



Prince William County

Chesapeake Bay TMDL Action Plan

Prepared in compliance with General Permit No. VA0088595

Draft

November 22, 2016

Watershed Management Branch
Prince William County Department of Public Works
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CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Name

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1. Introduction

1.1 Purpose

This Chesapeake Bay TMDL Action Plan (Action Plan) documents how Prince William County intends to meet the requirements of Municipal Separate Storm Sewer System Permit No. VA0088595 (MS4 Permit) issued December 17, 2014. In Section I.D.1, Chesapeake Bay Special Condition, the County is required to document the means and methods that will be utilized to meet the required reductions of specific Pollutants of Concern (POCs) allocated in the Special Condition of the Commonwealth of Virginia's Phase I and II Chesapeake Bay Total Maximum Daily Load (TMDL) Watershed Implementation Plans (WIPs).

These reductions are based on the Level 2 (L2) scoping run of the Chesapeake Bay Watershed Model for existing developed lands (pervious and impervious regulated urban lands developed prior to July 1, 2009). Level 2 implementation equates to an average reduction of 9% of nitrogen loads, 16% of phosphorous loads, and 20% of sediment loads from impervious regulated areas and 6% of nitrogen loads, 7.25% of phosphorous loads, and 8.75% of sediment loads from pervious regulated acres beyond the 2009 progress run loadings. As part of this effort, Virginia Department of Environmental Quality (VADEQ) has committed to a phased approach for MS4 permittees to implement necessary reductions. Permittees will have up to three, five-year permit cycles to achieve required reductions. Prince William County's first permit cycle (December 17, 2014 – December 16, 2019) represents implementation of 5% of the L2 as specified in the 2010 Phase I WIP. The second permit cycle will require an additional 35% of total L2 reductions (40% cumulative), while the final permit cycle will require implementation of the remaining 60% of reductions (100% cumulative).

This Action Plan documents how the County plans to implement the 5% reduction by the end of its first permit term. This includes a review of the County's current MS4 Program Plan and legal authority, how the County plans to address discharges from new sources, an estimate of existing source loads and required reductions, means and methods to meet required reductions, means and methods to offset increased loads from new sources and grandfathered projects, a list of potential future projects, a cost estimate for meeting reductions, and finally a summary of methods and results of the public comment period.

1.2 Permit Requirement Crosswalk

Section I.D.1 of the MS4 Permit identifies the required components of this Action Plan. Table 1A provides an overview of the organization of the Action Plan and identifies the associated MS4 Permit requirement(s).

Table 1 – Action Plan and Permit Requirement Crosswalk

Action Plan Section	Action Plan Element	MS4 Permit Requirement	MS4 Permit Reference
2.1	Program Plan and Existing Legal Authority	A review of the current MS4 Program Plan including existing legal authorities and the permittee's ability to ensure compliance with this special condition.	Section I.D.1.b)1)(a)
2.2	New or Modified Legal Authority	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.	Section I.D.1.b)1)(b)
3	Means and Methods to Address Discharges from New Sources	The means and methods utilized to address discharges into the MS4 from new sources.	Section I.D.1.b)1)(c)
4	Estimated Existing Source Loads and Calculated Total Pollutants of Concern (POC) Required Reductions	An estimate of the annual 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 and the 2009 Edge of Stream (EOS) Loading Rate. 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 MS4 by the First Permit Cycle Reduction in Loading Rate.	Section I.D.1.b)1)(d) and Section I.D.1.b)1)(e)
5	Means and Methods to Meet Required Reductions and Schedule	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).	Section I.D.1.b)1)(f)

6	Means and Methods to Offset Increased Loads from New Sources Initiating Construction between July 1, 2009 and June 30, 2014	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.	Section I.D.1.b)1)(g)
7	Means and Methods to Offset Increased Loads from Grandfathered Projects Beginning Construction After July 1, 2014	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.	Section I.D.1.b)1)(h)
8	List of Future Projects and Associated Acreage that Qualify as Grandfathered	A list of future projects and associated acreage that qualify as grandfathered in accordance with 9VAC25-870-48.	Section I.D.1.b)1)(i)
9	Estimated Expected Cost to Implement Necessary Reductions	An estimate of the expected cost to implement the necessary reductions during the permit cycle.	Section I.D.1.b)1)(j)
10	Public Comments on Draft Action Plan	An opportunity for receipt and consideration of public comment on the draft Chesapeake Bay TMDL Action Plan; and, A list of all comments received as a result of public comment and any modifications made to the draft Chesapeake Bay TMDL Action Plan as a result of the public comments.	Section I.D.1.b)1)(k) and Section I.D.1.b)1)(l)

2. Current Program and Legal Authority

Prince William County has determined through a review of its program plan and associated ordinance, that it currently holds sufficient legal authority to ensure compliance with the MS4 Permit. The following section briefly describes these authorities, and their relationship to permit compliance.

2.1 Program Plan

The County has completed an MS4 Program Plan (Program Plan) that documents implementation of all MS4 Permit requirements, including the programmatic and legal authorities required to meet the Chesapeake Bay Special Condition (Section I.D.1). The full Program Plan can be accessed from the following link:

<http://www.pwcgov.org/government/dept/publicworks/environment/pages/ms-4-permit.aspx>

Prince William County’s Program Plan outlines the specific BMPs that the County is implementing in order to meet requirements set forth in its MS4 Permit and associated Chesapeake Bay Special Condition. Table 2 provides a summary of these requirements and their location within the Program Plan.

Table 2 – MS4 Program Plan Components Related to Meeting the Chesapeake Bay TMDL

Program Plan Component	Program Plan Location	MS4 Permit Requirement	MS4 Permit
Nutrient Management Plans	BMPs d.1 and d.2 (Pages 13-14)	Implementation of turf and landscape nutrient management plans in accordance Part I.B.2.d).	Section I.D.1.c)2)(a)
Construction Site Runoff Controls	BMPs a.1 and a.2 (Pages 7-9)	Implementation of construction site runoff controls in Part I.B.2.a) in accordance with this state permit shall address discharges from transitional sources.	Section I.D.1.c)2)(b)
Discharges from New Sources	BMPs a.1 and a.2 (Pages 7-9)	Implementation of the means and methods to address discharges from new sources in accordance with requirements in Part I.B.2.a) for post-construction runoff from areas of new development and development on prior developed lands.	Section I.D.1.c)2)(c)

TMDL Action Plan Implementation	Section VI (Page 59)	Implementation of means and methods sufficient to meet 5% required reductions of POC loads from existing sources defined in this state permit in accordance with the Chesapeake Bay TMDL Watershed Implementation Plan as required in Part I.D.b)1)e).	Section I.D.1.c)2)(d)
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2.2 Existing Legal Authority

The following legal authorities enable Prince William County to comply with the Chesapeake Bay TMDL Special Condition. These legal authorities are referenced in the County’s Program Plan, and are included here for additional reference.

- Stormwater Management Ordinance – [Prince William County Code Chapter 23.2](#)
- Solid Waste Ordinance - [Prince William County Code Chapter 22.0](#)
- Water Supply System Ordinance - [Prince William County DCSM Section 400](#)
- Erosion and Sediment Control Ordinance – [Prince William County DCSM Section 700](#)
- Fire Prevention Ordinance – [Prince William County Code Chapter 9.1](#)
- Sewers and Sewage Disposal Ordinance - [Prince William County Code Chapter 23.0](#)

2.3 New or Modified Legal Authority

As described in subsection 2.2 above, the existing authority is sufficient for compliance with this Special Condition. There is no need for new or modified legal authority beyond what is described in the section above. As the County reaches its second and third permit cycles, an assessment of potential new or modified legal authority will be made. All updates will be reflected in future iterations of this document, as well as in the County’s Program Plan.

3. Means and Methods to Address Discharges from New Sources

As of July 1, 2014 Prince William County has adopted the Virginia Stormwater Management Program (VSMP) regulations into its local ordinance ([Prince William County Code Chapter 23.2](#), [Prince William County DCSM Section 700](#)). All development or redevelopment occurring within the County must incorporate water quality measures, also known as best management practices (BMPs). Any land disturbance activity greater than 2,500 square feet must have an approved erosion and sediment control plan. These standards and specifications are consistent with the requirements of the Virginia Stormwater Act, the Virginia Stormwater Management Program (VSMP) Regulations, the General Permit for Discharges of Stormwater from Construction Activities (9VAC25-880), and the Erosion and Sediment Control Law and Regulations.

4. Estimated Existing Source Loads and Calculated Total Pollutant of Concern (POC) Required Reductions

4.1 MS4 Regulated Area

The existing POC source loads from Prince William County have been estimated by means of a comprehensive GIS-based desktop analysis. Utilizing the County's extensive stormwater inventory and a specifically developed MS4 Delineation and Stormwater Tool, the County's regulated outfalls and associated drainage areas were identified. Included in the analysis was information on the ownership and operation of regulated outfalls, pipe networks, and SWM/BMP facilities, along with a determination of impervious surface acres in the County.

In order to determine the 2009 impervious area, the County's 2012 impervious area assessment was used as a base, as this was the best data available. Using ortho-rectified aerial photography dated 2009, an impervious data layer was created by identifying areas throughout the County that were undeveloped as of June 30, 2009. This was largely accomplished using the aerial photography, but also included an inventory of land development projects initiated throughout Prince William County after the first permit cycle 2009 progress run deadline as well as specific as-built plans and plats when necessary. Included in the impervious surface determination are structures, bridges, roadways, driveways, alleyways, paved medians, parking lots, sidewalks, and hard surface sports courts, as well as large patio surfaces that may include swimming pools.

Data pertaining to outfalls, pipe networks, and SWM/BMP facilities are continuously updated and maintained by the County's GIS department. These structures were imported into the Stormwater Delineation tool and are included in the assessment of the County's MS4 service area. The Stormwater Tool will update the attribute data for each outfall to include a unique ID, its latitude and longitude in decimal degrees, the local watershed (WTRSHD_ID), the 5th and 6th order VA HUC, the HUC12, and the waterbody receiving outflow (listed as a REACHCODE). Outfalls also contain ownership and maintenance responsibility information.

Once the initial MS4 service area was identified, excluded areas as outlined in the TMDL Action Plan Guidance Document (Section II.2) were removed. This included land regulated under any general VPDES permitted facility, lands regulated under an individual VPDES permit, forested lands, agricultural lands, wetlands and open waters. Refer to Appendix A for a map of the County's MS4 service area.

4.2 Existing Source Loads

An estimate of the annual POC loads discharged from the existing sources as of June 30, 2009 is provided below in Table 3. This estimate is based on the 2009 Chesapeake Bay Model progress run and is consistent with Table 1 of the County’s MS4 Permit.

Table 3 – Estimated Existing Source Loads from MS4

Subsource	Pollutant	Total Existing Acres Served by MS4 (6/30/09)	2009 EOS Loading Rate (Lbs/ac/yr)	Estimated Total POC Load Based on 2009 Progress Run (Lbs/yr)
Regulated Urban Impervious	Nitrogen	6,626.78	16.86	111,727.51
Regulated Urban Pervious		16,530.83	10.07	166,465.46
Regulated Urban Impervious	Phosphorous	6,626.78	1.62	10,735.38
Regulated Urban Pervious		16,530.83	0.41	6,777.64
Regulated Urban Impervious	Total Suspended Solids	6,626.78	1,171.32	7,762,079.95
Regulated Urban Pervious		16,530.83	175.8	2,906,119.91

4.3 Required Reductions

Using the above estimate of annual POC loadings as of June 30, 2009, an estimate for required reductions to meet the 5% POC reduction outlined in the County’s first permit cycle is included below in Table 4. This computation is consistent with Page 7 of the Chesapeake Bay TMDL Special Condition Guidance (DEQ Guidance Memo No. 15-2005).

Table 4 – Total 5% POC Reduction Required during First Permit Cycle

Subsource	Pollutant	Total Acres Served by MS4 (6/30/09)	First Permit Cycle		
			Required Reduction in Loading Rate (lbs/ac/yr)	Total Reduction Required (lbs/yr)	Total Reduction Required (lbs/yr)
Regulated Urban Impervious	Nitrogen	6,626.78	0.07587	502.77	1,002.17
Regulated Urban Pervious		16,530.83	0.03021	499.40	
Regulated Urban Impervious	Phosphorous	6,626.78	0.01296	85.88	110.45
Regulated Urban Pervious		16,530.83	0.00148625	24.57	
Regulated Urban Impervious	Total Suspended Solids	6,626.78	11.7132	77,620.80	90,335.07
Regulated Urban Pervious		16,530.83	0.769125	12,714.27	

Table 5 computes the required POC reductions for the remaining permit cycles. The second permit cycle (40% cumulative reduction), is based on the “seven times” methodology outlined in the County’s MS4 Permit Section I.D.1.d)5)(b). Table 5 also includes the 100% POC reductions due at the conclusion of the County’s third permit cycle.

Table 5 – Reduction Required per Permit Cycle

Pollutant	1st Permit Cycle (5%)	2nd Permit Cycle (35%)	3rd Permit Cycle (60%)	Total (100%)
Nitrogen	1,002.17	7,015.19	12,026.04	20,043.40
Phosphorous	110.45	773.15	1,325.40	2,209.00
Total Suspended Solids	90,349.54	632,446.78	1,084,194.48	1,806,990.80

5. Means and Methods to Meet Required Reductions and Schedule

Prince William County has a comprehensive watershed improvement program, which aims to improve water quality through the implementation of water quality improvement projects such as stormwater facility retrofits, stream restorations, and reforestation projects. The primary means and methods planned for this permit cycle include the above identified BMPs and credit for facilities constructed from January 1, 2006 to June 30, 2009, but may include other types depending on the opportunity and feasibility of implementation.

Table 6 provides a summary of the load reductions for each type of BMP completed and/or planned for this permit cycle. It includes projects that were completed after July 1, 2009 as well as projects that are planned to be completed by the end of the first permit cycle. The load reductions have been summarized into three main project categories: Stream Restoration, Stormwater Retrofit and Reforestation. For more detailed information on the projects including in each of the above categories, please refer to Appendices B, C and D, respectively. The table also includes the credit for facilities constructed 2006 to 2009 (see Appendix F).

Table 6 – POC Reductions for 1st Permit Cycle by Type

Project Status	Project Type	Number of Projects	Nitrogen Reductions	Phosphorous Reductions	Total Suspended Solids Reductions
Completed	Stream Restoration	8	359.52	343.33	87,632.08
	Stormwater Retrofit	11	368.83	27.89	14,917.43
	Reforestation (LUC)	9	134.89	7.16	2,504.97
	Sub-total	28	863.24	378.38	105,054.48
Planned	Stream Restoration	5	481.96	487.07	226,819.22
	Stormwater Retrofit	6	660.64	69.19	51,736.90
	Reforestation (LUC)	2	105.61	5.61	1,961.16
	Sub-total	13	1,248.21	561.87	280,517.28
Facilities Installed 2006-2009		88	4,231.83	393.69	464,836.62
Total		129	6,343.28	1,333.93	850,408.38
Required 1st Permit Cycle Load Reductions (Table 4)			<i>1,002.17</i>	<i>110.45</i>	<i>90,349.54</i>
Credit toward 2nd Permit Cycle Reductions			5,341.11	1,223.48	760,058.84
Required Percent Reduction in 1st Permit Cycle			5%	5%	5%
Planned Percent Reduction in 1st Permit Cycle			32%	60%	47%

The details, extent and timing of planned projects may change at the discretion of the County. Updates will be provided in each annual report as well as with the draft second phase Bay TMDL Action Plan. As shown in Table 6, the required load reductions for the first permit cycle have been met for total phosphorous, total nitrogen, and total suspended solids. Load reductions beyond those required for the first permit cycle will be applied to the 35% reduction progress requirement of the second permit cycle (40% cumulative reduction).

5.1 Stormwater Retrofits

The County has implemented water quality retrofits to 11 existing stormwater management facilities and plans to implement an additional six stormwater retrofits during the permit cycle. The load reductions associated with each completed retrofit project and the estimated load reductions for planned projects have been calculated in accordance with Appendix V.D. of the Chesapeake Bay TMDL Special Condition Guidance. Appendix B provides more details on each project identified in this plan including the implementation schedule, location, practice type, treatment area and pollutant reductions.

5.2 Stream Restoration Projects

A total of eight stream restoration projects have been completed since July 1, 2009 and an additional five projects are planned during the first permit cycle. The load reductions associated with each completed project and the estimated reductions for planned stream restoration project have been computed in accordance with Appendix V.J. of the Chesapeake Bay TMDL Special Condition Guidance. Appendix C includes details on each project including the implementation schedule, location, restoration length and pollutant reductions. Appendix E contains pictures of the streams before the stream restoration projects were constructed.

5.3 Reforestation Projects

Since July 1, 2009, the County has implemented nine reforestation projects with an additional two projects planned for implementation during the first permit cycle. The load reductions associated with the land use change for each project have been calculated in accordance with Appendix V.H. of the Chesapeake Bay TMDL Special Condition Guidance. Several of the projects qualify for the Forest Buffer BMP but these additional reductions have not been included at this time. Updated load reduction for reforestation projects will be provided in each annual report. Appendix D includes details on each reforestation project including the implementation schedule, location, acreage of each project, and the calculated pollutant reductions.

5.4 All Structural Facilities (Regulatory and Non-Regulatory) Between January 1, 2006 and June 30, 2009

In accordance with the Chesapeake Bay TMDL Special Condition Guidance (Part III.4, Part IV.2, and Appendix VI), the County may receive full credit for stormwater management facilities that were initially installed on or after January 1, 2006 and prior to July 1, 2009 within the regulated MS4 service area provided that the locality has submitted a full account of stormwater facilities to DEQ as part of the "Historical Data Clean-Up" effort. Facility data was submitted to DEQ by the

September 1, 2015 deadline by Prince William County. The drainage areas to these facilities has been further refined since that time and information on these facilities is included in Appendix F. The loading rates from the MS4 permit were used to calculate pollutant loads for the preconstruction condition of each site.

5.5 Additional Means and Methods

The County reserves the right to implement and take credit for additional creditable facilities or practices as provided for in the Chesapeake Bay TMDL Special Condition Guidance, such as credit for redevelopment, septic conversions, off-site pollutant reduction credits, and nutrient management plans not required under the MS4 permit. The guidance document specifically references the work of the Chesapeake Bay Urban Stormwater Workgroup, which includes credits for street sweeping, urban nutrient management and homeowner best management practices such as rainwater harvesting, downspout disconnection, permeable hard-scapes, tree planting, and impervious cover removal. Reductions achieved will be documented to DEQ in the annual reports.

6. All Structural Facilities (Regulatory and Non-Regulatory) Between January 1, 2006 and June 30, 2009

In accordance with the Chesapeake Bay TMDL Special Condition Guidance (Part III.4, Part IV.2, and Appendix VI), the County may receive full credit for stormwater management facilities that were initially installed on or after January 1, 2006 and prior to July 1, 2009 within the regulated MS4 service area provided that the locality has submitted a full account of stormwater facilities to DEQ as part of the “Historical Data Clean-Up” effort. Facility data was submitted to DEQ by the September 1, 2015 deadline by Prince William County. The drainage areas to these facilities has been further refined since that time and information on these facilities is included in Appendix F. The loading rates from the MS4 permit were used to calculate pollutant loads for the preconstruction condition of each site.

6.1 Additional Means and Methods

The County reserves the right to implement and take credit for additional creditable facilities or practices as provided for in the Chesapeake Bay TMDL Special Condition Guidance, such as credit for redevelopment, septic conversions, off-site pollutant reduction credits, and nutrient management plans not required under the MS4 permit. The guidance document specifically references the work of the Chesapeake Bay Urban Stormwater Workgroup, which includes credits for street sweeping, urban nutrient management and homeowner best management practices such as rainwater harvesting, downspout disconnection, permeable hard-scapes, tree planting, and impervious cover removal. Reductions achieved will be documented to DEQ in the annual reports.

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

The requirement of BMP controls for all new developments has been required in the County from:

- January 1983 for the Occoquan Watershed (66 percent of the County)
- November 27, 1990 (Countywide)

All new development plans submitted since then have been approved with BMP's. The County required that the developers reduce the increase in phosphorous loadings from post development runoff by at least 50 percent. The minimum 50 percent of phosphorous reduction requirement was applicable for any degree of impervious cover change, regardless of how small it is. An average land use impervious cover method, such as 16%, was not applied as a qualifying criterion either for requiring or for sizing BMP's. For redevelopments, Prince William County required a minimum 20 percent reduction in excess phosphorous loading originating from redevelopment. BMP exceptions were only for infill residential lots and large lot subdivisions (5 acres or more). The County's methodology for requiring BMP's was consistent with Chesapeake Bay Preservation Area Designation and Management Regulations.

Since Prince William County has not approved any plans using an "average land cover condition methodology", the requirements to effectively offset any increased load for new sources initiating construction between July 1, 2009 and June 30, 2014 does not apply to the County.

8. Means and Methods to Offset Increased Loads from Grandfathered Projects Beginning Construction After July 1, 2014

As stated in Section 7 above, the County has not approved plans using an "average land cover condition methodology"; therefore, offsets for grandfathered projects do not apply to the County.

9. List of Future Projects Qualifying as Grandfathered

As stated in Sections 7 and 8, Prince William County has not approved plans using an "average land cover condition methodology" since the early 1990s. Since all projects grandfathered in Prince William County are required to meet the County's technology-based requirements, and further offsets do not apply, it is not necessary to provide a list of future grandfather projects herein.

10. Estimate of the Expected Cost to Implement the Necessary Reductions

The implementation costs associated with the three project types identified in this Action Plan are provided in Table 7 below. Refer to Appendix G for the estimated costs for each project. Costs of completed projects are based on the actual costs for planning, design, and construction of each project. For planned projects, estimates have been provided based on currently available cost information and may change during the course of the permit cycle, but will be updated with each

subsequent Annual Report. The County’s FY2017 Capital Improvement Program (CIP) budget includes funding for all the planned projects included in this plan.

Table 7 – Estimated Cost of Compliance for TMDL Projects

Project Status	Project Type	Number of Projects	Cost
Completed	Stream Restoration	8	\$3,850,464
	Stormwater Retrofit	11	\$687,405
	Reforestation (LUC)	9	\$203,308
	Sub-total	28	\$4,741,177
Planned	Stream Restoration	5	\$5,474,330
	Stormwater Retrofit	6	\$1,030,000
	Reforestation (LUC)	2	\$160,000
	Sub-total	13	\$6,664,330
Total		41	\$11,405,507

11. Public Comments on Draft Action Plan

Prince William County has posted the draft Action Plan on the County’s website and advertised a 15-day public comment period via web announcements and a press release.

A summary of comments received and the County’s response, including any changes made to the public comment action plan, have been included in Appendix H.

Appendix A – MS-4 Service Area Delineation Map

Appendix B – Stormwater Retrofit Projects

Appendix C – Stream Restoration Projects

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