# Roanoke River Benthic (Sediment) TMDL Action Plan

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**Latest Revision: March 28, 2025**

This Action Plan is developed to address applicable sections of Part II.B of the Commonwealth's General VPDES Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems. This Action Plan is also developed for consistency with the *Benthic TMDL Development for the Roanoke River,* approved by the EPA on May 10, 2006.

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# Table of Contents

Executive Summary ..... 1
1.0 Introduction ..... 2
1.1 Roanoke River TMDL ..... 2
1.2 Permit Compliance ..... 3
2.0 MS4 Sediment Discharge Characterization ..... 5
2.1 Required Annual Pollutant Reductions to Achieve the WLA ..... 5
2.2 Identification of Significant Sources of Sediment ..... 5
3.0 Evaluation of Sediment Reductions Achieved ..... 7
3.1 Street Sweeping ..... 7
3.2 Surplus Credit from Stormwater Management Facilities ..... 9
3.3 Evaluation of the Results Achieved ..... 10
4.0 Adaptive Management Strategies ..... 11
4.1 BMP Option Considerations ..... 11
4.2 BMPs to Achieve Remaining Reductions ..... 13
4.3 Legal Authorities ..... 14
4.4 Public Education Outreach Strategy ..... 15
5.0 References ..... 17

# Appendices

Appendix A: Street Sweeping Activity Data Collection Form
Appendix B: VWCC MS4 Mapping
Appendix C: Public Input

**Executive Summary**

Virginia Western Community College (VWCC) is permitted to discharge stormwater from the college's municipal separate storm sewer system (MS4) by maintaining coverage under the General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Small MS4s (MS4 General Permit). In part, the MS4 General Permit requires the college to meet special conditions for a Total Maximum Daily Load (TMDL) when the college has been assigned a waste load allocation (WLA). VWCC has been assigned a WLA for sediment in an Environmental Protection Agency (EPA) approved TMDL for the Roanoke River, necessitating the development and implementation of this Action Plan. The WLA requires VWCC implement best management practices (BMPs) to reduce 4.33 tons/year of sediment discharge from the college's MS4, representing a 69.5% reduction from baseline TMDL loadings.

This Action Plan includes the specific information required by the MS4 General Permit for a local TMDL Action Plan, including, in part, evaluation of the results already achieved towards meeting the WLA and an adaptive management strategy incorporated into this updated action plan based on implementation thus far. On average, VWCC has achieved 91.4% of the required annual sediment reductions with street sweeping over the past 5 year, as further described in this Action Plan. However, during that span of time, the annual required reductions were achieved only twice, during the 2020-2021 and 2021-2022 reporting periods. It is noted the amount of material swept the past two reporting cycles has decreased, necessitating the need for an increased effort in sweeping activities and/or tracking protocols. The latter due to a small fraction of reductions recorded during the 2022-2023 reporting year due to a lack of documentation from a sweeping contractor.

Street sweeping shows promise towards annually achieving the required sediment reductions and procedures to increase the robustness of the sweeping program are identified herein. However, supplemental credit that may be readily available with: (1) existing "treatment train" scenarios and (2) surplus sediment reduction from existing stormwater management (SWM) facilities installed since the TMDL development will be identified during the 2025-2026 reporting year. This Action Plan will be subsequently updated to reflect any readily available surplus sediment reduction credit that can be applied to achieving the WLA.

## 1.0 Introduction

Virginia Western Community College (VWCC) has developed, maintains, implements and enforces a municipal separate storm sewer system (MS4) program designed to reduce the discharge of pollutants from the college's MS4 to the maximum extent practicable (MEP). The program is designed in accordance with the *General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Small MS4s*, also known as the MS4 General Permit. The program is intended to protect water quality and to satisfy the water quality requirements of the State Water Control Law and its attendant regulations. VWCC utilizes the legal authority provided by the laws and regulations of the Commonwealth of Virginia to control discharges, into and from, the college's MS4 consistent with the MS4 General Permit, college policies and specific contract language, as applicable.

Compliance with the MS4 General Permit is dependent on the implementation of best management practices (BMPs) to address the requirements described in the permit, including special conditions associated with applicable total maximum daily loads (TMDLs). A TMDL is a study producing a calculation of the maximum amount of an impairing pollutant allowed to enter a waterbody while still meeting and maintaining water quality standards. A TMDL assigns pollutant reduction targets and allocates allowable loadings of the pollutant(s) to point source discharges, including discharges from regulated MS4s. The allocations to MS4s, known as waste load allocations (WLAs), represent the amount of the pollutant the MS4 permittee is allowed to discharge annually, often translated from a percent reduction of the existing (baseline) annual pollutant loading, as calculated by the TMDL. VWCC has been assigned a WLA for sediment in an Environmental Protection Agency (EPA) approved TMDL for the Roanoke River, necessitating this action plan.

### 1.1 Roanoke River TMDL

The Louis Berger Group, Inc., prepared the report entitled "Benthic TMDL Development for the Roanoke River, Virginia," approved by the EPA on May 10, 2006. The TMDL was developed as required by Section 303(d) of the Clean Water Act (CWA) and the EPA's Water Quality Planning and Management Regulations (40 CFR Part 130). TMDL development was required due to impaired benthic invertebrate communities in a segment of the Roanoke River being listed as impaired on Virginia's Section 303(d) Report of Impaired Waters (see Figure 1). The impairment designation is due to violations of the general aquatic life (benthic) standards,

with the most probable stressor identified as excessive sediment, likely due to higher runoff flows from urban areas.

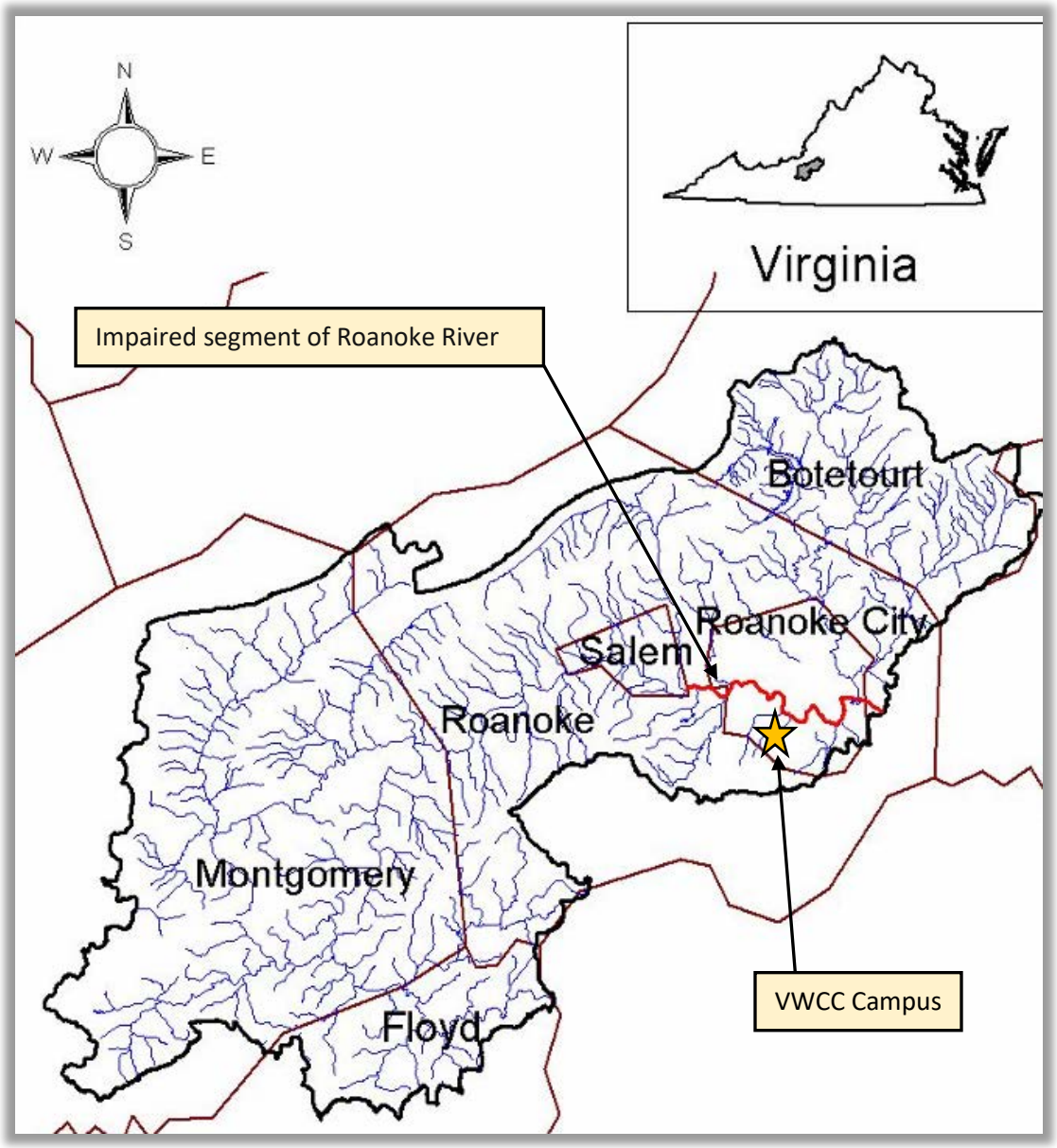


**Figure 1.** Roanoke River TMDL watershed.

## 1.2 Permit Compliance

As a result of the assignment of a WLA, the college is required to develop and implement a TMDL Action Plan to mitigate sediment loadings from the college's MS4 regulated area. This action plan updates and replaces previously developed VWCC Action Plans for the Roanoke

River benthic TMDL, done by others, as part of an iterative process and for consistency with the current MS4 General Permit. As required per sections of Part II.B.4 of the permit, for each sediment TMDL, this action plan includes:

- ✓ TMDL Project Names and EPA approval dates (Project name is the name of this Action Plan and EPA approval date for the TMDL is provided on the Cover and Page 2);
- ✓ The WLA allocations and the corresponding percent reductions (Section 2.1);
- ✓ Identification of the significant sources of sediment discharging to the college's MS4 (Section 2.2);
- ✓ The BMPs designed to reduce sediment, including a calculation of the anticipated load reduction achieved from each BMP and the anticipated end date that the WLA will be achieved (Sections 3.1and 4.2);
- ✓ Schedule of anticipated actions planned for implementation during the permit term (Section 4.2); and an
- ✓ Outreach strategy to enhance the public's education on methods to eliminate and reduce discharges of sediment (Section 4.3).

## 2.0 MS4 Sediment Discharge Characterization

The annual sediment load discharged from VWCC's regulated MS4 area and the required annual reduction per the Roanoke River TMDL are provided in this Section.

### 2.1 Required Annual Pollutant Reductions to Achieve the WLA

The "Benthic TMDL Development for the Roanoke River" WLA requires a 69.5% reduction of the modeled (baseline) loadings presented in the TMDL. The WLA assigned by the TMDL for VWCC is 1.9 tons/year of sediment (Table 7-5 of the EPA-approved TMDL report). To determine required annual pollutant reductions, this information is used to first determine the annual sediment loading from the VWCC MS4 at the time of the TMDL development (baseline loading). The baseline loading (x) is computed in Equation 1 as:

$$x - (0.695x) = 1.90\frac{tons}{year}\ therefore, x = 6.23\frac{tons}{year} \quad (1)$$

The required annual reduction is then computed in Equation 2 as the difference in the baseline loading and the WLA as:

$$6.23\frac{tons}{year} - 1.90\frac{tons}{year} = 4.33\frac{tons}{year} \quad (2)$$

### 2.2 Identification of Significant Sources of Sediment

The MS4 General Permit requires this Action Plan identify significant sources of sediment discharging to VWCC's MS4. The permit defines a "significant source" as a discharge where the expected pollutant loading is greater than the average loading for the land use identified in the TMDL. A field inspection of the VWCC campus did not identify any significant sources where sediment discharge would be expected to be greater than the average sediment loading for the land use identified in the Roanoke River TMDL, appearing to be commercial/industrial for VWCC.

Potential for minor sources of sediment may exist within areas of campus from time to time where campus maintenance operations occur, such as with soil stockpiling, which could potentially release sediment into stormwater runoff. However, the VWCC Handbook of Good Housekeeping and Pollution Prevention, along with associated staff training, address such

concerns with the implementation of BMPs targeted to prevent discharge of pollutants, including sediment. Additionally, there could be a risk of increased sediment loading in the case of future land disturbance activities. However, land disturbance activities on campus are subject to the Virginia Community College System (VCCS) Standards and Specifications for Erosion and Sediment Control (ESC) and Stormwater Management (SWM). The Standards and Specifications require controls to minimize sediment discharge from land disturbance activity. Currently, there no land disturbance activities planned on campus. There are currently no land disturbance activities occurring on campus.

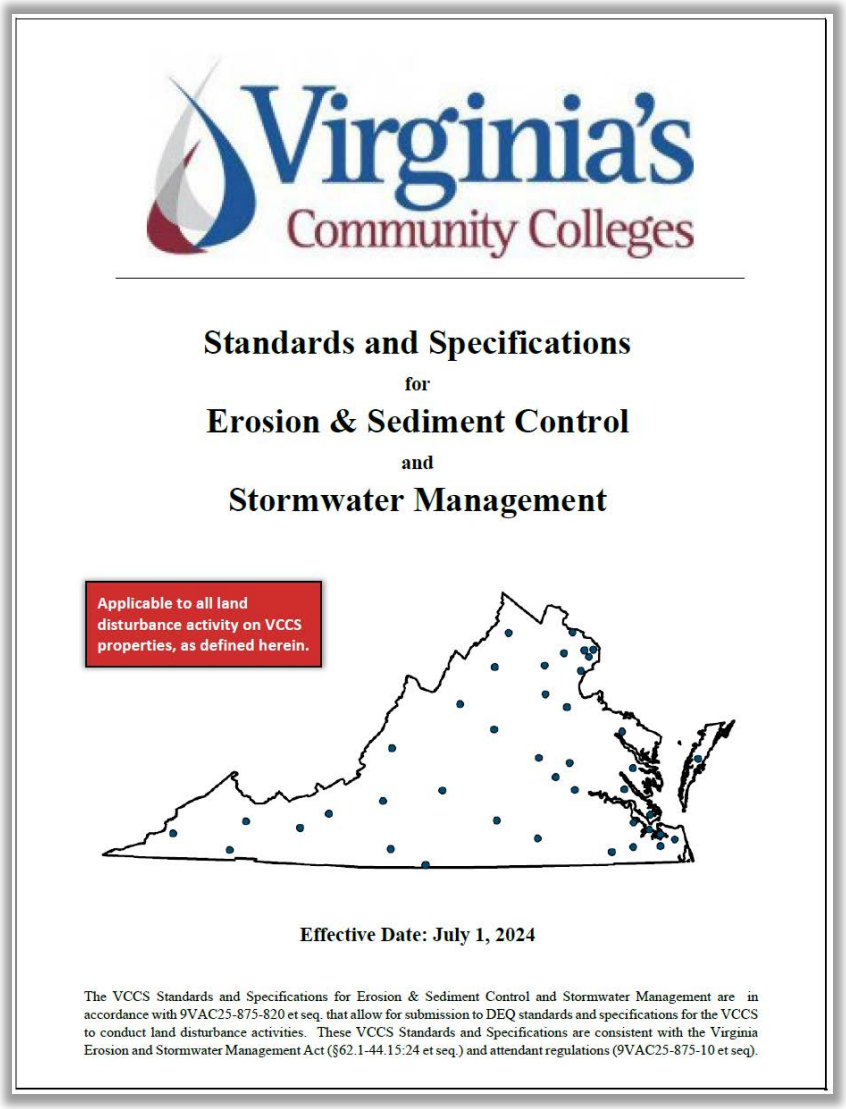


**Figure 2.** VWCC is subject to the VCCS Standards and Specifications for ESC and SWM. Requirements of the standards and specifications address potential increases in sediment loads from land disturbance activity.

## 3.0 Evaluation of Sediment Reductions Achieved

The previous version of VWCC's Action Plan for the Roanoke River Benthic TMDL, developed by Apex and last updated April 15, 2020, described the following practices to be implemented towards achieving the required annual sediment reductions:

- Annual street sweeping activities and
- Sediment reductions achieved from existing stormwater management (SWM) facilities installed on campus with development and redevelopment projects.

### 3.1 Street Sweeping

The previous version of VWCC's Action Plan for the Roanoke River Benthic TMDL did not provide quantification of reductions to be achieved by street sweeping. Past computational methods for quantifying reductions from street sweeping, such as the Mass Loading Approach (MLA) based on a study by Law (2008), that was previously accepted by the Virginia DEQ (VDEQ 2015), has been phased out. The phasing out of the MLA method was based on recommendations by an expert panel that concluded data regarding the impact to water quality from street sweeping is sparse and more studies are needed, suggesting challenges to measure impact in receiving waters may prevent the ability to measure effectiveness in receiving streams altogether (Schueler et al. 2016). As an alternative, the expert panel presents pollutant reduction efficiency values generated from a modeling application dependent on sweeping frequency and the type of sweeper employed (VDEQ 2020). The model predicts rigorous sweeping frequency as necessary to achieve appreciable pollutant reductions which is not practicable, nor feasible, for a community college. Further, due to difficulties measuring impacts downstream, the model is suspect since it cannot be calibrated to real world conditions in receiving streams.

In response, VWCC has participated in an ongoing study that includes collecting and analyzing swept material samples as a means to assist in quantifying/verifying reductions achieved by the practice. Results from the study, including participation of street sweeping programs from multiple MS4 permit holders, are presented by Hixon and Dymond (2019) and find association of pollutants within a fraction of swept material that is susceptible to downstream transport; and therefore, removed from contributing to TMDLs. The study included laboratory analysis of many street sweeping samples for moisture content, particles size distribution, and nutrient concentrations. Specifically, as relevant to a sediment TMDL, the particle size distribution (PSD) data were found to vary depending on time that had lapsed since

rainfall prior to a sweeping event. Dependent on these variables, PSD within swept samples was very consistent.

The study found particles < 840 µm are much less abundant in swept material collected within 2 days after a rainfall event compared to those collected after 2 days since rainfall. This finding indicates smaller particles were found to quickly accumulate on the surfaces after two days, filling the capacity voids available on the surface. Therefore, particles less than < 840 µm are defined as those contributing to the TMDL impairment since they are being washed off the swept surface in stormwater. Data also found the type of surface swept also to be a variable that impacted the fraction of sediment < 840 µm, with parking lot swept material containing higher fractions of the smaller particles compared to streets. This is likely due to more turbulence from traffic loadings on streets.

Exponential regression of the collected swept material data was used to correlate and extrapolate values for computing pollutant reductions for the mass of swept material susceptible to transport downstream to surface waters, reflected in Table 1. The values allow for computation of mass of pollutant reduction achieved based on the total weight of the swept material. Reductions vary dependent on the duration since the last rainfall prior to a sweeping occurrence and the type of surface area swept.

**Table 1.** Estimate of sediment reduction, as TSS, to surface waters per ton of swept materials (Hixon and Dymond 2019).

| Surface Type | Days Since Rain | TSS (< 841 µm) (lbs/ton)[1] | TSS (% of swept mass) |
|---|---|---|---|
| Streets | ≤ 2 | 571 | 28.6 |
| | > 2 | 998 | 49.9 |
| Parking Lots | ≤ 2 | 794 | 39.7 |
| | > 2 | 1,307 | 65.4 |

[1] Adjusted using a moisture content of 2.2% to compute dry weight, the median value measured in samples presented by Hixon and Dymond (2019).

VWCC has utilized the values from the Hixon and Dymond (2020) study to annually quantify sediment reductions, as TSS, from swept materials. The method provides an explicit measure for verification and as a measure of effectiveness with continued sampling and analysis of swept materials. The mass of sediment reductions has been included in annual reporting each

year since the 2019-2020 reporting year. Swept material is typically tracked as a mass or volume. In the case of volumes are recorded, volume of swept material collected is converted to a mass based on an average density of 2.0 g/cm$^3$, typical of density for street sweepings (Breault et al. 2005, Pitt et al. 2005). Table 2 list the sediment reductions achieved for each reporting period since 2019-2020 from street sweeping. Sweeping either achieved or nearly achieved the total reduction requirements between 2019-2022. An issue with tracking of swept material occurred in the 2022-2023 reporting period and sweeping in the 2023-2024 period resulted in less material collect than previous years.

**Table 2.** Annual VWCC sediment reductions achieved from street sweeping, calculated based on values from Table 1 for parking lots and dependent on days since rain for each recorded sweeping activity. (required annual reduction = 4.33 tons/year).

| MS4 Reporting Period | Reduction Achieved (tons) | % of Required Annual Reductions |
|---|---|---|
| 2023-2024 | 2.19 | 50.6 |
| 2022-2023* | 0.45 | 10.4 |
| 2021-2022 | 5.09 | 117.6 |
| 2020-2021 | 7.86 | 181.5 |
| 2019-2020 | 4.19 | 96.8 |

* Contracted sweeping company failed to track material collected from sweeping this reporting period.

### 3.2 Surplus Credit from Stormwater Management Facilities

The previous version of VWCC's Action Plan for the Roanoke River Benthic TMDL discusses sediment reductions from existing stormwater management facilities. The previous action plan provides a table with sediment reduction efficiency rates for the types of stormwater facilities at the campus. However, the action plan does not quantify sediment reduction surplus from the facilities that could be applied towards addressing the TMDL WLA. Any surplus credit that can be demonstrated from these facilities can be credited towards the TMDL sediment reductions. Specifically, credits can be realized per Appendix V.E. of DEQ Guidance Memo No. 20-2003 – Chesapeake Bay TMDL Special Conditions Guidance (also applicable to local TMDLs) as follows:

- ✓ Full credit for sediment reductions that result from a stormwater management facility installed as part of a redevelopment projects and
- ✓ For new development, credit from the difference between a stormwater management facility's achieved reductions and the reductions required under the Virginia Stormwater Management Program (VSMP) regulations.

As of the development of this action plan, an assessment of VWCC's stormwater management facilities, specifically those installed after the development of the TMDL, has not been implemented to identify sediment reduction credit that could be applied towards achieving the WLA.

### 3.3 Evaluation of the Results Achieved

In summary, an assessment of street sweeping to achieve pollutant reductions for the TMDL WLA finds street sweeping to have potential for achieving the annual required sediment reductions (refer to Table 2). However, a more robust program is needed to ensure sweeping activities annually remove the required sediment loadings. Specifically, review of the mass of swept material after each sweeping activity and a mechanism to ensure record keeping, including amount of material swept and dates for sweeping activities. Based on the values from Hixon and Dymond (2019), estimates of material necessary to be annually collected from sweeping to achieve the total required reductions are provided in Table 3.

**Table 3.** Estimate of minimum total required materials from street sweeping necessary to achieve full reductions required (4.33 tons/year) to achieve the WLA. Estimates based on values from Hixon and Dymond (2019) with sweeping of parking lots.

| Days Since Rain | Minimum Required Total Annual Swept Material | |
|---|---|---|
| | Weight (tons) | Volume (CY)[1] |
| ≤ 2 | 11.16 | 6.63 |
| > 2 | 6.77 | 4.02 |

[1] Based on conversion rate of 2.0 g/cm$^3$ as assumed value for density of swept material (Breault et al. 2005, Pitt et al. 2005).

## 4.0 Adaptive Management Strategies

Pollutant reductions from stormwater discharge can be achieved using a variety of practices and methods. Selection of the appropriate practices and methods is dependent on variables such as physical opportunities, the amount of required reductions and cost effectiveness. Although street sweeping is intended to achieve the required reductions, this Section discusses the various alternative options acceptable by the permit and identifies the methods that could be considered to supplement sweeping. Supplemental reductions to sweeping are desirable based on the results shown in Table 2.

### 4.1 BMP Option Considerations

The MS4 General Permit requires VWCC to reduce the pollutant identified in the WLA through implementation of any of the following:

- One or more of the BMPs from the Virginia Stormwater BMP Clearinghouse (Table 4);
- One or more BMPs approved by the Chesapeake Bay Program (see Table 5); and/or
- Land disturbance thresholds lower than Virginia's regulatory requirements for Erosion and Sediment Control (ESC) and post development SWM. (VCCS Standards and Standards and the City of Roanoke adhere to the thresholds consistent with the Commonwealths regulatory requirements; thus, this is not a viable option.)

The Clearinghouse BMPs listed in Table 4 are mostly known as “structural” BMPs and can provide pollutant reduction from runoff generated from a contributing drainage area. These types of BMPs are typically employed to address SWM regulations associated with land development. These BMPs are not efficient towards addressing pollutant load reductions at the scale of a watershed associated with WLAs since they treat relatively small discreet areas, limiting their upper threshold of pollution reduction, especially in regards to sediment. For example, in the conservative case of a high performing structural BMP that removes 75% of sediment from the contributing drainage area, at least 17.06 acres of impervious area would need to be directed to the BMP(s) to achieve the remaining reductions required to achieve the WLAs (based on an impervious area loading rate of 676.94 lbs/ac/yr per for the MS4 General Permit for the James River Basin, the most representative Chesapeake Bay basin for Roanoke). Due to physical constraints, this scenario would be challenging, if not impossible, at the VWCC

campus. Although structural BMPs could provide a portion of the required reductions, these options are considered as a last resort if the full WLA could not be achieved with other options.

**Table 4**. BMPs from the Virginia Stormwater BMP Clearinghouse.

- Vegetated Roof
- Rooftop Disconnection
- Rainwater Harvesting
- Soil Amendments
- Permeable Pavement
- Grass Channel
- Bioretention
- Infiltration
- Dry Swale
- Wet Swale
- Sheet Flow to Filter/Open Space
- Extended Detention Pond
- Filtering Practice
- Constructed Wetland
- Wet Pond
- Proprietary Hydrodynamic Devices
- Proprietary Filtering Devices

The BMPs listed in Table 5 are those additionally approved by the Chesapeake Bay Program. Several of the options are associated with structural BMPs, such as retrofits, enhancements of existing structural BMPs and the oversizing of BMPs associated with development. These options have similar limitations towards achieving significant pollutant reductions as the structural BMPs listed in Table 4. Of the remaining options, there are not practical opportunities for forest buffers and urban stream restoration on campus. Land use change is not a desirable option on campus since conversion to forest in open space areas would remove scenic views of the mountains.

In summary, evaluation finds the following BMP option as applicable and feasible for VWCC, to some extent:

- Structural BMPs, although unlikely to achieve the full reductions and not cost effective. Structural BMPs are not recommended.
- Treatment train reductions (includes additional reductions achieved by BMPs in series, not typically accounted for when a BMP is installed for an individual development).
- BMPs associated with development, where credit can be achieved with reductions exceeding those required for the development and with reductions achieved by projects considered redevelopment.
- Nutrient credit acquisition, as a last option.

**Table 5**. Additional BMPs approved by the Chesapeake Bay Program.

| | |
|---|---|
| • BMP Retrofits | • Land Use Change |
| • BMP Enhancements/Conversions | • Forest Buffers |
| • Oversizing Development BMPs | • Urban Stream Restoration |
| • Street Sweeping | • Treatment Trains |
| • Outfall Stabilization | • Urban Nutrient Management |
| • Redevelopment | • Urban Tree Canopy |
| • Septic Disconnections | • Nutrient Credit Acquisition |

## 4.2 BMPs to Achieve Remaining Reductions

As discussed, limited cost-effective options are feasible for VWCC for achieving sediment reductions to supplement those being achieved from street sweeping. However, there is potential for unrealized surplus credits from existing stormwater management facilities on campus. Based on the evaluation, the following step-wise implementation plan was developed:

1) Continue street sweeping as the intended practice to achieve the annual required sediment reductions. Implement a more robust sweeping program as follows:
    a. Monitor each sweeping instance to determine trajectory towards collecting the mass or volume required, as specified in Table 3.
    b. Complete the VWCC street sweeping activity data collection form with each sweeping activity (see Appendix A for form).
    c. Continue to obtain and analyze (particle size distribution data) samples from swept materials as a measure of verification and effectiveness.
    d. Plan sweeping to occur when more than 2 days has passed since rainfall to increase the sediment removal of the activity.
2) During the 2025-2026 reporting period, review computations of existing SWM facilities to identify unrealized pollutant reduction credits consistent with DEQ Guidance for development and redevelopment. This action plan will subsequently be updated to provide computations and summation of any unrealized surplus credit available.
3) During the 2025-2026 reporting period, conduct computations to identify any surplus sediment reductions credit from existing treatment train scenarios on campus that would have not been evaluated as part of installation of the facilities associated with individual developments. Specifically, this opportunity exists with a bioretention facility (BMP #8) discharging to an extended detention facility (BMP #17), a bioretention facility (BMP

#10) discharging to an extended detention facility (BMP #2), and a Filterra unit (BMP #13) discharging to an extended detention facility (BMP #7). Location of BMPs is shown on the VWCC MS4 mapping provided in Appendix B. This action plan will subsequently be updated to provide computations and summation of any unrealized surplus credit available.

4) Track and document, using DEQ methods, potential credit from future development and redevelopment projects completed during the permit period. Any potential from this strategy is unknown and not likely to provide appreciable sediment reductions.
5) Complete Table 2 each year for inclusion within annual reporting.

It is noted that structural BMP options are not incorporated into the step-wise implementation plan due to relative lack of cost effectiveness compared to alternative options. If required reductions cannot annually be achieved by the end of the permit cycle (2027-2028 reporting year), VWCC may consider the purchase of nutrient credits to obtain the associated sediment, as TSS, reductions in accordance with Part II.A.11 of the MS4 General Permit.

**Table 6.** Annual accounting table towards achieving the cumulative reductions.

| | TSS (tons/yr) | Balance Remaining |
|---|---|---|
| Required Annual Reduction to achieve the WLA → | 4.33 | |
| BMP Type | TSS Credit (tons/yr) | TSS (tons/yr) |
| Development and Redevelopment Unrealized Credit [1] | | |
| Treatment Train Unrealized Credit [1] | | |
| Development & Redevelopment Projects (As applicable) [2] | | |
| Reductions achieved with annual street sweeping | | |

[1] To be identified during the 2025-2026 MS4 reporting year.
[2] To be evaluated, as applicable, with future development projects.

### 4.3 Legal Authorities

VWCC utilizes the legal authority provided by the laws and regulations of the Commonwealth of Virginia to control discharges to and from the college MS4s through the MS4 General Permit, college policies and specific contract language, as applicable. New legal

authorities implemented, or needing to be implemented, to achieve the required pollutant loading reductions with the practices listed in Table 6 are not necessary for implementation.

### 4.4 Public Education Outreach Strategy

VWCC, as a non-traditional MS4, describes the college's public as students, faculty and staff in the 2023 – 2028 VWCC MS4 Program Plan (Program Plan). The Program Plan includes practices to enhance the public's (and contractors) education on methods to eliminate and reduce discharges of sediment, including:

- ✓ Implementing a *Public Education and Outreach Plan* to enhance the public's knowledge regarding high priority stormwater issues such as:
  - Providing materials with information about general stormwater impacts to surface waters and steps to reduce pollution;
  - Providing materials with information to inform the public of VWCC's illicit discharge prohibition and enforcement on the VWCC campus;
  - Increasing staff knowledge regarding pollutants of concern for local TMDLs; and
  - Surveys are conducted every other year and the results used to measure the effectiveness of the college's public education outreach program.
- ✓ Maintaining a dedicated stormwater webpage that includes links to various documents regarding methods to eliminate and reduce discharges of sediment, most notably an MS4 Staff Handbook for Good Housekeeping and Pollution Prevention with BMPs for various activities focused towards the college's field staff.
- ✓ Implementation and enforcement of the VCCS Standards and Specifications for Erosion and Sediment Control and Stormwater Management. Implementation of the Standards and Specifications is critical to minimizing sediment loadings during times of land disturbance. Further, implementation incorporates the requirement to address post-development stormwater regulations, often resulting in structural stormwater management facility to reduce sediment discharge from developed areas on campus.
- ✓ Biennial training for field staff on good housekeeping/pollution prevention procedures.

This Action Plan is available on the VECC stormwater webpage. Any public input on this Action Plan will annually be updated and provided in Appendix C.

## 5.0 References

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## Appendix A - Street Sweeping Activity Data Collection Form

**VWCC Sweeping Data Collection Form**

Version 2.0 (December 2020)

**Instruction and Purpose:** The purpose of the data collected on this form is to assist with quantifying pollutant reductions for VWCC stormwater permit compliance. Complete this form for each sample taken. A single form can be used for multiple samples, as will be identified with associated ID labels in Part # 14, if there are no changes in variables between each sample collected (such as those that will be identified below in Parts #1 - 10).

| ***Section 1: Complete Prior to Sweeping*** | |
|---|---|
| ***(1)*** **Location:** | ***(2)*** **Date:** |
| ***(3)*** **Make and Model of Sweeper:** | **(4) Time:** |
| **(5) Purpose of sweeping:** ☐ General Cleaning ☐ Leaves ☐ Post-winter (sand/salt) ☐ Other _____ | |
| **(6) Sweeper type:** ☐ Mechanical ☐ Regenerative-Air ☐ Vacuum | |
| **(7) Type of areas swept** *(check **all** that apply)* ☐ Mix of streets and parking lots ☐ Other _____<br>☐ Street *with* curb (no street parking[1]) ☐ Street *no* curb (no street parking[1]) ☐ All Parking Lot (no/few cars)<br>☐ Street *with* curb (with street parking[1]) ☐ Street *no* curb (street parking[1]) ☐ Parking Lot, aisles only<br>[1] *Street parking refers to cars blocking sweeping of curb and gutter* | |
| **(8) Rain conditions:** ☐ No Rain ☐ Rain while sweeping ☐ Recent rain (within 48 hrs.) | |
| **(9) Number of days or hours if last than 2 days since rainfall:** | |
| ***Section 2: Complete after Sweeping*** | |
| **(10) Description of material in hopper:** ☐ Fairly Consistent ☐ Non-consistent throughout (i.e., mingled trash) | |
| ***Section 3: Sample Collection from Hopper*** | |
| **(11) Instruction for sample collection:**<br>✓ Use safety precautions such as the use of gloves, as necessary.<br>✓ Collect 4 separate samples. Attempt to divide the samples between hopper loads if more than one load.<br>✓ Collect material that includes smaller particles such as silt and sand (i.e. no woody material)<br>✓ Collect material that is predominantly dry.<br>✓ Collect material within gallon sized zip-lock bags (double bag to protect samples from spillage). Use masking tape or other method to ensure the sample remains sealed. This is very important.<br>✓ Label with method to ensure the label identification (see #14 of this form) stays on the bag through shipping. If paper labels, perhaps this is best labeled on the first bag before double bagging. | |
| **(12) Were 4 samples collected:** ☐ Yes ☐ No | **(13) If no, explain why:** |
| **(14) List of each of the collected samples Label IDs** (VWCC-Date-Sample #)**:** | |
| **(15) The college needs to track the total amount of material collected. Please provide an estimated percentage full for each hopper load or, preferably, a total weight of material swept:** | |

**Provide samples to Kevin Witter**, Director of Planning and Development at Virginia Western Community College. Phone: 540-857-6481; Email: KWitter@virginiawestern.edu

## Appendix B - VWCC MS4 Mapping

N

0 60 120 240

SCALE IN FEET

## Outfall Information Table

| Outfall ID | Latitude | Longitude | Est. regulated drainage area |
|---|---|---|---|
| OF-3 | 37.24604876 | -79.96912069 | 5.4 |
| OF-2 | 37.24633607 | -79.97781866 | 12.13 |
| OF-1 | 37.24348483 | -79.97201852 | 40.76 |

**Outfall Information Table Notes:**

1. The receiving water for all regulated outfalls is Roanoke River – Peters Creek (RU 14) and is designated as impaired by the 2022 305(b)/303(d) Water Quality Assessment Integrated Report.
2. The following total maximum daily load (TMDL) waste load allocations (WLA) assigned to VWCC:
   - Benthic TMDL Development for the Roanoke River, Virginia, approved by the EPA on May 1, 2006; and the
   - Bacteria TMDLs for Wilson Creek, Ore Branch and Roanoke River Watersheds, approved by the EPA on August 2, 2006.

Area within yellow dashed line is not regulated since it does not drain to an MS4. All other areas within campus boundary are MS4 regulated areas unless otherwise shown.

Area within yellow dashed line is not regulated since it does not drain to an MS4. All other areas within campus boundary are MS4 regulated areas unless otherwise shown.

POI (To Roanoke City MS4)

POI (Ultimately to VDOT MS4)

POI (with Roanoke City MS4, typical along Colonial Avenue, as shown)

POI

POI

POI (Ultimately to VDOT MS4)

POI

OF-1

OF-2

OF-3

Murray Run

Ore Branch

McNeil Dr SW

Overland Rd SW

Colonial Ave SW

Colonial Ave SW

Rte 220 Hwy

## Abbreviations

| | |
|---|---|
| BMP | Stormwater Facility Best Management Practice |
| OF | Outfall (Screening Location) |
| POI | Point of MS4 Interconnection |
| VDOT | Virginia Department of Transportation |
| Typ | Typical throughout the map |

# VIRGINIA WESTERN

## MS4 Mapping

Latest Revision: February 28, 2024

| BMP ID | Type of facility |
|---|---|
| 1 | Extended Detention |
| 2 | Extended Detention |
| 3 | Extended Detention |
| 4 | Extended Detention (Underground) |
| 5 | Egg Crate Detention (Underground) |
| 6 | Egg Crate Detention (Underground) |
| 7 | Extended Detention (Underground) |
| 8 | Bioretention |
| 9 | Bioretention |
| 10 | Bioretention |
| 11 | Bioretention |
| 12 | Bioretention |
| 13 | BaySaver Barracuda (Hyd. Separator) |
| 14 | Filterra Unit |
| 15 | Filterrra Unit |
| 16 | Extended Detention (Underground) |
| 17 | Extended Detention |

| Building ID | Building Name |
|---|---|
| A | Chapman Hall |
| B | Craig Hall |
| C | Duncan Hall |
| D | Humanities |
| E | Gymnasium |
| F | Thomas Center |
| G | Student Life Center |
| H | Weber Hall |
| I | STEM Building |
| J | Business/Science Building |
| K | Fallin Center |
| L | Brown Library |
| M | Fishburn Hall |
| N | Natural Science Center |
| O | College Services |
| P | Field House and Tennis Courts |

## Legend

- Outfalls
- POI
- Buildings
- BMP ID
- Storm manhole
- Storm Inlet
- Open flow path
- Storm drain
- BMP
- Campus Boundary

**Notes:**

1. This map was developed by H2R Engineering Inc. as requested by the Virginia Western Community College (VWCC) Director of Planning and Development. The map was generated using readily available information from VWCC, the City of Roanoke, and other sources. Information shown hereon was supplemented with field inspection. The map is not based on a field survey. The map is intended solely to meet the requirements of the MS4 General Permit (9VAC25-890-40), Part I.E.3.a. Information shown is approximate.
2. Total regulated area is ±65.7 acres.
3. This map will be updated from time to time, dependent on changes to the campus. In the case of new development that modifies the storm sewer system, updates will be provided by June 30th of the year in which the project(s) are completed with updates based on record (as-built) drawings. Updated mapping will be provided at the VWCC MS4 webpage within 30 days of map modifications.

H2R Engineering, Inc.

**Appendix C – Public Input**

VWCC will maintain this TMDL Action Plan with request for solicitation and means for public comment on the college's stormwater management webpage. The latest version of the action plan will continue to be maintained on the webpage, along with the solicitation for comment throughout the permit cycle.

VWCC will update the action plan annually as part of the annual reporting process, as applicable and necessary, to include any public comment(s) and plan modifications(s). A summary of any comments received from the public will subsequently be provided in this Appendix with a response from the college and a description of any modifications to the plan.