County of Fairfax, Virginia

MEMORANDUM

DATE: February 8, 2022

TO: Board of Supervisors

FROM: Bryan J. Hill
County Executive

SUBJECT: Chloride Total Maximum Daily Load and Salt Management Strategy Update

Executive Summary:
Supervisor Storck requested an update regarding the Chloride Total Maximum Daily Load (TMDL) since the presentation to the Environmental Committee on October 27, 2020. Fairfax County's (County) new Municipal Separate Storm Sewer System (MS4) permit will set the County regulatory obligation related to the Chloride TMDL. The County expects the new permit will be reissued in 2022 and will give the County 30 months to develop a chloride TMDL Action Plan. The County is on schedule to comply with the anticipated 30-month requirement in terms of adopting Salt Management Strategy (SaMS) toolkit strategies.

Background:
The Chloride TMDL for the Accotink Creek Watershed was approved by the U.S. Environmental Protection Agency in 2018 (copy attached). It is the first TMDL completed in Virginia targeted at addressing winter salt. On October 27, 2020, the Virginia Department of Environmental Quality (DEQ) briefed the Environmental Committee on the development of their SaMS toolkit. The purpose of this memo is to provide an update of efforts the County has undertaken to address the TMDL.

DEQ completed the toolkit in August 2020, and the Northern Virginia Regional Commission hosts it online (https://www.novaregion.org/1498/SaMS-Toolkit). SaMS recommends improving winter practices through efficient and effective use of salt while maintaining appropriate levels of safety. The ultimate goal of SaMS is to raise awareness of these impacts, demonstrate how individuals and organizations can participate, and provide guidance for monitoring and research to support action on SaMS recommendations.

Status:
The County will be required to develop a Chloride TMDL Action Plan within 30 months of reissuance of the County's MS4 permit. The Department of Public Works and Environmental

Office of the County Executive
12000 Government Center Parkway, Suite 552
Fairfax, VA 22035-0066
703-324-2531, TTY 711, Fax 703-324-3956
www.fairfaxcounty.gov

Services (DPWES) staff were active participants in the development of SaMS, which will be used to develop the County's Chloride TMDL Action Plan. DPWES began phasing in SaMS components into the County's operations in 2018, with others in the process of being implemented or planned for future adoption. Below are additional details on the County's SaMS implementation status.

Winter Operations Best Management Practices:
DPWES has improved de-icer material storage with the investment of three new salt domes. The domes store de-icing materials under permanent cover and minimize potential for stormwater runoff. Materials stored at these centralized facilities will be shared among DPWES, Fairfax County Public Schools, and Fairfax County Park Authority snow operations staff, greatly reducing the number of distributed storage locations. DPWES is also phasing in equipment upgrades as vehicles are replaced, purchasing scales to accurately weigh materials loaded on to trucks and surface temperature recorders to improve the efficiency of material application. Winter Operations staff also attend updated training events annually and have incorporated new equipment calibration procedures to ensure that the proper amount of material is applied.

Tracking and Reporting:
DPWES has improved methods used to estimate and track salt usage, characterize storm events, and document workforce activations to better interpret and report de-icer usage. Staff have also updated the Winter Operations Standard Operating Procedure to reflect process improvements. Geographic Information Systems (GIS) are now used to quantify amounts of treated surfaces at the County facilities and target recommended de-icer application amounts. DPWES is also piloting a mobile GIS application for use by operators in the field so that the operations center can better coordinate and efficiently deploy resources. As contracted services for snow removal expire, County agencies are updating proposal language to promote use of SaMS best practices for private operators at the County-maintained properties.

Water Quality Monitoring:
The MS4 permit-required Wet Weather Screening program and the five continuous stream gages operated in conjunction with the United States Geological Survey have been enhanced to include a suite of SaMS recommended major ions. Additionally, in 2021, DPWES began an effort to monitor episodic events of potential high-salt runoff during winter snowmelt periods in the Long Branch tributary of Accotink Creek. DPWES also participates on the expert stakeholder group to help define scopes of research for the Virginia Tech Occoquan Monitoring Laboratory's multi-year grant from the National Science Foundation to address salinization in the Occoquan Reservoir.

Education and Outreach:
Outreach materials highlighting the importance being "Winter Salt Smart" have been developed and shared with the general public via social media platforms. The DPWES Public Information Officer has also shared winter storm messaging by the Metropolitan Washington Council of

Governments, Fairfax Water, and the Virginia Department of Transportation. In 2019, the MS4 illicit discharge and improper disposal (IDID) program initiated an ongoing effort to identify, track, and address improperly stored salt piles each winter. The IDID program also developed flyers (and a web page) that target commercial property managers to communicate the importance of reducing unnecessary salts in our waterways. The MS4 program is currently researching methods to effectively conduct outreach to Homeowner Associations.

Finally, DPWES was recently selected to present at the 2022 North American Snow Conference being held in Pittsburgh, Pennsylvania on April 10-13, 2022. The presentation is titled, "Fairfax County VA Department of Public Works Leads the Way with Salt Reduction in the Northern Virginia Region."

Please contact Martin Hurd at 571-635-6189 (martin.hurd@fairfaxcounty.gov) for any questions or additional information.

cc: Rachel Flynn, Deputy County Executive
Kambiz Agazi, Director, Office of Environmental and Energy Coordination
Christopher Herrington, Director, Department of Public Works and Environmental Services (DPWES)
Eleanor Ku Codding, Deputy Director, DPWES, Stormwater and Wastewater Divisions
Craig A. Carinci, Director, DPWES, Stormwater Planning Division

Attachment: EPA Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

MAY 2 3 2018

Ms. Jutta Schneider, Director
Water Planning Division
Virginia Department of Environmental Quality
1111 East Main Street, Suite 1400
Richmond, Virginia 23218

JUN 0 7 2018

Dear Ms. Schneider:

The U.S. Environmental Protection Agency (EPA), Region III, is pleased to approve the sediment and chloride Total Maximum Daily Loads (TMDLs) to address aquatic life use impairments in the Accotink Creek watershed. The TMDL reports, *Volume II Sediment TMDLs for the Accotink Creek Watershed, Fairfax County, Virginia* and *Volume III Chloride TMDLs for the Accotink Creek Watershed, Fairfax County, Virginia,* were submitted to EPA for review with a letter dated April 16, 2018, which was received on April 23, 2018. The TMDLs were established and submitted in accordance with Sections 303(d)(1)(c) and (2) of the Clean Water Act to address impairments of water quality as identified in Virginia's Section 303(d) List.

In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) be designed to attain and maintain the applicable water quality standards; (2) include a total allowable loading and, as appropriate, wasteload allocations for point sources and load allocations for nonpoint sources; (3) consider the impacts of background pollutant contributions; (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated); (5) consider seasonal variations; (6) include a margin of safety (which accounts for uncertainties in the relationship between pollutant loads and instream water quality); and (7) be subject to public participation. The sediment and chloride TMDLs for the Accotink Creek watershed satisfy each of these requirements. In addition, the TMDLs consider reasonable assurance that the TMDL allocations assigned to nonpoint sources can be reasonably met. A copy of EPA's Rationale for approval of these TMDLs is included with this letter.

As you know, all new or revised National Pollutant Discharge Elimination System permits must be consistent with the assumptions and requirements of any TMDL wasteload allocations pursuant to 40 CFR §122.44 (d)(1)(vii)(B). Please submit all such permits to EPA for review as per EPA's letter dated September 29, 1998.

If you have any questions please call me, or your staff may contact Jon Markovich, Virginia TMDL coordinator, at 215-814-5784.

Sincerely,

Catharine B. McManus for

Dominique Lueckenhoff, Acting Director
Water Protection Division

Enclosure

cc: Kelly Meadows, VADEQ (*via email*)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Decision Rationale
Sediment and Chloride Total Maximum Daily Loads for the Accotink Creek Watershed
Fairfax County, Virginia

Catharine M. McManus for

Dominique Lueckenhoff, Acting Director
Water Protection Division

Date: 5/23/2018

DECISION RATIONALE
APPROVAL OF TOTAL MAXIMUM DAILY LOADS FOR THE ACCOTINK CREEK WATERSHED

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by the State where technology-based and other controls will not provide for attainment of water quality standards (WQS). A TMDL establishes a target for the total load of a particular pollutant that a water body can assimilate and divides that load into wasteload allocations (WLAs), given to point sources, load allocations (LAs), given to nonpoint sources and natural background, and a margin of safety (MOS), which accounts for any uncertainty.

This document sets forth the U.S. Environmental Protection Agency's (EPA) rationale for approving the sediment and chloride TMDLs for the Accotink Creek watershed, Virginia. The TMDLs were established to address aquatic life use impairments, caused by sediment and chloride, in the Accotink Creek watershed as identified on Virginia's Section 303(d) List. The TMDLs are contained in three volumes: *Volume I Stressor Analysis Report for the Benthic Macroinvertebrate Impairments in the Accotink Creek Watershed, Fairfax County Virginia, Volume II Sediment TMDLs for the Accotink Creek Watershed, Fairfax County, Virginia,* and *Volume III Chloride TMDLs for the Accotink Creek Watershed, Fairfax County, Virginia,* and were submitted by the Virginia Department of Environmental Quality (VADEQ) to EPA for final review on April 16, 2018, and was received on April 23, 2018. The TMDLs in these volumes were developed to address aquatic life use impairments in the Accotink Creek watershed as identified on Virginia's Section 303(d) List.

EPA's rationale is based on the TMDL Reports and information in supporting files provided to EPA by VADEQ. EPA's review determined that the TMDLs meet the following seven regulatory requirements pursuant to 40 CFR Part 130:

1. The TMDL is designed to implement applicable water quality standards.
2. The TMDL includes a total allowable load as well as individual WLAs and LAs.
3. The TMDL considers the impacts of background pollutant contributions.
4. The TMDL considers critical environmental conditions.
5. The TMDL considers seasonal environmental variations.
6. The TMDL includes a MOS.
7. The TMDL has been subject to public participation.

In addition, the TMDLs considered reasonable assurance that the TMDL allocations assigned to nonpoint sources can be reasonably met.

II. Summary

The sediment and chloride TMDLs were developed to address stressors of aquatic life use impairments in the Accotink Creek watershed. Specifically, these waters include Long Branch (central) and the mainstem of Accotink Creek from its tidal limit to headwaters, excluding Lake Accotink. VADEQ analyzed all available monitoring data collected within the

Accotink Creek watershed in order to determine the causes of biological impairments. Conventional water quality monitoring, biological monitoring of benthic and fish communities, habitat assessments, stream geomorphic assessments, and monitoring of metals and toxics in sediment and fish tissue were performed in the mainstem of Accotink Creek and its tributaries and utilized in a biological stressor identification process. As a result of the stressor identification process, VADEQ concluded that chloride, sediment, hydromodification, and habitat modification were the most probable stressors to the benthic macroinvertebrate communities in upper Accotink Creek, lower Accotink Creek, and Long Branch. VADEQ also identified that hydromodification and habitat modification are stressors, but they are not specific pollutants. Therefore, TMDLs were developed for the pollutants: sediment and chloride. While TMDLs are not developed for hydromodification and habitat modification, many of the best management practices (BMPs) that address sediment also address these two non-pollutant stressors. VADEQ notes that BMPs to reduce sources of sediment that also address hydromodification and habitat modification should be prioritized during implementation of the sediment TMDLs.

Sources of sediment and chloride were identified and quantified in the watersheds. Sources included point sources as well as nonpoint sources. Virginia Pollutant Discharge Elimination System (VPDES) permits within the watersheds assigned sediment WLAs include individual industrial permits, general process water permits, general industrial stormwater permits, Municipal Separate Storm System (MS4) permits, and general construction permits. VPDES permits within the watershed assigned chloride WLAs include MS4 permits, individual stormwater permits, and industrial stormwater permits. In addition, future growth WLAs were included in the final TMDLs for the creation of new point sources and any growth in MS4 service areas or other regulated stormwater. Nonpoint sources included in the load allocations are for areas outside of either MS4 service areas or drainage areas to industrial stormwater outfalls. The sediment and chloride TMDLs are presented as average annual loads and maximum average daily loads. The calculation of the annual and daily TMDLs is explained in Chapter 4 of the TMDL reports. The average annual sediment TMDLs for the Accotink Creek impairments are presented in Tables 1-3, below. The average annual chloride TMDLs for the Accotink Creek impairments are presented in Tables 4-6, below. The TMDLs are calculated as the sum of the LAs, WLAs, and explicit MOS. The daily TMDLs are presented in Section 4.5 of Volumes II and III. Sediment and chloride WLAs for VPDES permits can be found in Volumes II and III.

Table 1: Upper Accotink Creek Average Annual Sediment TMDL

Source	Load (tons/yr)
Total WLA	2,338
City of Fairfax Aggregate MS4 WLA	634
Fairfax County Aggregate MS4 WLA	1,282
Town of Vienna Aggregate MS4 WLA	174
Total Process Water WLA	<1
Total Industrial Stormwater WLA	16
Construction WLA	83
Future Growth WLA	148
LA	**334**
MOS	**297**
TMDL (not including Long Branch)	**2,969**
Long Branch Upstream TMDL	1,148
Total TMDL (including Long Branch)	4,116

Table 2: Lower Accotink Creek Average Annual Sediment TMDL

Source	Load (tons/yr)
Total WLA	3,073
Fairfax County Aggregate MS4 WLA	2,457
Fort Belvoir Aggregate MS4 WLA	235
Total Process Water WLA	1
Total Industrial Stormwater WLA	95
Construction WLA	79
Future Growth WLA	206
LA	**629**
MOS	**411**
TMDL (not including upper Accotink Creek)	**4,113**
Upper Accotink Creek and Long Branch Upstream TMDLs	2,182
Total TMDL (including upper Accotink Creek)	6,294

Table 3: Long Branch Average Annual Sediment TMDL

Source	Load (tons/yr)
Total WLA	936
City of Fairfax Aggregate MS4 WLA	42
Fairfax County Aggregate MS4 WLA	880
Total Process Water WLA	<1
Construction WLA	2
Future Growth WLA	11
LA	97
MOS	115
TMDL	**1,148**

Table 4: Upper Accotink Average Annual Chloride TMDL

Source	Load (lbs/yr)
Total WLA	5,444,279
Aggregate MS4 WLA	4,972,399
Aggregate Industrial Stormwater WLA	61,028
Future Growth WLA	410,852
LA	1,951,048
MOS	821,703
TMDL (not including Long Branch)	8,217,030
Long Branch Upstream TMDL	1,292,997
Total TMDL (including Long Branch)	9,510,027

Table 5: Lower Accotink Creek Average Annual Chloride TMDL

Source	Load (lbs/yr)
Total WLA	3,723,479
Aggregate MS4 WLA	3,294,323
Aggregate Industrial Stormwater WLA	117,071
Future Growth WLA	312,084
LA	1,894,040
MOS	624,169
TMDL (not including upper Accotink Creek)	6,241,688
Upper Accotink Creek and Long Branch Upstream TMDLs	9,510,027
Total TMDL (including upper Accotink Creek)	15,751,714

Table 6: Long Branch Average Annual Chloride TMDL

Source		Load (lbs/yr)
Total WLA		**873,049**
	Aggregate MS4 WLA	860,119
	Future Growth WLA	12,930
LA		**290,648**
MOS		**129,300**
TMDL		**1,292,997**

III. Background

The Accotink Creek watershed is located in Fairfax County, Virginia. The mainstem of Accotink Creek drains into Accotink Bay and then Gunston Cove, an embayment on the tidal Potomac River, which drains to the Chesapeake Bay. The watershed is roughly 52 square miles. For modeling and allocation purposes, the area is divided into three TMDL watersheds. Figure 2-1 in *Volume II* shows the location of the impaired segments in the Accotink Creek watershed, and the delineation of the TMDL watersheds. The watersheds are highly developed with developed land accounting for 88% of the upper Accotink watershed, 87% of lower Accotink watershed, and 89% of the Long Branch watershed. Residential land use comprises the largest category of land use in the watersheds. Transportation (major paved transportation areas and their right of ways derived from zoning information) is the next largest category of land use in upper Accotink and Long Branch watersheds, accounting for about 13% and 11% of the watersheds, respectively. The second largest land use category in the lower Accotink watershed is industrial land use (12%), followed by open space (12%) and transportation (11%).

Based on benthic macroinvertebrate monitoring in the Accotink Creek watershed, VADEQ has placed Accotink Creek, both above and below Lake Accotink, and Long Branch on Virginia's 303(d) List of Impaired Waters (Category 5 of the Integrated Report) because the waterbodies have been assessed as not supporting their Aquatic Life Use. The aquatic life use impairment for the lower mainstem of Accotink Creek was first listed in 1996. The initial impairment listing started at the confluence of Calamo Branch and included the tidal waters of Accotink Bay. The downstream boundary of this impairment was adjusted in subsequent Water Quality Assessment Reports to cover only the free-flowing portion of the mainstem. The upper portion of Accotink Creek upstream of Lake Accotink, an impoundment on Accotink Creek, and the Long Branch tributary aquatic life use impairments were first identified on Virginia's 303(d) list during the 2008 and 2010 Integrated Reporting cycles. Long Branch (Central) is a tributary to Accotink Creek, joining it just upstream of Lake Accotink. While there are three tributaries named Long Branch in the Accotink Creek watershed, the impaired tributary for which separate TMDLs were developed is Long Branch (Central), hereafter simply referred to as Long Branch.

Biological monitoring data were collected at numerous stations in the Accotink Creek watershed from 1994 to 2016. All biological monitoring data were evaluated using the Virginia Stream Condition Index (VSCI). Calculation of a VSCI score incorporates eight standard metrics based on the abundance and types of macroinvertebrates present at each station. The multiple metrics evaluated together give an overall indication of ecological integrity. These VSCI metrics were compared to a reference condition, which is based on an aggregate of unimpaired streams in non-coastal Virginia. The VSCI is scored on a scale of 0 to 100, where 100 represents the best biological condition and 0 represents the worst. A score of 60 is the threshold for biological impairment. A total of 36 benthic sampling events occurred in the Accotink Creek watershed between 1994 and 2006. The VSCI scores for all samples were well below the cutoff value of 60, and only one sample was above 40 indicating suboptimal conditions for all collection periods. The samples had VSCI scores ranging from 21.2 to 41.9.

Based on biological monitoring from stations 1AACO002.50, 1AACO006.10, and 1AACO009.14, the lower mainstem of Accotink Creek was first listed as impaired for the aquatic life use in 1996[1] and was extended to the outlet of Lake Accotink on the 2010 303(d) list. In 2008, a 0.85-mile segment of upper Accotink Creek, from an unnamed tributary in Ranger Park to the confluence with Daniels Run, was listed for aquatic life use impairment based on benthic macroinvertebrate assessments performed by EPA at stations 1ACCO-A-EPA, 1ACCO-B-EPA, 1ACCO-C-EPA, and 1ACCO-D-EPA. That impaired segment was extended on the 2010 303(d) list to include all of upper Accotink Creek from the headwaters to the beginning of Lake Accotink, based on VADEQ's benthic assessments at station 1ACCO014.57. The Long Branch aquatic life use impairment was first listed in 2008, based on benthic macroinvertebrate assessments at station 1ALOE001.99.

Biological monitoring and VSCI scores do not determine or show the cause(s) of biological impairment in a waterbody. VADEQ performed a biological Stressor Identification (SI) analysis to determine the stressor(s) to the biological community and likely cause(s) of biological impairment. VADEQ, EPA, the U.S. Geological Survey (USGS), and the Fairfax County Department of Public Works and Environmental Services (FCDPWES) have all collected water quality monitoring data in the watershed. Based on analysis of available monitoring data, VADEQ concluded that temperature, pH, dissolved oxygen (DO), and metals were least probable stressors. VADEQ has numerical criteria for these parameters to protect aquatic life use. Discrete samples and continuous monitoring (ConMon) data show that temperature, pH, and DO water quality criteria are being met. Observations of metal concentrations in the water column from discrete samples also meet water quality criteria. Observed concentrations of metals in sediments are below respective threshold effect concentrations (TECs), indicating that adverse effects on the biota are unlikely.

Nutrients and toxics are categorized as possible stressors. ConMon data shows that nutrient concentrations are sufficient to generate enough primary production to cause wide diurnal swings in DO concentrations. However, DO water quality criteria are still met. Toxicity tests were performed on water fleas and fathead minnows using two water samples from Accotink Creek. No evidence of chemical toxicity was detected by toxicity tests on water fleas. One toxicity test on minnows had "biologically significant" results, while the other had an ambiguous result. Chlordane, fluoranthene and pyrene, were detected in sediment in lower Accotink Creek at concentrations above the TEC but below the probable effect concentration (PEC) benchmarks, indicating possible adverse effects on aquatic life. Concentrations of polychlorinated biphenyls (PCBs), chlordane, heptachlor epoxide, and dieldrin were measured in

---

1 The General Standard narrative criterion was previously assessed by VADEQ through application of the modified Rapid Bioassessment Protocol II (RBP II). However, in January 2008 VADEQ moved to a benthic macroinvertebrate multimetric index approach called the Virginia Stream Condition Index (VSCI) to identify aquatic life use impairments based on biological monitoring data.

fish tissue above their tissue screening values (TSVs). In addition, lower Accotink Creek is not supporting its Fish Consumption Use because of PCBs measured in fish tissue. However, all samples for PCBs, chlordane, heptachlor epoxide, and dieldrin were below the water column detection limit. Based on the above, VADEQ concluded the weight of evidence suggests nutrients and toxics are not the primary causes of the aquatic life use impairments.

Chloride, hydromodification, habitat modification, and sediment have been identified as the most probable stressors of the biological communities in the Accotink Creek watershed. Monitoring data indicates that Virginia's water quality criteria for chloride are not met in upper Accotink Creek, lower Accotink Creek, and Long Branch. Observed chloride concentrations in all three watersheds have exceeded Virginia's chronic chloride criterion to protect aquatic life at least twice in a three-year period. Observed chloride concentrations in upper Accotink Creek and lower Accotink Creek also have exceeded the acute chloride criterion at least twice in a three-year period. Moreover, chloride concentrations estimated from continuous monitoring of specific conductance, in conjunction with the strong correlation between conductivity and chloride, strongly indicates that in all three watersheds exceedances of the acute and chronic chloride criteria is a frequent occurrence during winter months. Accotink Creek watershed ConMon data for specific conductance paired with observed chloride monitoring data shows a strong correlation when plotted on a linear regression. Applying the corresponding chloride-specific conductance linear regression equation to the specific conductance ConMon data from upper Accotink Creek, lower Accotink Creek, and Long Branch yields estimated chloride concentrations that frequently exceed criteria during the winter months and strongly suggest the exceedances are stormwater-driven.

There is ample evidence that in the mainstem of Accotink Creek and its tributaries, sediment is being transported and deposited in sufficient quantities to adversely impact the aquatic community. According to FCDPWES' stream physical assessment (SPA), the mainstem of Accotink Creek and other streams in the Accotink Creek watershed are actively widening their channels by eroding their banks. Bank stability was assessed as marginal or poor in all but one of the sixteen habitat assessments that VADEQ performed since 2000 in the Accotink Creek watershed. The degree of sediment deposition is indicated by the embeddedness and sediment deposition habitat metrics. In the habitat assessments VADEQ has conducted since 2000, seven of 16 have marginal or poor embeddedness scores, and 12 of 16 have marginal or poor scores for sediment deposition. The SPA habitat survey confirms these results. The average embeddedness scores were marginal everywhere in the Piedmont portion of the watershed, except in lower mainstem Accotink Creek and the mainstem of Long Branch.

Hydromodification and habitat modification are non-pollutant stressors. The chloride and sediment TMDLs developed by VADEQ are intended to address the chloride and sediment stressors of biological impairment. While TMDLs are not developed for hydromodification and habitat modification, many of the BMPs that address sediment also address these two non-pollutant stressors. VADEQ notes that BMPs to reduce sources of sediment that also address hydromodification and habitat modification should be prioritized during implementation of the sediment TMDLs. Additional information regarding the biological stressor identification analysis performed for the Accotink Creek watershed impairments can be found in *Volume I.*

TMDL Endpoints

Sediment and chloride were determined to be the most probable pollutant stressors to the benthic community, therefore TMDLs were developed for these pollutants. Virginia does not have numeric water quality criteria for sediment to protect aquatic life. When developing sediment TMDLs, VADEQ uses a reference watershed approach, in which the sediment loads from unimpaired watersheds, which are similar in other respects to the impaired watershed, are used to compute the TMDL for the impaired watershed. For the Accotink Creek watershed sediment TMDLs, VADEQ utilized an all-forest load multiplier (AllForX) approach. The all-forest load multiplier is the ratio of current sediment loads to the loads which would occur under all-forested conditions. In other words, the AllForX multiplier is an indication of how much higher current sediment loads are above an undeveloped condition. These multipliers are calculated for both impaired and unimpaired watersheds, and the VSCI scores are then regressed against the AllForX values. Using the regression line, a threshold multiplier is identified for a VSCI score of 60, which is the assessment threshold that indicates a healthy benthic macroinvertebrate community. That AllForX threshold, multiplied by the all-forested sediment load of an impaired watershed, becomes the sediment TMDL endpoint for the impaired watershed.

As discussed further below, Virginia's WQS regulations include numeric chloride water quality criteria for freshwater for the protection of aquatic life. The chloride criteria include an acute criterion and chronic criterion for freshwater. The acute criterion of 860,000 μg/L (860 mg/L) is a one-hour average concentration not to be exceeded more than once every 3 years on the average, and the chronic criterion of 230,000 μg/l (230 mg/L) is a four-day average concentration not to be exceeded more than once every 3 years on the average. The chloride TMDLs were developed using the chronic criterion as the endpoint. VADEQ determined that greater reductions are required to meet the chronic chloride criterion than the acute criterion. By setting chloride TMDLs using the chronic criterion as the endpoint, both criteria will be met.

Computational Procedures

The Generalized Watershed Loading Functions (GWLF) modeling software was used in determining the sediment TMDLs. GWLF is a continuous-simulation model that can be used to represent streamflow, sediment loads, and nitrogen and phosphorus loads from point and nonpoint sources on a watershed basis. Loading rates for both the impaired and unimpaired watersheds were simulated for current and all-forested conditions. The process for computing the sediment TMDLs is as follows:

- Selecting comparison watersheds,
- Developing and running the GWLF model under current and all-forested, conditions for comparison and impaired watersheds,
- Calculating AllForX values for comparison and impaired watersheds,
- Regressing the VSCI scores against the AllForX values,
- Identifying a threshold multiplier for a VSCI score of 60, which indicates a healthy benthic macroinvertebrate community, and
- Multiplying the AllForX threshold by the all-forested sediment load for impaired watersheds to establish the TMDL endpoint for the impaired watersheds.

Eight unimpaired comparison watersheds were identified for use during the TMDL development process, and individual GWLF models were developed for each comparison watershed. Input parameters were modified as necessary to include animals, BMPs, constructions sources, and point sources. Where USGS gauges were available, hydrology calibration and validation were performed. It is important to note that the GWLF model software was developed to require little or no calibration.

GWLF models were also developed for the Accotink Creek watersheds: upper Accotink Creek, Long Branch, and lower Accotink Creek. After development of initial GWLF models for these watersheds, they were evaluated in comparison with total sediment load estimations from a regression model. The regression model estimates sediment concentrations as a function of flow and was developed using suspended sediment, turbidity, and flow monitoring data collected at the USGS gauge on Accotink Creek near Annandale, VA. In addition, FCDPWES estimated annual sediment loads in its 2011 Accotink Creek Watershed Management Plan. All sediment load estimates for Accotink Creek, i.e. loads derived from the GWLF models, regression model, and presented in the FCDPWES management plan, were compared to understand the relative agreement of the GWLF model estimates of baseline loads. To bring the GWLF loads for Long Branch into line with the other estimates, the streambank erosion rate in Long Branch was adjusted so that the average annual load equals the adjusted average annual load estimated by the regression model. The resulting sediment TMDLs are shown in Tables 1-3, above. A complete description supporting VADEQ's development and application of the GWLF models can be found in Section 3 and Appendix A of *Volume II.*

The chloride TMDLs were computed from flow duration curves (FDC), which used four-day average flows, translated to load duration curves (LDC) using the chronic chloride criterion of 230 mg/l. FDCs were computed using USGS gauge data within the watershed. LDCs were then computed by multiplying the chronic criterion to the FDCs for each USGS gauge. Since the USGS gauges may not capture the flow for an entire watershed given their location, areal adjustments were completed. Chloride loads were calculated for the extended winter season, November 1 through April 30, which represent the months in which snow events have occurred in the Washington Metropolitan Region in the last 30 years. The values used to make the LDC were summed and divided by the number of observations. The area under the LDC is thus the average daily value of the four-day average load that meets the chronic criterion. Multiplied by the number of days in the extended winter season (181.25 days, accounting for leap years), it gives the average loading capacity per season. The resulting seasonal loads are expressed as average annual loads for the final chloride TMDLs to recognize implementation activities could occur throughout the year. A complete description of the LDC computational process for the chloride TMDLs can be found in Section 3.1 of Volume III.

IV. Discussion of Regulatory Conditions

EPA finds that VADEQ has provided sufficient information to meet all seven of the requirements for establishing sediment and chloride TMDLs for the Accotink Creek watershed. EPA, therefore, approves the sediment and chloride TMDLs for upper Accotink Creek, lower

Accotink Creek and Long Branch. This approval is outlined below according to the seven regulatory requirements.

1. ***The TMDLs are designed to implement applicable water quality standards.***

Water quality standards consist of three components: designated and existing uses; narrative and/or numerical water quality criteria necessary to support those uses; and an anti-degradation statement. Virginia WQS Regulations at Section 9 VAC 25-26-10 describes the designation of uses as:

> *All state waters, including wetlands, are designated for the following uses: recreational uses, e.g., swimming and boating; the propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources, e.g., fish and shellfish.*

Section 9 VAC 25-260-20 A outlines narrative criteria for the protection of designated uses from substances that may interfere with attainment of such uses:

> *State waters, including wetlands, shall be free from substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which contravene established standards or interfere directly or indirectly with designated uses of such water or which are inimical or harmful to human, animal, plant, or aquatic life.*
>
> *Specific substances to be controlled include, but are not limited to: floating debris, oil, scum, and other floating materials; toxic substances (including those which bioaccumulate); substances that produce color, tastes, turbidity, odors, or settle to form sludge deposits; and substances which nourish undesirable or nuisance aquatic plant life. Effluents which tend to raise the temperature of the receiving water will also be controlled.*

As discussed above, benthic macroinvertebrate monitoring is used to assess, through VSCI scores, waterbody attainment of the above criteria. Sediment and chloride were pollutants identified as stressors to the benthic macroinvertebrate community. Section 9 VAC 25-260-140 identifies criteria for surface water. The chloride criteria are listed in Table 7, below.

Table 7: Virginia Chloride Criteria[1]

Parameter	Use Designation	Freshwater Acute[2] (μg/L)	Freshwater Chronic[3] (μg/L)
Chloride	Aquatic Life	860,000	230,000

Note: [1] Virginia's WQS regulations at 9 VAC 25-260-140 also include a human health chloride criterion of 250,000 (μg/L) to protect public water supply use. Specifically, the criterion is to maintain acceptable taste and aesthetic quality and applies at the drinking water intake. Waterbodies in the Accotink Creek watershed do not have PWS as a designated use.
[2] One-hour average concentration not to be exceeded more than once every 3 years on the average
[3] Four-day average concentration not to be exceeded more than once every 3 years on the average

For the chloride TMDLs to address chloride stressors to aquatic life, the chronic criterion served as the TMDL endpoint. Through applying the chloride-specific conductance linear regression equation to the specific conductance ConMon data from upper Accotink Creek, lower Accotink Creek, and Long Branch, estimated chloride concentrations were predicted for a multi-year period. VADEQ determined through these estimations that greater reductions are required to meet the chronic chloride criterion than the acute criterion. Therefore, by setting chloride TMDLs using the chronic criterion as the endpoint, both criteria will be met.

Virginia does not have numeric water quality criteria for sediment to protect aquatic life. To develop a TMDL endpoint to address the sediment stressor to aquatic life, VADEQ utilized the AllForX approach. The all-forest load multiplier is the ratio of current sediment loads to the loads which would occur under all-forested conditions. In other words, the AllForX multiplier is an indication of how much higher current sediment loads are above an undeveloped condition. These multipliers are calculated for both impaired and unimpaired watersheds, and the VSCI scores are then regressed against the AllForX values. Using the regression line, a threshold multiplier is identified for a VSCI score of 60, which is the assessment threshold that indicates a healthy benthic macroinvertebrate community. That AllForX threshold, multiplied by the all-forested sediment load of an impaired watershed, becomes the sediment TMDL endpoint for the impaired watershed. Through modeling analysis of eight comparison watersheds and the Accotink Creek watershed, the AllForX threshold was determined to be 5.07. In other words, the TMDL is equal to the product of the All-Forest load and 5.07 for each impaired watershed. Since the AllForX process uses unimpaired comparison watersheds and a regression approach to set the multiplier where the VSCI score is 60, this approach sets the TMDLs at a level that support a healthy benthic macroinvertebrate community.

EPA finds that these are reasonable and appropriate water quality goals.

2. ***The TMDLs include a total allowable load as well as individual wasteload allocations and load allocations.***

Total Allowable Load

EPA regulations at 40 CFR §130.2(i) state that *the total allowable load shall be the sum of individual WLAs for point sources, LAs for nonpoint sources, and natural background concentrations.* The sediment and chloride TMDLs for the Accotink Creek watershed are consistent with 40 CFR §130.2(i) because the total loads provided by VADEQ in Tables 1-6 above equal the sum of the WLAs assigned to point sources and the land-based LAs assigned to nonpoint sources considering natural background levels, and an explicit MOS.

As stated above, the TMDLs were calculated as average annual loads and maximum daily average loads. Through the use of the GWLF water quality model and supporting sediment estimation methods, pollutant concentrations were modeled over the entire duration of a representative modeling period and used to determine the AllForX multiplier. Once determined, the total allowable sediment loads represent the amount of sediment on an average annual basis that will support a healthy benthic macroinvertebrate community, i.e. a VSCI score of 60. For the chloride TMDLs, the load duration curve method discreetly identifies the loading capacity of the waterbody as it is the product of the four-day average flow and the chloride chronic criterion. The final sediment and chloride TMDLs are listed in Tables 4-6, above.

Load Allocations

According to EPA regulations at 40 CFR §130.2(g), LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loadings should be distinguished. The final TMDLs in Tables 1-6 above contain LAs for the Accotink Creek watershed.

For the sediment and chloride TMDLs, the load allocation primarily covers loads from areas outside either MS4 service areas or the drainage areas to industrial stormwater outfalls. The LA was calculated from the following equation:

LA = TMDL – MOS – WLA

Wasteload Allocations

WLAs have been calculated for VPDES-regulated permits discharging sediment and chloride in the Accotink Creek watershed. Section 4.2 of Volumes II and II discusses calculation and development of WLAs for the final TMDLs. In addition, the final WLAs[2] are presented in Section 4.4 of Volumes II and III.

To aid in developing the TMDLs and allocations, the Virginia Department of Transportation (VDOT), Fairfax County, the Town of Vienna, Fort Belvoir, and the Fairfax County Public School System all provided geographic information system (GIS) representations of their regulated MS4 service areas. Service areas for the City of Fairfax and the Northern Virginia Community College, Annandale Campus, were digitized from maps documented in the City of Fairfax Chesapeake Bay Action Plan and the MS4 manual, respectively. MS4 service area from GIS was accounted for during WLA development.

VADEQ has included a *Future Growth* reserve in the WLA for each of the final TMDLs. This is to ensure that an allocation is available for the creation of new point sources and any growth in MS4 service areas or other regulated stormwater in these watersheds. A future growth WLA of 5% of the TMDL value was chosen for the upper Accotink Creek and lower Accotink Creek TMDLs due to the large proportion of these watersheds that are already covered by MS4 service areas and the anticipated expansion in regulated stormwater. However, in the Long Branch watershed, because there is little room for MS4s or other regulated stormwater to grow, a future growth of 1% of the TMDL was used to account for any future growth in point sources.

Federal regulations at 40 CFR §122.44(d)(1)(vii)(B) require that, for an NPDES permit for an individual point source, the effluent limitations must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the State and approved by

2 The fact that the TMDL does not assign WLAs to any other sources in the watershed should not be construed as a determination by either EPA or VADEQ that there are no additional sources in the watershed that are subject to the NPDES program. In addition, the fact that EPA is approving these TMDLs does not mean that EPA has determined whether some of the sources discussed in the TMDLs, under appropriate conditions, might be subject to the NPDES program.

EPA. There is no express or implied statutory requirement that effluent limitations in NPDES permits necessarily be expressed in daily terms. The CWA definition of "effluent limitation" is quite broad (effluent limitation is "any restriction on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources ...)." See CWA 502(11). Unlike the CWA's definition of TMDL, the CWA definition of "effluent limitation" does not contain a "daily" temporal restriction. NPDES permit regulations do not require that effluent limits in permits be expressed as maximum daily limits or even as numeric limitations in all circumstances, and such discretion exists regardless of the time increment chosen to express the TMDL. For further guidance, refer to Benjamin H. Grumbles memo (November 15, 2006) titled *Establishing TMDL Daily Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al., No. 05-5015 (April 25, 2006) and implications for NPDES Permits.*

A TMDL represents the sum of WLAs for point sources, LAs for nonpoint sources and natural background conditions. In some circumstances, the available data and information may be insufficient to assign each outfall or source an individual WLA. In those circumstances, it is appropriate to express allocations from NPDES-regulated discharges as a single categorical aggregate wasteload allocation. *See* Memorandum from Robert H. Wayland and James A. Hanlon to EPA Water Division Directors, *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on those WLAs* (Nov. 22, 2002). Such aggregate WLAs constitute "available WLA[s]for the discharge[s] prepared by the State and approved by EPA" for purposes of 40 C.F.R. § 122.44(d)(1)(vii)(B)."

EPA has authority to object to the issuance of an NPDES permit that is inconsistent with the assumptions and requirements of WLAs established for that point source. It is expected that VADEQ will require periodic monitoring of the point source(s), through the NPDES permit process, in order to monitor and determine compliance with the TMDL's WLAs. Based on the foregoing, EPA has determined that the TMDLs are consistent with the regulations and requirements of 40 CFR Part 130.

3. ***The TMDLs consider the impacts of background pollutant contributions.***

For the sediment TMDLs, the consideration of natural background loads of sediment is inherent in the AllForX approach. The AllForX Value where the regression crosses a VSCI of 60 represents how many times greater than the all forested load, or the natural background load, that the load can be and still maintain water quality standards. Since that AllForX Value is multiplied by the impaired watersheds' modeled all forested loads, each individual TMDL considers the natural background loads of sediment in each TMDL watershed. In addition, any sediment loads contributed from forested areas in the Accotink Creek watershed that are not in an MS4 service are included in the gross LA for each TMDL.

For the chloride TMDLs, VADEQ notes chloride and other ions occur naturally in waters as a function of mineral composition of soils and bedrock. In urban watersheds, however, deicing salt is the primary source of chloride. Figure 1-6 of Volume III shows the average monthly chloride concentrations in upper and lower Accotink Creek. Monthly chloride concentrations are higher in the winter months. In addition, chloride loads estimated from the chloride-specific conductance linear regression equation yields estimated chloride concentrations that frequently exceed criteria during the winter months and strongly suggest the exceedances are stormwater-driven. Therefore, there was no reason to believe that the chloride criteria exceedances were due to natural conditions.

4. *The TMDLs consider critical environmental conditions.*

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to take into account critical conditions for stream flow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality is protected during times when it is most vulnerable. Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards. Critical conditions are a combination of environmental factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable worst-case scenario condition.

The GWLF model used to develop the sediment TMDLs can incorporate critical conditions into its simulation of watershed sediment loads. Critical conditions for sediment are during and after heavy rainfalls that erode sediment from fields and high flows that scour streambanks. Both types of events are represented in GWLF since the twelve-year simulation period contains a variety of meteorological and hydrological conditions. Therefore, using GWLF to develop TMDL allocations satisfies the requirements that TMDLs take into account critical conditions.

As Figures 3-5 and 3-6 of *Volume III* illustrate, exceedances of the chronic chloride criterion occur over a wide range of flow conditions. While these exceedances occur only in the winter season, it is difficult to predict when exceedance will occur based on deicing application rates and runoff from snowmelt or precipitation. Nonetheless, the TMDLs were developed under the assumption that for every four-day average flow that has been recorded to occur in the gauges' period of record, the chronic criterion must be met. In this way the TMDLs cover the critical conditions when exceedances of the criterion can occur.

5. *The TMDLs consider seasonal environmental variations.*

Seasonal variations involve changes in stream flow and loadings as a result of hydrologic and climatological patterns. Seasonally high flows normally occur in spring, while seasonally low flows typically occur during the warmer summer and early fall.

Again, the GWLF model used to develop the sediment TMDLs can incorporate seasonal variability into its simulation of watershed sediment loads. Several GWLF parameters, including rainfall erosivity and evaporation cover coefficients, are modified on a monthly basis to take into account their seasonal variation. Second, using a daily model over a twelve-year simulation period represents a wide variety of meteorological and hydrological conditions and seasonal effects. Variable seasonal conditions are represented over a long simulation period. Therefore, using GWLF to develop TMDL allocations satisfies the requirements that TMDLs take into account the seasonality of loads.

As discussed above, exceedances of the chloride criteria are a seasonal problem, occurring only in winter months after deicing salts have been applied to roads, parking lots, and sidewalks. Although expressed as annual loads, the TMDLs developed to address the chloride impairments in the Accotink Creek watershed were developed using flows from an extended winter season, November through April, which are the months in which snow events occurred in the Washington Metropolitan Region in last 30 years. The TMDLs therefore incorporate the seasonal variation in the possibility of exceeding the chloride criteria while taking a conservative approach by applying the seasonal loading capacity as annual TMDLs.

6. ***The TMDLs include a Margin of Safety.***

The margin of safety accounts for uncertainty in the modeling and data. The MOS may be implicit, built into the modeling process by using conservative modeling assumptions, or explicit, taken as a percentage of the WLA, LA, or TMDL. A 10% explicit margin of safety was used in both the sediment and chloride TMDLs to account for uncertainty in the methodology and add a conservative measure to the TMDLs.

7. ***The TMDLs have been subject to public participation.***

VADEQ generally seeks public participation at every stage of TMDL development in order to receive input from stakeholders and to apprise the stakeholders of the progress made. In total, three public meetings were held and six technical advisory committee (TAC) meetings were held. Section 6 of Volumes II and III describes the public participation process during development of these TMDLs.

The final public meeting was held on June 28, 2017. Following this meeting, a 30-day public comment period was held on the draft sediment and chloride TMDLs. VADEQ received multiple comments from the public and provided adequate responses. VADEQ provided EPA with a copy of its responses to public comments.

V. Discussion of Reasonable Assurance

When EPA establishes or approves a TMDL that allocates pollutant loads to both point and nonpoint sources, EPA considers whether there is a "reasonable assurance" that the point and nonpoint source loadings can be achieved and applicable water quality standards will be attained. Based on the information below and the information presented in Section 5 of Volumes II and III, EPA finds that VADEQ has provided reasonable assurance that the allocated loads in the TMDLs can be achieved. VADEQ recognizes that once a TMDL has been approved by EPA, measures must be taken to reduce pollution levels from both point and nonpoint sources. VADEQ intends to use existing state programs in order to meet the objectives of the TMDL and attain water quality goals.

As part of the Continuing Planning Process (CPP), VADEQ staff will present both EPA-approved TMDLs and TMDL implementation plans to the State Water Control Board (SWCB) for inclusion in the appropriate Water Quality Management Plan (WQMP), in accordance with the Clean Water Act's Section 303(e) and Virginia's Public Participation Guidelines for Water

Quality Management Planning. VADEQ staff will also request that the SWCB adopt TMDL WLAs as part of the Water Quality Management Planning Regulation (9VAC 25-720), except in those cases when permit limitations are equivalent to numeric criteria contained in the Virginia Water Quality Standards, such as in the case for bacteria. This regulatory action is in accordance with §2.2-4006A.4.c and §2.2-4006B of the Code of Virginia. SWCB actions relating to water quality management planning are described in the public participation guidelines referenced above and can be found on the VADEQ web site under:
http://www.deq.virginia.gov/Portals/0/DEQ/Water/TMDL/FeaturedTopics/WQMP_PPP_Final.pdf

Staged Implementation

In general, Virginia intends for the required control actions, including Best Management Practices (BMPs), to be implemented in an iterative process that first address those sources with the largest impact on water quality. The iterative implementation of pollution control actions in the watershed has several benefits:

1. It enables tracking of water quality improvements following implementation through follow-up stream monitoring;
2. It provides a measure of quality control, given the uncertainties inherent in computer simulation modeling;
3. It provides a mechanism for developing public support through periodic updates on implementation levels and water quality improvements;
4. It helps ensure that the most cost effective practices are implemented first; and
5. It allows for the evaluation of the adequacy of the TMDL in achieving water quality standards.

Many of the BMPs that address sediment also address the two non-pollutant stressors, hydromodification and habitat modification. EPA recommends that proposed measures to reduce sediment that also address the non-pollutant stressors be considered priority BMPs for implementing this TMDL. EPA further recommends that BMPs that work to stabilize the streambanks be considered as priority BMPs.

Implementing Wasteload Allocations

For the implementation of the WLA component of the TMDL, EPA's regulations require that NPDES permits contain effluent limitations are consistent with the assumptions and requirements of approved TMDL WLAs. 40 CFR §122.44 (d)(1)(vii)(B). Additionally, Virginia's 1997 Water Quality Monitoring, Information and Restoration Act directs the State Water Control Board to develop and implement a plan to achieve fully supporting status for impaired waters. The Act also establishes that the implementation plan shall include the date of expected achievement of water quality objectives, measurable goals, corrective actions necessary and the associated costs, benefits and environmental impacts of addressing the impairments. The WLA implementation process may be informed through the development of a TMDL implementation plan, or it may be addressed solely through the discharge permit. However, it is recognized that implementation plan development may help to coordinate the efforts of permitted stormwater sources through the collaborative process involved in development of the plan. Specifically, under their MS4 permits, Fairfax County, the City of Fairfax, and the Town of

Vienna are required to develop Action Plans to address attaining reductions in Pollutants of Concern (POCs) under the Chesapeake Bay TMDLs, which includes sediment. In addition, the Fairfax County Board of Supervisors approved a Watershed Plan for Accotink Creek on February 8, 2011.

VADEQ coordinates the State program that regulates the management of pollutants carried by storm water runoff. VADEQ regulates storm water discharges associated with "industrial activities", from construction sites, and from MS4s.

Implementing Load Allocations

VADEQ intends to use existing programs to the fullest extent in order to attain its water quality goals. The measures for unregulated, nonpoint source reductions are implemented in an iterative process that is described along with specific BMPs in a TMDL implementation plan. In the highly developed, urbanized Accotink Creek watershed, the nature of the unregulated, nonpoint source discharges is very similar to that of the regulated, point source discharges. Namely, it is stormwater generated from highly developed land-uses with a high percentage of impervious surfaces. It should be noted that the design and operational requirements of the Virginia Stormwater Management Program (VSMP) program, as applicable, to development and re-development projects in the Accotink Creek watershed will also serve to mitigate sediment loadings as well as stormwater energy over time. EPA recommends that measures to reduce sediment that also address the non-pollutant stressors be considered priority BMPs for implementing this TMDL.

For implementation of the load allocation components, a TMDL implementation plan will be developed that addresses at a minimum the requirements specified in the Code of Virginia, Section 62.1-44.19:7. State law directs the State Water Control Board to "develop and implement a plan to achieve fully supporting status for impaired waters". The implementation plan "shall include the date of expected achievement of water quality objectives, measurable goals, corrective actions necessary and the associated costs, benefits and environmental impacts of addressing the impairments".

The types of BMPs that may be considered to address unregulated, nonpoint source loads are stream restoration, stream bank stabilization, and other BMPs that work to capture stormwater and promote infiltration of that stormwater. VADEQ expects that implementation of the sediment TMDLs will occur in stages, and that full implementation of the TMDLs is a long-term goal. Specific goals for phased implementation will be determined as part of implementation plan development. Actions identified during TMDL implementation plan development that go beyond what can be considered cost-effective and reasonable will only be included as implementation actions if there are reasonable grounds for assuming that these actions will in fact be implemented.

Following the development of the TMDL, VADEQ will make every effort to continue to monitor the impaired streams in accordance with its ambient monitoring plan. The VADEQ Office of Water Quality Monitoring and Assessment (WQMA) operates an ambient network of monitoring stations known as "trend stations," designed to measure long term water quality trends. The design of the trend network is such that key water quality variables are measured at targeted locations approximately every month. This monitoring station network and potentially other monitoring stations will be utilized in monitoring water quality throughout and following implementation. The details of the follow-up ambient monitoring will be outlined in the Annual Water Monitoring Plan prepared by each VADEQ Regional Office.

Watershed stakeholders will have the opportunity to participate in the development of the TMDL implementation plan. Specific goals for BMP implementation will be established as part of the implementation plan development. With successful completion of implementation plans, local stakeholders will have a blueprint to restore impaired waters and enhance the value of their land and water resources. Additionally, development of an approved implementation plan may enhance opportunities for obtaining financial and technical assistance during implementation.

For implementation of the chloride TMDLs, VADEQ intends to initiate an Accotink Creek Salt Management Strategy (SaMS) in an effort to assist both regulated and non-regulated entities efficiently and effectively manage and apply deicers/anti-icers consistent with the assumptions and requirements of the TMDL. The Accotink Creek chloride TMDLs are the first chloride TMDLs in Virginia that focuses on winter anti-icing and deicing salt applications in an urban setting. The Accotink Creek chloride TMDLs were developed with the intent for it to be implemented collaboratively through performance-based goals using BMPs. Acknowledging the critical need to maintain public safety, it is envisioned that the performance-based BMP approach will include training and use of improved technologies to more efficiently and effectively apply chlorides in a manner that still meets the high standards of public safety. The Accotink Creek SaMS is envisioned to be developed in-lieu of a traditional TMDL Implementation Plan.

For more information on reasonable assurances, see Section 5 of Volumes II and III.