-TMDL-Action-Plan-PDF?bidId>

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Appendix

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Appendix A—Estimating Pollutant Loadings to the MS4 Service Area

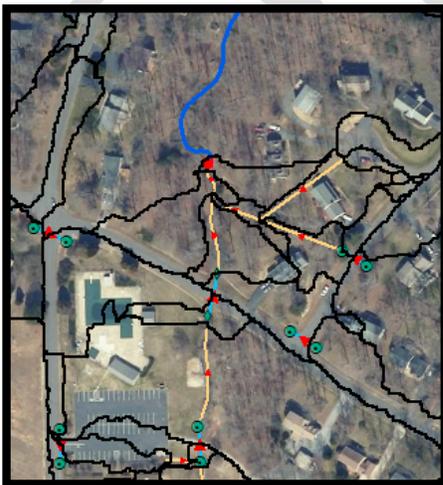
DEFINING THE MS4 SERVICE AREA

MAPPING INFRASTRUCTURE



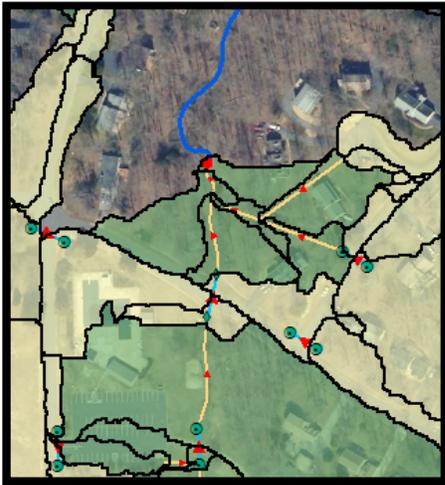
- A stormwater asset inventory (Inventory), to include ditches, pipes, inlets, manholes, and outfalls, was mapped using archived construction plans.
- Within the Inventory, streams were updated using previous mapping efforts and Geographic Information System (GIS) analysis.
- Outfalls were defined as those assets that drained directly to streams or BMPs that discharged to streams.
- Outfall ownership was based on the following criteria:
 - Drainage easements
 - Ownership of property on which the outfall was located
 - Location of storm sewer infrastructure in residential developments

DEVELOPING CATCHMENTS



- Local drainage areas, or catchments, were developed by modeling software that analyzed the location of assets within the Inventory in relation to digital elevation data.

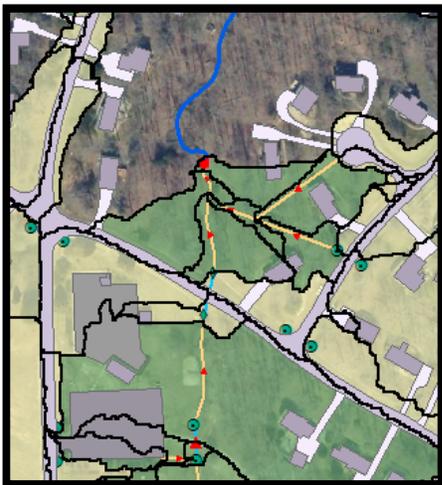
ASSIGNING OWNERSHIP



- Each catchment was assigned an ownership status with consideration of the following:
 - Individual storm sewer system outfall's ownership
 - Individual storm sewer systems falling within VDOT right-of-way
 - Operator status as identified in the Inventory
- Those storm sewer systems covered by VPDES Individual and General Stormwater Permits, in addition to the five Phase II MS4 permittees in the county, were evaluated to determine connectivity to the county's MS4.
- The county's MS4 Service Area was submitted to DEQ in June of 2016.

DETERMINING IMPERVIOUS AND PERVIOUS AREA

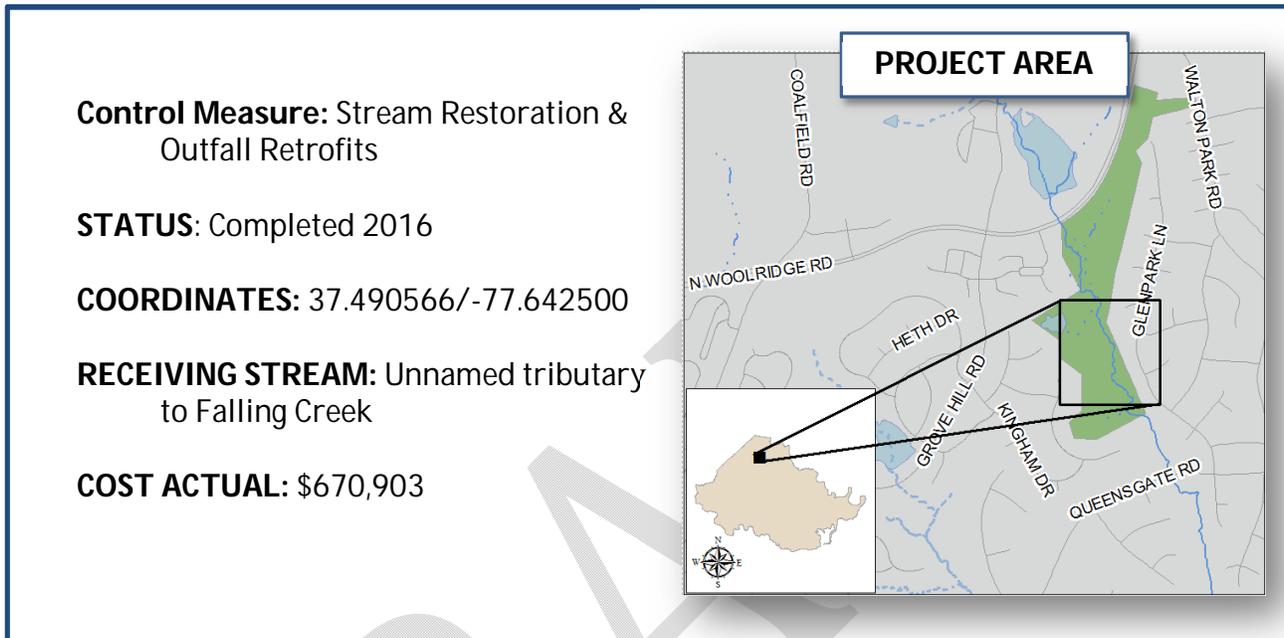
ESTIMATING LAND COVER



- The following information was used to estimate land cover:
 - County-maintained GIS files for impervious cover, wetlands, and open waters
 - VGIN (2016) land cover for forested areas
- The total impervious cover was calculated as follows:
 - Urban Impervious = Urban Impervious within MS4 Service Area – Impervious Development after 2009
= 6,659 acres
- The total pervious cover was calculated as follows:
 - Urban Pervious = Total MS4 service area – (Urban Impervious + Forest + Water)
= 33,390 acres

Appendix B—Detailed Project Information

Mid-Lothian Mines Park Stream Restoration



DESCRIPTION

The project area is located on county property within the Mid-Lothian Mines Park. The total length of stream restoration for this project is 1,700 linear feet. The restoration effort also included retrofitting three stormwater outfalls that discharged untreated stormwater runoff into the stream within the limits of restoration. The retrofits provide for demonstration projects of three options for reduction water quantity and quality impacts from outfalls. The improvements provide for the ability of the stream channel to accommodate current and future flows, sustain a healthy habitat, improve water quality, and protect adjacent properties from flood damage. Restoration techniques and outfall retrofits also provide educational opportunities for park visitors.

CREDIT CALCULATIONS

The Urban Stream Restoration Interim Approval Removal Rates found in Table V.J.1. of the Guidance Memo were used to calculate the final pollutant removal for the project.

STEP 1: CALCULATE POC REDUCTIONS FROM STREAM RESTORATION PROJECT						
Linear Feet Restored		POC Reductions (lbs/yr)				
		TN	TP	TSS		
1,700		127.50	115.60	76,296		
STEP 2: CHARACTERIZE ACRES DRAINING TO THE STREAM RESTORATION PROJECT						
Land Type	Urban Impervious	Urban Pervious	Total Urban	Forested		
Regulated Land	115.17	215.89	331.06	60.81		
Unregulated Land	16.31	42.51	58.82	35.90		
		Sub-Total	389.88	96.71		
		Total	486.60			
STEP 3: CALCULATE THE TOTAL REDUCTIONS FOR REGULATED AND UNREGULATED URBAN LANDS						
Land Type	Ratio	Pollutant Credits (lbs/yr)				
		TN	TP	TSS		
Regulated Acreage	0.68	86.7	78.7	51,909.1		
Unregulated Acreage	0.12	15.4	14.0	9,223.0		
Forested Acreage	0.20	25.3	23.0	15,163.9		
STEP 4: ACCOUNT FOR THE TOTAL BASELINE REDUCTIONS ON UNREGULATED LAND						
Land Type	Baseline Loading Rate (lbs/ac/yr)			Unregulated Required Baseline Reduction (lbs/yr)		
	TN	TP	TSS	TN	TP	TSS
Urban Impervious	0.85	0.2816	135.39	13.78	4.59	2,208.18
Urban Pervious	0.42	0.0363	8.84	17.83	1.54	376.00
Total Baseline Reduction Requirement				31.61	6.13	2,584.17
Reduction Credit Available for Unregulated Lands				0.00	7.84	6,638.83
STEP 5: CALCULATE TOTAL REDUCTIONS FROM REGULATED AND UNREGULATED (NON-FORESTED) ACRES, ACCOUNTING FOR REQUIRED BASELINE REDUCTIONS						
Land Type	Adjusted Pollutant Reduction Credits (lbs/yr)					
	TN	TP	TSS			
Regulated	86.75	78.65	51,909.06			
Unregulated	0.00	7.84	6,638.83			
Forested	25.34	22.98	15,163.93			
Total Reductions for Project (lbs/yr)		112.09	109.47	73,711.83		



Wrens Nest Stream Restoration

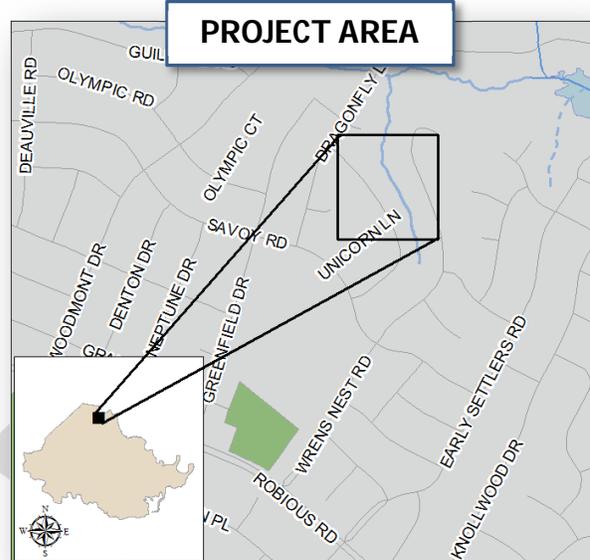
Control Measure: Stream Restoration

STATUS: Completed 2016

COORDINATES: 37.522134/-77.589776

RECEIVING STREAM: Unnamed tributary
to Powhite Creek through Settlers
Landing Subdivision

COST ACTUAL: \$1,038,766



DESCRIPTION

The project area is located in the Settlers Landing subdivision and drains to Powhite Creek. The project consists of channel mitigation over approximately 1,150 linear feet and includes a combination of bank stabilization and channel grade control structural retrofits used to dissipate energy, reduce erosive stormwater flows, and reconnect flood waters to the floodplain. These improvements provide for protection of the adjacent lots, property, and infrastructure, while reducing water quantity and quality impacts downstream.

CREDIT CALCULATIONS

The Urban Stream Restoration Interim Approval Removal Rates found in Table V.J.1. of the Guidance Memo were used to calculate the final pollutant removal for the project.

STEP 1: CALCULATE POC REDUCTIONS FROM STREAM RESTORATION PROJECT						
<u>Linear Feet Restored</u>	<u>POC Reductions (lbs/yr)</u>					
	<u>TN</u>	<u>TP</u>	<u>TSS</u>			
1,150	86.25	78.20	51,612			
STEP 2: CHARACTERIZE ACRES DRAINING TO THE STREAM RESTORATION PROJECT						
<u>Land Type</u>	<u>Urban Impervious</u>	<u>Urban Pervious</u>	<u>Total Urban</u>	<u>Forested</u>		
Regulated Land	21.75	59.01	80.76	0.15		
Unregulated Land	1.17	4.41	5.58	0.00		
		Sub-Total	86.34	0.15		
		Total	86.49			
STEP 3: CALCULATE THE TOTAL REDUCTIONS FOR REGULATED AND UNREGULATED URBAN LANDS						
<u>Land Type</u>	<u>Ratio</u>	<u>Pollutant Credits (lbs/yr)</u>				
		<u>TN</u>	<u>TP</u>	<u>TSS</u>		
Regulated Acreage	0.93	80.5	73.0	48,192.5		
Unregulated Acreage	0.06	5.6	5.0	3,328.7		
Forested Acreage	0.00	0.2	0.1	90.8		
STEP 4: ACCOUNT FOR THE TOTAL BASELINE REDUCTIONS ON UNREGULATED LAND						
<u>Land Type</u>	<u>Baseline Loading Rate (lbs/ac/yr)</u>			<u>Unregulated Required Baseline Reduction (lbs/yr)</u>		
	<u>TN</u>	<u>TP</u>	<u>TSS</u>	<u>TN</u>	<u>TP</u>	<u>TSS</u>
Urban Impervious	0.85	0.28	135.39	0.99	0.33	158.67
Urban Pervious	0.42	0.04	8.84	1.85	0.16	38.97
Total Baseline Reduction Requirement				2.84	0.49	197.64
Reduction Credit Available for Unregulated Lands				2.72	4.55	3,131.07
STEP 5: CALCULATE TOTAL REDUCTIONS FROM REGULATED AND UNREGULATED (NON-FORESTED) ACRES, ACCOUNTING FOR REQUIRED BASELINE REDUCTIONS						
<u>Land Type</u>	<u>Adjusted Pollutant Reduction Credits (lbs/yr)</u>					
	<u>TN</u>	<u>TP</u>	<u>TSS</u>			
Regulated	80.54	73.02	48,192.49			
Unregulated	2.72	4.55	3,131.07			
Forested	0.15	0.14	90.79			
Total Reductions for Project (lbs/yr)	83.41	77.71	51,414.36			



Regional Stormwater Facility LTC 20/25

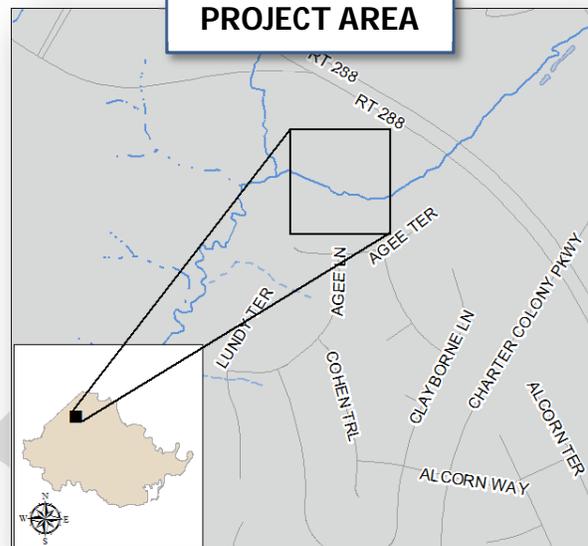
Control Measure: Stormwater BMP

STATUS: Completed 2016

COORDINATES: 37.483333/-77.670833

RECEIVING STREAM: Little Tomahawk
Creek

COST ACTUAL: \$1,792,563



DESCRIPTION

The project, LTC-20/25, is a 2.5 acre watershed-level regional stormwater pond with a 0.5 acre sediment forebay. A dam was constructed, and grading completed to create a sediment forebay and main pond that impounds and treats runoff from an unnamed tributary for the enhancement of water quality downstream. The pond receives stormwater runoff and base flow from approximately a 352 acre drainage area. A concrete spillway maintains storm flows out of the pond while a low-level outlet releases water at a cooler temperature and maintains downstream base flow.

CREDIT CALCULATIONS

Due to design constraints and insufficient storage capacity, the Chesapeake Bay Program Retrofit Curves were used to calculate the final pollutant load removal efficiencies for the project.

DETERMINE INITIAL POLLUTANT LOADING				
Draining Area (acres)				
Impervious	86.60			
Pervious	226.78			
Forest	39.08			
Total	352.46			
Initial Pollutant Loading (lbs/yr)				
TN	2,490.62			
TP	270.89			
TSS	84,571.62			
DETERMINE REMOVAL EFFICIENCY				
Reduction Rate Calculation				
Runoff Storage (acre-feet)	RS	12.10		
Impervious Acres	IA	86.60		
Runoff Depth Treated (inches)	RD	1.68		
Final Removal Efficiency				
TN	38.5%			
TP	60.6%			
TSS	77.1%			
Initial Calculated Load Reduction Credit (lbs/yr)		TN	960.11	
		TP	164.15	
		TSS	65,214.56	
STEP 1: CHARACTERIZE ACRES DRAINING TO THE PROJECT				
Land Type	Urban Impervious	Urban Pervious	Total Urban	Forested
Regulated Land	68.01	143.46	211.47	13.66
Unregulated Land	18.59	83.33	101.92	25.42
		Sub-Total	313.38	39.08
		Total	352.46	



STEP 2: DETERMINE PROPORTION OF BMP REDUCTIONS THAT MAY BE APPLIED TOWARDS THE TMDL REDUCTION REQUIREMENTS				
		Total TP Load (lb/yr)	TP Efficiency (%)	
TP Load from Unregulated Land	Impervious	32.72	-	
	Pervious	41.66	-	
	Total	74.39	-	
Baseline TP Load (unregulated load * 0.41)		41.79	-	
Total TP Reduction Required for Unregulated Land		32.60	-	
TP Reduction Efficiency Provided by BMP		-	61%	
TP Reduction Provided by BMP for Unregulated Lands		45.07	-	
TP Credit Allowed (Reduction Provided by BMP - Reduction Required for Baseline)		12.47	-	
Proportion of Unregulated Land Allowed for Credits		0.28		
STEP 3: DETERMINE LOADS FOR TN AND TSS FROM UNREGULATED LANDS				
Pollutant Type		Pollutant Load (lbs/yr)		
TN		757.03		
TSS		21,008.50		
STEP 4: DETERMINE BMP REDUCTIONS FOR TN AND TSS FROM UNREGULATED LAND				
Pollutant Type		Removal Efficiency	Reduction (lbs/yr)	
TN		39%	291.83	
TSS		77%	16,200.01	
STEP 5: DETERMINE CREDIT TOWARDS TMDL REDUCTION FOR TN AND TSS FROM UNREGULATED LAND				
Pollutant Type		Proportion TP	Reduction (lbs/yr)	
TN		0.28	80.77	
TSS		0.28	4,483.57	
STEP 6: CALCULATE TOTAL CREDITS USING PROPORTIONS OF REGULATED AND UNREGULATED LANDS				
Land Type	Proportion of Credits from Land Type			
	Ratio	Pollutant Credits (lbs/yr)		
		TN	TP	TSS
Regulated	0.60	576.03	98.48	39,126.61
Unregulated	0.29	80.77	12.47	4,483.57
Forest	0.11	106.45	18.20	7,230.41
Total Reductions for Project (lbs/yr)		763.25	129.16	50,840.59



Proctors Creek Outfall Retrofits

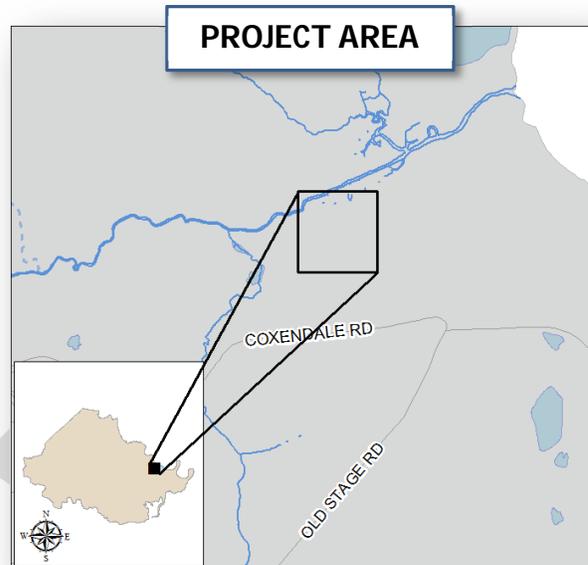
Control Measure: Outfall Retrofit

STATUS: Completed 2017

COORDINATES: 37.382230/-77.394079

RECEIVING STREAM: Proctors Creek

COST ACTUAL: \$393,821



DESCRIPTION

The project includes the design and construction of stormwater outfall retrofits for two outfalls located at the Proctors Creek Wastewater Treatment Plant (WWTP). These outfalls currently drain approximately 39 acres of impervious area and managed turf. Stormwater runoff from the Proctors Creek WWTP is currently collected via curb and gutter and is discharged without treatment through two outfalls to Proctor's Creek. Outfall retrofits consist of a dissipation section, plunge pool, level spreader, and diversion area on county property to reduce nutrient and sediment loads prior to discharging to Proctor's Creek. The outfall retrofits have been designed to meet the design specifications for Sheet flow to Vegetated Filter or Conserved Open Space (VA DEQ Stormwater Design Specification No. 2).

CREDIT CALCULATIONS

Loads to the outfalls were calculated using the 2009 EOS Loading Rates from Table 1 of the Permit. Total nitrogen and phosphorus removal efficiencies from the Virginia BMP Clearinghouse for Sheetflow to Vegetated Filter or Conserved Open Space 2 (A/B soils at Outfall 1, C/D soils at Outfall 2) were used to calculate the reductions for the project. The Chesapeake Bay Program Retrofit Curve (from Table V.B.2 of the Guidance Memo) was used to calculate the TSS removal efficiency.

DETERMINE INITIAL POLLUTANT LOADING			
		Outfall 1	Outfall 2
Draining Area (acres)			
Impervious		4.26	6.16
Pervious		11.97	12.28
Water		3.89	0.77
Total		20.12	19.21
Initial Pollutant Loading (lbs/yr)			
TN		123.67	143.68
TP		13.48	16.98
TSS		4,093.69	5,411.21
DETERMINE REMOVAL EFFICIENCY			
TSS Reduction Rate Calculation			
Runoff Storage (cubic-feet)		17,573	15,517
Runoff Storage (ac-feet)	RS	0.403	0.356
Impervious Acres	IA	4.26	6.16
Runoff Depth Treated (in)	RD	1.134	0.694
Removal Efficiency			
TN		75%	50%
TP		75%	50%
TSS		72.15%	61.51%
CALCULATE TOTAL POC REDUCTIONS FOR PROJECT			
Load Reduction (lbs/yr)			
TN		92.75	71.84
TP		10.11	8.49
TSS		2,953.73	3,328.39
Total Reductions for Project (lbs/yr)	TN	TP	TSS
	164.59	18.60	6,282.11



James River High School BMP Retrofits

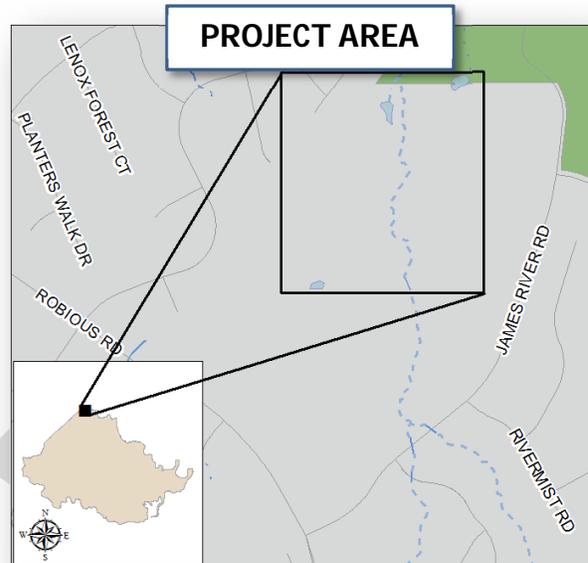
Control Measure: BMP Retrofit

STATUS: Completed 2018

COORDINATES: 37.553306/-77.650107

RECEIVING STREAM: Unnamed tributary
to the James River

COST ACTUAL: \$853,835



DESCRIPTION

James River High School is located at 3700 James River Road in Midlothian, Virginia, in the northernmost part of Chesterfield County, near its border with the James River. The site is approximately 42 acres, and stormwater runoff from the site discharges through unnamed tributaries to the James River. The BMP retrofits include the conversion of three extended dry detention basins located on county property at the James River High School. The combined stormwater treatment includes approximately 43 acres of impervious cover, managed turf and forested areas.

Pond A was enhanced to meet the specifications of a Level 1 Constructed Wetland in the Virginia Stormwater BMP Clearinghouse. Pond B was enhanced to meet the specifications of a Level 2 Wet Pond in the Virginia Stormwater BMP Clearinghouse. Pond C was enhanced to a wet pond with a pretreatment installed upstream in lieu of a forebay within the pond itself.

CREDIT CALCULATIONS

Downward modifications were applied to each pond due to missing design elements. Pond A has lowered efficiency of 10% of the starting efficiency for each of the following: missing forebay, short-circuiting, volume deficiency. Pond B and Pond C have lowered efficiencies of 10% of the starting efficiency for each of the following: missing forebay and volume deficiency. For Pond A and Pond B, the TN and TP values were calculated from Virginia Stormwater BMP Clearinghouse Efficiencies; and the TSS efficiency was

calculated using Chesapeake Bay Retrofit Curve for Stormwater Treatment using designed volumes to calculate runoff depth. For Pond C, all efficiencies (TN, TP, and TSS) were calculated using Chesapeake Bay Retrofit Curve for Stormwater Treatment using designed volumes to calculate runoff depth. Pond C starting loads exclude those loads treated by the Stormceptor.

DETERMINE INITIAL POLLUTANT LOADING					
		Pond A	Pond B	Pond C	Stormceptor
Draining Area (acres)					
Impervious		4.25	11.44	7.71	7.43
Pervious		3.42	9.01	2.39	0.58
Forest		4.46	0.60	1.08	1.06
Total		12.13	21.05	11.19	9.08
Initial Pollutant Loading (lbs/yr)					
TN		74.29	171.85	91.70	76.36
TP		9.76	24.72	12.21	13.51
TSS		3,565.83	8,702.19	2,961.30	5,171.61
DETERMINE REMOVAL EFFICIENCY					
Starting Efficiency					
TN		20%	20%	20%	NA
TP		20%	20%	20%	NA
TSS		60%	60%	60%	NA
Downward Modification					
Missing Forebay		X	X	X	NA
Absence of Micropool		X	X	X	NA
Short Circuiting		X	-	-	NA
Volume Deficiency		X	-	X	NA
Total		40%	20%	30%	NA
Revised Starting Efficiency					
TN		12%	16%	14%	NA
TP		12%	16%	14%	NA
TSS		36%	48%	42%	NA
TSS Reduction Rate Calculation					
Runoff Storage (ac-feet)	RS	0.535	1.791	0.687	NA
Impervious Area	IA	4.25	11.44	7.71	NA
Runoff Depth (in)	RD	1.51	1.88	1.07	NA



Restored Removal Efficiency				
TN	25%	40%	35.24%	0%
TP	50%	75%	55.38%	20%
TSS	76%	78%	71.12%	50%
CALCULATE TOTAL POC REDUCTIONS FOR PROJECT				
Efficiency Improvement				
TN	13%	24%	21%	0%
TP	38%	59%	41%	20%
TSS	40%	29%	28%	50%
Load Reduction (lbs/yr)				
TN	9.66	41.24	19.77	0.0
TP	3.71	14.59	5.11	2.70
TSS	1,429.86	2,602.07	862.36	2,585.80
Total Reductions for Project (lbs/yr)		TN	TP	TSS
		70.67	26.11	7,480.10

DRAFT



Pocoshock Creek Stream Restoration

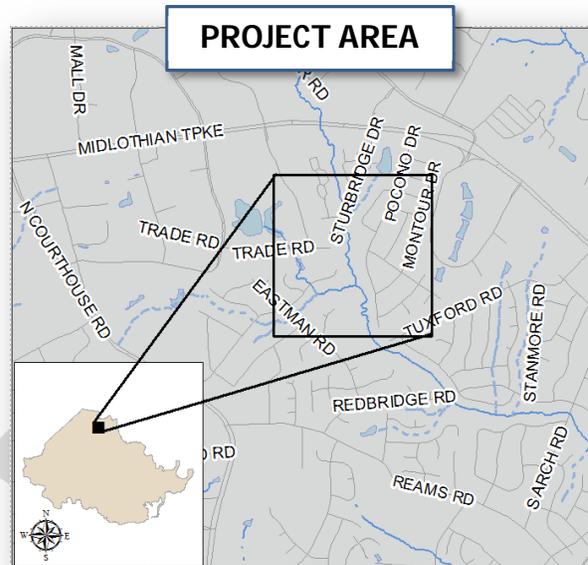
Control Measure: Stream Restoration

STATUS: Plan Development

COORDINATES: 37.500202/-77.588163

RECEIVING STREAM: Pocoshock Creek

COST ESTIMATE: \$3,051,832



DESCRIPTION

The proposed project is located in the area of Midlothian Turnpike and Sturbridge Drive in Chesterfield County. The stream restoration consists of approximately 4,652 linear feet (4,070 linear feet of main channel and 582 linear feet of side channel) and will improve the functions and value of the impaired stream channel by improving water quality and aquatic habitat in the creek. The restoration will establish a geomorphically stable stream channel using natural channel design principles and reduce downstream nutrient and sediment loads. The improvements will also provide for the ability to accommodate future flows and protect adjacent properties from flood damage.

CREDIT CALCULATIONS

The Urban Stream Restoration Interim Approval Removal Rates found in Table V.J.1. of the Guidance Memo were used to calculate the preliminary pollutant removal for the project.

STEP 1: CALCULATE POC REDUCTIONS FROM STREAM RESTORATION PROJECT						
Linear Feet Restored		POC Reductions (lbs/yr)				
		TN	TP	TSS		
4,473		335.48	304.16	200,748.24		
STEP 2: CHARACTERIZE ACRES DRAINING TO THE STREAM RESTORATION PROJECT						
Land Type	Urban Impervious	Urban Pervious	Total Urban	Forested		
Regulated Land	379.07	464.65	843.72	95.98		
Unregulated Land	59.15	118.03	177.18	47.05		
		Sub-Total	1,020.90	143.03		
		Total	1,163.93			
STEP 3: CALCULATE THE TOTAL REDUCTIONS FOR REGULATED AND UNREGULATED URBAN LANDS						
Land Type	Ratio	Pollutant Credits (lbs/yr)				
		TN	TP	TSS		
Regulated Acreage	0.72	243.2	220.5	145,520.3		
Unregulated Acreage	0.15	51.1	46.3	30,559.3		
Forested Acreage	0.12	41.2	37.4	24,668.7		
STEP 4: ACCOUNT FOR THE TOTAL BASELINE REDUCTIONS ON UNREGULATED LAND						
Land Type	Baseline Loading Rate (lbs/ac/yr)			Unregulated Required Baseline Reduction (lbs/yr)		
	TN	TP	TSS	TN	TP	TSS
Urban Impervious	0.85	0.28	135.39	49.99	16.66	8,008.84
Urban Pervious	0.42	0.04	8.84	49.50	4.28	1,043.99
Total Baseline Reduction Requirement				99.49	20.94	9,052.73
Reduction Credit Available for Unregulated Lands				0.00	25.37	21,506.54
STEP 5: CALCULATE TOTAL REDUCTIONS FROM REGULATED AND UNREGULATED (NON-FORESTED) ACRES, A COUNTY FOR REQUIRED BASELINE REDUCTIONS						
Land Type	Adjusted Pollutant Reduction Credits (lbs/yr)					
	TN	TP	TSS			
Regulated	243.18	220.49	145,520.31			
Unregulated	0.00	25.37	21,506.54			
Forested	41.22	37.38	24,668.66			
Total Reductions for Project (lbs/yr)		284.41	283.23	191,695.51		



County Safety Complex BMP Retrofits

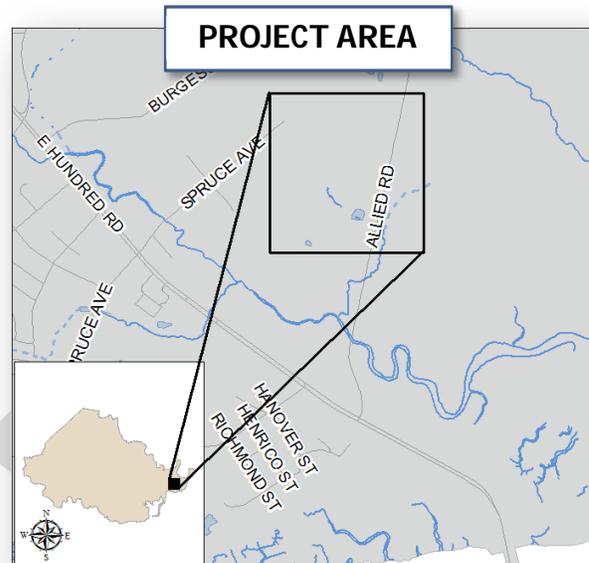
Control Measure: BMP Retrofit

STATUS: Procurement

COORDINATES: 37.331189/-77.306000

RECEIVING STREAM: Unnamed tributary
to Johnson Creek/Johnson Creek &
Shand Creek

COST ESTIMATE: \$221,201



DESCRIPTION

The county is planning to retrofit existing BMPs and evaluate the addition of new BMPs at the Enon County Safety Complex located at 13754 Allied Road in Chester, VA. The goal of the project is to reduce the nutrient and sediment loads currently discharged from the existing site by increasing the water quality treatment efficiency of several of the existing BMPs, as well as potentially constructing new BMPs to treat runoff that is currently discharged from the site without treatment. The county is planning to conduct an evaluation of up to 38 stormwater BMP retrofit alternatives, including a cost-benefit analysis and anticipated nutrient and sediment load reductions. The county plans to construct those BMP retrofits that are recommended as part of this evaluation. Conservative credit estimates were made for the following project alternatives:

1. Conversion of the existing ravine and the adjacent Extended Detention Basin #1 to a "combined" Level 1 wet pond or constructed wetland;
2. Conversion of 10,000 linear feet of existing grass, riprap and/or concrete ditch to bioswales; and
3. Conversion of Extended Detention Basin #3 to a Level 1 wet pond or constructed wetland.

CREDIT CALCULATIONS

Chesapeake Bay Program BMP Efficiencies for dry detention ponds were used for existing TN, TP, and TSS removal of the Basins #1 & #3. Virginia Stormwater Clearinghouse BMP Efficiencies for grass channels were used for existing TP and TN removal of the grass channel. The Bay Program Retrofit Curve was used to calculate TSS removal for the grass channel. BMP Clearinghouse Efficiencies for Level 1 Wet Ponds were used for TN and TP removal efficiencies of the North and South Basins. Chesapeake Bay Program Retrofit Curves were used to calculate TSS removal efficiencies for the North and South Basin. Chesapeake Bay Program BMP Established Efficiencies for Bioswales were used for TN, TP, and TSS removal of the bioswale.

DETERMINE INITIAL POLLUTANT LOADING					
		Basin #1	Basin #3	Bioswale	
Draining Area (acres)					
Impervious		2.79	7.75	1.25	
Pervious		9.83	49.36	15.48	
Forest		0.00	34.09	0.00	
Total		12.62	91.20	16.73	
Starting Loads (lbs/yr)					
TN		94.91	417.79	119.95	
TP		9.83	38.32	9.94	
TSS		2,883.13	10,235.05	2,412.75	
DETERMINE REMOVAL EFFICIENCY					
Starting Efficiency					
TN		5%	5%	28%	
TP		10%	10%	23%	
TSS		10%	10%	83%	
Downward Modification					
		0%	0%	0%	
Revised Starting Efficiency					
TN		5%	5%	28%	
TP		10%	10%	23%	
TSS		10%	10%	83%	
TSS Reduction Rate Calculation					
Runoff Storage (ac-feet)	RS	0.5	1.0	0.3	
Impervious Acres	IA	2.79	7.75	1.25	
Runoff Depth (in)	RD	2.15	1.55	2.87	



Restored Removal Efficiency			
TN	30%	30%	70%
TP	50%	50%	75%
TSS	78%	76%	80%
CALCULATE TOTAL POC REDUCTIONS FOR PROJECT			
Efficiency Improvement			
TN	25%	25%	42%
TP	40%	40%	52%
TSS	68%	66%	0%
Load Reduction (lbs/yr)			
TN	23.73	104.45	50.38
TP	3.93	15.33	5.17
TSS	1,970.47	6,792.02	0.00
Total Reductions for Project (lbs/yr)	TN	TP	TSS
	178.56	24.43	8,762.49

DRAFT



Bailey Bridge Middle School Outfall Retrofits

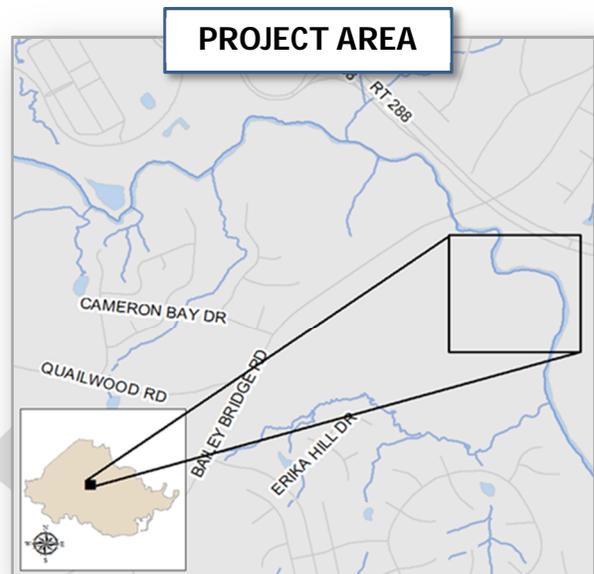
Control Measure: Outfall Retrofit

STATUS: Procurement

COORDINATES: 37.407318/-77.614805

RECEIVING STREAM: Swift Creek

COST ESTIMATE: \$786,148



DESCRIPTION

The project includes the design and construction of a stormwater outfall retrofit for an outfall located at the Bailey Bridge Middle School. This outfall drains approximately 48.56 acres of impervious and managed turf areas. Stormwater runoff from the Bailey Bridge Middle School is currently collected via curb and gutter and is discharged without treatment through the outfall to Swift Creek. The outfall retrofit consist of a dissipation section, plunge pool, level spreader, and diversion area on county property to reduce nutrient and sediment loads prior to discharging to Swift Creek. The outfall retrofit will be designed to meet the design specifications for Sheet flow to Vegetated Filter or Conserved Open Space (VA DEQ Stormwater Design Specification No. 2).

CREDIT CALCULATIONS

Loads to the outfalls were calculated using the 2009 EOS Loading Rates from Table 1 of the Permit. Total nitrogen and phosphorus removal efficiencies from the Virginia BMP Clearinghouse for Sheetflow to Vegetated Filter or Conserved Open Space 2 (C/D soils at Outfall 1) were used to calculate the reductions for the project. The Chesapeake Bay Program Retrofit Curves (from Table V.B.2 of the Guidance Memo) was used to calculate the TSS removal efficiency.

DETERMINE INITIAL POLLUTANT LOADING			
			Outfall 001
Draining Area (acres)			
Impervious			20.59
Pervious			27.97
Water			0
Total			48.56
Initial Pollutant Loading (lbs/yr)			
TN			388.82
TP			50.22
TSS			16,762.82
DETERMINE REMOVAL EFFICIENCY			
TSS Reduction Rate Calculation			
Runoff Storage (cubic-feet)			91,280
Runoff Storage (ac-feet)	RS		2.095
Impervious Acres	IA		20.59
Runoff Depth Treated (in)	RD		1.222
Removal Efficiency			
TN			50%
TP			50%
TSS			73.33%
CALCULATE TOTAL POC REDUCTIONS FOR PROJECT			
Calculated Load Reduction Credit (lbs/yr)			
TN			194.41
TP			25.11
TSS			12,292.45
Total Reductions for Project (lbs/yr)	TN	TP	TSS
	194.41	25.11	12,292.45



Falling Creek Reservoir Restoration

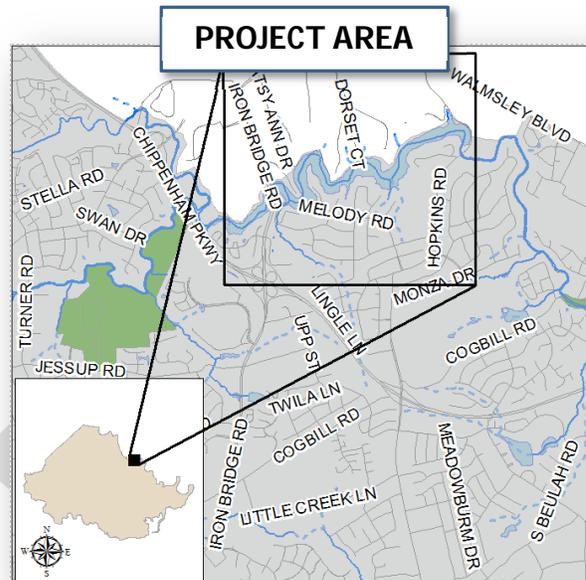
Control Measure: BMP Retrofit

STATUS: Plan Development

COORDINATES: 37.458460/-77.485063

RECEIVING STREAM: Falling Creek

COST ESTIMATE: \$24,976,732



DESCRIPTION

Falling Creek Reservoir in Chesterfield County has a watershed drainage area of about 34,000 acres, and two major tributaries, Falling Creek and Pocoshock Creek, enter the upstream end of the reservoir. The reservoir is part of the Chesapeake Bay watershed and water released through the dam drains to the James River, which is located about 2.5 miles east of the reservoir. Although the reservoir was originally constructed in 1951 for water supply storage, it has not been used for this purpose since 1985. It is estimated that about 84 million gallons (MG), or 28% of the original storage volume has been lost due to sedimentation. While it is expected that the reservoir currently provides some benefit for runoff treatment, past sedimentation, accumulation of pollutants, water quality deterioration, and lack of modern BMP design features have diminished the potential for the reservoir to reduce the pollutant load. Furthermore, continued sedimentation at the average historical rate (about 1.5MG per year) will contribute to additional degradation and minimize the potential for the reservoir to act as a BMP in the future.

Given that the large drainage area into Falling Creek Reservoir was mostly developed before any stormwater management requirements were established, it is critical that the reservoir be restored in order to improve water quality in the Chesapeake Bay watershed. Therefore, the goal of the reservoir restoration project is to enhance the reservoir's efficiency for removal of nitrogen, phosphorus, and suspended solids and achieve stormwater pollutant load reduction credits. Credits achieved through reservoir

restoration are computed based on existing DEQ guidance on BMP retrofits. In FY 2017, 3.0 million dollars was appropriated by the BOS for planning and design of the project.

CREDIT CALCULATION

The county worked closely with DEQ to determine the appropriate crediting methodology and received approval from DEQ on the credit calculation strategy. The credit calculation methodology contained in Appendix V.D (BMP Enhancement, Conversion and Restoration) of the DEQ Guidance Memo was used to calculate the estimated nutrient and sediment reduction credits that will be achieved by the Falling Creek Reservoir Restoration project. According to the "Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects" dated October 2012, a "BMP Restoration" retrofit requires a "major sediment clean-out" equal to at least 10% of the current BMP volume. Furthermore, the required treatment volume needed for the reservoir to perform as a BMP was estimated based on guidance documents from DEQ and the Virginia BMP Clearinghouse.

The methodology that will be followed to calculate credits is as follows:

1. Determine TN, TP and TSS loads flowing to the reservoir. Loads removed by upstream BMPs will be quantified and deducted from the total loads entering the reservoir.
2. Determine the starting pollutant removal efficiency of the reservoir in its current condition. Chesapeake Bay Program BMP Efficiencies for a Wet Pond were used for the existing reservoir efficiency since the reservoir was not designed to meet the Virginia BMP Clearinghouse design standards.
3. Apply a 10% downward modification of the existing efficiency based on the absence of a sediment forebay.
4. Determine the final pollutant removal efficiency of the restored reservoir. The Virginia BMP Clearinghouse Level 1 Wet Pond efficiencies for TN and TP removal were used, and the Chesapeake Bay Program Retrofit Curve for Stormwater Treatment was used to determine the final TSS removal efficiency.
5. The efficiency improvement is calculated as the final efficiency less the adjusted starting efficiency.
6. The improved efficiencies for TN, TP, and TSS will then be multiplied by the incoming loads to the reservoir to determine the load reduction in pounds per year.
7. Per Part III.2.1 of the Guidance Memo, an adjustment will be made to the final load reductions based on the portion of the reductions that are attributed to unregulated lands within the watershed.



The Falling Creek Reservoir Restoration Project is the largest planned component of the county's long-term Chesapeake Bay TMDL strategy. While this project will not be completed during the first permit cycle, CIP funds have been allocated for the design of the project in the FY2017 budget and the Draft FY2018 budget. A preliminary engineering report (PER) was completed in December 2014, which documented the design strategy and potential nutrient and sediment reduction credits that may be achieved through the restoration of this reservoir. This section provides a brief description of the project, the calculation methodology that will be followed, a summary of CIP budget allocated to the project, and an approximate timeline of completion. It is understood that the final allowable credits for the Falling Creek Reservoir Restoration Project will be determined during final design and will be reviewed and approved by DEQ as part of the Plan for the second permit term.

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Appendix C—Additional Reduction Credits

Redevelopment

DESCRIPTION

TBD

CREDIT CALCULATIONS

TBD

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Nonpoint Source Nutrient Trading

DESCRIPTION

TBD

CREDIT CALCULATIONS

TBD

DRAFT



Land Use Conversion

DESCRIPTION

TBD

CREDIT CALCULATIONS

TBD

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Historical BMPs Brought Online Between 2006 and July 1, 2009

Facility ID	BMP Type	HUC	Date Brought Online	Drainage Area (ac)	Impervious (ac)	Pervious (ac)	Load to BMP (lbs/yr)			Removal Efficiency			Total Load Reduction		
							TN Loads	TP Loads	TSS Loads	TN	TP	TSS	TN	TP	TSS
BMP-00048	Wet Pond	020802070901	02/2009	589.09	28.01	208.81	1,722.60	153.70	40,067.60	20%	45%	60%	344.52	69.17	24,040.56
BMP-000644	Wet Pond	020802060102	11/2008	244.89	23.32	142.59	1,215.68	112.34	30,199.24	20%	45%	60%	243.14	50.55	18,119.54
BMP-000697	Wet Pond	020802071002	08/2007	112.53	20.86	67.98	671.06	70.70	20,992.39	20%	45%	60%	134.21	31.82	12,595.43
BMP-000181	Wet Pond	020802070901	11/2006	51.81	8.05	27.46	267.53	27.90	8,225.02	20%	45%	60%	53.51	12.55	4,935.01
BMP-000168	Wet Pond	020802050604	01/2008	49.95	11.08	37.93	369.16	38.47	11,334.36	20%	45%	60%	73.83	17.31	6,800.62
BMP-000175	Wet Pond	020802070901	04/2009	30.80	6.29	21.39	208.58	21.77	6,420.05	20%	45%	60%	41.72	9.79	3,852.03
BMP-000200	Underground Infiltration System	020802060102	12/2007	6.54	3.39	4.58	63.85	8.26	2,757.77	80%	85%	95%	51.08	7.02	2,619.88
BMP-000185	Wet Pond	020802060102	01/2006	9.14	5.68	14.62	155.53	17.31	5,322.81	20%	45%	60%	31.11	7.79	3,193.69
BMP-000091	Wet Pond	020802070901	05/2006	25.64	14.93	4.74	173.33	28.65	10,585.83	20%	45%	60%	34.67	12.89	6,351.50
BMP-000361	Wet Pond	020802060102	04/2007	35.56	6.08	23.00	217.86	22.20	6,440.64	20%	45%	60%	43.57	9.99	3,864.38
BMP-000176	Wet Pond	020802070901	04/2009	18.20	9.10	9.10	149.06	20.57	7,079.98	20%	45%	60%	29.81	9.25	4,247.99
BMP-000777	Dry Detention Ponds	020802060102	07/2007	75.50	6.10	69.40	542.39	45.44	11,144.29	5%	10%	10%	27.12	4.54	1,114.43
BMP-000172	Wet Pond	020802070901	05/2006	12.64	6.32	6.32	103.52	14.28	4,917.09	20%	45%	60%	20.70	6.43	2,950.25
BMP-000025	Wet Pond	020802070901	05/2007	11.14	6.90	4.24	94.43	14.26	5,099.47	20%	45%	60%	18.89	6.42	3,059.68
BMP-000645	Dry Detention Ponds	020802071002	01/2008	36.20	12.10	24.10	282.08	33.35	10,627.00	5%	10%	10%	14.10	3.33	1,062.70
BMP-000371	Wet Pond	020802060103	03/2006	7.66	3.83	3.83	62.74	8.66	2,979.82	20%	45%	60%	12.55	3.90	1,787.89
BMP-000028	Wet Pond	020802070901	05/2007	7.48	1.96	5.52	56.99	6.21	1,884.76	20%	45%	60%	11.40	2.79	1,130.86
BMP-000146	Wet Pond	020802060102	10/2008	5.53	2.44	3.09	44.51	5.84	1,964.07	20%	45%	60%	8.90	2.63	1,178.44
BMP-000767	Dry Detention Ponds	020802060103	04/2009	19.30	9.65	9.65	158.07	21.81	7,507.89	5%	10%	10%	7.90	2.18	750.79
BMP-000026	Wet Pond	020802070901	05/2007	4.75	0.75	4.00	35.00	3.32	912.03	20%	45%	60%	7.00	1.49	547.22
BMP-000676	Dry Detention Ponds	020802071001	01/2008	9.04	1.99	7.05	67.97	7.03	2,059.72	5%	10%	10%	3.40	0.70	205.97
BMP-000593	Filtering Practices	020802060102	08/2007	0.91	0.67	0.24	7.97	1.30	477.81	40%	60%	80%	3.19	0.78	382.25
BMP-000169	Wet Pond	020802070901	08/2006	1.80	0.90	0.90	14.74	2.03	700.22	20%	45%	60%	2.95	0.92	420.13
BMP-000027	Dry Detention Ponds	020802070901	05/2007	5.90	3.04	2.86	48.54	6.78	2,346.99	5%	10%	10%	2.43	0.68	234.70
BMP-000170	Wet Pond	020802070901	08/2006	1.20	0.60	0.60	9.83	1.36	466.81	20%	45%	60%	1.97	0.61	280.09
BMP-000171	Wet Pond	020802070901	08/2006	1.00	0.50	0.50	8.19	1.13	389.01	20%	45%	60%	1.64	0.51	233.41
BMP-000173	Wet Pond	020802070901	02/2006	1.00	0.50	0.50	8.19	1.13	389.01	20%	45%	60%	1.64	0.51	233.41
BMP-000396	Dry Detention Ponds	020802060102	07/2007	3.00	0.83	2.17	22.96	2.55	781.20	5%	10%	10%	1.15	0.25	78.12
BMP-000674	Dry Detention Ponds	020802071002	10/2006	2.50	1.20	1.30	20.36	2.76	943.73	5%	10%	10%	1.02	0.28	94.37
BMP-000615	Filtering Practices	020802070902	10/2006	0.25	0.25	0.00	2.34	0.44	168.08	40%	60%	80%	0.94	0.26	134.47
BMP-000522	Dry Detention Ponds	020802060103	06/2006	2.10	1.05	1.05	17.20	2.37	816.92	5%	10%	10%	0.86	0.24	81.69
BMP-000569	Filtering Practices	020802070902	10/2006	0.22	0.22	0.00	2.07	0.39	148.93	40%	60%	80%	0.83	0.23	119.14
BMP-000571	Filtering Practices	020802070902	10/2006	0.18	0.17	0.01	1.67	0.31	116.67	40%	60%	80%	0.67	0.18	93.33
BMP-000180	Dry Detention Ponds	020802070901	11/2006	1.40	0.20	1.20	10.27	0.95	256.68	5%	10%	10%	0.51	0.10	25.67
BMP-000570	Filtering Practices	020802070902	10/2006	0.11	0.11	0.00	1.03	0.19	74.46	40%	60%	80%	0.41	0.12	59.57



Facility ID	BMP Type	HUC	Date Brought Online	Drainage Area (ac)	Impervious (ac)	Pervious (ac)	Load to BMP (lbs/yr)			Removal Efficiency			Total Load Reduction		
							TN Loads	TP Loads	TSS Loads	TN	TP	TSS	TN	TP	TSS
BMP-000283	Hydrodynamic Structures	020802070803	2008	0.62	0.30	0.32	5.05	0.69	235.43	5%	10%	10%	0.25	0.07	23.54
BMP-000284	Hydrodynamic Structures	020802070803	2008	0.77	0.60	0.17	6.82	1.14	423.35	5%	10%	10%	0.34	0.11	42.33
BMP-000036	Wet Pond	020802070901	2009	14.01	10.51	3.50	123.15	20.25	7,468.42	20%	45%	60%	24.63	9.11	4,481.05
BMP-000165	Wet Pond	020802070901	2010	8.44	3.45	4.99	67.28	8.57	2,839.83	20%	45%	60%	13.46	3.86	1,703.90
BMP-000213	Wet Pond	020802070901	2011	6.21	3.42	2.79	51.62	7.41	2,597.15	20%	45%	60%	10.32	3.34	1,558.29
BMP-000368	Filtering Practices	020802071002	2012	0.49	0.42	0.07	4.43	0.77	291.39	40%	60%	80%	1.77	0.46	233.11
BMP-000369	Filtering Practices	020802071002	2013	0.26	0.22	0.04	2.35	0.41	152.97	40%	60%	80%	0.94	0.24	122.38
BMP-000436	Wet Pond	020802070901	2014	16.61	3.10	13.51	123.54	12.21	3,464.10	20%	45%	60%	24.71	5.49	2,078.46
BMP-000727	Filtering Practices	020802060102	2015	0.31	0.31	0.00	2.91	0.55	209.85	40%	60%	80%	1.16	0.33	167.88
BMP-000781	Wet Pond	020802070901	2016	14.91	1.23	13.68	107.17	9.00	2,215.41	20%	45%	60%	21.43	4.05	1,329.25
BMP-000816	Wet Pond	020802060106	2017	185.56	70.00	115.56	1,465.06	180.98	59,066.60	20%	45%	60%	293.01	81.44	35,439.96
BMP-000822	Wet Pond	020802071001	2018	32.00	16.00	16.00	262.08	36.16	12,448.32	20%	45%	60%	52.42	16.27	7,468.99
BMP-000009	Dry Detention Ponds	020802070901	2019	8.16	4.08	4.08	66.83	9.22	3,174.32	5%	10%	10%	3.34	0.92	317.43
BMP-000031	Hydrodynamic Structures	020802070901	2020	0.21	0.11	0.11	1.72	0.24	81.69	5%	10%	10%	0.09	0.02	8.17
BMP-000174	Infiltration Basin	020802070901	2021	7.96	3.98	3.98	65.19	8.99	3,096.52	5%	10%	10%	3.26	0.90	309.65
BMP-000229	Wet Pond	020802070901	2022	5.35	3.46	1.89	45.70	7.03	2,533.25	20%	45%	60%	9.14	3.17	1,519.95
BMP-000248	Wet Pond	020802070901	2023	11.96	3.30	8.66	91.52	10.14	3,109.25	20%	45%	60%	18.30	4.56	1,865.55
BMP-000456	Filtering Practices	020802070901	2024	0.45	0.23	0.23	3.69	0.51	175.05	40%	60%	80%	1.47	0.31	140.04
BMP-000536	Filtering Practices	020802070901	2025	0.14	0.12	0.02	1.26	0.22	82.68	40%	60%	80%	0.51	0.13	66.14
BMP-000537	Filtering Practices	020802070901	2026	0.26	0.17	0.09	2.22	0.34	123.03	40%	60%	80%	0.89	0.21	98.42
BMP-000547	Filtering Practices	020802070901	2027	0.09	0.03	0.06	0.70	0.08	26.37	40%	60%	80%	0.28	0.05	21.10
BMP-000548	Filtering Practices	020802070901	2028	0.10	0.10	0.01	0.93	0.17	64.81	40%	60%	80%	0.37	0.10	51.85
BMP-000549	Filtering Practices	020802070901	2029	0.27	0.19	0.08	2.33	0.37	134.40	40%	60%	80%	0.93	0.22	107.52
BMP-000568	Filtering Practices	020802070901	2030	0.06	0.04	0.02	0.52	0.08	30.25	40%	60%	80%	0.21	0.05	24.20
BMP-000578	Filtering Practices	020802070901	2031	0.40	0.26	0.14	3.43	0.53	191.88	40%	60%	80%	1.37	0.32	153.51
BMP-000579	Filtering Practices	020802070901	2032	0.23	0.15	0.08	1.97	0.31	110.78	40%	60%	80%	0.79	0.18	88.62
BMP-000580	Filtering Practices	020802070901	2033	0.22	0.22	0.00	2.07	0.39	148.93	40%	60%	80%	0.83	0.23	119.14
BMP-000581	Filtering Practices	020802070901	2034	0.14	0.14	0.00	1.31	0.25	94.77	40%	60%	80%	0.53	0.15	75.82
BMP-000582	Filtering Practices	020802070901	2035	0.10	0.04	0.06	0.79	0.10	32.57	40%	60%	80%	0.32	0.06	26.05
BMP-000583	Filtering Practices	020802070901	2036	0.04	0.02	0.02	0.32	0.04	13.26	40%	60%	80%	0.13	0.02	10.61
BMP-000585	Filtering Practices	020802070901	2037	0.22	0.14	0.08	1.87	0.29	102.86	40%	60%	80%	0.75	0.17	82.29
BMP-000586	Filtering Practices	020802070901	2038	0.11	0.11	0.00	1.03	0.19	74.46	40%	60%	80%	0.41	0.12	59.57
BMP-000587	Filtering Practices	020802070901	2039	0.14	0.12	0.02	1.27	0.22	83.83	40%	60%	80%	0.51	0.13	67.06
BMP-000588	Filtering Practices	020802070901	2040	0.12	0.12	0.00	1.12	0.21	79.51	40%	60%	80%	0.45	0.12	63.60
BMP-000596	Filtering Practices	020802070901	2041	0.26	0.22	0.04	2.34	0.40	150.67	40%	60%	80%	0.93	0.24	120.53
BMP-000597	Filtering Practices	020802070901	2042	0.27	0.04	0.24	1.97	0.18	47.45	40%	60%	80%	0.79	0.11	37.96
BMP-000598	Filtering Practices	020802070901	2043	0.11	0.09	0.03	0.97	0.16	60.07	40%	60%	80%	0.39	0.10	48.05
BMP-000599	Filtering Practices	020802070901	2044	0.10	0.05	0.05	0.82	0.12	40.05	40%	60%	80%	0.33	0.07	32.04
BMP-000600	Filtering Practices	020802070901	2045	0.09	0.09	0.00	0.83	0.15	58.05	40%	60%	80%	0.33	0.09	46.44
BMP-000609	Filtering Practices	020802070901	2046	0.19	0.19	0.00	1.78	0.33	128.62	40%	60%	80%	0.71	0.20	102.89



Facility ID	BMP Type	HUC	Date Brought Online	Drainage Area (ac)	Impervious (ac)	Pervious (ac)	Load to BMP (lbs/yr)			Removal Efficiency			Total Load Reduction		
							TN Loads	TP Loads	TSS Loads	TN	TP	TSS	TN	TP	TSS
BMP-000610	Filtering Practices	020802070901	2047	0.17	0.16	0.01	1.57	0.29	109.32	40%	60%	80%	0.63	0.17	87.46
BMP-000611	Filtering Practices	020802070901	2048	0.24	0.20	0.04	2.15	0.37	137.13	40%	60%	80%	0.86	0.22	109.70
BMP-000612	Filtering Practices	020802070901	2049	0.34	0.29	0.05	3.08	0.54	201.94	40%	60%	80%	1.23	0.32	161.55
BMP-000637	Hydrodynamic Structures	020802070901	2050	0.80	0.40	0.40	6.55	0.90	311.21	5%	10%	10%	0.33	0.09	31.12
BMP-000787	Wet Pond	020802070901	2051	6.96	3.48	3.48	57.00	7.86	2,707.51	20%	45%	60%	11.40	3.54	1,624.51
BMP-000789	Filtering Practices	020802070901	2052	0.39	0.29	0.11	3.41	0.55	203.54	40%	60%	80%	1.36	0.33	162.83
BMP-000790	Filtering Practices	020802070901	2053	0.23	0.23	0.00	2.16	0.40	155.70	40%	60%	80%	0.86	0.24	124.56
BMP-000791	Filtering Practices	020802070901	2054	0.13	0.05	0.08	1.02	0.12	39.63	40%	60%	80%	0.41	0.07	31.70

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Appendix D—Potential Future Projects Qualifying as Grandfathered

List of Potential Future Projects Qualifying as Grandfathered in accordance with 9VAC25-870-48

<u>Project Title</u>	<u>Project Reference Number</u>	<u>Acres</u>
ACAC Fitness Center	2009172	14.73
Acton Mobile Industries Jefferson Davis Highway	2006097	69.148
Adkins Village Road, Water and Sewer	2008191	8.649
All American Warehouse 2 and 3	2008185	1.85
Amberleigh Clippers	2012067	1.2
BB&T At The Shoppes at Westchester	2008078	0.92
Beaverwood Section D,E	2003196	21.4
Bethesda Full Gospel Baptist Church	2005067	4.85
Bloom Brothers Loading Dock Expansion	2006257	0.1469
Boze at Sommerville	2009076	2.51
Branch Point Office Park	2005172	3.22
Brandermill Headwall Replacement	2010107	14.087
Buckingham Place	2008059	6.15
Butlers Corner	2011063	5.82
Camp Baker Dining Hall Addition	2008152	0.2
Camp Baker Slope Remediation	2009046	21.08
Chaney Route 10 Change of Use	2007070	0.22
Charter Colony 5 Acre Retail Site	2008188	3.83
Chesdin Harbor Section 2	2007153	23.3
Chesterfield County Combined Support Building	2010025	8.08
Chesterfield Trading Company Expansion	2007065	0.82
Cloverhill Mid Atlantic Steel	2007154	2
Colonial Heights Baptist Church BMP and Mass Grading	2010102	11.86
Colonial Heights Baptist Church Building B Expansion	2010133	0.45
Colonial Heights Baptist Church Overflow Gravel Lot	2009129	38
Columbia Gas of Virginia Eagle Cove Propane Tank Farm	2009044	0.15
Costco Gasoline	2004209	0.95
CVS Pharmacy 75642 Chalkley Road	2009020	2.437
Davis Tract Rivington Road	2009009	7.13
Dogwood Estates	2009078	30.6
Dominion Service Company Commercial Building Turner Road	2006208	1.2
Enon Optimist Club Field House	2008187	1.5
Enterprise Rent-A-Car	2011139	0.702
Fox Club Parkway Road Improvements	2008007	0.25
FP Pine Glen LLC Parking Expansion	2009062	1.04
Fraternal Order of Police 47	2009202	1.7



List of Potential Future Projects Qualifying as Grandfathered in accordance with 9VAC25-870-48 (Cont.)

Project Title	Project Reference Number	Acres
Genito Road Industrial Park	2009095	14.44
Genito Towns Clubhouse	2010043	0.34
Gods Mission of Faith Love Eternal Church	2010019	0.72
Greenbriar Woods Section 4	2006158	19.724
Hanley Office Building	2009074	2
Harbour Pointe Medical Arts Building	2011142	6.31
Hickory Estates	2011028	52.17
Horner Park 2005	2009079	35.8
Horner Park Maintenance Building	2008095	385
JP Mount Retail Center	2009227	1.15
Kroger Store R-501 Expansion	2006231	0.11
Little Creek	2008003	12.263
Martyn Enterprises	2008175	0.92
Mayberry Park Drive Road Improvements	2004182	57
Midlothian Quarry Drainage Improvements	2009141	182.61
Midlothian Surgery Center	2008121	0.06
Midlothian Town Center Apartments	2009035	7.51
Midlothian Town Center Section 3	2009093	2.56
Midlothian Turnpike Improvement Access Drive	2009064	5.83
New Auto Repair	2010041	0.17
Norandex Parking Lot Expansion	2010132	1.1
Patient Services Phase III	2009036	1.29
Phoenix Center Parking Addition	2009133	1.22
Polo Circle Wellness Center	2008140	0.66
Quail Oaks Section 8	2010094	1.294
River Road Improvement Plan	2009216	2.65
Saint Anns Connection	2007119	37.15
Saint Francis Medical Center Bed Tower Expansion	2010022	0.27
Saint Michaels Episcopal Church Sanctuary Addition	2009113	0.23
Salisbury At Wylderose	2008277	1.8
Salisbury Lot 15-19 Block I Section H-3	2010089	4.098
School House Café	2007015	0.34
Shell Road Industrial Park	2009094	5.48
Shooters Outdoor Basketball Court	2011101	0.1
Sikh Gurudwara Priests Residence	2006003	33.04
Sleep Inn Walthall	2009005	1.72
Sommerville East	2008024	13.4
Sommerville Industrial Park Lot 54	2008253	1.09
Sonic Restaurant	2009028	0.9
Southeast Resource Recovery Grading and Utility	2008198	5.65



List of Potential Future Projects Qualifying as Grandfathered in accordance with 9VAC25-870-48 (Cont.)

Project Title	Project Reference Number	Acres
Southaven-Kingsport Lane	2008216	2.051
Southside Virginia Auto Auction Storage Yard Expansion	2008129	4
Spanish School House	2012033	1.372
Sportsman Motors	2005176	0.405
Sportsquest West Campus ELD Phase I	2011050	20.29
Spring Rock Green Phase I,II	2009178	11.05
Stafford Place Section 5	2008066	16.82
The Townes At Ironbridge	2005227	20.05
The Townes at Ironbridge Recreation Site	2006227	0.5
The Village of Westchester Offsite Roadway and Utility Improvements	2009008	24
Twilight Bluff	2007273	26.87
Uppys Turner and Hull	2008304	1.5
Virginia Air Distributors Storage Improvements	2011091	0.41
Virginia State University Hunter-McDaniel Hall Renovations Project	2010119	0.6
Virginia State University Storage Shed At The Randolph Farm	2011049	1
Virginia State University Waterline Extension to Serve 4th Avenue Education Building	2011144	0.22
Vissco At Oaklake	2009075	0.47
Wako Chemicals LP Facility	2005136	0.21
Walmart Store 2808 Building Expansion	2005097	0.6
Watkins Centre East West Road	2010082	8
Watkins Centre Parkway Roundabout No 1	2009102	1.3
Whitepine Office Warehouse Building	2005143	2.8
Williamsburg West	2010034	62.88
Woods Edge Road Tract Timbering Management Plan	2012014	0.01
Woolridge Road Daycare	2009077	4.58
Wright At Oaklake	2008300	1.45



Appendix E—Public Comments

As of the date of this document, there have been no comments received as a result of public comment period. A summary of the public comments received to date on the Plan can be found on the county's website at:

<https://www.chesterfield.gov/DocumentCenter/View/444/Chesapeake-Bay-TMDL-Action-Plan-PDF?bidId>.

DRAFT



Appendix F— Revision Summary

CORRECTIONS/UPDATES:

Corrections and updates are made throughout the document where applicable. See the modifications to the Chesapeake Bay TMDL Action Plan outlined below. Minor grammatical corrections are not noted.

CLARIFYING LANGUAGE:

1. Part I.D.1.b)1)(g)
 - a. Section reference removed and language revised.
2. Part I.D.1.b)1)(h)
 - a. Section reference removed and language revised.

SUBSTANTIAL CHANGES:

1. Part I.D.1.b)1)(c)
 - a. Section rewritten to capture existing requirements for stormwater discharges from new development.
2. Appendix B
 - a. Engineering design study and resulting pollutant load reduction calculations indicated that implementation of original proposed project, LaPrade Library BMP Retrofit/Conversion, was no longer feasible to achieve the stated project goals. The new proposed project, Outfall Retrofits – Nonspecific, will replace the LaPrade Library project. Future updates to this document will contain project specific information currently under development.
 - b. Specific information for the project selected for the Outfall Retrofits is updated and included.
 - c. Table has been updated with information from the selected project.

MODIFICATIONS TO THE CHESAPEAKE BAY TMDL ACTION PLAN				
<u>Section</u>	<u>Change Date</u>	<u>Page Number</u>	<u>Subject</u>	<u>Modification</u>
Cover	1/23/2017	Cover	Correction	Insert revised on date
	1/25/2017	Cover	Update	Revised revision date
	10/20/2017	Cover	Update	Revised revision date
	1/29/2019	Cover	Update	Revised revision date
Table of Contents	1/20/2017	iii	Update	Added Appendix F
	1/23/2017	i	Update	Format content
	1/23/2017	ii	Update	Format content
	10/20/2017	i-ii	Update	Format content
Part I.D.1.b)1)(c)	1/20/2017	2	Change	Section rewritten



MODIFICATIONS TO THE CHESAPEAKE BAY TMDL ACTION PLAN				
Section	Change Date	Page Number	Subject	Modification
Part I.D.1.b)1)(f)	1/20/2017	6	Update	Replaced proposed project in Table 3.
	1/20/2017	6	Update	Recalculated values in Table 3.
	1/20/2017	7	Update	Figure 1. adjusted
	1/20/2017	8	Update	Values in Table 4. revised
	10/20/2017	6	Update	Values in Table 3. added and revised
	10/20/2017	6	Correction	Language revised
	10/20/2017	7	Update	Figure 1. adjusted
	10/20/2017	7	Update	Values in Table 4. revised
	10/20/2017	7	Correction	Language revised
	10/20/2017	7	Update	Values in Table 5. revised
	10/20/2017	7	Correction	Language in Table 5. revised
	3/20/2018	6	Update	Values in Table 3. revised
	3/21/2018	6	Clarification	Language revised
	5/1/2018	6	Update	Values in Table 3. revised
	1/24/2019	6	Update	Values in Table 3. revised
1/24/2019	6	Clarification	Footnote added	
1/24/2019	7	Update	Values in Table 4. revised	
	1/31/2019	7	Update	Inserted "Nonpoint Source Nutrient Trading"
Part I.D.1.b)1)(g)	1/20/2017	9	Clarification	Language revised
Part I.D.1.b)1)(h)	1/20/2017	10	Clarification	Language revised
Part I.D.1.b)1)(k)	1/29/2019	12	Clarification	Language revised
Part I.D.1.b)1)(j)	1/20/2017	12	Update	Replaced proposed project in Table 6.
	10/20/2017	12	Update	Values in Table 6. revised
	3/20/2018	12	Update	Values in Table 6. revised
	3/22/2018	11	Update	Values in Table 6. revised
	1/24/2019	11	Update	Values in Table 6. revised



MODIFICATIONS TO THE CHESAPEAKE BAY TMDL ACTION PLAN				
Section	Change Date	Page Number	Subject	Modification
Appendix B	10/20/2017	41	Correction	Language revised
	1/21/2017	31	Correction	Revised calculation
	1/21/2017	36	Correction	Revised location
	10/20/2017	23-24	Correction	Revised calculation
	10/20/2017	28-29	Correction	Revised calculation
	10/20/2017	31	Correction	Revised values
	10/20/2017	34	Correction	Revised values
	10/20/2017	35	Change	Removed information on existing proposal - updated to include information on new proposal project
	10/20/2017	36	Change	Inserted calculations for proposed project
	1/31/2018	23-24	Correction	Table revised using Appendix V.E in Guidance Memo 15-2005
	1/31/2018	28	Clarification	Table revised to include itemized downward modifications
	3/20/2018	23-24	Correction	Table revised using Appendix V.E in Guidance Memo 15-2005
	3/21/2018	24	Clarification	Language revised
	3/22/2018	34	Clarification	Language revised
	5/1/2018	27-28	Update	Table revised to include as built WQ volumes
	1/31/2018	28	Clarification	Table revised to include itemized downward modifications
	6/25/2018	26	Clarification	Language revised
1/24/2019	30	Update	Table revised to include current design information	
1/29/2019	ALL	Update	Language revised in the information tables for each project	
Appendix C	1/31/2019	40	Update	Inserted "Nonpoint Source Nutrient Trading" for future development
Appendix F	1/20/2017	48	Correction	Inserted Revision Summary

