CHICKAHOMINY RIVER BENTHIC TMDL ACTION PLAN

SECTION 1. OVERVIEW

Henrico County's Chickahominy River Benthic TMDL Action Plan (Action Plan) addresses the Sediment (TSS) wasteload allocation (WLA) associated with the EPA-approved Chickahominy River Benthic TMDL. This Action Plan is prepared and maintained to satisfy the requirements for local (non–Chesapeake Bay) TMDL action plans in Part I.D.2 of MS4 Permit VA0088617.

This Action Plan is designed to:

- Identify the TMDL name and approval dates.
- Identify the applicable WLA(s) allocated to the MS4 (individually or in aggregate).
- Identify potential significant sources of the pollutant of concern (sediment/TSS) discharging to the MS4 that are not covered under a separate VPDES permit.
- Identify BMPs/strategies intended to reduce sediment/TSS loading.
- Provide a schedule of anticipated actions during the permit term.
- Describe public participation and annual reporting consistent with Permit VA0088617.

Note regarding Chesapeake Bay TN/TP WLAs: This Action Plan is a local TMDL action plan for the Chickahominy River Benthic (sediment/TSS) impairment. Chesapeake Bay TN/TP planning and implementation are addressed under the Chesapeake Bay special condition (Permit Part I.D.1) and are not the basis for the required elements of this local TMDL action plan.

SECTION 2. MS4 PERMIT LANGUAGE

PART I.D. TMDL ACTION PLAN AND IMPLEMENTATION

TMDL Action Plans other than the Chesapeake Bay TMDL

a) The Permittee shall update, as necessary, and maintain a local TMDL action plan designed to reduce loadings for pollutants of concern if the permittee discharges the pollutants of concern to an impaired water for which a TMDL has been approved by the U.S. Environmental Protection Agency (EPA) as described in Part I.D.2 a 1 and 2:
   1) For TMDLs approved by EPA prior to April 1, 2015 and in which an individual or aggregate wasteload has been allocated to the permittee (see Attachment 3 to the Fact Sheet), the permittee shall develop and initiate or update as applicable the local TMDL action plans to meet the conditions of Part I.D.2 c, d, e, f, and g, as applicable, no later than 18 months after the permit effective date and continue implementation of the action plan. Updated action plans shall include:
      a) An evaluation of the results achieved by the previous action plan and
      b) Any adaptive management strategies incorporated into updated action plans based on action plan evaluation.
   2) For TMDLs approved by EPA on or after April 1, 2015, and prior to the effective date of this permit, and in which an individual or aggregate wasteload has been allocated to the permittee, the permittee shall develop and initiate implementation of action plans to meet the conditions of Part I.D.2 c, d, e, f, and g, as applicable no later than 30 months after the permit effective date.

b) The permittee shall complete implementation of the TMDL action plans as determined by the schedule. TMDL action plans may be implemented in multiple phases over more than one permit cycle using the adaptive iterative approach provided adequate progress is achieved in the implementation of BMPs designed to reduce pollutant discharges in a manner that is consistent with the assumptions and requirements of the applicable TMDL.

c) Each local TMDL action plan developed by the permittee shall include the following:
   1) The TMDL project name
   2) The EPA approval date of the TMDL
   3) The wasteload allocated to the permittee (individually or in aggregate), and the corresponding percent reduction, if applicable
   4) Identification of the potential significant sources of the pollutants of concern discharging to the permittee's MS4 that are not covered under a separate VPDES permit. For the purposes of this requirement, a significant source of

pollutants of concern means a discharge where the expected pollutant loading is greater than the average pollutant loading for the land use identified in the TMDL

5) The BMPs designed to reduce the pollutants of concern in accordance with Part I.D.2 d and e
    a) Any calculations required in accordance with Part I.D.2 d and e;
    b) For action plans developed in accordance with Part I.D.2 d and e, an outreach strategy to enhance the public's education (including employees) on methods to eliminate and reduce discharges of the pollutants; and
    c) A schedule of anticipated actions planned for implementation during this permit term.

d) Bacterial TMDLs (Not applicable to this plan).
    1) The permittee shall implement at least six strategies designed to reduce the load of bacteria to the MS4. Table 3 provides a list of strategies which correspond to sources identified in Part I.D.2 c 4. Additional strategies that are equivalent to or better than the strategies provided in Table 3 may be used as approved by the Department.

Table 3
Strategies for Bacteria Reduction Stormwater Control/Management Strategy

Source	Strategies (provided as an example and not meant to be all inclusive or limiting)
Domestic pets (dogs and cats)	Provide signage to pick up dog waste, providing pet waste bags and disposal containers. Adopt and enforce pet waste ordinances or policies, or leash laws or policies. Place dog parks away from environmentally sensitive areas. Maintain dog parks by removing disposed of pet waste bags and cleaning up other sources of bacteria. Protect riparian buffers and provide unmanicured vegetative buffers along streams to dissuade stream access.
Urban wildlife	Educate the public on how to reduce food sources accessible to urban wildlife (e.g., manage restaurant dumpsters and grease traps, residential garbage, feed pets indoors). Install storm drain inlet or outlet controls. Clean out storm drains to remove waste from wildlife. Implement and enforce urban trash management practices. Implement rooftop disconnection programs or site designs that minimize connections to reduce bacteria from rooftops

	Implement a program for removing animal carcasses from roadways and properly disposing of the same (either through proper storage or through transport to a licensed facility).
Illicit connections or illicit discharges to the MS4	Implement an enhanced dry weather screening and illicit discharge, detection, and elimination program beyond the requirements of Part I E 3 to identify and remove illicit connections and identify leaking sanitary sewer lines infiltrating to the MS4 and implement repairs. Implement a program to identify potentially failing septic systems. Educate the public on how to determine whether their septic system is failing. Implement septic tank inspection and maintenance program. Implement an educational program beyond any requirements in Part I E 1 though E 6 to explain to citizens why they should not dump materials into the MS4.
Dry weather urban flows (irrigations, car washing, powerwashing, etc.)	Implement public education programs to reduce dry weather flows from storm sewers related to lawn and park irrigation practices, car washing, powerwashing and other nonstormwater flows. Provide irrigation controller rebates. Implement and enforce ordinances or policies related to outdoor water waste. Inspect commercial trash areas, grease traps, washdown practices, and enforce corresponding ordinances or policies.
Birds (Canadian geese, gulls, pigeons, etc.)	Identify areas with high bird populations and evaluate deterrents, population controls, habitat modifications and other measures that may reduce bird-associated bacteria loading. Prohibit feeding birds.
Other sources	Enhance maintenance of stormwater management facilities owned or operated by the permittee. Enhance requirements for third parties to maintain stormwater management facilities. Develop BMPs for locating, transporting, and maintaining portable toilets used on permittee-owned sites. Educate third parties that use portable toilets on BMPs for use. Provide public education on appropriate recreational vehicle dumping practices.

e) Local sediment, phosphorous, and nitrogen TMDLs.

1) The permittee shall select and implement strategies designed to reduce the loads associated with sediment, phosphorus, or nitrogen to the permittee's MS4. The permittee may implement this requirement through one or more of the following:

a) One or more of the BMPs from the Virginia Stormwater BMP Clearinghouse listed in 9VAC25-870-65 or other approved BMPs found on the Virginia Stormwater BMP Clearinghouse website;
b) One or more BMPs approved by the Chesapeake Bay Program. Pollutant load reductions generated by annual practices, such as street and storm drain cleaning, shall only be applied to the compliance year in which the annual practice was implemented; or
c) Land disturbance thresholds lower than Virginia's regulatory requirements for erosion and sediment control and post development stormwater management.

2) The permittee may meet the local TMDL requirements for sediment, phosphorus, or nitrogen through BMPs implemented or sediment, phosphorus, or nitrogen credits acquired. BMPs implemented and nutrient and sediment credits acquired to meet the requirements of the Chesapeake Bay TMDL in Part I.D 1 may also be utilized to meet local TMDL requirements as long as the BMPs are implemented or the credits are generated in the watershed for which local water quality is impaired.
3) The permittee shall calculate the anticipated load reduction achieved from each BMP and include the calculations in the action plan required in Part I.D.2 c 5.
4) No later than 36 months after the effective date of this permit, the permittee shall submit to the department an update on the progress made toward achieving local TMDL action plan goals and the anticipated end dates by which the permittee will meet each wasteload allocation for sediment, phosphorus, or nitrogen. The proposed end date may be developed in accordance with Part II.B.3.

f) Prior to submittal of the action plan required in Part I.D.2 a, the permittee shall provide an opportunity for public comment for no fewer than 15 days on the proposal to meet the local TMDL action plan requirements.

g) The MS4 Program Plan as required by Part I.A.6 of this permit shall incorporate each local TMDL action plan. Local TMDL action plans may be incorporated by reference into the MS4 Program Plan provided that the Program Plan includes the date of the most recent local TMDL action plan and identification of the location where a copy of the local TMDL action plan may be obtained.

h) For each reporting period, each annual report shall include a summary of actions conducted to implement each local TMDL action plan

SECTION 3. APPLICABLE SEDIMENT ALLOCATION AND REDUCTION REQUIREMENTS

3.1 Applicable WLA(s)

The Chickahominy River Benthic TMDL, approved by the Environmental Protection Agency on November 7, 2013, establishes an aggregate MS4 WLA for sediment/TSS shared among MS4 permittees in the watershed. As reflected in the County's MS4 permit, the aggregate WLA is shared between:

- Henrico County MS4 (VA0088617), and
- VDOT MS4 (VAR040115).

Aggregate WLA (TSS): 202.68 tons/year (405,360 lb/year)

3.2 MS4 Service Area / Watershed Context (Henrico GIS summary)

- County MS4 Service Area: approximately 51,961 acres
- MS4 Service Area within the Chickahominy River Benthic TMDL watershed:
  - 5,477 acres (any parcel that is at least 75% within the watershed).
- VDOT impervious cover within watershed (ROW): approximately 201 acres.

3.3 Determining Henrico's planning share of an aggregate WLA

Because the TMDL WLA is aggregate between Henrico County and VDOT, Henrico County may estimate a proportional share for planning purposes using regulated land area proportions (Henrico MS4 vs. VDOT MS4 regulated areas) within the Chickahominy benthic watershed. Since the published wasteload allocation is an aggregate between the County's MS4 and VDOT's MS4, a similar percentage breakdown is used to determine the County's allocation – 372,931.20 lbs/year (92% of 202.68 tons/year).

3.4 Regulated land cover tables

Table 3-1. Regulated acres within Chickahominy River Benthic TMDL watershed (Henrico MS4)

Land Cover Category	Acres	Data Year	Dataset/Method
Regulated Urban Impervious	1,366	2021	VA Landcover Data
Regulated Urban Pervious	3,908	2021	VA Landcover Data
VDOT Impervious (ROW)	201	2026 VA	Henrico GIS summary

3.5 Sediment (TSS) load and reduction approach

Sediment reductions needed to comply with the TMDL were calculated using the loading rates specified in the MS4 Permit for regulated impervious and pervious lands and comparing these loads to the County's allocation.

Source	Existing Acres in the Current MS4 Service Area subject to the TMDL	Loading Rate (lbs/acre/year)	Total Load Generated by the Regulated Areas in the MS4 Service Area (lbs/year)
Henrico Regulated Urban Impervious	1,366	676.94	924,700
Henrico Regulated Urban Pervious	3,908	101.08	397,834
		Total	1,322,534

*See Attachments 1 and 2

Therefore, the County must achieve an overall sediment reduction of 949,603 lbs/year (1,322,534 – 372,931). This will be accomplished over the course of the next five permit cycles (by 2040).

SECTION 4 SEDIMENT TMDL PLANNING

4.1 Legal Authority

Henrico County maintains legal authorities (ordinances, permits, policies, contract language, and enforcement mechanisms) sufficient to:

- Control the contribution of pollutants to the MS4;
- Prohibit illicit discharges and improper disposal;
- Require compliance with applicable stormwater requirements; and
- Perform inspections and enforce compliance.

Legal authority is documented in the County's MS4 Program Plan and reviewed/updated as necessary consistent with Permit Part I.A.3.

4.2 Identification of Potential Significant Sources (Permit Part I.D.2.c.4)

Henrico County will identify potential significant sources of sediment/TSS discharging to the MS4 within the Chickahominy River Benthic TMDL watershed that are not covered under a separate VPDES permit.

For purposes of this Action Plan, a significant source means a discharge where the expected pollutant loading is greater than the average pollutant loading for the land use identified in the TMDL.

Potential categories of significant sediment/TSS sources may include (as applicable within the watershed):

- Chronic erosion and sediment transport associated with failing MS4 infrastructure (e.g., outfall scour, channel incision at discharge points);
- Unstabilized areas at municipal operations (if present) where stormwater exposure can transport sediment;
- Problem areas identified through MS4 inspections, dry-weather screening follow-up, or citizen drainage/erosion complaints.

Henrico's municipal facility assessment processes have not identified significant sediment sources from County-owned/operated facilities within the watershed that are not covered under a separate VPDES permit.

4.3 BMPs and strategies designed to reduce sediment/TSS (Permit Part I.D.2.c.5 and Part I.D.2.e)

The following management practices with quantifiable sediment reductions have also been implemented in the watershed:

Mean / Method	Type	Applicable Reductions (lbs)	Anticipated / Completion Date
		TSS	
BMPs Installed between January 1, 2006 and June 30, 2025	Stormwater Compliance BMPs	59,977 lbs/year	Complete
Energy Dissipators installed prior to June 30, 2025	Additional Outfall Treatment	21,694 lbs/year	Complete
	TOTAL	**81,671 lbs/year**	

* See Attachment 3 and 4

4.4 Outreach Strategy (Permit Part I.D.2.c.5.b)

Henrico County conducts various public education and outreach and employee training programs that promote a reduction of sediments discharges throughout the County. These efforts include programs such as:

Public Outreach addressing drainage and erosion concerns / back yard stream erosion

Henrico County responds to citizen complaints related to drainage and erosion concerns, and backyard stream erosion. During site visits, citizens are provided with information on vegetative and structural controls. Any issues within the county drainage easement are addressed by County staff.

Staff training for IDDE

To address training requirements of Part I.B.2.k of the MS4 Permit, the County provides training sessions for appropriate County personnel for:

1) the recognition and reporting of illicit discharges, and
2) good housekeeping on and around municipal facilities.

Municipal Facility Inspections
Henrico County engages MMA Environmental to conduct inspections of High Priority Municipal facilities and to provide technical guidance to County personnel on municipal facility operations and housekeeping practices necessary to maintain compliance with the MS4 permit including IDDE and good housekeeping. MMA Environmental supports County staff by identifying potential stormwater compliance issues, recommending corrective actions, and advising departments and divisions responsible for municipal facilities on best management practices and permit expectations.

Pamphlets for Proper Disposal of Yard Waste
Residential Leaf Collection Services pamphlets are distributed annually to all Henrico Utility customers. The pamphlets include a leaf collection schedule, alternative methods for proper disposal of yard debris, and cautions to prevent yard debris from obstructing roads and stormwater drainage.

Individual letters are also sent to citizens if yard debris is found to be dumped in the County's ROW and/or storm sewer system. The letters inform citizens that the dumping of yard debris in the storm sewer is a violation of County Code and state that it is unlawful to "cause or allow illicit discharges to the County's storm sewer system" or "discharge materials other than stormwater to the storm sewer system by spills, dumpings or disposal." Citizens are informed of the impacts caused by dumping yard debris and given information on proper disposal.

4.5 Anticipated actions during this permit term (Permit Part I.D.2.c.5.c)

An evaluation of the activities conducted during the permit year will be included in the annual report and will consider the implementation details of the programs. Appropriate results of the In Stream Monitoring program required by Part I.C.2 of the MS4 Permit will be considered in developing the evaluations. In addition, the status of proposed watershed projects that are expected to result in quantifiable sediment reductions will be provided. Evaluations of County owned/operated facilities are conducted in accordance with MMMA System described in Part I.B.2.i of the MS4 Program Plan.

4.6 Public participation (Permit Part I.D.2.f)

Prior to submittal of this Action Plan and/or substantive updates, Henrico County will provide an opportunity for public comments for no fewer than 15 days. The County will:

- Post the draft Action Plan (or a summary with instructions for obtaining the full document) on the County website;

- Provide instructions for submitting comments during the comment period; and
- Summarize any comments received and document responses/changes in the final Action Plan.

4.7 Annual reporting and progress update requirements

Annual report due date / reporting period (Permit VA0088617):

- Annual report due: October 1 of each year
- Reporting period: July 1 – June 30

For each reporting period, the annual report will include a summary of actions conducted to implement this local TMDL Action Plan consistent with Permit Part I.D.2.g.

Permit progress update requirement (Permit Part I.D.2.e.4): No later than 36 months after the effective date of the permit, Henrico County must submit to DEQ an update on progress toward achieving local TMDL Action Plan goals and anticipated end dates by which the County will meet each wasteload allocation for sediment/TSS (and/or other local sediment/nutrient TMDLs, as applicable).

4.8 Evaluation / adaptive management

Henrico County will evaluate implementation progress and BMP performance using available program metrics, inspection and maintenance records, and any relevant monitoring data collected under the MS4 Program Plan. This evaluation will inform adaptive management updates to:

- BMP selection and prioritization,
- Implementation schedules, and
- Anticipated end dates for meeting the WLA.

ATTACHMENT 1 MS4 SERVICE AREA

A1.1 OVERVIEW

The MS4 Service Area is the land area that drains into and through Henrico County's MS4 infrastructure, including both publicly owned and privately owned lands that discharge to the County's MS4.

A1.2 DELINEATION

Henrico County maintains an MS4 service area map and associated data consistent with Permit Part I.B.2.h.3.

There are approximately 156,800 acres located within the boundaries of Henrico County.

Service area values:

- Approximately 51,961 acres of the County are located within the MS4 Service Area.
- Approximately 5,477 acres of MS4 Service Area are within the Chickahominy River Benthic TMDL watershed (≥75% within watershed).
- Approximately 201 acres of impervious cover within the VDOT ROW are within the Chickahominy benthic watershed.

ATTACHMENT 2
REGULATED URBAN IMPERVIOUS AND PERVIOUS AREAS

A2.1 OVERVIEW

This attachment documents the regulated impervious and regulated pervious acres within the Henrico MS4 Service Area that are within the Chickahominy River Benthic TMDL watershed. These acreages are used to support sediment/TSS load and reduction calculations for this local TMDL Action Plan.

A2.2 APPLICABLE LAND COVER DATA SETS

Henrico County used the 2021 Virginia Statewide Land Cover Data Sets to calculate pervious vs impervious acreage for WLA calculations. The four classes used to develop area measurements are below.

Water: This classification includes all areas of open water; typically, 25 percent or greater pixel cover of water, and all areas characterized by perennial cover of ice/snow as defined by the EPA. Includes drainage network and basins such as rivers, streams, lakes, canals, waterways, reservoirs, ponds, bays, estuaries, and ocean as defined by the NHD. Only features greater than 1 acre in size will remain in this classification.

Impervious: This classification includes areas characterized by a high percentage of constructed materials such as asphalt and concrete, buildings and parking lots, and infrastructure such as roads and rail-roads as defined by the EPA.

Turf Grass: This classification includes vegetation (primarily grasses) planted in developed settings for erosion control or aesthetic purposes, as well as natural herbaceous vegetation and undeveloped land, including upland grasses and forbs, as defined by the EPA. Examples include but are not limited to recreational areas, lawns, and vacant lands. Any grasses or managed turf that fall into this description will be included if the land is less than 1 acre in size, or visually determined to be recreational from the imagery.

Other: Includes all remaining land cover classifications, including Forest, Scrub/Shrub, Agriculture, Wetlands, and Barren.

Methodologies for Determining Land Cover classes:

Water: These are polygonal features representing open water features. Existing National Hydrology Dataset (NHD) data will be delivered as an overlay to the full dataset. This overlay will include flow polylines that will be buffered based on a general 15ft representation of perennial stream features. The Eliminate tool will be run against the Feature Analyst hydrography output to reclassify incorrect and smaller features of this type to the closest competing feature classification of the greatest size. This will ensure that shadows from buildings will dissolve into the surrounding land features, while anomalies of green and brown land that may have been misclassified as water be corrected to forest or turf. The minimum area criteria will decide which extracted features stay in the dataset. VGIN DTM Data will also be analyzed for capability in filtering of potential water surfaces using a terrain deviation parameter (e.g., filtering features with a deviation from the terrain of <1 meter).

Impervious: Impervious and Building layers were originally created separately to utilize the Feature Analyst Building Toolkit to extract more precise footprints for localities that did not already maintain them. These two feature classifications will be combined by grouping all impervious features together. The next step to developing the impervious features will be the input of existing vector data sources. Feature Analyst impervious surface features will be supplemented with available local, regional and state basemap data by erasing and appending these datasets to the extracted output. This will ensure that the land cover data represent impervious surfaces regardless of overhanging tree canopy. Where vector features provide a more accurate representation of impervious surfaces for any given feature, we will defer to this source. Where they are less accurate or not available, we will defer to the spectral classification method for the impervious feature.

Turf Grass: Turf Grass will start as a set of training samples that define those non-forested and non-agricultural areas of flat land into large classifications including spectral variation between yellows, greens, and browns. Any attempt to distinguish between what is agricultural, turf, etc. within the image extraction process ends up as blended results, so although this class will also capture agricultural land, these areas will be removed later are processed first. Areas that are extracted in this classification that are greater than

or equal to 2 acres will, and are within parcels greater than 3 acres, will be reevaluated as possible reclassification into Pasture. For those areas where parcel data is unavailable, all features meeting the size threshold will be reviewed. There will be a stage of manual cleanup for falsely identified features.

Other: After the three previous classes (water, impervious and turf grass) have been extracted, the remaining classes are grouped into the other category. The previously referenced document outlines specific criteria for each.

ATTACHMENT 3 BMPS
INSTALLED BETWEEN
JANUARY 1, 2006 AND JUNE 30, 2025

A3.1 OVERVIEW

The following pollutant removal evaluation includes those BMPs that are within the MS4 Service Area that were installed between January 1, 2006 and June 30, 2025, in the watershed subject to the Chickahominy River Benthic TMDL.

A3.2. POLLUTANT LOAD REDUCTIONS

Calculating the pollutant load reductions achieved by the BMPs brought online, requires removal efficiency for the various types of BMPs. The historical BMPs within the MS4 Service Area were grouped based on BMP types from Table V.C.1 – Chesapeake Bay Program BMPs, Established Efficiencies in the TMDL Guidance.

Chesapeake Bay Program BMP Type	County BMP Type
Wet Ponds and Wetlands	Retention basin
Filtering Practices	Filterra
	Stormwater360

The removal efficiencies for these Chesapeake Bay Program BMPs are:

Chesapeake Bay Program BMP Type	Removal Efficiencies
	TSS
Wet Ponds and Wetlands	60%
Filtering Practices	80%

Based on the BMP design data, the total drainage area and impervious and pervious areas served by these BMPs are:

Chesapeake Bay Program BMP Type	Acres Served		
	Drainage Area	Impervious Area	Pervious Area
Wet Ponds and Wetlands	257	94	163
Filtering Practices	28	21	7

The pollutant loads generated by these areas are calculated using the 2009 EOS Loading Rates for the James River Basin from Table 1 in the MS4 Permit.

2009 EOS Loading Rates (lbs/acre/year)	
Source	TSS
Urban Impervious	676.94
Urban Pervious	101.08

Pollutant Loading to BMPs	
Chesapeake Bay Program BMP Type	TSS
Wet Ponds and Wetlands	80,227 lbs/year
Filtering Practices	14,801 lbs/year

Application of the removal efficiencies identified previously from Table V.C.1 – Chesapeake Bay Program BMPs, Established Efficiencies in the TMDL Guidance yields the following load reductions for the BMPs that are within the MS4 Service Area.

Pollutant Loading Removal by BMPs	
Chesapeake Bay Program BMP Type	TSS
Wet Ponds and Wetlands	48,136 lbs/year
Filtering Practices	11,841 lbs/year
TOTAL	**59,977 lbs/year**

ATTACHMENT 4
ENERGY DISSIPATORS INSTALLED BETWEEN JANUARY 1, 2006 AND JUNE 30, 2025

A4.1 OVERVIEW

Since 2001, the County has required the installation of Energy Dissipators at select stormwater outfalls as a requirement of the development process in addition to meeting the required pollutant removal requirement associated with the proposed impervious cover. The County's Energy Dissipator is also listed as an acceptable alternative to Virginia DEQ Stormwater Design Specification No. 2 – Sheet Flow to a Vegetated Filter Strip or Conserved Open Space is an approved BMP for complying with the pollutant removal requirement dictated by Virginia's stormwater program.

In accordance with the Chesapeake Bay TMDL Guidance distributed by DEQ on May 18, 2015: *Permittees may receive credit for:…BMPs that were installed to meet development requirements, but exceed those requirements and any applicable state standards…*

A4.2 POLLUTANT LOAD REDUCTIONS

To calculate the pollutant load reductions achieved by these Energy Dissipators, removal efficiencies are required. Removal efficiencies for TN and TP can be found in the Virginia Runoff Reduction Method (VRRM).

Pollutant	Removal Efficiency	
	A / B Soils	C / D Soils
TN	75%	50%
TP	75%	50%

Since quantification of sediment reduction is not provided for any of the BMPs listed in the VRRM, the performance curves provided by the Bay Program were used to establish a removal efficiency for TSS. Assuming a runoff depth of 0.5 inches (the approximate runoff depth that results in 50% efficiency for TN and TP), the performance curve for TSS yields a removal efficiency for TSS of 55%.

To calculate the pollutant load entering each of the Energy Dissipators, an analysis of the drainage areas to each Energy Dissipator was conducted to determine the impervious and pervious acreage that drains to each facility. This analysis is based

on the Virginia Statewide Land Cover Data Set. The location of the Energy Dissipator was also studied to determine whether the facility is on an A/B soil or a C/D soil.

The 2009 EOS Loading Rates for the James River Basin from Table 1 in the MS4 Permit were then used to determine the pollutant load entering each facility from these acreages.

2009 EOS Loading Rates (lbs/acre/year)	
Source	TSS
Urban Impervious	676.94
Urban Pervious	101.08

Application of the removal efficiencies identified previously to the incoming loads results in the following load reductions for the Energy Dissipators that were installed prior to June 30, 2025 within the MS4 Service Area and exceeded any applicable state standards in place at the time of installation.

TSS Removed by the Energy Dissipators
21,694