FINAL – CHESAPEAKE BAY TMDL ACTION PLAN

January 2019

Arlington National Cemetery

1 Memorial Drive
Arlington, VA 22211

VPDES Permit Number: VAR040139
Effective Date: November 1, 2018
Expiration Date: October 31, 2023

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List of Acronyms and Abbreviations

ANC	Arlington National Cemetery
BMP	Best Management Practice
EOS	Edge of Stream
FIPS	Federal Information Processing Standards
GIS	Geographic Information System
HUC	Hydrologic Unit Code
L2	Level 2
MCM	Minimum Control Measure
MS4	Municipal Separate Storm Sewer System
MTD	Manufactured Treatment Device
NPS	National Park Service
POC	Pollutant of Concern
SPC	Street Cleaning Practice
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
U.S.	United States
VAC	Virginia Administrative Code
VDEQ	Virginia Department of Environmental Quality
VESCP	Virginia Erosion and Sediment Control Program
VPDES	Virginia Pollutant Discharge Elimination System
ZPG	Zeolite, Perlite, and Granular Activated Carbon

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1.0 BACKGROUND

Arlington National Cemetery (ANC) is a military shrine and active cemetery in Arlington County, Virginia, located within the Potomac River Basin. The site is approximately 620 acres with pervious, impervious, and forest land cover. The National Park Service (NPS) owns land located within and adjacent to ANC's property not included in ANC's Small Municipal Separate Storm Sewer System (MS4) and is not included in this Plan. The ANC storm sewer system includes open ditches, piping, and a natural stream. Stormwater discharges to Boundary Channel or adjacent MS4s, and ultimately to the Potomac River.

ANC prepared this Chesapeake Bay Total Maximum Daily Load (TMDL) Action Plan to comply with Part II A. of the General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from MS4s (9 Virginia Administrative Code [VAC] 25-890, et seq.), Chesapeake Bay TMDL Special Condition, hereafter referred to as the "General Permit." The General Permit regulates all stormwater runoff at ANC.

This Action Plan describes ANC's methodologies for reducing the amount of phosphorus, nitrogen, and total suspended solids (TSS) in stormwater discharges from its MS4. ANC developed this Plan in accordance with Virginia Department of Environmental Quality (VDEQ) Guidance Memo Number 15-2005, dated May 18, 2015, hereafter referred to as the "Guidance Memo." VDEQ allows MS4 operators three full 5-year permit cycles to implement necessary pollutant of concern (POC) reductions. ANC has met and exceeded the required 40% reduction of POCs required by the end of the second permit cycle.

This Action Plan updates ANC's 2015 TMDL Action Plan which VDEQ approved on December 28, 2015.

The Action Plan includes the following permit-required elements:

1. Current program and legal authority;
2. Estimated existing source loads and calculated POC cumulative reductions
3. Total reductions achieved as of July 1, 2018 for each POC;
4. BMPs (best management practice) implemented prior to July 1, 2018 to achieve TMDL reductions;
5. BMPs to be implemented prior to June 30, 2023 to meet cumulative POC reductions;
6. Public comments on the TMDL Action Plan; and
7. Annual reporting.

2.0 CURRENT PROGRAM AND LEGAL AUTHORITY

This section summarizes ANC's existing legal authorities, including ANC's MS4 Program Plan, and describes ANC's ability to ensure compliance with the TMDL as required in Part II A. 11 (a) of the General Permit.

2.1 MS4 Program Plan

The MS4 Program Plan describes the six minimum control measures (MCM) ANC implements to reduce stormwater pollutant discharges to the maximum extent practicable. It applies to activities, staff, and structures within the ANC facility. ANC developed the MS4 Program Plan and maintains responsibilities for its implementation and compliance. ANC maintains the following enforceable stormwater policies and procedures as part of the MS4 Program Plan:

- Public education, outreach, and training programs;
- Illicit discharge detection and elimination procedures;

- Non-stormwater compliance standard contract language;
- Stormwater compliance contract language and inspection procedures for construction projects;
- Stormwater management facilities inspection and maintenance and design review procedures;
- Stormwater pollution prevention plan; and
- Minimization or prevention of pollutant discharge protocols.

ANC updates the MS4 Program Plan annually in accordance with the General Permit.

2.2 Existing Legal Authority

ANC, a United States (U.S.) Army facility, has direct legal authority over the use and condition of the land and infrastructure it owns and operates within its legal boundaries. Army Regulation 600-20 (U.S. Army, revised 2014) prescribes the policies and responsibilities for the U.S. Army Command, and Edition Fourteen of The Military Commander and Law (Watson, 2017), provides ANC's Commanders with the authority to ensure the property is operated in accordance with the applicable regulations including the General Permit.

ANC's MS4 Program Plan and existing legal authority provide adequate authority to address the Special Condition for the Chesapeake Bay TMDL.

2.3 New or Modified Legal Authority

To meet the General Permit Part II A requirements, ANC will implement new legal authorities as described in **Table 2-1**.

Table 2-1: New Legal Authorities in the MS4 Program Plan

Reason for New Legal Authority	New Legal Authority
Illicit Discharge Detection and Elimination	ANC incorporates standard language into contracts prohibiting non-stormwater discharges to the storm sewer system.
Construction Site and Stormwater Runoff Control	ANC develops project-specific contract language to address discharges from land disturbing activities. Each contract is considered a new legal authority. ANC requires contractors to comply with 9 VAC 25-880 and 9 VAC 25-870.
Post-Construction Stormwater Management	ANC complies with 9 VAC 25-870 and 9 VAC 25-890.
Pollution Prevention and Good Housekeeping	ANC incorporates a summary of the MS4 Program Plan into standard language for appropriate contracts to enforce proper pollution prevention and good housekeeping procedures.

2.4 Means and Methods to Address Discharges from New Sources

ANC has tools in place to address discharges from new sources, defined as pervious and impervious urban lands served by the MS4 developed or redeveloped on or after July 1, 2009. **Table 2-2** addresses Part II A. of the General Permit and lists "new source" construction projects.

Table 2-2: Addressing Discharges from New Sources	
New Source Type and Description	**Applicability**
Construction initiated ON/AFTER July 1, 2009 that disturbed less than 1 acre.	ANC conducted such projects; however, no additional offsets required.
Construction initiated ON/AFTER July 1, 2009 that disturbed greater than 1 acre but will result in 16% or less impervious acreage within the limits of disturbance.	ANC conducted such projects; however, no additional offsets required because the projects did not exceed the baseline condition of 16% impervious urban.
Construction initiated between July 1, 2009 and June 30, 2019 that disturbed greater than 1 acre AND will result in greater than 16% impervious acreage within the limits of disturbance.	ANC conducted such projects; however, no additional offsets are required because ANC installed BMPs that reduced post-development loads to a level less than or equal to 16% impervious.
Construction initiated ON/AFTER July 1, 2014 that will disturb greater than 1 acre, AND will result in greater than 16% impervious acreage within the limits of disturbance, AND are grandfathered (project approved by VDEQ or funding allocated before July 1, 2012).	ANC's Millennium project is grandfathered and permitted in accordance with Part II A of the permit (9VAC25-870-62 et seq.) No additional offsets required.
Construction initiated ON/AFTER July 1, 2014 that will disturb greater than one acre, AND will result in greater than 16% impervious acreage within the limits of disturbance AND are NOT grandfathered (Project approved by VDEQ or funding allocated before July 1, 2012).	ANC will conduct projects meeting this New Source type. ANC has not adopted a greater than 16% land cover condition under the Chesapeake Bay Preservation Act. BMPs required under the 2014 Construction General Permit for these New Sources will reduce post-development loads to a level equivalent to 16% impervious urban. No additional offsets required.

ANC requires contractors comply with 9 VAC 25-870, 9 VAC 25-880, and 9 VAC 25-890 as described in **Table 2-1** prior to initiating land disturbing activity.

3.0 ESTIMATED EXISTING SOURCE LOADS AND CALCULATED POLLUTANT OF CONCERN CUMULATIVE REDUCTIONS

This section describes existing land uses (as of June 30, 2009), POC load estimates, and required cumulative POC load reductions for the first and second permit cycles. ANC determined the existing land cover for the facility using ANC's Geographic Information System (GIS) data. The entire ANC property consists of regulated urban lands based on the following:

- ANC is located entirely within an urbanized area according to the 2000 U.S. Census;
- Any changes to urbanized areas as a result of the 2010 U.S. Census did not impact ANC;
- All stormwater drains directly through the storm sewer system; and
- All stormwater discharges through the MS4.

Table 3-1 provides a breakdown of pervious and impervious areas at ANC as of June 30, 2009.

Table 3-1: Existing Land Use Acreage at ANC		
Land Use	**Acreage**	**Urban Categorization (Acreage)**
Building/Structure	3.23	**Regulated Impervious Urban (73.80 acres)**
Pavement	70.05	
Gravel	0.52	
Dirt	4.41	**Regulated Pervious Urban (528.80 acres)**
Grass	524.39	
Forest	19.65	**Non-urban Lands (20.10 acres)**
Water	0.45	
Total	**622.70**	**NA**

In accordance with the procedures outlined in the General Permit for facilities discharging to the Potomac River Basin, **Table 3-2** shows the calculations for estimating existing source loads.

Table 3-2: Calculation Sheet for Estimating Existing Source Loads for the Potomac River Basin				
Subsource	**Pollutant**	**Total Existing Acres Served by MS4 June 30, 2009**	**2009 EOS Loading Rate (lbs/ac/yr)**	**Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)**
Regulated Urban Impervious	Nitrogen	73.80	16.86	1,244.27
Regulated Urban Pervious		528.80	10.07	5,325.02
Regulated Urban Impervious	Phosphorus	73.80	1.62	119.56
Regulated Urban Pervious		528.80	0.41	216.81
Regulated Urban Impervious	TSS	73.80	1171.32	86,443.42
Regulated Urban Pervious		528.80	175.80	92,963.04

Table 3-3 provides a summary of the total nitrogen, phosphorus and TSS loads at ANC as of June 30, 2009.

Table 3-3: Summary of Total POC Loads for ANC	
Pollutant	**Total Load (pounds/year)**
Nitrogen	6,569.29
Phosphorus	336.37
TSS	179,406.46

ANC multiplied the total loads listed in **Table 3-3** by the MS4 Required Chesapeake Bay Total L2 Loading Reduction Value, as required in Part II. A. 3 of the General Permit and the Guidance Memo to determine the value on which to base reduction requirements. **Tables 3-4**, **3-5, and 3-6** provide estimates of ANC's pollutant load reduction requirements for the first, second, and third permit cycles.

ANC's General Permit requires, ANC to reduce the POC loads summarized in **Table 3-3** by the target percentage specified in the Level 2 (L2) scoping run model. The Special Condition of the General Permit requires ANC to achieve 5% of the POC reduction targets for the L2 scoping run in the first permit cycle, 40% by the end of the second permit cycle, and 100% by the end of the third permit cycle.

Table 3-4: Total POC Reductions Required for One Permit Cycle for the Potomac River Basin								
Pollutant	**Subsource**	**Loading Rate (lbs/ac/yr)**	**Total Acres Served by MS4 as of June 30, 2009 (ac)**	**Loading (lbs/ac/year)**	**MS4 Required Chesapeake Bay Total L2 Loading Rate Reduction Value**	**Percentage of L2 Required Reduction by June 30, 2018**	**Cumulative Reduction Required (lbs/yr) by June 30, 2018**	**Sum of Cumulative Reduction (lbs/yr)**
Nitrogen	Regulated Urban Impervious	16.86	73.8	1,244	9%	5%	5.60	22
	Regulated Urban Pervious	10.07	528.8	5,325	6%	5%	16	
Phosphorus	Regulated Urban Impervious	1.62	73.8	120	16%	5%	0.96	1.74
	Regulated Urban Pervious	0.41	528.8	217	7.25%	5%	0.79	
TSS	Regulated Urban Impervious	1,171.32	73.8	8,6443	20%	5%	864	1,271
	Regulated Urban Pervious	175.8	528.8	9,2963	8.75%	5%	407	

Table 3-5: Total POC Reductions Required for Two Permit Cycles for the Potomac River Basin								
Pollutant	**Subsource**	**Loading Rate (lbs/ac/yr)**	**Total Acres Served by MS4 as of June 30, 2009 (ac)**	**Loading (lbs/ac/year)**	**MS4 Required Chesapeake Bay Total L2 Loading Rate Reduction Value**	**Percentage of L2 Required Reduction by June 30, 2023**	**Cumulative Reduction Required by June 30, 2023 (lbs/yr)**	**Sum of Cumulative Reduction (lbs/yr)**
Nitrogen	Regulated Urban Impervious	16.86	73.8	1,244	9%	40%	45	173
	Regulated Urban Pervious	10.07	528.8	5,325	6%	40%	128	
Phosphorus	Regulated Urban Impervious	1.62	73.8	120	16%	40%	7.65	14
	Regulated Urban Pervious	0.41	528.8	217	7.25%	40%	6.29	
TSS	Regulated Urban Impervious	1,171.32	73.8	86,443	20%	40%	6,915	10,169
	Regulated Urban Pervious	175.8	528.8	92,963	8.75%	40%	3,254	

Table 3-6 : Total POC Reductions Required for Three Permit Cycles for the Potomac River Basin								
Pollutant	**Subsource**	**Loading Rate (lbs/ac/yr)**	**Total Acres Served by MS4 as of June 30, 2009 (ac)**	**Loading (lbs/ac/year)**	**MS4 Required Chesapeake Bay Total L2 Loading Rate Reduction Value**	**Percentage of L2 Required Reduction by June 30, 2028**	**Cumulative Reduction Required by June 30, 2028 (lbs/yr)**	**Sum of Cumulative Reduction (lbs/yr)**
Nitrogen	Regulated Urban Impervious	16.86	73.8	1,244	9%	100%	112	431
	Regulated Urban Pervious	10.07	528.8	5,325	6%	100%	320	
Phosphorus	Regulated Urban Impervious	1.62	73.8	120	16%	100%	19	35
	Regulated Urban Pervious	0.41	528.8	217	7.25%	100%	16	
TSS	Regulated Urban Impervious	1,171.32	73.8	86,443	20%	100%	17,289	25,423
	Regulated Urban Pervious	175.8	528.8	92,963	8.75%	100%	8,134	

Table 3-7 provides a summary of the total POC load reductions required for each POC for the first and second permit cycles, and cumulatively by the end of the second and third permit cycles.

Table 3-7: Summary of Total POC Load Required Reductions for ANC				
Pollutant	**Reduction Required in 1st Permit Cycle (lbs/yr)**	**Reduction Required in 2nd Permit Cycle (lbs/yr)**	**Cumulative Reduction Required by End of 2nd Permit Cycle (lbs/yr)**	**Cumulative Reduction Required by End of 3rd Permit Cycle (lbs/yr)**
Nitrogen	21.57	151.02	172.59	431.49
Phosphorus	1.74	12.20	13.94	34.85
TSS	1,271.15	8,898.03	10,169.18	25,422.95

4.0 TOTAL REDUCTIONS ACHIEVED AS OF JULY 1, 2018 FOR EACH POLLUTANT OF CONCERN

ANC uses BMPs to meet the required POC load reductions from existing sources and calculates BMP load reduction credits using methodologies detailed in the Guidance Memo, Part III and Appendix V. **Appendix A** includes a list of BMPs installed at ANC and corresponding pollutant load reduction values.

Table 4-1 provides a summary of POC load reductions ANC achieved during the first and second permit cycles. ANC exceeded its required reductions for both permit cycles.

Table 4-1: Summary of Total POC Load Reductions Achieved for ANC

	First Permit Cycle July 1, 2013-June 30, 2018		*Second Permit Cycle July 1, 2018-June 30, 2023*	
Pollutant	**Reduction Required in 1st Permit Cycle (lbs/yr)**	**Total Reduction Achieved with BMPs (lbs/yr)**	**Reduction Required in 2nd Permit Cycle (lbs/yr) [8x or 40% of L2 Scoping Run Reductions]**	**Total Reduction Achieved with BMPs (lbs/yr)**
Nitrogen	21.58	612.73	172.60	212.20
Phosphorus	1.75	315.25	13.95	143.37
TSS	1,271.14	142,876.37	10,169.17	105,884.20

5.0 BMPs IMPLEMENTED PRIOR TO JULY 1, 2018 TO ACHIEVE TMDL REDUCTIONS

ANC utilizes the BMP types listed in **Table 5-1** to treat existing sources. **Appendix A** includes a list of BMPs, BMP implementation date, and calculations of reductions achieved.

Table 5-1: Types of BMPs at ANC

Structural BMPs	Alternative BMPs
• Permeable Pavement • Rain Garden • Stormceptor Manufactured Treatment Device • Stormwater Filter Manufactured Treatment Device • Bioretention Facilities • Underground Stormwater Detention Chamber	• Vacuum-type sweeper • Stream Restoration

Since the last TMDL Action Plan, ANC revised its street sweeping operations, revised calculations for Stormceptor 6, and added one BMP.

5.1 Street Sweeping

ANC recalculated street sweeping credits for this permit cycle based on the Management Board of the Chesapeake Bay Program's U-8 Street Cleaning Practices Fact Sheet, dated January 2017. The updated calculations reflect street sweeping using a vacuum-type sweeper and conducted twice per week, 45 weeks per year, covering 70.05 acres of pavement (equivalent to 70.05 curb-lane miles swept using the street cleaning practice [SPC]-1 category). **Appendix A** includes calculations of POC load reductions achieved by street sweeping.

5.2 Stormceptor 6

ANC reviewed construction drawings for Stormceptor 6 and Stormceptor 2 and determined that stormwater flows from Stormceptor 2 into Stormceptor 6. Stormceptor 6 receives treatment credit for POC reductions; however, Stormceptor 2 does not due to age and lack of treatment information. The drainage areas for Stormceptor 6 (1.43 acres) and Stormceptor 2 (0.98 acres) total 2.41 acres. Stormceptor 6 is designed to treat a maximum of 1.5 impervious acres; therefore, ANC can receive up to 1.5 acres of treatment credit for the 2.41 acres draining to Stormceptor 6.

ANC recalculated the POC reductions from Stormceptor 6 accordingly. **Appendix A** includes calculations of POC load reductions achieved by Stormceptor 6.

5.3 Soil, Sand, and Salt Storage Building Storm Filter

ANC constructed a new soil, sand, and salt storage building in its maintenance area in 2017. The project included installation of a storm filter manufactured treatment device (MTD). The MTD treats areas categorized as regulated urban impervious as of 2009. These areas remained regulated urban impervious following the redevelopment; therefore, TMDL credits apply. ANC calculated the POC reductions by determining the drainage area to the BMP and then measuring the portion of the drainage area qualified as redeveloped impervious. **Appendix A** includes calculations of POC load reductions achieved by the storm filter MTD.

The storm filter MTD is a Contech Sandfilter with zeolite, perlite, and granular activated carbon (ZPG) filter media and treats 1 inch of rainfall. Treatment efficiencies and the source used to calculate those efficiencies are as follows:

- Nitrogen, 35% (Retrofit Curves [ST for stormwater treatment practices], Guidance Memo Table V.B.1 and pages 50-51)
- Phosphorus, 45% (BMP Clearinghouse data, http://vwrrc.vt.edu/swc/ProprietaryBMPs.html)
- TSS, 70% (Retrofit Curves [ST for stormwater treatment practices], Guidance Memo Table V.B. and pages 50-51)

5.4 Summary of BMPs Revised or Installed Since the Last TMDL Action Plan

Table 5-2 summarizes BMPs revised or installed since the last TMDL Action plan to achieve required POC load reductions. These POC load reductions are included in the total reductions achieved in **Table 4-1** and calculations are documented in **Appendix A**.

Table 5-2: Summary of Existing POC Load Reductions Achieved or Revised at ANC Since the last TMDL Action Plan

Project/BMP	Nitrogen (lbs/yr)	Phosphorus (lbs/yr)	TSS (lbs/yr)
Street Sweeping	47.24	11.35	17,230.70
Stormceptor 6	1.26	0.49	878.49
Soil, Sand, and Salt Storage Building Storm Filter	1.77	0.22	245.98

6.0 BMPs TO BE IMPLEMENTED PRIOR TO JUNE 30, 2023 TO MEET CUMULATIVE POC REDUCTIONS

During the next permit cycle, ANC anticipates constructing and implementing BMPs listed in **Table 6-1** for treating existing impervious areas. **Appendix B** contains a list of proposed BMPs including type, project name, location, percent removal efficiency for each POC, and associated POC load reductions.

Table 6-1: Types of Proposed BMPs at ANC

Structural BMPs	Alternative BMPs
• Stormwater Filter Manufactured Treatment Device • Hydrodynamic Separator • Bioretention Facilities	• Redevelopment

The following section discusses ANC's projects proposed for the next permit cycle.

6.1 Southern Expansion Project

ANC's will acquire 48.34 acres of land adjacent to their southern border from Joint Base Myer-Henderson Hall, known as the Southern Expansion project.

In 2009, the site contained office buildings, parking lots, lawns, and roads. Based on aerial images dated December 2009, the area consisted of approximately 24.09 regulated urban impervious acres and 24.25 regulated urban pervious acres. Demolition of the buildings and parking areas in 2012 resulted in approximately 2.76 impervious acres and 45.58 pervious acres. The pervious acreage is currently meadow.

To determine reduction credits, ANC calculated the POC load estimates from both pervious and impervious acres present in 2009, and current interim land use in 2018. The net change is negative, indicating POC load reductions. **Table 6-2** provides a summary of the total POC loads and reductions achieved and **Appendix B** contains detailed calculations.

Table 6-2: Estimated Total POC Load Reductions Achieved for Southern Expansion Redevelopment

Pollutant	Total Load 2009 (lbs/yr)	Total Load 2018 (lbs/yr)	Total Load Reduction Achieved (lbs/yr)
Nitrogen	650.35	505.52	144.83
Phosphorus	48.97	23.16	25.81
TSS	32,480.25	11,245.81	21,354.44

ANC expects completion of the design documents in 2020. This project site meets the requirements for redevelopment. ANC plans to recalculate load ratings and TMDL credits once site designs are complete.

6.2 Tram Plaza Project

ANC plans to redevelop the Tram Plaza outside the Visitor's Center. Based on planning documents, the post-construction site is eligible for TMDL credit with approximately 0.48 acres of managed turf and 1.66 acres of impervious cover. Treatment efficiencies used for the proposed bioretention facility follow:

- Nitrogen, 64% (BMP Clearinghouse data, Guidance Memo Table V.C.1)
- Phosphorus, 55% (BMP Clearinghouse data, Guidance Memo Table V.C.1)

- TSS, 75% (Retrofit Curves [RR for runoff reduction practices], Guidance Memo Table V.B.1 and pages 50-51)

Table 6-3 provides estimates of the POC reductions for the proposed BMPs and **Appendix B** contains the detailed calculations.

Table 6-3: Estimated Total POC Load Reductions Achieved for Tram Plaza	
Pollutant	**Total Reduction Achieved with BMPs (lbs/yr)**
Nitrogen	15.88
Phosphorus	0.80
TSS	640.55

6.3 Parking Garage Phase 3 Project

ANC plans to redevelop its parking garage area. Proposed bioretention facilities replace landscape beds and turf at the north and south ends of the parking garage treating approximately 7.62 acres of existing impervious area. Estimated POC reductions include two bioretention ponds each treating half of the site (3.81 impervious acres). **Section 6.2** identifies methods for estimating treatment efficiencies for bioretention facilities.

Table 6-4 provides estimates of the POC reductions for the proposed BMPs and **Appendix B** contains the detailed calculations.

Table 6-4: Estimated Total POC Load Reductions Achieved for Parking Garage Phase 3	
Pollutant	**Total Reduction Achieved with BMPs (lbs/yr)**
Nitrogen	82.22
Phosphorus	6.79
TSS	6,694.09

6.4 Planned Capital Improvement Road Projects

ANC has roadway improvement projects ongoing throughout the property. These projects include installation of two BMPs:

- Hydrodynamic Separator
- Underground Chamber System (Contech Sandfilter with ZPG filter media) MTD

The two BMPs, located in Section 52 near Ord and Weitzel Drive, will treat 4.36 impervious acres and 53.55 pervious acres (managed turf). The regulated land use categories in the drainage area remain unchanged and will be eligible for TMDL credit.

Treatment efficiencies and the source used to calculate those efficiencies follow:

- Nitrogen, 35% (Retrofit Curves [ST for stormwater treatment practices], Guidance Memo Table V.B.1 and pages 50-51)
- Phosphorus, 55% (BMP Clearinghouse data, http://vwrrc.vt.edu/swc/ProprietaryBMPs.html)
- TSS, 70% (Retrofit Curves [ST for stormwater treatment practices], Guidance Memo Table V.B.1 and pages 50-51)

See **Section 5.2** for methods for estimating treatment efficiencies for the Contech Sandfilter with ZPG filter media.

Table 6-5 provides estimates of the POC reductions for BMPs proposed at the Capital Improvement Road Projects with detailed calculations included in **Appendix B**.

Table 6-5: Estimated Total POC Load Reductions Achieved for Capital Improvement Road Projects

Pollutant	Total Reduction Achieved with BMPs (lbs/yr)
Nitrogen	428.93
Phosphorus	29.02
TSS	20,329.46

6.5 Queuing Area Bioretention Facilities

In 2017, ANC installed two bioretention facilities as part of the Administration Queuing Area redevelopment project; however, ownership remains with the contractor. ANC considers these future BMPs. The queuing area redevelopment includes replacement and expansion of a paved parking lot. The two bioretention facilities treat areas categorized as regulated urban impervious and regulated urban pervious as of 2009 and remained the same following redevelopment; therefore, TMDL credits apply. ANC calculated the POC reductions by determining the drainage area to each BMP and then measuring the portion of the drainage area qualified as redeveloped impervious and redeveloped pervious.

See **Section 6.2** for methods for estimating treatment efficiencies for bioretention facilities.

Table 6-6 provides estimates of the POC reductions for BMPs at the Queuing Area with detailed calculations included in **Appendix B**.

Table 6-6: Estimated Total POC Load Reductions Achieved for Queuing Area

Pollutant	Total Reduction Achieved with BMPs (lbs/yr)
Nitrogen	11.08
Phosphorus	0.81
TSS	772.66

6.6 Summary of Future BMPs

Implementation of redevelopment BMPs prior to July 1, 2023 achieve required POC load reductions as described in **Table 6-7**.

Table 6-7: Summary of Estimated Future POC Load Reductions Achieved at ANC			
Project/BMP	**Nitrogen (lbs/yr)**	**Phosphorus (lbs/yr)**	**TSS (lbs/yr)**
Southern Expansion*	144.83	25.81	21,234.44
Tram Plaza	15.88	0.80	640.55
Parking Garage Phase 3	82.22	6.79	6,694.09
Capital Improvement Road Projects	428.93	29.02	20,329.46
Queuing Area	11.08	0.81	772.66
Totals	**682.94**	**63.23**	**49,671.20**

*Project will also change the required POC reductions.

7.0 PUBLIC COMMENTS ON TMDL ACTION PLAN

ANC allows 15 days for receipt of public comment on additional proposed BMPs previously not approved by VDEQ in the first phase TMDL Action Plan dated 2015. ANC's "public" is defined as ANC personnel; however, posting the TMDL Action Plan on ANC's website, allows visitors to access, review, and comment on the plan. **Appendix C** includes a summary of comments received.

8.0 ANNUAL REPORTING

Annual Report requirements follow:

- A list of BMPs implemented during the reporting period but not reported to the VDEQ BMP Warehouse (if any);
- Any credits acquired during the reporting period;
- A summary of the progress, using the final design efficiencies of the BMPs, toward meeting the required cumulative pollutant loading reductions; and
- A list of BMPs ANC plans to implement in the next reporting period.

APPENDIX A
Existing BMP Inventory and Calculations

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Arlington National Cemetery
Load Reductions for Existing BMPs - Second Permit Cycle

Existing BMP Type	Year Installed	Location	Subsource	Pollutant	Acres Served by BMP	EOS[2] Loading Rates (lbs/ac/yr)	EOS Load (lbs/yr)	Reduction Efficiencies	Total Load Reductions (lbs/yr)	Comments
BMP ANC Location / Type										
Vacuum-type sweeper used on all roads, twice per week. Contents dumped in solid waste dumpster		Roadways throughout ANC	Regulated Urban Impervious	Nitrogen	70.05	16.86	1181.0	4.00%	47.24	BMP ELIGIBLE FOR CREDIT BECAUSE IT TREATS LAND USE EXISTING IN 2009. Sweeping occurs twice/week on 70.05 acres (70.05 curb line miles) of paving. SPC-1: 4% N removal, 10% P Removal 21% TSS removal; Chesapeake Stormwater Network U-8 Fact Sheet
			Regulated Urban Pervious		Curb Lane Miles	10.07	N/A	0.00%	0.00	
			Regulated Urban Impervious	Phosphorous	70.05	1.62	113.5	10.00%	11.35	
			Regulated Urban Pervious		Curb Lane Miles	0.41	N/A	0.00%	0.00	
			Regulated Urban Impervious	TSS	70.05	1171.32	82051.0	21.00%	17,230.70	
			Regulated Urban Pervious		Curb Lane Miles	175.8	N/A	0.00%	0.00	
Permeable Pavement, no underdrain, with gravel	2012	Sidewalk along Eisenhower Ave	Regulated Urban Impervious	Nitrogen	0.36	16.86	6.1	65.00%	3.95	2009-2014 BMP ELIGIBLE FOR CREDIT BECAUSE IT TREATS LAND USE EXISTING IN 2009. Treatment volume based on 4" gravel bed under permeable pavement. Adjustor curves used to determine removal efficiencies
			Regulated Urban Pervious		0.00	10.07	0.0	65.00%	0.00	
			Regulated Urban Impervious	Phosphorous	0.36	1.62	0.6	75.00%	0.44	
			Regulated Urban Pervious		0.00	0.41	0.0	75.00%	0.00	
			Regulated Urban Impervious	TSS	0.36	1171.32	421.7	80.00%	337.34	
			Regulated Urban Pervious		0.00	175.8	0.0	80.00%	0.00	
Rain Garden 2, No underdrain	2012	Bldg. 123	Regulated Urban Impervious	Nitrogen	0.16	16.86	2.7	35.00%	0.94	2009-2014 BMP ELIGIBLE FOR **PARTIAL** CREDIT BECAUSE IT TREATS SOME LAND USE EXISTING IN 2009 THAT REMAINED UNCHANGED DURING THE DEVELOPMENT PROJECT ASSOCIATED WITH THIS RAIN GARDEN. Acreage values provided in this table are those located inside the treatment area for this BMP according to as built plans, but acreage that existed outside the limit of disturbance for the project (therefore, acreage that was existing in 2009 and that was not altered during construction). This is the only acreage within the TA for this BMP that is eligible for credit. BMP volume based on info from as built plans. Impervious area from GIS data. Used this info and adjustor curves to obtain removal efficiencies.
			Regulated Urban Pervious		0.09	10.07	0.9	35.00%	0.32	
			Regulated Urban Impervious	Phosphorous	0.16	1.62	0.3	40.00%	0.10	
			Regulated Urban Pervious		0.09	0.41	0.0	40.00%	0.01	
			Regulated Urban Impervious	TSS	0.16	1171.32	187.4	45.00%	84.34	
			Regulated Urban Pervious		0.09	175.8	15.8	45.00%	7.12	
Stormceptor 5	2006	SEC76	Regulated Urban Impervious	Nitrogen	1.50	16.86	25.3	5.00%	1.26	Max. area for the STC 2400 is 2.0 acres. Per plan sheets the Stormceptor treats 1.5 impervious ac; therefore, use 1.5 ac. as effective TA. For TSS and TP reduction efficiencies, used VDEQ Letter, August 13, 2014, Stormceptor STC. For TN reduction efficiencies, used GM15-2005, Retrofit Pollutant Removal Adjuster Curve. RS = 2462 gallons = 0.0076 acre foot. RD = 0.06.
			Regulated Urban Pervious		0.00	10.07	0.0	5.00%	0.00	
			Regulated Urban Impervious	Phosphorous	1.50	1.62	2.4	20.00%	0.49	
			Regulated Urban Pervious		0.00	0.41	0.0	20.00%	0.00	
			Regulated Urban Impervious	TSS	1.50	1171.32	1757.0	50.00%	878.49	
			Regulated Urban Pervious		0.00	175.8	0.0	50.00%	0.00	

Existing BMP Type	Year Installed	Location	Subsource	Pollutant	Acres Served by BMP	EOS[2] Loading Rates (lbs/ac/yr)	EOS Load (lbs/yr)	Reduction Efficiencies	Total Load Reductions (lbs/yr)	Comments
Stormceptor 6	2006	SEC78	Regulated Urban Impervious	Nitrogen	1.50	16.86	25.3	5.00%	1.26	Max. area for the STC 1800 is 1.5 acres. Per plan sheets the Stormceptor treats 1.43 impervious ac and recieves flow from STC 2; therefore, use 1.50 ac. as effective TA. For TSS and TP reduction efficiencies, used VDEQ Letter, August 13, 2014, Stormceptor STC. For TN reduction efficiencies, used GM15-2005, Retrofit Pollutant Removal Adjuster Curve. RS = 1833 gallons = 0.0056 acre foot. RD = 0.05.
			Regulated Urban Pervious		0.00	10.07	0.0	5.00%	0.00	
			Regulated Urban Impervious	Phosphorous	1.50	1.62	2.4	20.00%	0.49	
			Regulated Urban Pervious		0.00	0.41	0.0	20.00%	0.00	
			Regulated Urban Impervious	TSS	1.50	1171.32	1757.0	50.00%	878.49	
			Regulated Urban Pervious		0.00	175.8	0.0	50.00%	0.00	
Permeable Pavement, no underdrain, with gravel	2014	Meigs Drive SEC1	Regulated Urban Impervious	Nitrogen	0.03	16.86	0.5	65.00%	0.34	Treatment volume based on 4" gravel bed under permeable pavement. Adjustor curves used to determine removal efficiencies.
			Regulated Urban Pervious		0.00	10.07	0.0	65.00%	0.00	
			Regulated Urban Impervious	Phosphorous	0.03	1.62	0.1	75.00%	0.04	
			Regulated Urban Pervious		0.00	0.41	0.0	75.00%	0.00	
			Regulated Urban Impervious	TSS	0.03	1171.32	36.3	80.00%	29.04	
			Regulated Urban Pervious		0.00	175.8	0.0	80.00%	0.00	
Stream Restoration	2016	Millennium Site	Regulated Urban Impervious/Pervious	Nitrogen	1900.00	N/A	N/A	0.075	142.50	BMP not measured in TA acres but in LF of stream restoration. Load reduction based on mass reduction (lbs removed/LF of stream restored).
					LF	N/A	N/A	0.00	0.00	
			Regulated Urban Impervious/Pervious	Phosphorous	1900.00	N/A	N/A	0.068	129.20	
					LF	N/A	N/A	0.000	0.00	
			Regulated Urban Impervious/Pervious	TSS	1900.00	N/A	N/A	44.88	85272.00	
					LF	N/A	N/A	0.00	0.00	
Underground Stormwater Detention Chamber	2016	Chaffee Place Parking Lot (part of Millennium Site Project)	Regulated Urban Impervious	Nitrogen	1.08	16.86	18.2	5.00%	0.91	No classification for underground stormwater chambers in adjustor curve documents. Used Ches. Bay Efficiencies
			Regulated Urban Pervious		1.22	10.07	12.3	5.00%	0.61	
			Regulated Urban Impervious	Phosphorous	1.08	1.62	1.8	10.00%	0.18	
			Regulated Urban Pervious		1.22	0.41	0.5	10.00%	0.05	
			Regulated Urban Impervious	TSS	1.08	1171.32	1266.2	10.00%	126.62	
			Regulated Urban Pervious		1.22	175.8	214.3	10.00%	21.43	

Existing BMP Type	Year Installed	Location	Subsource	Pollutant	Acres Served by BMP	EOS[2] Loading Rates (lbs/ac/yr)	EOS Load (lbs/yr)	Reduction Efficiencies	Total Load Reductions (lbs/yr)	Comments
Bioretention 1	2016	Administration Queuing Area	Regulated Urban Impervious	Nitrogen	0.40	16.86	6.74	64.00%	4.32	BMP ELIGIBLE FOR **PARTIAL** CREDIT BECAUSE IT TREATS SOME LAND USE EXISTING IN 2009 THAT REMAINED UNCHANGED DURING THE DEVELOPMENT PROJECT ASSOCIATED WITH THIS LEVEL 1 BIORETENTION .
			Regulated Urban Pervious		0.00	10.07	0.00	64.00%	0.00	
			Regulated Urban Impervious	Phosphorous	0.40	1.62	0.65	55.00%	0.36	
			Regulated Urban Pervious		0.00	0.41	0.00	55.00%	0.00	Acreage values are existing impervious areas located inside the treatment area for this BMP according to stormwater plans. This is the only acreage within the TA for this BMP that is eligible for credit. BMP design for 1" depth of rainfall based on info from stormwater plans. Used Virginia BMP Clearinghouse data for TN and TP and adjustor curves for TSS to obtain removal efficiencies.
			Regulated Urban Impervious	TSS	0.40	1171.32	468.53	75.00%	351.40	
			Regulated Urban Pervious		0.00	175.8	0.00	75.00%	0.00	
Bioretention 2	2016	Administration Queuing Area	Regulated Urban Impervious	Nitrogen	0.43	16.86	7.25	64.00%	4.64	BMP ELIGIBLE FOR **PARTIAL** CREDIT BECAUSE IT TREATS SOME LAND USE EXISTING IN 2009 THAT REMAINED UNCHANGED DURING THE DEVELOPMENT PROJECT ASSOCIATED WITH THIS LEVEL 1 BIORETENTION.
			Regulated Urban Pervious		0.33	10.07	3.32	64.00%	2.13	
			Regulated Urban Impervious	Phosphorous	0.43	1.62	0.70	55.00%	0.38	
			Regulated Urban Pervious		0.33	0.41	0.14	55.00%	0.07	Acreage values are existing impervious and unchanged pervious areas located inside the treatment area for this BMP according to stormwater plans. This is the only acreage within the TA for this BMP that is eligible for credit. BMP design for 1" depth of rainfall based on info from stormwater plans. Used Virginia BMP Clearing house data for TN and TP and adjustor curves for TSS to obtain removal efficiencies.
			Regulated Urban Impervious	TSS	0.43	1171.32	503.67	75.00%	377.75	
			Regulated Urban Pervious		0.33	175.8	58.01	75.00%	43.51	
MTD Contech Sandfilter with ZPG filter media	2016	Soil, Sand and Salt Storage Building	Regulated Urban Impervious	Nitrogen	0.30	16.86	5.06	35.00%	1.77	BMP ELIGIBLE FOR **PARTIAL** CREDIT BECAUSE IT TREATS SOME LAND USE EXISTING IN 2009 THAT REMAINED UNCHANGED DURING THE DEVELOPMENT PROJECT ASSOCIATED WITH THIS LEVEL 1 MTD .
			Regulated Urban Pervious		0.00	10.07	0.00	35.00%	0.00	
			Regulated Urban Impervious	Phosphorous	0.30	1.62	0.49	45.00%	0.22	
			Regulated Urban Pervious		0.00	0.41	0.00	45.00%	0.00	Acreage values are existing impervious areas located inside the treatment area for this BMP according to stormwater plans. This is the only acreage within the TA for this BMP that is eligible for credit. BMP design for 1" depth of rainfall based on info from stormwater plans. Used Virginia BMP Clearinghouse data TP and adjustor curves forTN and TSS to obtain removal efficiencies.
			Regulated Urban Impervious	TSS	0.30	1171.32	351.40	70.00%	245.98	
			Regulated Urban Pervious		0.00	175.8	0.00	70.00%	0.00	

Total Load of Nitrogen Reduced (lbs/yr) **212.20**
Total Load of Phosphorous Reduced (lbs/yr) **143.37**
Total Load of Suspended Solids Reduced (lbs/yr) **105,884.20**

[2]Edge of Stream loading rates for Potomac River basin from the MS4 permit

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APPENDIX B
Planned BMP Inventory and Calculations

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Arlington National Cemetery
Load Reductions for Proposed BMPs - Second Permit Cycle
Southern Expansion Redevelopment

Calculation Sheet for Estimating Existing Source Loads for the Potomac River Basin				
Subsource	**Pollutant**	**Total Existing Acres Served by MS4 30-Jun-09**	**2009 EOS Loading Rate (lbs/ac/yr)**	**Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)**
Regulated Urban Impervious	Nitrogen	24.09	16.86	406.16
Regulated Urban Pervious		24.25	10.07	244.20
Regulated Urban Impervious	Phosphorus	24.09	1.62	39.03
Regulated Urban Pervious		24.25	0.41	9.94
Regulated Urban Impervious	TSS	24.09	1171.32	28,217.10
Regulated Urban Pervious		24.25	175.8	4,263.15

Summary of Total POC Loads 2009	
Pollutant	**Total Load (lbs/yr)**
Nitrogen	650.35
Phosphorus	48.97
TSS	32,480.25

Calculation Sheet for Estimating 2018 Source Loads for the Potomac River Basin				
Subsource	**Pollutant**	**Total Existing Acres Served by MS4 2017**	**2009 EOS Loading Rate (lbs/ac/yr)**	**Estimated Total POC Load Based on 2009 Progress Run (lbs/yr)**
Regulated Urban Impervious	Nitrogen	2.76	16.86	46.53
Regulated Urban Pervious		45.58	10.07	458.99
Regulated Urban Impervious	Phosphorus	2.76	1.62	4.47
Regulated Urban Pervious		45.58	0.41	18.69
Regulated Urban Impervious	TSS	2.76	1171.32	3,232.84
Regulated Urban Pervious		45.58	175.8	8,012.96

Summary of Total POC Loads 2018	
Pollutant	**Total Load (lbs/yr)**
Nitrogen	505.52
Phosphorus	23.16
TSS	11,245.81

Net Difference of Total POC Loads 2009-2018	
Pollutant	**Total Load (lbs/yr)**
Nitrogen	-144.83
Phosphorus	-25.81
TSS	-21,234.44

(- negative signifies reduction/credit)

Arlington National Cemetery
oad Reductions for Proposed BMPs - Second Permit Cycl
Tram Plaza Renovation

Planned BMP Type	Year To Be Installed	Location	Subsource	Pollutant	Acres Served by BMP	EOS[2] Loading Rates (lbs/ac)	EOS Load (lbs)	Reduction Efficiencies	Total Load Reductions (lbs)	Comments
Bioretention	Future	Tram Plaza	Regulated Urban Impervious	Nitrogen	0.48	16.86	8.09	64.00%	5.18	Estimated load reductions for project in planning stages. Assume that all areas within the project site drain to bioretention and proposed impervious / pervious areas are the same as existing. Acreage values are existing impervious areas located inside the treatment area for this BMP. Assume (standard) BMP design for 1" depth of rainfall based on info from stormwater plans. Used Virginia BMP Clearinghouse data for TN and TP and adjustor curves for TSS to obtain removal efficiencies.
			Regulated Urban Pervious		1.66	10.07	16.72	64.00%	10.70	
			Regulated Urban Impervious	Phosphorous	0.48	1.62	0.78	55.00%	0.43	
			Regulated Urban Pervious		1.66	0.41	0.68	55.00%	0.37	
			Regulated Urban Impervious	TSS	0.48	1171.32	562.23	75.00%	421.68	
			Regulated Urban Pervious		1.66	175.8	291.83	75.00%	218.87	

Total Load of Nitrogen Reduced (lbs) **15.88**
Total Load of Phosphorous Reduced (lbs) **0.80**
Total Load of Suspended Solids Reduced (lbs) **640.55**

[2]Edge of Stream loading rates for Potomac River basin from the MS4 permit

Arlington National Cemetery
Load Reductions for Proposed BMPs - Second Permit Cycle
Parking Garage Phase 3

Planned BMP Type	Year To Be Installed	Location	Subsource	Pollutant	Acres Served by BMP	EOS[2] Loading Rates (lbs/ac)	EOS Load (lbs)	Reduction Efficiencies	Total Load Reductions (lbs)	Comments
Bioretention	Future	Parking Garage (Phase 3)	Regulated Urban Impervious	Nitrogen	3.81	16.86	64.24	64.00%	41.11	Estimated load reductions for project in planning stages. Assume that all areas within the project site drain to bioretention and proposed impervious/pervious areas are the same as existing. Acreage values are existing impervious areas located inside the treatment area for this BMP. Assume (standard) BMP design for 1" depth of rainfall based on info from stormwater plans. Used Virginia BMP Clearinghouse data for TN and TP and adjustor curves for TSS to obtain removal efficiencies.
			Regulated Urban Pervious		0.00	10.07	0.00	64.00%	0.00	
			Regulated Urban Impervious	Phosphorous	3.81	1.62	6.17	55.00%	3.39	
			Regulated Urban Pervious		0.00	0.41	0.00	55.00%	0.00	
			Regulated Urban Impervious	TSS	3.81	1171.32	4462.73	75.00%	3347.05	
			Regulated Urban Pervious		0.00	175.8	0.00	75.00%	0.00	
Bioretention	Future	Parking Garage (Phase 3)	Regulated Urban Impervious	Nitrogen	3.81	16.86	64.24	64.00%	41.11	
			Regulated Urban Pervious		0.00	10.07	0.00	64.00%	0.00	
			Regulated Urban Impervious	Phosphorous	3.81	1.62	6.17	55.00%	3.39	
			Regulated Urban Pervious		0.00	0.41	0.00	55.00%	0.00	
			Regulated Urban Impervious	TSS	3.81	1171.32	4462.73	75.00%	3347.05	
			Regulated Urban Pervious		0.00	175.8	0.00	75.00%	0.00	

Total Load of Nitrogen Reduced (lbs) **82.22**
Total Load of Phosphorous Reduced (lbs) **6.79**
Total Load of Suspended Solids Reduced (lbs) **6694.09**

[2]Edge of Stream loading rates for Potomac River basin from the MS4 permit

Arlington National Cemetery
Load Reductions for Proposed BMPs - Second Permit Cycle
Capital Improvement Roadway Projects

Planned BMP Type	Year To Be Installed	Location	Subsource	Pollutant	Acres Served by BMP	EOS[2] Loading Rates (lbs/ac)	EOS Load (lbs)	Reduction Efficiencies	Total Load Reductions (lbs)	Comments
Hydrodynamic Separator	2019	SEC 52	Regulated Urban Impervious	Nitrogen	4.36	16.86	73.51	35.00%	25.73	BMP ELIGIBLE FOR CREDIT BECAUSE IT TREATS LAND USE EXISTING IN 2009 THAT REMAINED UNCHANGED DURING THE PROJECT. BMP design for 1" depth of rainfall based on info from stormwater plans. Used Virginia BMP Clearinghouse data for TN and TP and adjustor curves for TSS to obtain removal efficiencies.
			Regulated Urban Pervious		53.55	10.07	539.25	35.00%	188.74	
			Regulated Urban Impervious	Phosphorous	4.36	1.62	7.06	55.00%	3.88	
			Regulated Urban Pervious		53.55	0.41	21.96	55.00%	12.08	
			Regulated Urban Impervious	TSS	4.36	1171.32	5106.96	70.00%	3574.87	
			Regulated Urban Pervious		53.55	175.8	9414.09	70.00%	6589.86	
Underground Chamber System -- Contech Sandfilter with ZPG fitler media	2019	SEC 52	Regulated Urban Impervious	Nitrogen	4.36	16.86	73.51	35.00%	25.73	BMP ELIGIBLE FOR CREDIT BECAUSE IT TREATS LAND USE EXISTING IN 2009 THAT REMAINED UNCHANGED DURING THE PROJECT. BMP design for 1" depth of rainfall based on info from stormwater plans. Used Virginia BMP Clearinghouse data for TN and TP and adjustor curves for TSS to obtain removal efficiencies.
			Regulated Urban Pervious		53.55	10.07	539.25	35.00%	188.74	
			Regulated Urban Impervious	Phosphorous	4.36	1.62	7.06	45.00%	3.18	
			Regulated Urban Pervious		53.55	0.41	21.96	45.00%	9.88	
			Regulated Urban Impervious	TSS	4.36	1171.32	5106.96	70.00%	3574.87	
			Regulated Urban Pervious		53.55	175.8	9414.09	70.00%	6589.86	
						Total Load of Nitrogen Reduced (lbs)			**428.93**	
						Total Load of Phosphorous Reduced (lbs)			**29.02**	
						Total Load of Suspended Solids Reduced (lbs)			**20329.46**	

[2]Edge of Stream loading rates for Potomac River basin from the MS4 permit

Arlington National Cemetery
Load Reductions for Existing BMPs - Second Permit Cycle
Queuing Area Renovation

Planned BMP Type	Year to be Installed	Location	Subsource	Pollutant	Acres Served by BMP	EOS[2] Loading Rates (lbs/ac/yr)	EOS Load (lbs/yr)	Reduction Efficiencies	Total Load Reductions (lbs/yr)	Comments
Bioretention 1	2016	Administration Queuing Area	Regulated Urban Impervious	Nitrogen	0.40	16.86	6.74	64.00%	4.32	BMP ELIGIBLE FOR **PARTIAL** CREDIT BECAUSE IT TREATS SOME LAND USE EXISTING IN 2009 THAT REMAINED UNCHANGED DURING THE DEVELOPMENT PROJECT ASSOCIATED WITH THIS LEVEL 1 BIORETENTION .
			Regulated Urban Pervious		0.00	10.07	0.00	64.00%	0.00	
			Regulated Urban Impervious	Phosphorous	0.40	1.62	0.65	55.00%	0.36	
			Regulated Urban Pervious		0.00	0.41	0.00	55.00%	0.00	Acreage values are existing impervious areas located inside the treatment area for this BMP according to stormwater plans. This is the only acreage within the TA for this BMP that is eligible for credit. BMP design for 1" depth of rainfall based on info from stormwater plans. Used Virginia BMP Clearinghouse data for TN and TP and adjustor curves for TSS to obtain removal efficiencies.
			Regulated Urban Impervious	TSS	0.40	1171.32	468.53	75.00%	351.40	
			Regulated Urban Pervious		0.00	175.8	0.00	75.00%	0.00	
Bioretention 2	2016	Administration Queuing Area	Regulated Urban Impervious	Nitrogen	0.43	16.86	7.25	64.00%	4.64	BMP ELIGIBLE FOR **PARTIAL** CREDIT BECAUSE IT TREATS SOME LAND USE EXISTING IN 2009 THAT REMAINED UNCHANGED DURING THE DEVELOPMENT PROJECT ASSOCIATED WITH THIS LEVEL 1 BIORETENTION.
			Regulated Urban Pervious		0.33	10.07	3.32	64.00%	2.13	
			Regulated Urban Impervious	Phosphorous	0.43	1.62	0.70	55.00%	0.38	
			Regulated Urban Pervious		0.33	0.41	0.14	55.00%	0.07	Acreage values are existing impervious and unchanged pervious areas located inside the treatment area for this BMP according to stormwater plans. This is the only acreage within the TA for this BMP that is eligible for credit. BMP design for 1" depth of rainfall based on info from stormwater plans. Used Virginia BMP Clearing house data for TN and TP and adjustor curves for TSS to obtain removal efficiencies.
			Regulated Urban Impervious	TSS	0.43	1171.32	503.67	75.00%	377.75	
			Regulated Urban Pervious		0.33	175.8	58.01	75.00%	43.51	

[2]Edge of Stream loading rates for Potomac River basin from the MS4 permit

Total Load of Nitrogen Reduced (lbs/yr) **11.08**
Total Load of Phosphorous Reduced (lbs/yr) **0.81**
Total Load of Suspended Solids Reduced (lbs/yr) **772.66**

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Appendix C
Public Comments

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FINAL – CHESAPEAKE BAY TMDL ACTION PLAN

Arlington National Cemetery
Arlington, Virginia

November 2018

Prepared for:

Contract Number: N40080-17-C-0321

NAVFAC Washington
1314 Harwood St, SE
Washington Navy Yard, DC 20374

Arlington National Cemetery
1 Memorial Drive
Arlington, VA 22211

Prepared by:

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