



## Chesapeake Bay TMDL Action Plan





James Madison University – Harrisonburg, Virginia  
Chesapeake Bay TMDL Action Plan

Submitted to satisfy the terms of the General VPDES Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4)

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Cover pictures from JMU's Newman Lake aquatic bench

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*Table of Contents*

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Appendices .....	1
Acronyms and Abbreviations .....	1
Introduction.....	2
1. Current Program and Existing Legal Authority .....	3
2. New or Modified Legal Authority .....	4
3. Means and Methods to Address Discharges from New Sources.....	4
4. Estimated Existing Source Loads and Calculated Total Pollutant of Concern Required Reductions .....	5
5. Means and Methods to Meet the Required Reductions and Schedule.....	6
6. Means and Methods to Offset Increased Loads from New Sources Initiating Construction between July 1, 2009 and June 30, 2014.....	8
7. Means and Methods to Offset Increased Loads from Grandfathered Projects that Begin Construction after July 1, 2014 .....	8
8. List of Future Projects, and Associated Acreage that Qualify as Grandfathered .....	8
9. An Estimate of the Expected Cost to Implement the Necessary Reductions.....	9
10. Public Comments on Draft Action Plan .....	9
Resources .....	9

**Appendices**

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Appendix A      Calculations Ledger

**Acronyms and Abbreviations**

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Bay	Chesapeake Bay	MCM	Minimum Control Measure
BMP	Best Management Practice	MS4	Municipal Separate Storm Sewer System
CWA	Clean Water Act	NPDES	National Pollution Discharge Elimination System
DEQ	Department of Environmental Quality	POC	Pollutants of Concern
EPA	Environmental Protection Agency	SWPPP	Stormwater Pollution Prevention Plan
ESC	Erosion & Sediment Control	TMDL	Total Maximum Daily Load
FM	Facilities Management	UA	Urbanized Area
GIS	Geographic Information Systems	VPDES	Virginia Pollution Discharge Elimination System
GPS	Global Positioning System	VSMP	Virginia Stormwater Management Program
HUC	Hydrologic Unit Code	WLA	Waste Load Allocation
IDDE	Illicit Discharge Detection & Elimination		
JMU	James Madison University		
MEP	Maximum Extent Practicable		

## Introduction

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This Action Plan was created to satisfy Part II A of the 2023-2028 General Permit for Discharges of Stormwater from Small (Phase II) Municipal Separate Storm Sewer Systems (MS4). Part II A is the Special Condition for the Chesapeake Bay Total Maximum Daily Load (TMDL), which requires reductions of the Chesapeake Bay pollutants of concern (POCs) from existing development, including both impervious and pervious land that drains to James Madison University's MS4. The Chesapeake Bay POCs include nitrogen, phosphorus, and sediment. This Action Plan was developed to conform to the Virginia Department of Environmental Quality (DEQ) Guidance Memo No. 15-2005, dated May 18, 2015.

The Action Plan provides a review of the current MS4 program, which demonstrates James Madison University's (JMU) ability to ensure compliance with the Special Condition. It describes the required reduction in POCs, as well as the means and methods to be utilized in achieving 100% of the total reductions during the 2023 - 2028 permit cycle, as required by the permit. The required POC reductions are based on the Level 2 scoping run reduction for existing development, as defined in Virginia's Phase II Watershed Implementation Plan. Level 2 implementation refers to a modeled pollution reduction level of effort. It equates to an average reduction of 9.0% of nitrogen loads, 16% of phosphorus loads, and 20% of sediment loads from impervious regulated acres from the 2009 baseline loads. From pervious regulated acres, Level 2 implementation requires the reduction of 6.0% of nitrogen loads, 7.25% of phosphorus loads and 8.75% sediment loads from the 2009 baseline loads. Further discussion of required pollution reductions may be found in Virginia's Phase II Watershed Implementation Plan.

The Action Plan is composed of the following elements:

1. Current Program and Existing Legal Authority
2. New or Modified Legal Authority
3. Means and Methods to Address Discharges from New Sources
4. Estimated Existing Source Loads and Calculated Total Pollutant of Concern Required Reductions
5. Means and Methods to Meet the Required Reductions and Schedule
6. Means and methods to Offset Increased Loads Form New Sources Initiating Construction Between July 1, 2009 and June 30, 2014
7. Means and Methods to Offset Increased Loads from Grandfathered Projects that Begin Construction After July 1, 2014
8. List of Future Projects, and Associated Acreage that Qualify as Grandfathered
9. An Estimate of the Expected Cost to Implement the Necessary Reductions
10. Public Comments on Draft Action Plan

The Action Plan was initially completed in June, 2015, and was submitted to the DEQ with JMU's MS4 Program Annual Report for the reporting period of July 1, 2014 through June 30, 2015 and was approved by the Department on November 2, 2015. Should the Action Plan need to be updated for any reason, updates will be included in annual reports.

## 1. Current Program and Existing Legal Authority

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James Madison University falls under the Phase II MS4 regulations as a small municipal storm sewer system operator, based on the definition found in 40 CFR 122.26(b)(8). As an operator of a small MS4, JMU must develop, implement, and enforce a MS4 Program designed to reduce the discharge of pollutants from the small MS4 to the maximum extent practicable, to protect water quality, to ensure compliance with water quality standards, and to satisfy the water quality requirements of the Clean Water Act and its attendant regulations.

As the operator of the MS4, and other campus infrastructure, University Administration has assigned the Facilities Management Department the responsibility of, and authority to administer a comprehensive and compliant Stormwater Management Program. JMU has developed and administered a compliant MS4 program since it was first permitted in 2007. The core of the program revolves around the six minimum controls measures (MCM) found in the Phase II MS4 General Permit. Best management practices implemented to comply with the minimum control measures and outcomes achieved can be found in JMU's MS4 Program Plan and annual reports, respectively. The MCMs include:

1. Public education and outreach
2. Public involvement and participation
3. Illicit discharge detection and elimination (IDDE)
4. Construction site stormwater runoff control
5. Post-construction stormwater management
6. Pollution prevention and good housekeeping for facilities owned or operated by the permittee

The Facilities Management Department maintains four stormwater policies that provide it with the authority to administer the program and comply with the MCMs. The policies describe in detail their purpose, definitions, responsibilities, and procedures. They provide guidance to faculty, staff, students and the public, which results in the efficient administration of the program, and continuity of operations within the Stormwater Division. These policies can be found on their MS4 web page at <https://www.jmu.edu/facmgt/sustainability/stormwater/site-plan-review.shtml>, and are reviewed annually. The existing policies and their most recent version include:

- Illicit Discharge Detection and Elimination (IDDE) Policy & Procedure, February 2014
- Land-Disturbing Activities Policy & Procedure, December 2022
- Stormwater Management Facilities Policy & Procedure, December 2022
- Standards and Specifications for ESC and SWM, March 2021
- Daily Operating Procedures for Stormwater Control Best Management Practices, December 2022

MCMs 4 and 5 regulate construction and post-construction stormwater management, respectively. § 62.1-44.15:54 of the Virginia Administrative Code allows state agencies to adopt their own Virginia Erosion and Sediment Control (ESC) Program. JMU has administered its own ESC program since 2009, with the oversight of the Virginia Department of Conservation and Recreation (DCR), and now DEQ. As of July 1, 2014, the University now also administers its own Virginia Stormwater Management Program (VSMP), as allowed by § 62.1-44.15:27. JMU submits Standards & Specifications for ESC and SWM for approval by DEQ to ensure all development on the campus conforms with the intent of the Virginia Erosion and Sediment Control Law, the Virginia Stormwater Management Act, and attendant regulations.

Regarding legal authority over contractor activities, all contractors performing land disturbing activities on JMU properties are required, through contract documents, to obtain all applicable permits before construction activity

commences, and to follow JMU's Standards and Specifications. CO-7 of the General Conditions of the Construction Contract addresses requirements of related to land disturbance.

### *1.1 Ability to Address Special Condition for the Chesapeake Bay TMDL*

The existing program provides adequate authority to address the Special Condition for the Chesapeake Bay TMDL. The required deliverables will be produced with existing Facilities Management staff, and outside support available to staff. Projects implemented to achieve pollutant reduction targets, and strategies to fund them, will be developed and managed by existing staff. A robust recordkeeping system will provide long-term continuity for managing load reductions and maintenance activities. Additionally, through the development of a Stormwater Management Master Plan and Stormwater Retrofit Opportunities study, staff has inventoried additional options for POC reductions, beyond what is identified in the Action Plan. Existing staff will also provide for the adoption of stormwater practices and infrastructure into a long-term stormwater asset management program. Funds to meet the Special Condition may continue to be requested from the University General Fund, and may be supplemented with grant funds.

## **2. New or Modified Legal Authority**

No new legal authorities are required for compliance with the Special Condition for the Chesapeake Bay TMDL. JMU already possess the authorities necessary to meet the pollution reduction goals identified in Section 4.

## **3. Means and Methods to Address Discharges from New Sources**

When it comes to site development, JMU has the advantage of being the project manager, which assists with administering site design, stormwater regulatory conformance, and construction all within the same department. Therefore, the University is in a good position to design projects that meet or exceed the requirements of the Erosion and Sediment Control Law and Virginia Stormwater Management Act and regulations.

JMU's VESC Program and VSMP operate under DEQ approved Standards and Specifications. JMU requires all development projects that are 10,000 square feet or greater to have an ESC plan that conforms to the Standards and Specifications. The VSMP requires the development of a Stormwater Pollution Prevention Plan (SWPPP) for all construction projects that require a VSMP permit. The SWPPP includes the following elements:

- Erosion and Sediment Control Plan
- Stormwater Management Plan
- Pollution Prevention Plan
- Description of control measures necessary to address a TMDL

The Project Manager is responsible for requiring site design that meets the technical criteria of the Virginia Stormwater Management Regulations, and that a VSMP Construction General Permit (CGP) is obtained from DEQ. The Stormwater Coordinator is responsible for reviewing and providing comments to confirm conformance of the plans with the regulations and Standards and Specifications. The Stormwater Coordinator may seek qualified assistance for plan review, at his discretion.

Pre-construction meetings are routinely held to clarify ESC and SWM expectations. Construction sites are inspected regularly by certified personnel to ensure compliance with the CGP, approved plans, and all applicable regulations, standards and specifications. Inspection reports are issued to project personnel, and violations corrected under the supervision of the Project Manager. The General Conditions of the Construction Contract document requires contractors to have a Responsible Land Disturber on-site. A detailed procedure that allows for

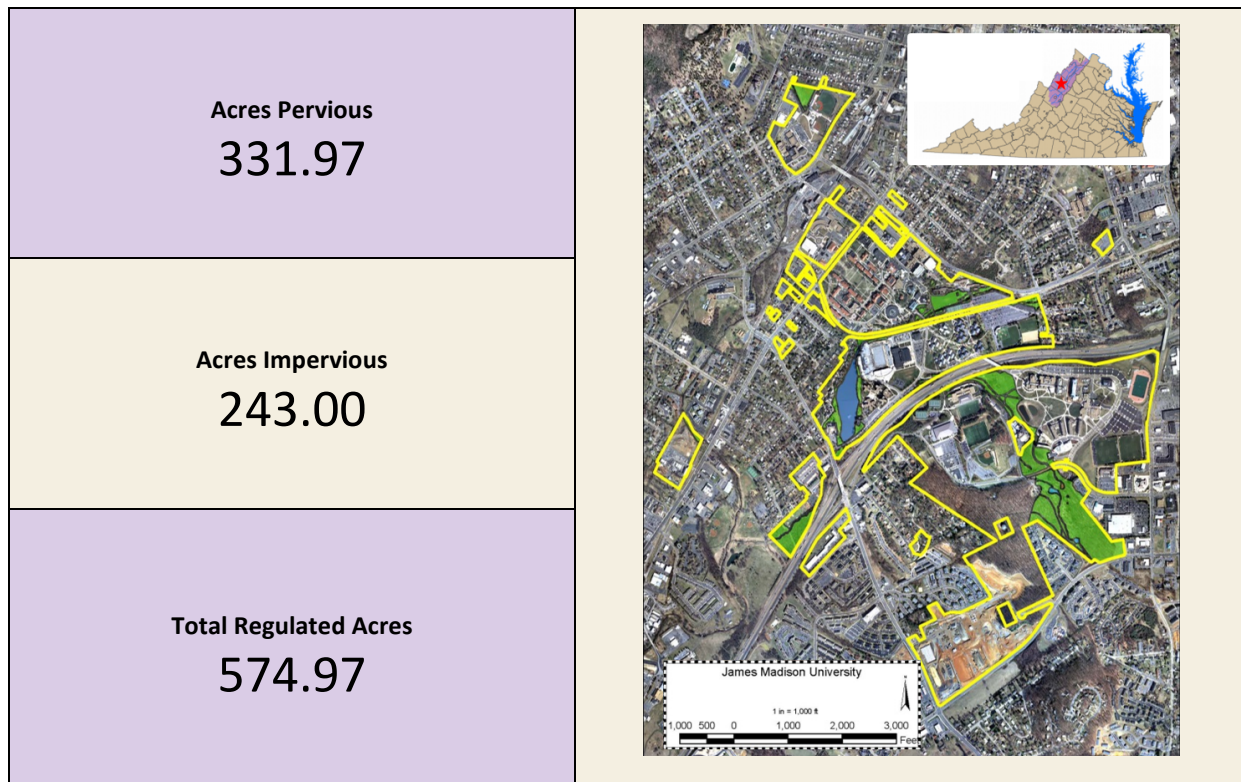
variances and exceptions that are still protective of offsite property and resources is documented in the Standards and Specifications.

Permanent stormwater facilities are inspected for conformance to plans, specifications and standards, and as-built drawings are submitted to the Stormwater Coordinator to file and draw upon for long-term inspections of permanent stormwater facilities. Stormwater management plans must include maintenance information. Inspections of stormwater facilities will be conducted annually, and work orders submitted for maintenance, as needed. Maintenance is performed by Facilities Management staff or a contractor of the department. Additional information on these programs, policies, and procedures may be found at JMU’s MS4 website.

Prior to 2014, new sources of stormwater discharges were regulated by the Virginia Department of Conservation and Recreation. Implementation of JMU’s VSMP began July 1, 2014 with oversight from DEQ and the State Water Control Board.

#### 4. Estimated Existing Source Loads and Calculated Total Pollutant of Concern Required Reductions

For the purposes of the Action Plan, JMU estimated existing source loads and total pollutant of concern (POC) required reductions using its most recent jurisdictional boundary, excluding open water and unregulated acreage that sheet flows directly to waters of the United States, to represent the MS4 service area. The jurisdictional boundary was identified using JMU’s property record Geographic Information System data. Pervious and impervious acreage from which loads were derived were delineated by Vanasse Hagen Brustlin, Inc. in a 2013 study that was used to develop a stormwater master plan for JMU. For the study, a GIS analysis of aerial imagery was conducted to categorize land cover into pervious and impervious categories. Construction site plans from projects constructed between the aerial imagery year and the study year were used to update the land cover data to reflect the most recent conditions. A map of JMU’s MS4 service area used for this plan can be found in Figure 1.



**Figure 1.** Regulated urban acreage inside service area (jurisdictional boundary – indicated by yellow outline). Open Water (blue) and unregulated acreage sheet flowing to waters of the U.S. (green) are excluded.

The baseline loads and required POC required reductions will be recalculated after mapping of JMU’s MS4 drainage areas is complete, and more accurate land cover estimates can be made. Recalculations will be included in the next phase of the Action Plan, to be submitted with the reapplication package, in accordance with Section I.C of the MS4 General Permit.

The estimated existing source loads and POC required reductions are based on the regulated urban acreage identified in Figure 1, and the Level 2 scoping for POC reductions identified in Virginia’s Phase II Watershed Implementation Plan. Level 2 scoping provides for the reduction (from 2009 baseline loads) of 9.0% of nitrogen loads, 16% of phosphorus loads, and 20% of sediment loads from impervious regulated acres, and 6.0% of nitrogen loads, 7.25% of phosphorus loads and 8.75% sediment loads from pervious regulated acreage. The Phase II MS4 permit requires that 100% of the reduction targets (identified in Table 1) be achieved within the 2023 – 2028 permit term (referred to by the permit, and in the tables below, as “third permit cycle”).

Table 1 includes the information required by Phase II MS4 Permit, Section I.C Table 3b, entitled: “Table 3b: Calculation Sheet for Estimating Existing Source Loads and Reduction Requirements for the Potomac River Basin”

**Table 1.** Estimated Existing Source Loads and Reduction Requirements in Third Permit Cycle  
TSS shown for reference.

<i>Pollutant</i>	<b>Loading Rate (lbs/ac/yr)</b>	<b>Regulated MS4 Acreage</b>	<b>Loading (lbs/ac/yr)</b>	<b>L2 Loading Rate Reduction</b>	<b>100% Cumulative reduction required</b>	<b>Sum of 100% cumulative reduction (lbs/yr)</b>
<i>Total Nitrogen</i>	16.86	243.00	4,096.98	9%	368.73	569.30
	10.07	331.97	3,342.94	6%	200.58	
<i>Total Phosphorus</i>	1.62	243.00	393.66	16%	62.99	72.85
	0.41	331.97	136.11	7.25%	9.87	
<i>Total Suspended Solids</i>	1,171.32	243.00	284,630.76	20%	56,926.15	62,032.68
	175.8	331.97	58,360.33	8.75%	5,106.53	

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

Stream restoration, and land use changes associated with stream restoration projects, are the primary strategies JMU will use to achieve the pollution reductions called for by the General Permit. Bioretention will also play a part. Calculations to determine the pollution reductions to result from these projects adhere to the guidelines established in Guidance Memo No. 15-2005. Projects completed since 2009 will be used to account for part of the required POC reductions, and the remainder will be reduced by a planned stream restoration project. Together, these projects exceed 100% of the pollutant of concern (POC) reductions required of JMU through 2028. Accordingly, pollution reductions achieved during this permit cycle will be applied to the POC reductions required in subsequent permit cycles. Additionally, all means and methods included in this plan are guaranteed to be credited at the efficiencies established at the time this Action Plan is submitted, according to the Guidance Memo (Part III. Eligible BMPs and Credit Opportunities), which states “Likewise, if the BMPs included in the initial Action Plan result in reductions beyond the required 5% those reductions will also be guaranteed at the efficiencies



available at the time the Action Plan is submitted.” Table 2 compares the required pollutant reductions to those which are planned by 2018.

**Table 2.** Pollutant reductions required versus planned.

	TP	TN	TSS
Required by 2018, lbs. (5%)	3.64	28.47	3,101.63
Required by 2023, lbs. (40%)	29.14	227.72	24,813.07
Required by 2028, lbs. (100%)	72.85	569.30	62,032.68
Completed by 2018, lbs.	342.79	835.03	173,566.99

This section of the Action Plan describes the projects JMU plans to use to achieve its permitted pollution reduction goals required by 2018 (and beyond). However, JMU maintains flexibility to remove any of the identified projects from the plan, adapt them, or to consider different projects as opportunities arise, as long as the changes do not compromise JMU’s ability to comply with the goals and schedule established in the General Permit.

### 5.1 Completed and Planned Projects

JMU has already implemented several stormwater best management practices and stream restoration projects to meet the full requirements for the Chesapeake Bay TMDL. These projects, described in Table 3, were developed to address in-stream erosion caused by watershed urbanization. The approved interim rates for urban stream restoration were used to calculate the mass reduction of POCs per length of stream restored found in Appendix V.J. of the Guidance Memo.

Land use changes associated with adding grass buffers to the restored streams also yielded pollutant reductions, and are included as a strategy in this plan. Efficiencies from Table V.H.1. of the Guidance Memo were used to calculate these reductions. A bioretention filter was also completed in 2012. Chesapeake Bay Program efficiencies were used to calculate POC reductions resulting from the bioretention filter.

An additional stream restoration project implemented on campus, at the Edith J. Carrier Arboretum restored 1,080 feet of a headwaters tributary to Blacks Run, an impaired waterbody in Harrisonburg, Virginia. The design for the restoration includes the creation of 0.37 acres of interconnected wetland cells in a large floodplain area that was reconnected to the tributary by the project.

The POC reductions for the Arboretum stream restoration project were calculated using two protocols found in Appendix V.J. of the Guidance Memo. These protocols were approved in 2014 by the Chesapeake Bay Program’s Urban Stormwater Workgroup and Water Quality Goal Implementation Team. Details of the protocols can be found in the guidance document entitled *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects*, and include Protocol 1: Sediment Prevented, and Protocol 3: Floodplain Reconnection. The estimates do not take into consideration potential rate reductions due to sediment transport/delivery or the limited stream flow of the project reach. The degraded condition of the stream, information about the calculations and other project design details are documented in the *Final Design and Pollutant Reduction Report* which was updated in 2016. This document is available upon request.

Table 3 summarizes the completed projects, and their associated POC reductions. Detailed pollution reduction calculations for each project are located in the electronic spreadsheet ledger submitted with this plan, as directed by the Guidance Memo. Baseline reductions in credit calculated for unregulated land in the drainage area of the projects are included in the spreadsheet, where applicable. The spreadsheet ledger contains the following data:

- the total reductions required;
- each practice that will be implemented;
- the approximate location of the project;
- the load that will be reduced by each project, and
- the project schedules.

**Table 3.** Projects completed since 2009.

ID	Project Name/Description	BMP Total Removal			Status
		TP	TN	TSS	
ST1	SRP: East Campus (1031')	69.74	71.03	45,895.20	Complete
ST1a	SRP: East Campus Land Use Change - Pervious to Grass		2.75		Complete
ST2	SRP: Siberts Creek - Segment 'A' (407')	27.63	29.47	18,231.23	Complete
ST3	SRP: Siberts Creek - Segment 'B' (498')	33.80	36.09	22,283.14	Complete
ST4	SRP: Siberts Creek - Segment 'C' (711')	47.91	47.45	31,446.04	Complete
ST4a	SRP: Siberts Creek Land Use Change - Pervious to Grass		4.31		Complete
S4	SRP: Siberts Creek Bioretention	1.87	13.02	1,551.38	Complete
ST5	SRP: Arboretum w/ Constructed Wetlands (1050')	161.84	630.91	54,160.00	Complete

### 5.2 Project Schedules

Project ID's ST1, ST1a, ST2, ST3, ST4, ST4a and S4 had a completion date of September 15, 2012, as they were constructed at essentially the same time, and were deemed "stabilized" on that date. The Arboretum stream restoration project (ST5) was initiated in September of 2013 and construction was completed on March 23, 2016. The Facilities Management Department will inspect all projects annually to ensure that they continue to function as designed.

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

JMU does not have increased loads to offset in this category, as it has never used an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities.

## 7. Means and Methods to Offset Increased Loads from Grandfathered Projects that Begin Construction after July 1, 2014

JMU will not have increased loads to offset in this category. As the VSMP authority, the University will not use an average land cover condition greater than 16% impervious cover for the design of post-development stormwater management facilities for grandfathered projects.

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

JMU has one project that would qualify for grandfathering in accordance with 9VAC25-870-48. Should any revisions be made to the plans that would increase the amount of Total Phosphorus discharged from the site, the plans will no longer be considered grandfathered. It is undetermined whether either of these projects will be built. The projects include:

1. Name: CISAT Campus Pond Relocation  
Approval Date: March 10, 2011

Acres: 4.93

No increase in impervious surface will occur with this project.

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

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JMU estimates that the projects described in section 5 cost approximately \$485,000 to implement. All of the projects were funded, in part, by federal grants that were matched by JMU with a mix of cash and in-kind contributions. The estimated cost does not account for long-term operation and maintenance of the improvements.

There may not be a need to implement projects in future Action Plans, as all reductions were met in the first permit cycle. However, if needed, JMU's funding strategy for the future would include a combination of continuing to pursue grants, incorporation of projects into the Capital Improvements Plan, and continuing to request funding from the University general fund, when needed.

## **10. Public Comments on Draft Action Plan**

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The Facilities Management Department informed the public of the initial draft Chesapeake Bay Action Plan and provided a 2-week public comment period before finalizing and submitting the Plan to the DEQ. An article was published in the Facilities Management Human Resources monthly newsletter on June 1, 2015, which is sent to all Facilities Management staff (587 employees). The draft document was also added to the Facilities Management Department webpage on the JMU website on May 29, 2015, where it could be accessed by any member of JMU's faculty, staff, student body, or the community. Seven responses were received requesting further clarification. No comments were received requesting amendments to the plan.

For the second phase, a mass email was sent to all Facilities Management employees providing a web link to the draft document providing a month-long comment period during the month of April 2018. No comments were received.

For the third phase, a mass email was sent to all JMU staff and faculty providing a web link to the draft document providing a month-long comment period during the month of September 2023. One comment was received commending JMU for efforts, and referencing a solar powered pavement BMP.

These outreach efforts informed the public of the development of the Chesapeake Bay Action Plan draft, and directed them to the location on the Facilities Management Department webpage where the draft could be obtained and instructions on how to provide comments.

## **Resources**

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Ecosystem Services, Inc. (2016 Update) Edith J. Carrier Arboretum Stream Restoration Final Design and Pollutant Reduction Report.

Virginia Department of Environmental Quality. (2023) General Permit for Discharges of Stormwater from Small (Phase II) Municipal Separate Storm Sewer Systems  
<http://lis.virginia.gov/cgi-bin/legp604.exe?000+reg+9VAC25-890-40>

Virginia Department of Environmental Quality. (2021) Guidance Memo No. 20-2003 which replaced Memo No. 15-2005 <https://www.deq.virginia.gov/home/showpublisheddocument/8191/637529559093430000>



# Calculations Ledger

ID	Project Name/Description	Location	Construction Estimate	Pollutant Load			BMP Efficiency			BMP Total Removal			Project Initiated	Estimated Dates		
				TP	TN	TSS	TP	TN	TSS	TP	TN	TSS		Construction Start	Construction Completed	
ST1	Stream Restoration Project: East Campus (1031')	38°26'02.44" N 78°51'57.61" W	\$26,800.00							69.74	71.03	45,895.20			9/15/2012	
ST1a	Stream Restoration Project: East Campus Land Use Change - Pervious to Grass	38°26'02.44" N 78°51'57.61" W									2.75				9/15/2012	
ST2	Stream Restoration Project: Siberts Creek - Segment 'A' (407')	38°26'16.35" N 78°51'48.62" W	\$23,200.00							27.63	29.47	18,231.23			9/15/2012	
ST3	Stream Restoration Project: Siberts Creek - Segment 'B' (498')	38°26'18.26" N 78°51'58.06" W	\$28,400.00							33.80	36.09	22,283.14			9/15/2012	
ST4	Stream Restoration Project: Siberts Creek - Segment 'C' (711')	38°26'15.84" N 78°52'06.26" W	\$40,500.00							47.91	47.45	31,446.04			9/15/2012	
ST4a	Stream Restoration Project: Siberts Creek Land Use Change - Pervious to Grass	38°26'18.26" N 78°51'58.06" W									4.31				9/15/2012	
S4	Siberts Creek Bioretention	38°26'15.95" N 78°52'01.57" W	\$26,000.00	4.15	52.06	2820.69	0.45	0.25	0.55	1.87	13.02	1,551.38			9/15/2012	
ST5	Arboretum Stream Restoration Project w/ Constructed Wetlands (1050')	38°25'39.49" N 78°51'39.30" W	\$340,000.00							161.84	630.91	54,160.00	9/1/2013	7/1/2015	3/17/2016	
Total			\$484,900.00							<b>Total Credit</b>	<b>342.79</b>	<b>835.03</b>	<b>173,566.99</b>			
										<b>TP</b>	<b>TN</b>	<b>TSS</b>				
										<b>MS4 Credit</b>						