PHASE III CHESAPEAKE BAY TMDL ACTION PLAN

Central State Hospital

Petersburg, VA

A Plan for Achieving an Additional 60% Reduction (100% Cumulative) in Accordance with 9VAC25-890-40 Part II A

October 2024

This plan satisfies the requirements of Part I of the 2023 – 2028 MS4 General Permit (9VAC25-890-40) and Part II A of the 2023 – 2028 MS4 General Permit for Special Conditions for the Chesapeake Bay TMDL. This plan is consistent with the Chesapeake Bay TMDL and the Virginia Phase I, II, and III WIPs to meet the Level 2 (L2) scoping run for existing developed lands as it represents an implementation of 5.0%, 35% and 60% of L2.

The data and analysis provided herein is based on the combined 2000 and 2010 census urbanized area. Additional revisions may be necessary once the 2020 census urban area is reconciled and information provided by the DEQ.

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EXECUTIVE SUMMARY

Central State Hospital (CSH) is authorized to discharge stormwater from its municipal separate storm sewer system (MS4) under the Virginia Pollutant Discharge Elimination System (VPDES) General Permit for Discharges of Stormwater from Small MS4s (MS4 General Permit). To maintain permit compliance, CSH implements a MS4 Program Plan that includes best management practices (BMPs) to address six minimum control measures (MCMs) and special conditions for the Total Maximum Daily Loads (TMDLs) in which CSH has been assigned a wasteload allocation (WLA). The Environmental Protection Agency (EPA) describes a TMDL as a "pollution diet" that identifies the maximum amount of a pollutant the waterway can receive and still meet water quality standards. A WLA determines the required reduction of the pollutant of concern (POC) loadings from the MS4s to meet water quality standards. The MS4 General Permit serves as the regulatory mechanism for addressing the load reductions described in the TMDL, predominantly through the requirement of a TMDL Action Plan.

The Chesapeake Bay TMDL was established by the EPA on December 29, 2010, and initiated WLAs for phosphorus, nitrogen, and total suspended solids (TSS). In response, the Commonwealth of Virginia developed Watershed Implementation Plans (WIPs) that, in part, identify the MS4 General Permit as a mechanism for enforcing load reductions in urban areas. Subsequently, the Commonwealth included special conditions into the MS4 General Permits to address the reductions required by the TMDL for the pollutants of concern (POC). The WIPs intended the reductions to be achieved over the course of three 5-year permit cycles. The first cycle (2013 – 2018) required 5%, the second cycle (2018 – 2023) an additional 35%, and the third permit cycle (2023 – 2028) required an additional 60% of the reductions to be achieved, respectively.

CSH has developed Phase I, Phase II, and Phase III Chesapeake Bay TMDL Action Plans consistent with the Virginia Department of Environmental Quality (DEQ) Guidance Memos No. 15-2005 and 20-2003. The guidance documents were used to determine the required pollutant load reductions and identify the means and methods for achieving pollutant load reductions required by the MS4 General Permits. CSH implemented land use change conversions to achieve the required reductions. The land use change conversions along with continued implementation of the CSH MS4 Program Plan, is consistent with the provisions of an iterative MS4 Program and constitutes compliance with the MS4 General Permit standard of reducing pollutants to the maximum extent practicable (MEP).

Table 1: Summary of POC Load Reductions

POC	Phase I (2013 – 2018) 5% Load Reduction (lbs./yr.)	Phase II (2018 – 2023) 35% Load Reduction (lbs./yr.)	Phase III (2023 – 2028) 60% Load Reduction (lbs./yr.)	Cumulative 100% Load Reduction (lbs./yr.)
Nitrogen	6.54	45.78	78.48	130.80
Phosphorus	1.29	9.03	15.48	25.80
TSS	546.29	3,824.03	NA	NA

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Acronyms

BMP	Best Management Practice
CSH	Central State Hospital
CUA	Census Urbanized Area (2013 -2023) / Census Urban Area (2023 – 2028)
CWA	Clean Water Act
DBHDS	Virginia Department of Behavioral Health and Developmental Services
DEQ	Virginia Department of Environmental Quality
DGS	Virginia Department of General Services
EPA	Environmental Protection Agency
ESC	Erosion and Sediment Control
GIS	Geographic Information System
IDDE	Illicit Discharge Detection and Elimination
LA	Load Allocation
L2	Level 2
MCM	Minimum Control Measure
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
POC	Pollutant of Concern
SWM	Stormwater Management
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
VAC	Virginia Administrative Code
VPDES	Virginia Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program
WIP	Watershed Implementation Plan
WLA	Wasteload Allocation

Definitions

Best Management Practices (BMPs) are schedules of activities, prohibitions of practices, maintenance procedures, and other management practices, including both structural and nonstructural practices, to prevent or reduce the pollution of surface waters and groundwater systems.

Census Urbanized Areas (CUAs) are areas identified as urban. MS4 regulations only apply within CUAs.

Existing Sources are pervious and impervious urban land uses served by the MS4 as of June 30, 2009.

Impervious Cover is a surface composed of material that significantly impedes or prevents natural infiltration of water into soil.

L2 Scoping Run is a model run to determine required reductions from urban sources as of June 30, 2009. The L2 reductions are summarized in the following table:

Pollutant of Concern	Regulated Impervious (%)	Regulated Pervious (%)
Nitrogen	9	6
Phosphorus	16	7.25
Sediment	20	8.75

Municipal Separate Storm Sewer System (MS4) is a conveyance or system of conveyances including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains that are:

- Owned or operated by a federal entity, state, city, town, county, district, association, or other public body, created by or pursuant to state law that discharges to surface waters;
- Designed or used for collecting or conveying stormwater;
- Not a combined sewer; and
- Not part of a publicly owned treatment works.

New Sources are pervious and impervious urban land uses served by the MS4 developed or redeveloped on or after July 1, 2009.

CSH MS4 Program Plan is the guiding document of the CSH's MS4 Program and includes best management practices to address conditions of the MS4 General Permit.

Pollutants of Concern (POC) are total nitrogen and total phosphorus.

Prior Developed Lands are lands that have been previously utilized for residential, commercial, industrial, institutional, recreation, transportation, or utility facilities or structures, and that will have the impervious areas associated with those uses altered during a land-disturbing activity.

Transitional Sources are regulated land disturbing activities that are temporary in nature and discharge through the MS4.

1.0 INTRODUCTION AND PURPOSE

"CSH's MS4 program strives to improve environmental compliance, quality, and stewardship through effective management, implementation, and enforcement."

Mandated by Congress under the Clean Water Act (CWA), the National Pollutant Discharge Elimination System (NPDES) storm water program includes the Municipal Separate Storm Sewer System (MS4), Construction, and Industrial General Permits. In Virginia the NPDES program is administered by the Department of Environmental Quality (DEQ) through the Virginia Stormwater Management Program (VSMP) and the Virginia Pollutant Discharge Elimination System (VPDES). Central State Hospital (CSH) is authorized to discharge stormwater from its MS4 under the VPDES General Permit for Discharge of Stormwater from Small MS4s (MS4 General Permit). As part of the MS4 General Permit authorization, CSH developed and implements a MS4 Program Plan (the Plan) with best management practices (BMPs) to address the six minimum control measures (MCMs) and the special conditions for applicable total maximum daily loads (TMDLs) outlined in the MS4 General Permit. Implementation of these BMPs is consistent with the provisions of an iterative MS4 Program, which constitutes compliance with the standard of reducing pollutants to the "maximum extent practicable" or MEP.

The CSH MS4 program strives to improve environmental compliance, quality, and stewardship through effective management, implementation, and enforcement of sound technical guidelines, criteria, and practices for stormwater management (SWM) and erosion and sediment control (ESC). The plan presented herein demonstrates how CSH's MS4 Program Plan addresses the nutrients, nitrogen and phosphorus, in its MS4 regulated area consistent with the requirements of the Chesapeake Bay TMDL.

1.1 Total Maximum Daily Loads

A TMDL is the total amount of a given pollutant that a waterbody can assimilate and still meet water quality standards. Typically, TMDLs are represented numerically in three main components: Wasteload Allocations (WLAs), Load Allocations (LAs), and a Margin of Safety. A WLA is the allocated amount of pollutant from areas discharging through a pipe or other conveyance considered a point source. Point sources include sewage treatment plants, industrial facilities, and storm sewer systems. In contrast, a LA is the amount of pollutant from existing non-point sources and natural background such as farm runoff and atmospheric deposition. As a point source discharge, MS4s are assigned a WLA representing the annual loading of the pollutant of concern (POC) that can be discharged from its regulated MS4 area.

1.2 MS4 General Permit Special Conditions

CSH's MS4 General Permit includes a series of special conditions that must be addressed for permit compliance where CSH has been assigned a WLA as part of an approved TMDL. The special conditions state that any TMDL approved by the State Water Control Board assigning a WLA to an MS4 must be addressed by the Permittee through the measurable goals of their MS4 Program Plan.

In 1998, large portions of the Chesapeake Bay and its tidal tributaries within Virginia were identified as not meeting water quality standards and listed as impaired because of excess nitrogen, phosphorus, and sediment. Due to the Chesapeake Bay waters remaining on the impaired waters list, the Environmental Protection Agency (EPA) required that a TMDL be developed, which was subsequently approved on December 29, 2010.

1.3 Watershed Implementation Plan and Strategy for MS4s

The Chesapeake Bay Watershed Implementation Plans (WIPs) detail how and when the six Chesapeake Bay states and the District of Columbia will meet pollutant allocations. In the Phase I and Phase II WIPs for the Chesapeake Bay TMDL, Virginia committed to a phased approach to reducing nutrients and sediment discharging from MS4s. In part, the special conditions require the permittee to achieve 5% of the required reductions identified in the Level 2 Scoping Run from existing baseline loads by July 1, 2018, 40% by July 1, 2023, and 100% by July 1, 2028. Baseline loads are defined as those occurring on June 20, 2009, and are computed using loading rates provided in the MS4 General Permit. The issuance of the Phase III 2023 - 2028 MS4 General Permit removed the requirement for reducing suspended solids discharging from MS4s.

1.4 CSH Chesapeake Bay TMDL Action Plan

The CSH Action Plan presented herein provides a review of the current MS4 program, which demonstrates CSH's ability to ensure compliance with the special conditions and includes the means and methods CSH used to meet 5.0% of the Level 2 scoping run reductions by July 1, 2018, and 40% reductions by July 1, 2023. This Plan also describes how CSH anticipates meeting the 100% reductions by July 1, 2028.

This Action Plan was developed to comply with the special conditions of the MS4 General Permit (9VAC25-890-40) and under the advisement of DEQ's Guidance Memo No. 15-2005 and Guidance Memo No. 20-2003, which provide background information and procedures to meet the Chesapeake Bay TMDL special condition requirements.

2.0 APPLICABLE OVERVIEW OF CSH'S MS4 PROGRAM

CSH's MS4 General Permit regulates stormwater discharges from areas located within census urbanized areas (CUAs). CSH is located within a CUA, as depicted in Appendix A. CSH's collective efforts, as described in the CSH MS4 Program Plan, result in a significant reduction of pollutants that could potentially be discharged from its regulated MS4. BMPs already included in the CSH Program Plan that address sediment and nutrients are described in the following sections. Each subsection is provided to address the referenced special condition in the 2013 - 2018 and 2018 - 2023 MS4 General Permits.

2.1 Legal Authorities

As a non-traditional MS4, CSH does not have the ability to create legal authorities and has not identified any legal authorities necessary to meet the requirements of the special conditions. However, CSH's MS4 Program includes Minimum Control Measures (MCMs) that include policies and procedures consistent with the goals of the Chesapeake Bay TMDL.

- *MCM 1 (Public Education and Outreach) –* CSH's MS4 Program contains a Public Education and Outreach Program (PEOP) that identifies the Chesapeake Bay TMDL POCs as a high priority water quality issue. The PEOP is described in BMP 1.1 of the CSH MS4 Program Plan and includes the distribution of educational materials regarding methods to reduce introduction of the POCs into stormwater runoff.

- *MCM 3 (Illicit Discharge Detection and Elimination) –* CSH's MS4 Program contains an Illicit Discharge Detection and Elimination (IDDE) Program that includes written procedures to detect, identify, and address non-stormwater discharges, including illegal dumping, to the small MS4, with policies and procedures for when and how to use legal authorities. IDDE BMPs are described in the Minimum Control Measure 3 BMPs in the CSH MS4 Program Plan. The IDDE Program is effective at addressing the POCs through staff training, prohibition of illicit discharges, and annual outfall screening.

- *MCM 4 (Construction Site Runoff Control) –* CSH's MS4 Program contains a Construction Site Runoff Control Program that includes mechanisms to ensure compliance and enforcement on regulated construction sites. All plans will be consistent with the Virginia Erosion and Sediment Control and Stormwater Management Laws and Regulations. CSH relies on The Department of General Services (DGS) who ensures plan review, and inspections are completed by DEQ approved ESC Inspectors. Enforcement is provided by DEQ as the VSMP authority. CSH and the Department of Behavioral Health and Developmental Services (DBHDS) utilizes the Construction and Professional Services Manual (CPSM) as the legal authority to ensure compliance with ESC and construction site stormwater runoff control. CSH as an MS4 ensures that construction inspections are conducted by the DGS and/or a third party at the appropriate interval and receives copies of the inspection forms for annual

reporting purposes. The Construction Site Runoff Control Program is especially effective at reducing downstream conveyance of sediment from transitional sources. Minimum Control Measure 4 in the CSH MS4 Program Plan describes construction site runoff control BMPs.

- *MCM 5 (Post-Construction Stormwater Management) –* CSH's MS4 Program contains a Post-Construction (SWM) Program that ensures water quality criteria in the Virginia Stormwater Management Regulations has been achieved on new developments and developments on prior developed land since July 1, 2009. Included among these requirements are written policies and procedures in the VCCS Erosion and Sediment Control and Stormwater Management Standards and Specifications to ensure that stormwater management facilities are designed and installed in accordance with appropriate law and regulations. CSH relies on DGS for implementation of this requirement.

  Post-construction, the Program includes schedules and written procedures to ensure long-term inspections and maintenance of stormwater management BMPs to maintain functionality. Minimum Control Measure 5 BMPs in the CSH MS4 Program Plan describe post-construction stormwater management BMPs.

- *MCM 6 (Good Housekeeping) –* CSH's MS4 Program contains a Pollution Prevention/Good Housekeeping Program that incorporates policies and procedures to ensure that day-to-day operations minimize the exposure of pollutants to rainfall on the property to the MEP. The program is supported with CSH's Pollution Prevention and Good Housekeeping Manual and biennial training for applicable staff. Minimum Control Measure 6 in the CSH MS4 Program Plan describes pollution prevention and good housekeeping BMPs.

2.2 New or Modified Legal Authorities

Consistent with 2013 – 2018, 2018 - 2023 and 2023 - 2028 MS4 General Permits, CSH uses an iterative approach to ensure it is minimizing the discharge of pollutants through its MS4 to the MEP. The iterative approach is implemented through the annual reporting process with the review of the effectiveness of each MS4 Program Plan BMP. BMPs are modified, as necessary, to increase effectiveness. If new or modified authorities are identified as part of the annual "measure of effectiveness" as described for each BMP in the CSH MS4 Program Plan annual reporting, they will be reported through the annual report process.

As a non-traditional MS4, CSH does not have the ability to create legal authorities. No new policies and procedures or modifications to existing policies and procedures were identified as necessary to meet the requirements of the special conditions. Means and methods to meet the special conditions are described in Section 4.

3.0 POLLUTANT OF CONCERN LOADINGS

The 2013 – 2018 MS4 General Permit required CSH to estimate the annual loadings and the POC load reductions (5.0% from the L2 Scoping Run and 35% of L2). To complete this requirement, CSH determined the amount of pervious and impervious land cover for their regulated property and input the data into the appropriate loading and reduction tables provided in the MS4 General Permit. The methodology to determine sediment and nutrient loadings and the required reductions are described in the following sub-sections.

3.1 Baseline Loading Characterization

Before estimating the loads and required reductions, CSH first evaluated the extent of their regulated MS4 area, including the regulated acres of urban pervious and impervious surface served by its MS4 as of June 30, 2009. These evaluations were conducted using Geographic Information System (GIS) digitization utilizing aerial photography, as depicted in Appendix A.

CSH's MS4 regulated area was determined using the CSH property boundary as a conservative estimate of the area the MS4 serves. The CSH property boundary was obtained from Dinwiddie County's GIS parcel data. Aerial photography was obtained from the 2009 Virginia Base Map Program Orthophotography Aerials[1]. The extent of pervious, impervious, and forested areas was digitized based on the aerial imagery and best professional judgment. Baseline land cover results are provided in Table 2. The determination of regulated area was based on 2000 and 2010 CUA.

Table 2: Classification of CSH Property Land Cover Area (Acres)

Land Cover	CSH Property
Impervious	69.49
Pervious	171.59
Forest*	271.35
Surface Water*	4.15

* Consistent with methodology described in the DEQ Chesapeake Bay Guidance, these areas are not included in the loading computations described in Section 3.2.

3.2 Annual Loadings from Existing Sources

The data summarized in Table 2 was used to estimate pollutant loads from existing sources as of June 30, 2009, using the James River Basin calculation sheet for estimating existing source loads provided in the MS4 General Permit. The calculation sheet was completed for the regulated CSH property as provided in Table 3.

[1] The Virginia Base Mapping Program Orthophotography, 2009. https://www.vita.virginia.gov/isp/default.aspx?id=12118

Table 3: Loadings from the CSH Property

Pollutant	Regulated Urban Land Cover	Total Existing Acres Served by MS4 (06/30/09)	2009 EOS Loading Rate (lbs./acre)	Estimated Total POC Load Based on 2009 Progress Run (lbs.)	Total Load (lbs.)
Nitrogen	Impervious	69.49	9.39	652.51	1,851.92
	Pervious	171.59	6.99	1,199.41	
Phosphorus	Impervious	69.49	1.76	122.30	208.10
	Pervious	171.59	0.50	85.80	
TSS	Impervious	69.49	676.94	47,040.56	64,384.88
	Pervious	171.59	101.08	17,344.32	

3.3 Annual Loadings from New Sources and Grandfathered Projects

In addition to computing baseline loadings from existing conditions as of June 30, 2009, the special conditions require the determination of offsets for increased loads from development occurring on or after July 1, 2009, including grandfathered projects. No offsets are necessary for new sources since:

- Loadings from new sources are addressed with the water quality criteria in the SWM regulations. Water quality criteria for new sources from regulated development between July 1, 2009, and June 30, 2014, were based on an average land cover condition of 16% and therefore appropriate offsets were incorporated within the development project's SWM plan.
- No CSH projects are grandfathered.

3.4 Required 5% Load Reductions

The 2013 - 2018 MS4 General Permit required CSH to achieve 5.0% of the L2 Scoping Run POC reductions for existing sources as of June 30, 2009. The required load reductions for the CSH property for the permit cycle were calculated using the calculation sheet in the 2013 – 2018 MS4 General Permit for determining POC reductions for the James River basin. The calculation sheet was modified with the corrected loading rates provided in DEQ's Guidance Memo No. 15-2005. The required load reductions for CSH are depicted in Table 4.

Table 4: Estimated 5% POC Reductions Required from the CSH Property

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	Reduction Required First Permit Cycle (lbs.)	Total Reduction (lbs.)
Nitrogen	Impervious	69.49	0.042255	2.94	6.54
	Pervious	171.59	0.02097	3.60	
Phosphorus	Impervious	69.49	0.01408	0.98	1.29
	Pervious	171.59	0.0018125	0.31	
TSS	Impervious	69.49	6.7694	470.41	546.29
	Pervious	171.59	0.442225	75.88	

3.5 Required 35% Load Reductions

The 2018 – 2023 MS4 General Permit required CSH to reduce 35.0% of the L2 Scoping Run POC reductions for existing sources as of June 30, 2009. The required load reductions for the CSH property for the permit cycle were calculated using the calculation sheet in the 2018 – 2023 MS4 General Permit for determining POC reductions for the James River basin. The calculation sheet was modified with the corrected loading rates provided in DEQ's Guidance Memos 15-2005 and 20-2003. The required load reductions for CSH are depicted in Table 5.

Table 5: Estimated 35% POC Reductions from the CSH Property

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	35% Reduction (lbs.)
Nitrogen	Impervious Pervious	69.49 171.59	0.042255 0.02097	45.78
Phosphorus	Impervious Pervious	69.49 171.59	0.01408 0.0018125	9.03
TSS	Impervious Pervious	69.49 171.59	6.7694 0.442225	3,824.03

- No expanded sources identified in the 2000 and 2010 census urbanized area.
- No additional 35% reduction for new sources developed between 2009 and 2014 and for which the land use cover condition was greater than 16%.
- No modifications to the applicable loading rate provided to the operator as a result of TMDL modification.

3.6 Required 40% Overall Load Reductions

The required 40% load reductions for CSH are depicted in Table 6.

Table 6: Estimated 40% Overall POC Reductions from the CSH Property

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	40% Reduction (lbs.)
Nitrogen	Impervious Pervious	69.49 171.59	0.042255 0.02097	52.32
Phosphorus	Impervious Pervious	69.49 171.59	0.01408 0.0018125	10.32
TSS	Impervious Pervious	69.49 171.59	6.7694 0.442225	4,370.32

3.7 Required 60% Load Reductions

The 2023 – 2028 MS4 General Permit required CSH to reduce 60.0% of the L2 Scoping Run POC reductions for existing sources as of June 30, 2009. The required load reductions for the CSH property for the permit cycle were calculated using the calculation sheet in the 2023 – 2028 MS4 General Permit for determining POC reductions for the James River basin. The calculation sheet was modified with the corrected loading rates provided in DEQ's Guidance Memo 20-2003. The required load reductions for CSH are depicted in Table 7.

Table 7: Estimated 60% POC Reductions from the CSH Property

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	60% Reduction (lbs.)
Nitrogen	Impervious Pervious	69.49 171.59	0.042255 0.02097	78.48
Phosphorus	Impervious Pervious	69.49 171.59	0.01408 0.0018125	15.48

- No expanded sources identified in the 2000 and 2010 census urbanized area.
- No additional 35% reduction for new sources developed between 2009 and 2014 and for which the land use cover condition was greater than 16%.
- No modifications to the applicable loading rate provided to the operator as a result of TMDL modification.

3.8 Required 100% Overall Load Reductions

The required 100% overall load reductions for CSH are depicted in Table 8:

Table 8: Estimated 100% Overall POC Reductions from the CSH Property

Pollutant	Regulated Urban Land Cover	Existing Acres Served by MS4 (06/30/09)	Reduction in Loading Rate (lbs./acre)	100% Reduction (lbs.)
Nitrogen	Impervious Pervious	69.49 171.59	0.042255 0.02097	130.80
Phosphorus	Impervious Pervious	69.49 171.59	0.01408 0.0018125	25.80

4.0 MEANS TO ACHIEVE 5% POLLUTANT REDUCTIONS

DEQ's Guidance Memo No. 15-2005 was used to identify appropriate means and methods for achieving the required reductions computed in Section 3.4. The means and methods are described in the following sub-sections and were incorporated into the CSH MS4 Program Plan for implementation.

POC load reductions described in the following sub-sections demonstrate compliance with the reduction requirements for the 2013 - 2018 MS4 General Permit cycle with the understanding that any changes in established BMP efficiencies will not be retroactively applied to projects approved to meet reductions for the 2013 - 2018 MS4 General Permit cycle.

4.1 5% Reductions Achieved with Street Sweeping

CSH implemented street sweeping to satisfy the required POC reductions identified in Section 3.4. The "mass loading approach," as described in the DEQ Guidance No. 15-2005, was used to determine the extent of street sweeping efforts to be implemented. Per the mass loading approach, the overall weight of material collected through street sweeping is multiplied by a dry weight factor and then a factor specific to each POC to quantify the pollutant reductions achieved. Given the target pollutant reductions and the dry weight and POC factors, it was determined that CSH must collect a minimum of 3,738 pounds of material per year to meet the POC reduction requirements. Required reductions are summarized in Table 9.

Table 9: Required 5%Street Sweeping Material to be Swept per the Mass Loading Approach

Pollutant	Annual Reductions Required by L2 Scoping Run (lbs./yr.)	Dry Weight Factor	POC Multiplication Factor	Required Street Sweeping Material Weight (lbs./yr.)
Nitrogen	6.54	0.7	.0025	3,737.14
Phosphorus	1.29	0.7	.001	1,842.86
TSS	546.29	0.7	0.3	2,601.38

CSH documented 38,500 lbs. of material swept, exceeding the required 3,738 lbs.

4.2 Implementation of the 5% POC Reductions to the MEP

Implementation of the Action Plan was dependent on continued execution of the CSH MS4 Program Plan. MS4 Program Plan BMPs were implemented per the schedules outlined in the CSH 2013 – 2018 MS4 Program Plan.

The cost associated with the implementation of street sweeping was estimated to be approximately $3,475 per year per pound of phosphorous removed. This estimate is based on the document titled "Cost-Effectiveness Study of Urban Stormwater BMPs in the James River Basin" by the Center for Watershed Protection. The study detailed costs associated with street sweeping based on a ten-year life cycle and the capital cost of a mechanical sweeper.

During the 2013 - 2018 permit cycle, CSH evaluated the most cost-effective way to implement a street sweeping program, which included contracting a street sweeping company to perform regular street sweeping. CSH's actual costs for the 2013 – 2018 permit cycle were $4,050.

4.3 Supplemental Means and Methods for 5% POC Reductions

The remaining Minimum Control Measure BMPs described in Section 2.1 were implemented by CSH as part of the CSH MS4 Program Plan. Continued implementation of these BMPs demonstrated compliance with the CSH Chesapeake Bay Action Plan to the MEP and demonstrates adequate progress.

4.4 Public Comment Period for 5% POC Reductions

CSH solicited public comments on Phase I Chesapeake Bay TMDL Plan during the 2013 – 2018 MS4 General Permit cycle and considered all comments that were provided. Opportunities for public comment were provided through the following means:

- A draft of the Chesapeake Bay TMDL Action plan was posted on CSH's website for a minimum of 14 days.
- An email was sent to the target audience identified in Minimum Control Measure 1 of the CSH MS4 Program Plan with a link where comments can be provided on the Action Plan.

4.5 Annual Reporting for 5% POC Reductions

The effectiveness of the Action Plan was measured through the MS4 General Permit annual reporting. CSH reported annually on the implementation of the means and methods described in Section 4.1 of this Plan.

5.0 MEANS TO ACHIEVE 40% OVERALL POC REDUCTIONS

Prior to July 1, 2022, DEQ's Guidance Memo No. 15-2005 was used to identify appropriate means and methods for achieving the required reductions computed in Section 3.6 for the Phase II Chesapeake Bay TMDL Action Plan. The means and methods are described in the following sub-sections and were incorporated into the CSH MS4 Program Plan for implementation.

POC load reductions described in the following sub-sections demonstrated compliance with the reduction requirements for the 2018 - 2023 MS4 General Permit cycle with the understanding that any changes in established BMP efficiencies were not be retroactively applied to projects approved to meet reductions for this 2018 – 2023 MS4 General Permit cycle.

5.1 40% Overall POC Reductions to be Achieved with Street Sweeping

CSH implemented street sweeping to satisfy the required POC reductions identified in Section 3.6. The "mass loading approach," as described in DEQ's Guidance Memo No. 15-2005, was used to determine the extent of street sweeping efforts to be implemented. Per the mass loading approach, the overall weight of material collected through street sweeping is multiplied by a dry weight factor and then a factor specific to each POC to quantify the pollutant reductions achieved. Given the target pollutant reductions and the dry weight and POC factors, it was determined that CSH must collect a minimum of 29,898 pounds of material per year to meet the POC reduction requirements. Required reductions and sweeping efforts are summarized in Table 10.

Table 10: 40% Overall POC Reductions to be Achieved with Street Sweeping

Pollutant	Annual Reductions Required by L2 Scoping Run (lbs./yr.)	Dry Weight Factor	POC Multiplication Factor	Required Street Sweeping Material Weight (lbs./yr.)
Nitrogen	6.54	0.7	0.0025	29,897.14
Phosphorus	1.29	0.7	0.001	14,724.86
TSS	546.29	0.7	0.3	20,811.05

5.2 Revised Means to Achieve 40% POC Reductions

For the 2022 - 2023 reporting year, CSH implemented a new BMP, land use change conversion, to satisfy the required POC reductions identified in Section 3.6 in accordance with DEQ's Guidance Memo No. 20-2003. CSH converted managed turf to forest to achieve the following (lbs./ac/yr.) reductions within the James River Basin: 6.37 Total Nitrogen (TN), 1.39 Total Phosphorus (TP), and 465 Total Suspended Solids (TSS) according to Table V.H.1 – Land Use Change Conversion Efficiency Table. According to Table V.H.2 – Minimum Number of Trees Required Per Acre to Determine 30 Square Feet of Tree Basal Area of 40% Stocking For Classification as Forest Land, CSH planted 25.1 acres of seedlings at a rate of 400 trees per acres.

25.1 acres X 400 trees/acre = 10,040.00 trees

The following is the credit CSH received for the land use change conversion for the POCs/yr.:

25.1 acres converted * (6.37 lbs. TN/ac) / yr. = 159.89 TN/yr.

25.1 acres converted * (1.39 lbs. TP/ac) / yr. = 34.89 TP/yr.

25.1 acres converted * (465 TSS/ac) / yr. = 11,671.50 TSS/yr.

Table 11: Summary of 40% POC Reductions Achieved

Pollutant	Annual Reductions Required by L2 Scoping Run (lbs./yr.)	Reductions Achieved (lbs./yr.)
Nitrogen	52.32	159.89
Phosphorus	10.32	34.89
TSS	4,370	11,671.50

- No expanded sources identified in the 2000 and 2010 census urbanized area.
- No additional 60% reduction for new sources developed between 2009 and 2014 and for which the land use cover condition was greater than 16%.
- No modifications to the applicable loading rate provided to the operator as a result of TMDL modification.

5.3 Implementation of 40% POC Reductions to the MEP

Implementation of the 2018 – 2023 Action Plan was dependent on continued execution of the CSH MS4 Program Plan. MS4 Program Plan BMPs were implemented per the schedule outlined in the CSH MS4 Program Plan. For the 2022 - 2023 permit year, CSH in conjunction with the Department of Forestry planted 11,176 trees in the 25.1 acres of managed turf as shown on the map in Appendix B exceeding the 40% POC reductions required.

5.4 Supplemental Means and Methods for 40% POC Reductions

In addition, the remaining Minimum Control Measure BMPs described in Section 2.1 were implemented by CSH as part of its MS4 Program Plan. Continued implementation of these BMPs demonstrates adherence to the CSH Chesapeake Bay Action Plan to the maximum extent practicable and demonstrates adequate progress.

5.5 Public Comment Period for 40% POC Reductions

CSH solicited public comment on the 2018 – 2023 Phase II Chesapeake Bay TMDL Action Plan and considered all comments that were provided. Public comment was provided through the following means:

- A draft of the Chesapeake Bay TMDL Action plan was sent via email to the target audience identified in Minimum Control Measure 1 of the CSH MS4 Program Plan with a link where comments could be provided on the 2018 – 2023 Phase II Chesapeake Bay TMDL Action Plan through survey software. The survey remained open for 15 days.

5.6 Annual Reporting for 40% POC Reductions

The effectiveness of the 2018 – 2023 Phase II Chesapeake Bay TMDL Action Plan was measured through the MS4 General Permit annual reporting. CSH reported annually on the implementation of the means and methods described in Sections 5.1 and 5.2 of this Plan.

6.0 MEANS TO ACHIEVE 100% CUMULATIVE POC REDUCTIONS

During the 2022 - 2023 permit year, CSH in conjunction with the Department of Forestry converted 25.1 acres of managed turf to forest as shown on the map in Appendix B. A total of 11,176 trees were planted. The land use change conversion exceeds the additional 60% and cumulative 100% reductions required as summarized in Table 12.

Table 12: Summary of 100% Cumulative POC Reductions

POC	100% Reductions Required (lbs./yr.)	Reductions Achieved by Land Use Conversion (lbs./yr.)
Nitrogen	130.80	159.89
Phosphorous	25.80	34.89

- No expanded sources identified in the 2000 and 2010 census urbanized area.
- No additional 60% reduction for new sources developed between 2009 and 2014 and for which the land use cover condition was greater than 16%.
- No modifications to the applicable loading rate provided to the operator as a result of TMDL modification.

6.1 Implementation of 100% POC Reductions to the MEP

Implementation of the 2023 – 2028 Action Plan will be dependent on continued execution of the CSH MS4 Program Plan. MS4 Program Plan BMPs will continue to be implemented per the schedule outlined in the CSH MS4 Program Plan.

6.2 Supplemental Means and Methods for 100% POC Reductions

In addition, the remaining Minimum Control Measure BMPs described in Section 2.1 were implemented by CSH as part of its MS4 Program Plan. Continued implementation of these BMPs demonstrates adherence to the CSH Chesapeake Bay Action Plan to the maximum extent practicable and demonstrates adequate progress.

6.3 Public Comment Period for 100% POC Reductions

CSH solicited public comments on the 2023 – 2028 Phase III Chesapeake Bay TMDL Action Plan and considered all comments that were provided. Public comment was provided through the following means:

- A draft of the Phase III Chesapeake Bay TMDL Action plan was sent via email to the target audience identified in Minimum Control Measure 1 of the CSH MS4 Program Plan with a link where comments could be provided on the Action Plan through an online survey program for 15 days.

6.4 Annual Reporting for 100% POC Reductions

The effectiveness of the 2023 – 2028 Phase III Chesapeake Bay TMDL Action Plan will be measured through the MS4 General Permit annual reporting. CSH will report annually on the implementation of the means and methods described in Section 6.1 of this Plan.

Appendix A: 2009 Baseline Map for Characterization of CSH's Property

Wetland Studies and Solutions, Inc. a DAVEY company

Projection: NAD 1983 StatePlane Virginia South FIPS 4502 Feet

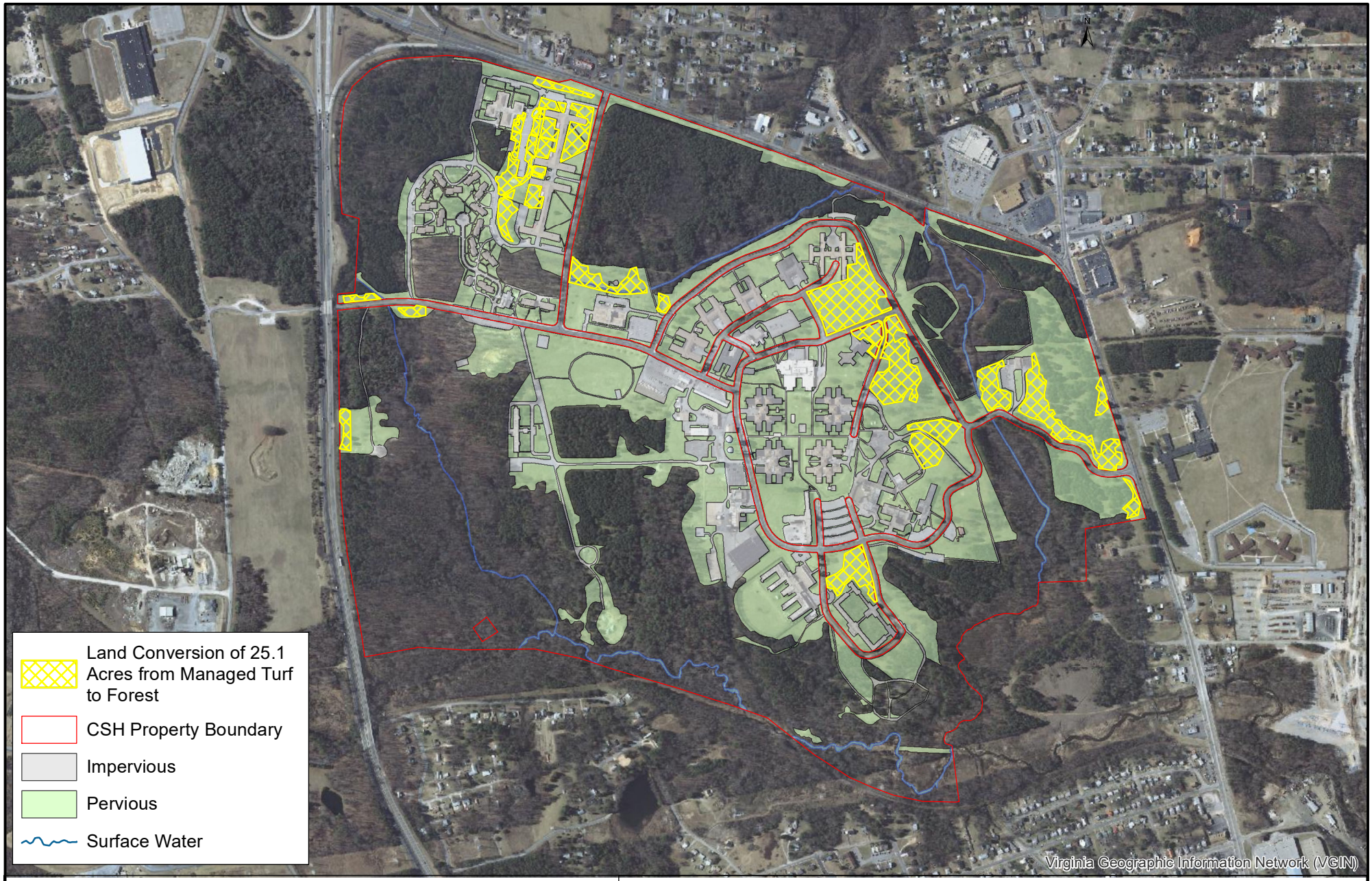
CENTRAL STATE HOSPITAL (CSH)
IMPERVIOUS AND PERVIOUS LAND COVER

0 500 1,000 Feet

N

Petersburg, Virginia
Sources: 2009 VBMP Imagery
Updated by JDB, October 2022

Appendix B: Land Use Change Map



Wetland Studies and Solutions, Inc. a DAVEY company

Projection: NAD 1983 StatePlane Virginia South FIPS 4502 Feet

CENTRAL STATE HOSPITAL (CSH)
LAND CONVERSION AREAS

0 500 1,000 Feet

N

Petersburg, Virginia
Sources: 2009 VBMP Imagery
Updated by CMF, September 2024