FORT BELVOIR

CHLORIDE TMDL ACTION PLAN FOR LOWER ACCOTINK CREEK

VPDES Small MS4 General Permit No. VAR040093

PREPARED FOR:
Directorate of Public Works
Environmental Division
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APRIL 2025

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ACRONYMS AND ABBREVIATIONS

AAFES	Army and Air Force Exchange Services
Ac	Acres
ADFE	Aerospace Data Facility - East
AR	Army Regulation
BMP	Best Management Practice
CFR	Code of Federal Regulations
CWA	Clean Water Act
DAAF	Davison Army Airfield
DC	District of Columbia
DES	Directorate of Emergency Services
DLA	Defense Logistics Agency
DOD	Department of Defense
DPW	Directorate of Public Works
EMS	Environmental Management System
EPA	United States Environmental Protection Agency
FBNA	Fort Belvoir North Area
ft	feet
GIS	Geographic Information System
HPF	High Priority Facility
ISW	Industrial Stormwater
IDDE	Illicit Discharge Detection and Elimination
lbs.	Pounds
MCM	Minimum Control Measures
MgCl	Magnesium Chloride
Mg/L	Milligrams per Liter
MS4	Municipal Separate Storm Sewer System
NaCl	Sodium Chloride
NGA	National Geospatial-Intelligence Agency
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
POC	Pollutants of Concern
RO	Representative Outfall
SaMS	Salt Management Strategy
sq.yd.	Square Yard
SMF	Stormwater Management facility
SWPPP	Stormwater Pollution Prevention Plan
SWM	Stormwater Management
TE	Technical Exhibit
TMDL	Total Maximum Daily Load
VAC	Virginia Administrative Code
VADEQ	Virginia Department of Environmental Quality
VDOT	Virginia Department of Transportation
VPDES	Virginia Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program
WLA	Waste Load Allocation
WQC	Water Quality Criteria

1. INTRODUCTION AND BACKGROUND

The U.S. Army Garrison Fort Belvoir is in southeastern Fairfax County, Virginia, approximately 15 miles southwest of Washington, DC, and 95 miles north of Richmond, Virginia. Fort Belvoir's military history dates to the early 1900s, when the facility was known as Camp Belvoir and used as an Army rifle range and training camp. The post was re-named Fort Humphreys in 1922 and became Fort Belvoir in 1935. Since 1935, Fort Belvoir has supported major U.S. military operations throughout the world. In recent years, Fort Belvoir has functioned primarily as an administrative and logistics support center for the Army and as a host for over 100 tenant organizations from various government branches (including all branches of the armed services). It currently employs more than 35,000 civilian and military personnel, and provides support services for over 207,000 military personnel, dependents, and retirees in the region.

Fort Belvoir consists of more than 7,700-acres on Main Post and an 806-acre detached parcel, Fort Belvoir North Area (FBNA), located north of Main Post and west of Interstate 95. The Main Post is situated between Interstate 95, Pohick Bay, and Gunston Cove on the Potomac River. U.S. Route 1 divides the Main Post into two distinct geographical areas, referred to as North Post and South Post, as shown in Figure 1.

All urbanized area of Fort Belvoir is covered under the General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4) Permit No. VAR040093. The current MS4 General Permit (9VAC25-890-40) was approved by the State Water Control Board and became effective on November 1, 2023. Part II.B of the permit covers requirements and Total Maximum Daily Load (TMDL) special conditions as they relate to local TMDLs and calls for the permittee to update any previously approved TMDL Action Plans to meet the conditions of Parts II.B.4 and II.B.8, which cover the requirements for all TMDL Action Plans and those in relation to Chloride TMDLs, respectively. Additionally, the permit notes that updated plans should include:

> *(1) An evaluation of the results achieved by the previous action plan; and*
>
> *(2) Any adaptive management strategies incorporated into updated action plans based on action plan evaluation.*

Under the Clean Water Act (CWA), States are required to develop a list of impaired waters based on the State's established water quality standards. The Virginia Department of Environmental Quality (VADEQ) states,

> *All Virginia waters 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.*

Virginia identified Accotink Creek as an impaired water based on benthic macro-invertebrate monitoring and assessments showing it did not support Aquatic Life Use. Following the listing a stressor identification analysis was performed to determine the cause of the biological impairments in this waterbody, which identified chloride and sediment as the most probable pollutant stressors. Once the cause was identified, Virginia proceeded with the development of the TMDL entitled "Chloride TMDLs for the Accotink Creek Watershed, Fairfax County, Virginia" (TMDL Report) which was approved by the State Water Control Board on April 16, 2018, and the U.S. Environmental Protection Agency (EPA) on May 23, 2018.

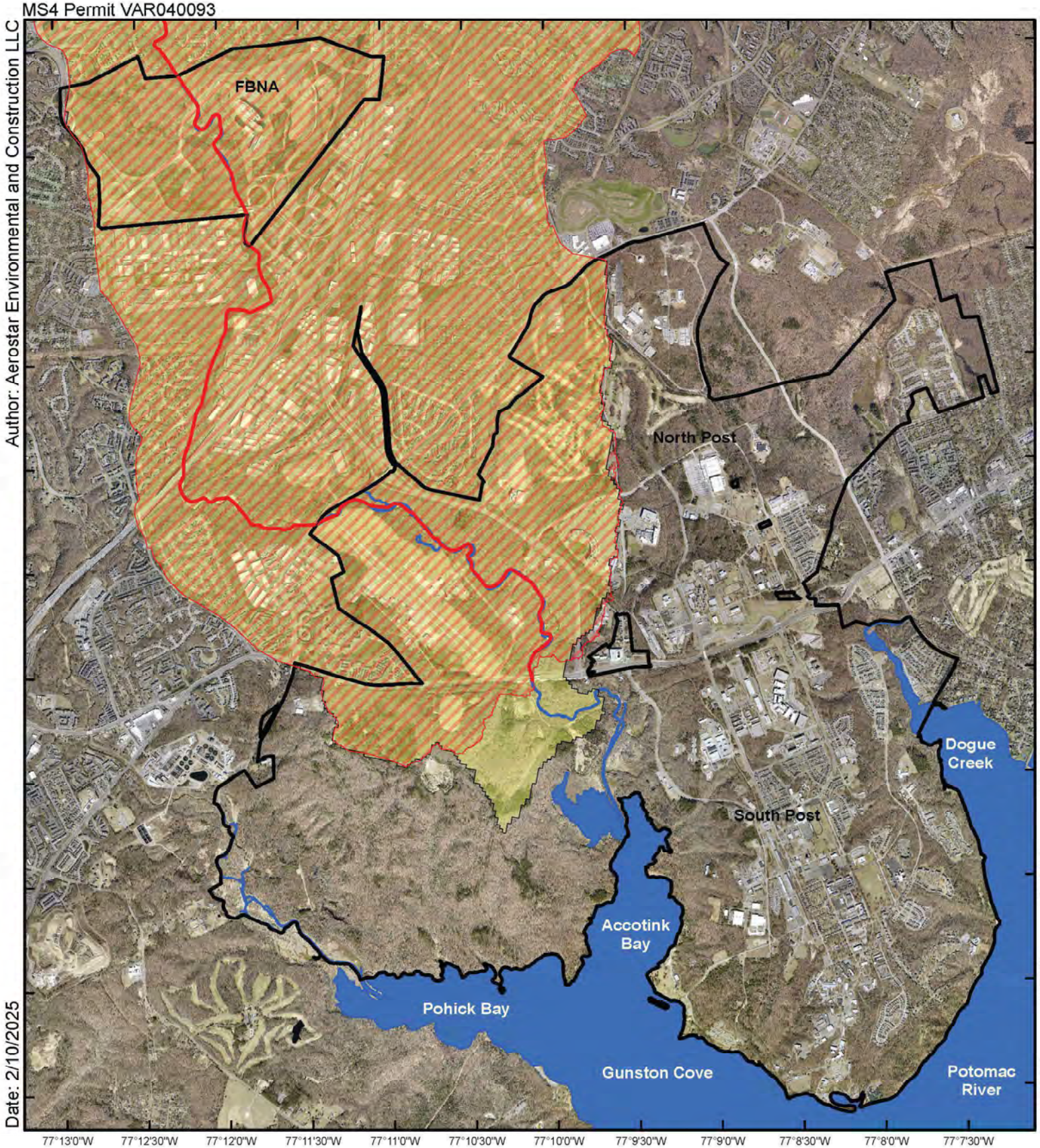
Impaired segment A15R-01-BEN, referred to as lower Accotink Creek, is noted in the TMDL Report as beginning at the outlet of Lake Accotink and continuing downstream until the tidal waters of Accotink Bay. The majority of Fort Belvoir drains into the Accotink Creek, with all of FBNA and a portion of North Post, being direct sources of runoff to the designated impaired watershed covered by this TMDL.

The purpose of this 2025 Action Plan is to address the waste load allocation (WLA) assigned to Fort Belvoir for the Lower Accotink Creek Chloride TMDL in accordance with the special conditions in the MS4 General Permit. Fort Belvoir also holds VPDES Industrial Stormwater (ISW) Individual Major Permit No. VA0092771. The ISW permit covers industrial areas of Fort Belvoir, including the approximate 350 acres associated with the Davison Army Airfield (DAAF), which is located within the Lower Accotink Creek Watershed. Although DAAF is not a part of the regulated MS4 area, its contribution to chloride loading in the Lower Accotink Watershed is considered in this Action Plan.

The Chloride TMDL sets the aggregate allocated chloride load from four (4) MS4 sources in the Lower Accotink Watershed at 3,294,323 lbs./year. The four MS4 sources contributing to the load include the Phase I permit for Fairfax County and the three Phase II permits for Virginia Department of Transportation (VDOT), Fairfax County Public Schools (now part of Fairfax County Permit), and Fort Belvoir. The aggregate Industrial Stormwater WLA is 117,071 lbs./year, which is noted in reference to operations at DAAF. The 2017 Chloride TMDL notes that:

> *Due to the lack of information on chloride application rates and chloride delivery to surface waters, a load duration approach was used to establish the chloride TMDLs. This approach did not establish a baseline condition to set load reductions from, nor did it divide stormwater loads at a greater spatial resolution than TMDL watersheds. Therefore, the TMDL watershed* ***aggregate WLAs are to be implemented using a performance-based BMP approach*** *in accordance with 40 CFR § 122.44(k) as it is not appropriate, nor intended, to establish individual, numeric effluent limits for regulated stormwater sources using load duration-based TMDL WLAs.*

There are two Virginia mandated chloride criteria discussed in the TMDL documentation – acute and chronic. Acute criteria require no more than one chloride concentration exceeding 860 mg/l every three years which equates to a 31% reduction in the Lower Accotink Creek. The chronic criterion for chloride allows no more than one four-day average chloride concentration exceeding 230 mg/l every three years which is equivalent to an 68% reduction from current condition in the Lower Accotink Creek.



Author: Aerostar Environmental and Construction LLC

Date: 2/10/2025

Figure 1:
Lower Accotink Watershed
and Fort Belvoir

N

2,750 1,375 0 2,750 5,500 Feet

Legend

- Fort Belvoir Boundaries
- Major Waterway
- Lower AccotinkWatershed
- Impaired Watershed Drainage Area
- 303d Listed Stream Segment (VAN-A15R-01)

Fort Belvoir 2025 Chloride TMDL
Sources: Fort Belvoir, USEPA, Fairfax County

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The goal of this Chloride TMDL Action Plan for the Lower Accotink Creek Watershed, herein referred to as the Action Plan, is to implement measures that will assist in restoring water quality in the impaired water body and to potentially de-list the impaired segments of the Accotink from the Virginia 303(d) List of Impaired Waters for chloride impairments. Table 1 below summarizes the requirements set forth within the permit and where in the Action Plan the requirement is addressed.

Table 1: Summary of Permit Requirements and Action Plan Location

Reference	Requirement	Action Plan Location
Part II.B.2.a	For TMDLs approved by the EPA prior to 1 July 2018, and in which an individual or aggregate wasteload has been allocated to the permittee, the permittee shall update the previously approved local TMDL action plans to meet the conditions of Part II B.4, B.6, B.7, and B.8 as applicable, no later than 18 months after the permit effective date and continue implementation of the action plan.	Action Plan in its entirety
Part II.B.2.a. (1)-(2)	Updated action plans shall include: (1) an evaluation of the results achieved by the previous action plan; and (2) any adaptive management strategies incorporated into updated action plans based on action plan evaluation.	*Section 5: Evaluation of Previous Plan*
Part II.B.4.a	The TMDL project name.	*Section 1: Introduction and Background*
Part II.B.4.b	The EPA approval date of the TMDL.	*Section 1: Introduction and Background*
Part II.B.4.c	The wasteload allocated to the permittee (individually or in aggregate), and the corresponding percent reduction, if applicable.	*Section 1: Introduction and Background*
Part II.B.4.d	Identification of the significant sources of the pollutants of concern discharging to the permittee's MS4 and are not covered under a separate VPDES permit. For the purposes of this requirement, a significant source of pollutants of concern means a discharge where the expected pollutant loading is greater than the average pollutant loading for the land use identified in the TMDL.	*Section 4: Chloride Source Assessment*
Part II.B.4.e	The best management plans (BMPs) designed to reduce the pollutants of concern in accordance with Part II.B.8	*Section 6: Chloride Reduction Strategy*
Part II.B.4.f	Any calculations required in accordance with Part II B.8	*Appendices F, G, and H*
Part II.B.4.g	For action plans developed in accordance with Part II.B.5, B.6, and B.8, an outreach strategy to enhance the public's education (including employees) on methods to eliminate and reduce discharges of the pollutants.	*Section 6: Chloride Reduction Strategy*

Reference	Requirement	Action Plan Location
Part II.B.4.h	A schedule of anticipated actions planned for implementation during this permit term.	*Section 7: Implementation Schedule*
Part II.B.8.a	No later than 36 months after the permit effective date, permittees shall develop an anti-icing and deicing agent education and outreach strategy that identifies target audiences for increasing awareness of anti-icing and deicing agent application impacts on receiving waters and encourages implementation of enhanced BMPs for application, handling, and storage of anti-icing and de-icing agents used for snow and ice management.	*Section 6: Chloride Reduction Strategy*
Part II.B.8.b	Anti-icing and deicing agent education and outreach strategies shall contain a schedule to implement two or more of the strategies listed in Part I E 1 d Table 1 *[of the MS4 Permit]* per year to communicate to target audiences the importance of responsible anti-icing and deicing agent application, transport, and storage.	*Section 6: Chloride Reduction Strategy*
Part II.B.8.c	No later than 36 months after permit issuance, the permittee shall review good housekeeping procedures for anti-icing and deicing agent application, handling, storage, and transport activities required under Part I E 6 b (1) (a) and identify a minimum of two strategies for implementing enhanced BMPs that promote efficient management and application of anti-icing and deicing agents while maintaining public safety.	*Section 6: Chloride Reduction Strategy*

2. LEGAL AUTHORITIES AND GUIDANCE

2.1. SECTION 303(D) OF THE CLEAN WATER ACT (CWA) AND THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S (EPA'S) WATER QUALITY PLANNING AND MANAGEMENT REGULATIONS (40 CODE OF FEDERAL REGULATION (CFR) PART 130)

The CWA and EPA's Management regulations direct States to identify and list water bodies in which current required controls of a specified pollutant are inadequate to achieve water quality standards. For the Commonwealth of Virginia, Impaired Waters are outlined in the biennial Virginia Water Quality Assessment 305(b)/303(d) Integrated Report. The segment comprising Lower Accotink Creek was first listed as impaired for chloride on Virginia's 2018 305(b)/303(d) Water Quality Assessment Integrated Report.

States are then required to establish Total Maximum Daily Loads (TMDLs) for water bodies that are exceeding water quality standards. TMDLs represent the total pollutant loading that a water body can receive without violating water quality standards. The TMDL process establishes the allowable loading of a pollutant, or the waste load allocation (WLA), needed to achieve and maintain water quality standards. The Chloride TMDL for the Lower Accotink Creek Watershed was finalized on 30 August 2017. The EPA approved the TMDL on 23 May 2018, and the State Water Control Board approved the TMDL on 16 April 2018.

2.2. 40 CFR §122.44 ESTABLISHING LIMITATIONS, STANDARDS AND OTHER PERMIT CONDITIONS APPLICABLE TO STATE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PROGRAMS

This permitting program was established by the EPA to comply with Section 402 of the CWA. The National Pollutant Discharge Elimination System (NPDES) program prohibits the discharge of pollutants through a point source into a water body of the U.S. unless a NPDES permit is obtained. The permit places limits on what can be discharged and includes monitoring and reporting requirements and other provisions to ensure that the discharge does not harm water quality or public health.

Section (d) (1) (vii) (B) requires that all new or revised NPDES permits must be consistent with assumptions and requirements of any applicable TMDL WLA. The Commonwealth of Virginia VADEQ regulates the management of pollutants carried by stormwater runoff under the Virginia Pollutant Discharge Elimination System (VPDES) program. VPDES regulations are contained in the Virginia Administrative Code (VAC) at 9VAC25-31.

2.3. U.S. ARMY REGULATION (AR) 200-1, ENVIRONMENTAL PROTECTION AND ENHANCEMENT

Army Regulation (AR) 200-1 defines the framework for the Army Environmental Management System (EMS). It implements Federal, State, and local environmental laws and Department of Defense (DOD) policies for preserving, protecting, conserving, and restoring the quality of the environment. This regulation addresses environmental responsibilities of all Army organizations and agencies. Specifically, this regulation applies to Active Army, Army National Guard, United States Army Reserve, as well as tenants, contractors, and lessees performing functions on real property under the jurisdiction of the Department of the Army (Army, 2007).

AR 200-1 requires in Chapter 4-2(a)(1) that these groups must:

> *Comply with applicable Federal, State, and local laws and regulations regarding water resources management and permitting.*

Chapter 4-2(a)(2) requires these groups to:

> *Obtain and comply with all required Federal, State, and local Clean Water Act (CWA), Coastal Zone Management Act (CZMA), and Safe Drinking Water Act (SDWA) permits.*

This regulation also states in Chapter 4-2(d)(1) that to implement (TMDL) regulations, all Army facilities will:

> *(a) Initiate and maintain contact with Federal and State water regulators concerning the process of setting TMDLs and allocations for water bodies located on or passing through Army installations.*
>
> *(b) Integrate all aspects of CWA requirements, programs and available information (for example, the National Pollutant Discharge Elimination System (NPDES) program, 404 wetlands program, wellhead protection, storm water plans/projects, storm water construction permits, spill prevention, control, and countermeasures (SPCC) plans/projects, State CWA 319 requirements (State plans & strategies for reducing non-point source runoff)) with TMDL development and future planning. Ensure all of these programs are consistent with, and work together to attain compliance under, TMDL allocations once they are set by states.*
>
> *(d) Ensure other programs that are or may have their activities affected by identification of impaired waters and new TMDL allocations are informed of the impacts and requirements (for example, facilities construction, master planning, National Environmental Policy Act (NEPA) requirements).*
>
> *(g) Ensure that mission and non-mission activities and construction designs utilize best management practices (BMPs) to minimize TMDL impacts.*

2.4. Fort Belvoir General VPDES Permit for Discharges of Stormwater From Small Municipal Separate Storm Sewer Systems (MS4), MS4 Permit No. VAR040093

As required by Fort Belvoir's MS4 permit, TMDL WLAs are specifically addressed through the iterative implementation of programmatic Best Management Practices (BMPs). Only failure to implement the programmatic BMPs identified in this plan would be considered a permit noncompliance issue. The current regulations found in 9VAC25-890-40, effective 1 November 2023, state in Part I.B:

> *The MS4 program shall include the minimum control measures described in Part I E. For the purposes of this permit term, implementation of MCMs in Part I E and the Chesapeake Bay and local TMDL requirements in Part II (as applicable) consistent with the provisions of an iterative MS4 program required pursuant to this general permit constitutes compliance with the standard of reducing pollutants to the "maximum extent practicable," provides adequate progress in meeting water quality standards, and satisfies the appropriate water quality requirements of the State Water Control Law and its attendant regulations.*

Fort Belvoir originally developed a Chloride TMDL Action Plan during the 2018-2023 permit cycle. In accordance with the 2023-2028 MS4 General VPDES Permit 9VAC25-890-40 Part II.B, Local TMDL special condition Part II.B.2 states that:

> *Permittees previously covered under the General VPDES Permit for Discharges of Stormwater from MS4 effective November 1, 2018, shall develop and maintain a local TMDL action plan designed to reduce loadings for pollutants of concern if the permittee discharges the pollutants of*

concern to an impaired water for which a TMDL has been approved by the U.S. Environmental Protection Agency (EPA) as described in Part II B 2 a and 2 b

Part II.B.2.a applies to TMDLs approved before 1 July 2018, and Part II.B.2.b applies to TMDLs approved on or after 1 July 2018. Since the Chloride TMDL was approved by EPA before 1 July 2018, Part II.B.2.a applies and requires that:

*a. For TMDLs approved by EPA prior to July 1, 2018, and in which an individual or aggregate wasteload has been allocated to the permittee, the permittee shall develop and initiate or update as applicable the local TMDL action plans to meet the conditions of Part II B 4, B 6, B 7, and B 8, as applicable, no later than **18 months after the permit effective date** and continue implementation of the action plan.*

In addition, Part II.B.9 of the 2023-2028 MS4 General Permit requires a minimum of 15 days of public comment to the Fort Belvoir public, stating:

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

As outlined above, the due date for this Chloride TMDL Action Plan update is 1 May 2025, 18 months after the permit effective date of 1 November 2023. The specific requirements for Chloride TMDLs are discussed in Section 2.5 below.

2.5. Fort Belvoir Chloride TMDL Action Plan for Lower Accotink Creek

This Action Plan addresses the requirement to minimize the pollutant of concern (POC), chloride, by identifying legal authorities, BMPs and measurable goals for achieving compliance in accordance with 9VAC25-890-40, Part II.B.2 through 4 and 8 of the Local TMDL Special Conditions of the General VPDES Permit for Discharges of Stormwater from Small MS4s, MS4 Permit #VAR040093.

Part II.B.2 is outlined above in Section 2.4 and requires that permittees previously covered under the General VPDES Permit should develop and maintain a local TMDL action plan to reduce loadings for pollutants of concern.

Part II.B.3 describes how TMDL action plans should be implemented, specifically that:

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

Part II.B.8 specifically addresses Chloride TMDLs, stating:

a. No later than 36 months after the permit effective date, permittees shall develop an anti-icing and deicing agent education and outreach strategy that identifies target audiences for increasing awareness of anti-icing and deicing agent application impacts on receiving waters and encourages implementation of enhanced BMPs for application, handling, and storage of anti-icing and de-icing agents used for snow and ice management.

b. Anti-icing and deicing agent education and outreach strategies shall contain a schedule to implement two or more of the strategies listed in Part I E 1 d Table 1 per year to communicate to

target audiences the importance of responsible anti-icing and deicing agent application, transport, and storage.

c. No later than 36 months after permit issuance, the permittee shall review good housekeeping procedures for anti-icing and deicing agent application, handling, storage, and transport activities required under Part I E 6 b (1) (a) and identify a minimum of two strategies for implementing enhanced BMPs that promote efficient management and application of anti-icing and deicing agents while maintaining public safety.

2.6. Fort Belvoir Garrison Policy Memorandum #25, Prohibition of Illicit/ Unauthorized Discharges to the Municipal Separate Storm Sewer

Fort Belvoir Policy Memorandum #25 *Prohibition of Illicit/ Unauthorized Discharges to the Municipal Separate Storm Sewer* can be found in full in Appendix A. An installation-wide Stormwater Pollution Prevention policy was developed to address compliance with the MS4 Permit, the ISW Major Permit, the Clean Water Act and other stormwater regulations, as well as the Hazardous Waste Minimization and Management Plan. The policy outlines proper protocols for minimizing stormwater pollution during activities that directly and indirectly impact water quality of the receiving waters. Section 5 of this policy states:

Fort Belvoir is committed to protecting water quality of waterways on and surrounding Fort Belvoir to ensure that human health, ecosystem health, and the ability to conduct recreational opportunities are not impacted by stormwater pollution.

Section 5.a. specifically prohibits illicit discharges/illegal dumping at Fort Belvoir, including but not limited to:

Sanitary sewer overflows, trash, paint, grease, motor oil or other lubricants, fuel, cooking oil, salt, fertilizer, pesticides chemicals, liquid materials, lawn wastes (grass clippings and leaves), mulch, cigarette butts, sand, soil, construction materials, wash waters containing soaps, detergents and degreasers of any kind, fire hydrant and water line flushing and potable water tank discharge without prior de-chlorination, and pet/animal waste.

Section 5.b. addresses material storage:

Personnel responsible for bulk storage areas for items such as salt, mulch, and soil stockpiles will implement best management practices to ensure that material does not enter storm sewer during a storm event.

This policy provides an avenue of enforcement for requirements set forth by Fort Belvoir's CWA permits.

2.7. Northern Virginia Salt Management Strategy Toolkit

The Northern Virginia Salt Management Strategy Toolkit, completed in December 2020, is a voluntary, non-regulatory resource that was developed by a diverse group of stakeholders in the Northern Virginia region brought together to develop a Salt Management Strategy (SaMS). The group sought to balance the benefits of salt use during the winter – safety for drivers and pedestrian as well as keeping businesses, vital services, and the economy open - with the unintended impacts on drinking water, corrosion of infrastructure and property, and freshwater fish and other aquatic life not adapted for salty water. They were guided by the following goals:

Use a stakeholder-driven process to proactively address salt loads in the region and address the Accotink Creek chloride (salt) TMDLs.

Generate increased public awareness that leads to positive behavior changes, and long-term support for the continual improvement of deicing/anti-icing practices and actions.

Ensure continued protection of public safety, improve water quality and terrestrial habitat, and lessen the effects of deicing/anti-icing salts on drinking water resources, property and road infrastructure through information sharing and implementation of best practices over time.

The SaMS Toolkit is a comprehensive document intended to be used as a resource from which readers can pick and choose the practices that work best for them and their situation. All practices and recommendations have the common objective of improving the efficiency of winter salt use, so that only the amount needed to achieve the snow and ice management goal is used, and excessive use is avoided.

3. FORT BELVOIR MS4 WITHIN THE LOWER ACCOTINK

Conducting an annual assessment is identified as a BMP in this Action Plan. As part of the annual assessment, Fort Belvoir needs to determine the chloride usage and application rates within the Lower Accotink Watershed, which allows comparison to the aggregate WLA and storm-specific target application rates, respectively. Consequently, it is necessary to identify and quantify the areas that are subject to winter maintenance within the watershed.

To complete this analysis, Aerostar started with the installation's jurisdictional boundary and refined the areas as follows:

1. Delineated the portion of Fort Belvoir within the Lower Accotink impaired drainage area
2. Identified the MS4 Service Area based on census data
3. Identified areas covered under a separate VPDES permit
4. Identified treated impervious surfaces by type (parking vs roads)
5. Divided impervious/treated surfaces out according to each winter maintenance provider.

To perform the analysis, local ArcGIS data, aerials, and calculation tools were utilized. The sections and figures below describe findings from this assessment.

3.1. TOTAL JURISDICTIONAL BOUNDARY

Fort Belvoir is broken into two separate land masses known as the Main Post and the Fort Belvoir North Area (FBNA) as discussed in the Introduction and Background. Based on computed GIS data rounded to the nearest acre, the Main Post covers approximately 7,743 acres while the FBNA covers an additional 806 acres for a total of 8,549 acres of land within the Fort Belvoir Jurisdictional Boundary.

3.2. AREAS WITHIN THE LOWER ACCOTINK IMPAIRED DRAINAGE AREA

To further refine the MS4 area where the Chloride TMDL is applicable, Aerostar used watershed data made available from EPA watershed reports and overlaid the impaired water segments and catchments over the overall jurisdictional boundary described above and as shown in Figure 1. It was determined that 2,365 acres of Fort Belvoir are within the drainage area for the Lower Accotink that is identified as impaired, including 802 acres at FBNA and 1,563 acres on Main Post.

3.3. MS4 SERVICE AREA

Guidance Memo No. GM-16-2006, *TMDL Action Planning for Local Total Maximum Daily Loads as Required in the Small MS4 General Permit (VAR04)* defines an MS4 Service Area and Unregulated Land:

> ***Service Area (also known as Regulated Land)*** *– The conveyances and drainage area served by the permittee's MS4. For Phase II MS4s the service area is a delineation of the conveyances and drainage area that fall within a Census Defined Urbanized Area.*
>
> ***Unregulated Land*** *- means those acres that are not owned or operated by the MS4 permittee AND are located outside the permittee's regulated land.*

Under this portion of the analysis, Aerostar reviewed the 2000, 2010, and 2020 Census Defined Urban Area for the Washington, DC Metropolitan Area. GIS layers for the 2000, 2010, and 2020 Census data designating urbanized areas within the Fort Belvoir Jurisdictional Boundary were mapped over Fairfax County Aerial Photography from both 2009 and 2024 (Fairfax, 2024).

Comparing census data with aerial photography, it was clear that the urbanized areas designated by the Census were inconsistent and not accurately representative of land use on Fort Belvoir over time, as shown on Figure 2. A summary of findings from this comparison is as follows:

- The 2000 urbanized area covered FBNA and most of Main Post, except the southwest training area. Many of the areas covered were largely undeveloped forested land; wetlands, and open waters that could be excluded from the regulated MS4 service area. This discrepancy is believed to be due to specific criteria used for census blocks on military installations for the 2000 Census.
- With changes made to urban area criteria for the 2010 Census, urbanized area on Fort Belvoir covered FBNA and the eastern portion of Main Post, excluding the southwest training area, Davison Army Airfield (DAAF), the golf course, the National Museum of the US Army (NMUSA), Alexander T. Augusta Military Medical Center (Hospital Complex), and some portions of the southern peninsula. This aligned more closely to land use and was found to be highly representative of where the Belvoir population was (i.e. housing areas) but excluded areas which should be considered developed lands.
- The 2020 Census urbanized area covered FBNA, the entire area north of Route 1 on Main Post, and the eastern portion of Main Post south of Route 1. Essentially, this is a more refined version of the 2000 census data and balances out the missing developed lands omitted from the 2010 data. Although this still covers some undeveloped forested land; wetlands, and open waters that could be excluded from the regulated MS4 service area, it was found to be the most representative of land use on Fort Belvoir and therefore, was used in any further analysis.

Based on the 2020 Census data, a total of 2,108 acres on Fort Belvoir were found to be within census-defined urban areas and within the impaired portion of the Lower Accotink watershed, including 802 acres at FBNA and 1,306 acres on Main Post, as shown in Figure 3.

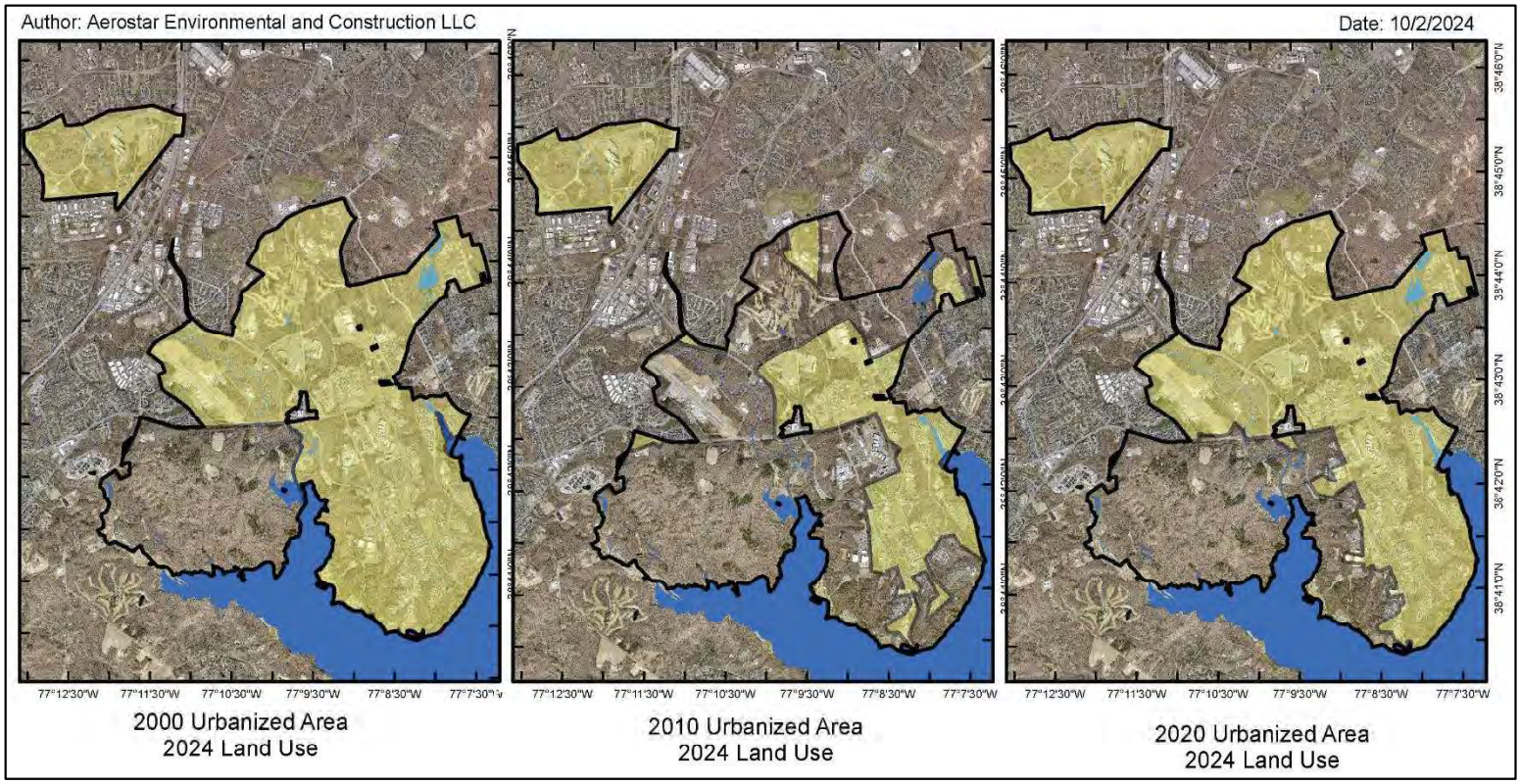

Figure 2: Change in Urbanized Land Over Time

Author: Aerostar Environmental and Construction LLC

Date: 3/24/2025

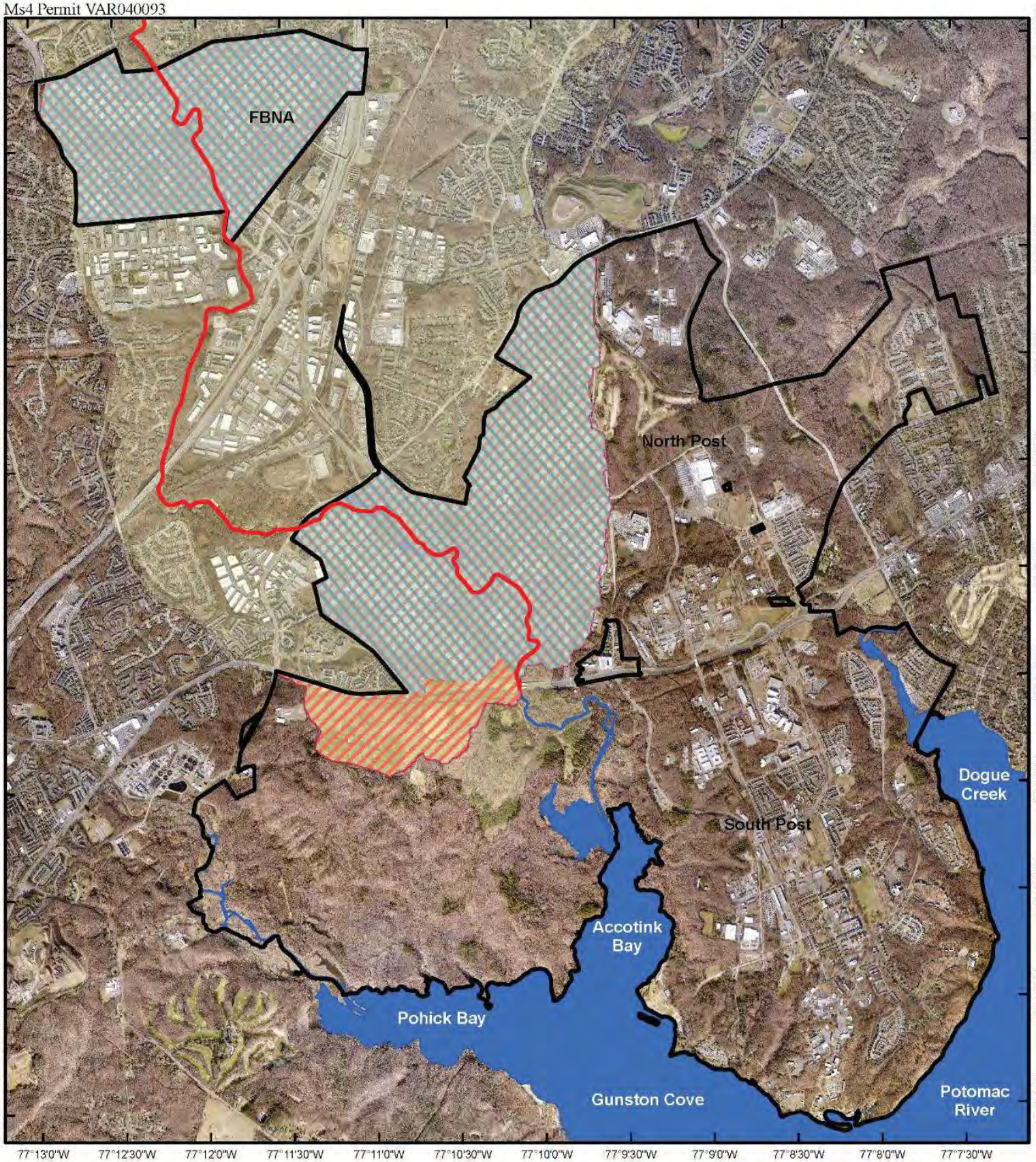

Figure 3:
2020 Census Urbanized Area
Within Impaired Watershed

N

2,750 1,375 0 2,750 5,500
Feet

Legend

- Fort Belvoir Boundaries
- Major Waterway
- Lower Accotink Creek Watershed
- Impaired Watershed Drainage Area
- 2020 Census Urban Area
- 303d Listed Stream Segment (VAN-A15R-01)

Fort Belvoir 2025 Chloride TMDL
Sources: Fort Belvoir, USEPA, Fairfax County

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Lorton, Virginia 22079

3.4. Areas Covered Under A Separate VPDES Permit

Guidance Memo 16-2006 states that the TMDL should assess significant sources of pollutants from facilities owned or operated by the MS4 permittee that are not covered under a separate VPDES permit. Therefore, to properly assess significant sources of Chloride that could contribute to the loads draining to impaired segments, Aerostar reviewed other state stormwater permits under the VPDES program and determined areas where separate permits cover discharges that are within the census-defined urban area described above. Two (2) other VPDES permits were found to cover areas within the census-defined urban area and within the impaired portion of the Lower Accotink watershed, as shown in Figure 4 and summarized in Table 2.

- The Virginia Department of Transportation (VDOT) operates under VPDES Permit No. VA040115 and holds easements for multiple portions of roads within the jurisdictional boundary. VDOT easements cover approximately 194 acres within the areas considered in this TMDL Action Plan, to include sections of Route 1, Fairfax County Parkway, Rolling/Barta Roads, and Interstate 95 (I95).
- Fort Belvoir currently holds a separate Individual Major Permit for Stormwater Discharges from Industrial (ISW) Activities Permit No. VA0092771. The 2017 ISW permit had 31 representative outfalls and covered discharges from these outfalls and their significantly identical outfalls. The area drained totals 762.5 acres - approximately 751 acres on the Main Post and 11.5 acres at FBNA.

  The ISW permit is currently in the process of renewal and is expected to be reissued in April 2025. Fort Belvoir is expecting a significant reduction of areas covered by the ISW permit with the reissuance and, therefore, only areas that will continue to be covered under the new ISW permit as per the currently available Draft Permit, such as DAAF, are shown in Figure 4.

  Chloride loading from operations at DAAF and other areas covered by the ISW Permit were considered in this plan, as roads and parking areas treated at DAAF are indistinguishable when assessing application rates. A full discussion of DAAF deicing and anti-icing operations are discussed in the Davison Army Airfield section.

Table 2: Areas Under Separate VPDES Permits

Permit Holder	Permit Type	Permit Number	Total Acres	Acres on Main Post	Acres at FBNA
VDOT	MS4	VA040115	194	45	149
Fort Belvoir	Industrial[1]	VA0092771	292.7	292.7	0
Total Acres Covered under separate Permit			**486.7**	**337.7**	**149**

[1] Only considers areas assumed to remain permitted after the reissuance of Permit No. VA0092771

MS4 Permit VAR040093

Author: Aerostar Environmental and Construction LLC

Date: 2/10/2025

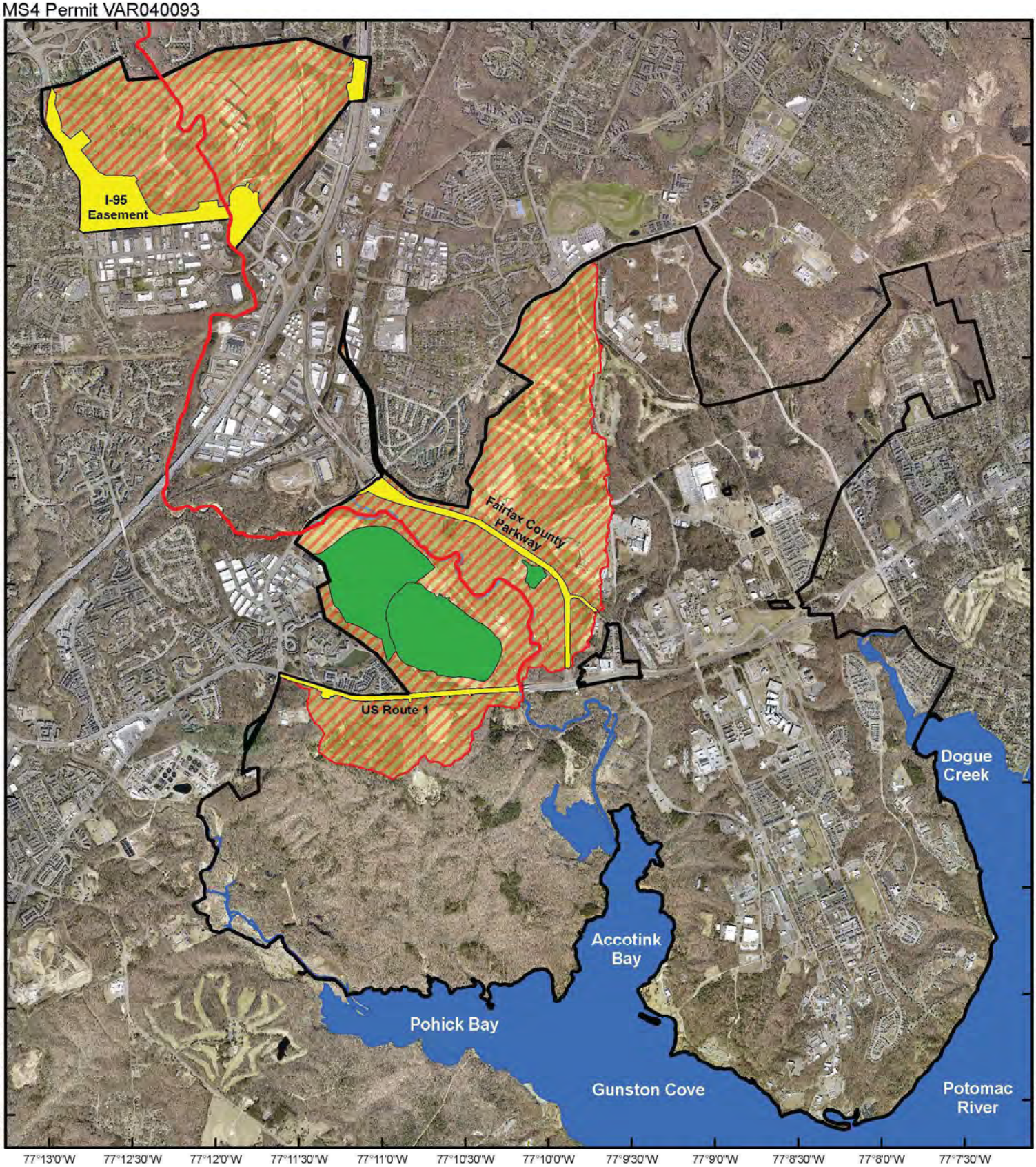

Figure 4:
Other VPDES Permits Within Impaired Drainage Area

N

2,750 1,375 0 2,750 5,500 Feet

Legend

- Fort Belvoir Boundaries
- Major Waterway
- VDOT Permit No. VA040115
- ISW Permit No. VA0092771
- Impaired Watershed Drainage Area Within Fort Belvoir
- 303d Listed Stream Segment (VAN-A15R-01)

Fort Belvoir 2025 Chloride TMDL
Sources: Fort Belvoir, USEPA, Fairfax County

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3.5. TREATMENT AREAS AND OPERATORS

To properly evaluate sources and to regularly assess improvements to chloride product application practices, it is important to quantify the areas where winter maintenance could or does occur, including roads and parking areas. Aerostar used GIS data available for roads and parking areas as well as any agreements in place to determine the total treatment area and the responsible maintenance provider. It was determined that winter maintenance within Fort Belvoir's jurisdictional boundary and the impaired drainage area is conducted by five (5) entities – four (4) that operate within the installation's MS4 service area with specific geographic areas of responsibility plus VDOT operating within its own MS4 service area. Figure 5 and Figure 6 provide detailed views of the treatment areas within the impaired drainage areas within FBNA and Main Post, respectively. Table 3 and the following sections provide a summary of findings.

Table 3: Treatment Areas by Maintenance Responsibility

Responsible Maintenance Entity	Treated Area (Acres)
FBNA Total MS4 Service Area within Lower Accotink Watershed = 653 acres	
NGA	26.6
DPW	17.4
Fort Belvoir FBNA Total Treatment Area	44
Main Post Total MS4 Service Area within Lower Accotink Watershed = 968.3 acres	
DLA	28.3
ADFE	1.4
DPW	43.8
Fort Belvoir Main Post Total Treatment Area	73.5

3.5.1. FBNA

Of the 802 acres at FBNA that are within the impaired drainage area, approximately 149 acres are covered under the VDOT permit and fall under their responsibility for maintenance. Much of the remaining area is not considered 'treatment areas' as it includes undeveloped areas, vegetated/wooded areas, or buildings where treatment would not occur. The assessment found that of the 802 acres only approximately 11% or 89.2 acres could be considered potential treatment areas including 69.4 acres of roads and 19.8 acres of parking areas. Of the 89.2 acres, 2.4 acres consist of unpaved or abandoned roads and 6.17 acres consist of permeable pavement where treatment would not occur. Therefore, FBNA has a total of approximately 67 acres of road surface and 13.6 acres of parking areas considered treatment areas.

There are three (3) winter maintenance providers identified as servicing the treatment areas at FBNA as shown in Figure 5. These included the National Geospatial-Intelligence Agency (NGA) through a standalone contract and Fort Belvoir Directorate of Public Works (DPW) through the Base Operation Contract as well as VDOT operating within its own MS4 service area. Of the 80.6 acres of treatment surface at FBNA, 26.6 acres are managed by NGA, 17.4 acres by DPW, and 36.6 acres by VDOT. Approximately 5% of the total FBNA acreage is treated by Fort Belvoir during the winter season.

It should be noted that as of February 2025, there were two major developments planned or in progress at FBNA that were not considered in this Action Plan update, due to lack of available data. Once development is completed and maintenance agreements/responsibilities are identified, this action plan will be updated to reflect the changes.

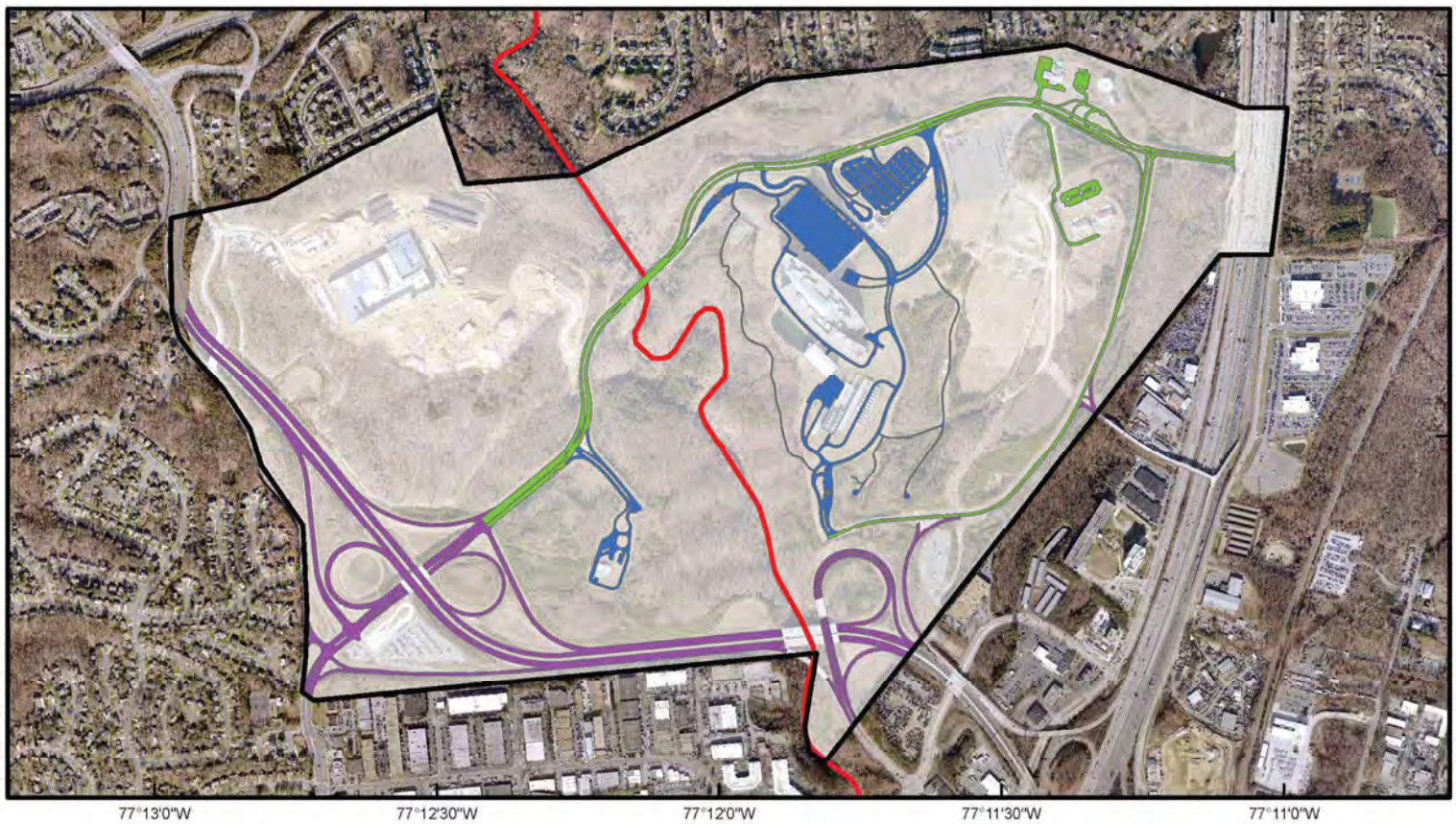
3.5.2. MAIN POST

Of the 1,306 acres on Main Post that fall within the impaired drainage area, approximately 45 acres are covered under the VDOT permit and fall under their responsibility for maintenance. Much of the area that is within Fort Belvoir's MS4 Service area and maintenance responsibility on Main Post is not considered 'treatment areas' as it includes undeveloped areas, vegetated/wooded areas, or buildings where treatment would not occur.

The assessment found that of the 1,306 acres only approximately 12.5% or 163.5 acres could be considered potential treatment areas consisting of 100.2 acres of roads and 63.3 acres of parking areas. Of the 163.5 acres, 5.3 acres consist of unpaved or abandoned roads, 11.8 acres are untreated parking areas, 3.2 acres are permeable pavement where treatment would not occur, and 50.2 acres consist of air traffic areas where non-chloride products are used for treatment. Therefore, Main Post has a total of approximately 93 acres considered treatment areas, consisting of 44.7 acres of road surface and 48.3 acres of parking areas.

There are four (4) winter maintenance providers identified as servicing the treatment areas on Main Post as shown in Figure 6. These include the Defense Logistics Agency (DLA) and the Aerospace Data Facility - East (ADFE) through standalone contracts and Fort Belvoir DPW through the Base Operations Contract as well as VDOT operating within its own MS4 service area. Of the 93 acres of treatment surface on Main Post, 28.3 acres are managed by DLA, 1.4 acres by ADFE, 43.8 acres by DPW, and 19.5 acres are managed by VDOT. Approximately 6% of the total Main Post acreage within the Lower Accotink Watershed is treated by Fort Belvoir during the winter season.

Author: Aerostar Environmental and Construction LLC



Date: 3/24/2025

38°45'30"N
38°45'0"N
38°44'30"N

77°13'0"W 77°12'30"W 77°12'0"W 77°11'30"W 77°11'0"W

Figure 5:
Treatment Areas at FBNA
and Maintenance Providers

N

1,100 550 0 1,100 2,200
Feet

Legend

- Fort Belvoir Boundaries
- VDOT Easement Permit No. VA040115
- 303d Listed Stream Segment (VAN-A15R-01)

Treatment Surfaces
- Roads
- Parking Areas
- Permeable Pavement

Providers
- DPW
- NGA
- VDOT

Fort Belvoir 2025 Chloride TMDL
Sources: Fort Belvoir, USEPA, Fairfax County

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Author: Aerostar Environmental and Construction LLC

Date: 3/24/2025

Figure 6:
Treatment Areas at Main Post and Maintenance Providers

N

1,500 750 0 1,500 3,000
Feet

Legend

- Fort Belvoir Boundaries
- VDOT Easement Permit No. VA040115
- 303d Listed Stream Segment (VAN-A15R-01)

Treatment Surfaces

- Roads
- Parking Areas
- Air Traffic Areas

Providers

- DPW
- DLA
- ADFE
- VDOT

Fort Belvoir 2025 Chloride TMDL
Sources: Fort Belvoir, USEPA, Fairfax County

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4. CHLORIDE SOURCE ASSESSMENT

To more effectively meet the requirements of Part II.B.8.c during the 2023-2028 MS4 Permit cycle, this chloride source assessment section of the Action Plan was restructured from that of the May 2021 Action Plan. This 2025 Action Plan includes the following:

- A summary of Fort Belvoir's overall contribution to chloride loading in the impaired segment of the Lower Accotink Watershed and an analysis of chloride application rates.
- A dedicated subsection for each of the four (4) entities conducting winter maintenance operations within the Lower Accotink Watershed on behalf of Fort Belvoir. Since each entity- the Base Operations contractor and three (3) autonomous tenants - DLA, NGA, and ADFE - conducts treatment operations independently, each subsection provides specific treatment products used, known practices, and a compilation of reported data as well as a discussion of deicing product storage. DLA and NGA were identified as storing deicing products seasonally within the impaired segment of the Lower Accotink Watershed.
- A discussion of winter maintenance activities at DAAF, which is not covered under Fort Belvoir's MS4 Permit but contributes to chloride loading within the impaired segment due to winter maintenance performed on its access roads and parking areas.
- Sampling results from four (4) representative outfalls across Fort Belvoir that were consistently sampled for chlorides in accordance with the installation's ISW Major VPDES Permit from 2017 through 2024.

Guided by the SaMS Toolkit, this new structure is intended to enhance overall analysis and assist in developing adaptive management strategies to optimize chloride usage in the Lower Accotink Watershed. Table 4 provides the total acreages treated by entity and breaks that total out into two categories - parking lots and roadways. The total treated area of 117.5 acres comprises 6.14% of the total 1,914 acres within the impaired segment of the Lower Accotink Watershed and Fort Belvoir's MS4 service area.

Table 4: Treated Areas by Entity within Lower Accotink Watershed & MS4 Service Area

Treatment Entity	Total Treated Area[1] (Acres)	Parking Lots (Acres)	Roadways (Acres)
Base Operations[1]	61.2	23.6	37.6
DLA[2]	28.3	20.6	7.7
NGA[2]	26.6	11.6	15
ADFE	1.4	0	1.4
Total Treatment Area	**117.5**	**55.8**	**61.7**

[1] Includes 16.7 acres at DAAF that are treated with chloride products by Base Operations, consisting of 9.2 acres of parking lots and 7.5 acres of roadway, small portions of which are a part of the ISW Permit.

[2] DLA and NGA store winter treatment products within the Lower Accotink Watershed and MS4 service area.

Figure 7 shows general treatment areas of responsibility for each entity, salt storage areas, and historical sampling locations across the installation. As shown, operations within the impaired drainage area are only a portion of overall winter maintenance across the installation which includes other stakeholders, such as privatized housing partners. Overall, the installation has approximately 817 acres of potential treatment surfaces with roads accounting for 371 acres and parking areas accounting for 446 acres. Note: this includes areas that will never be serviced (permeable pavement, unpaved, etc.).

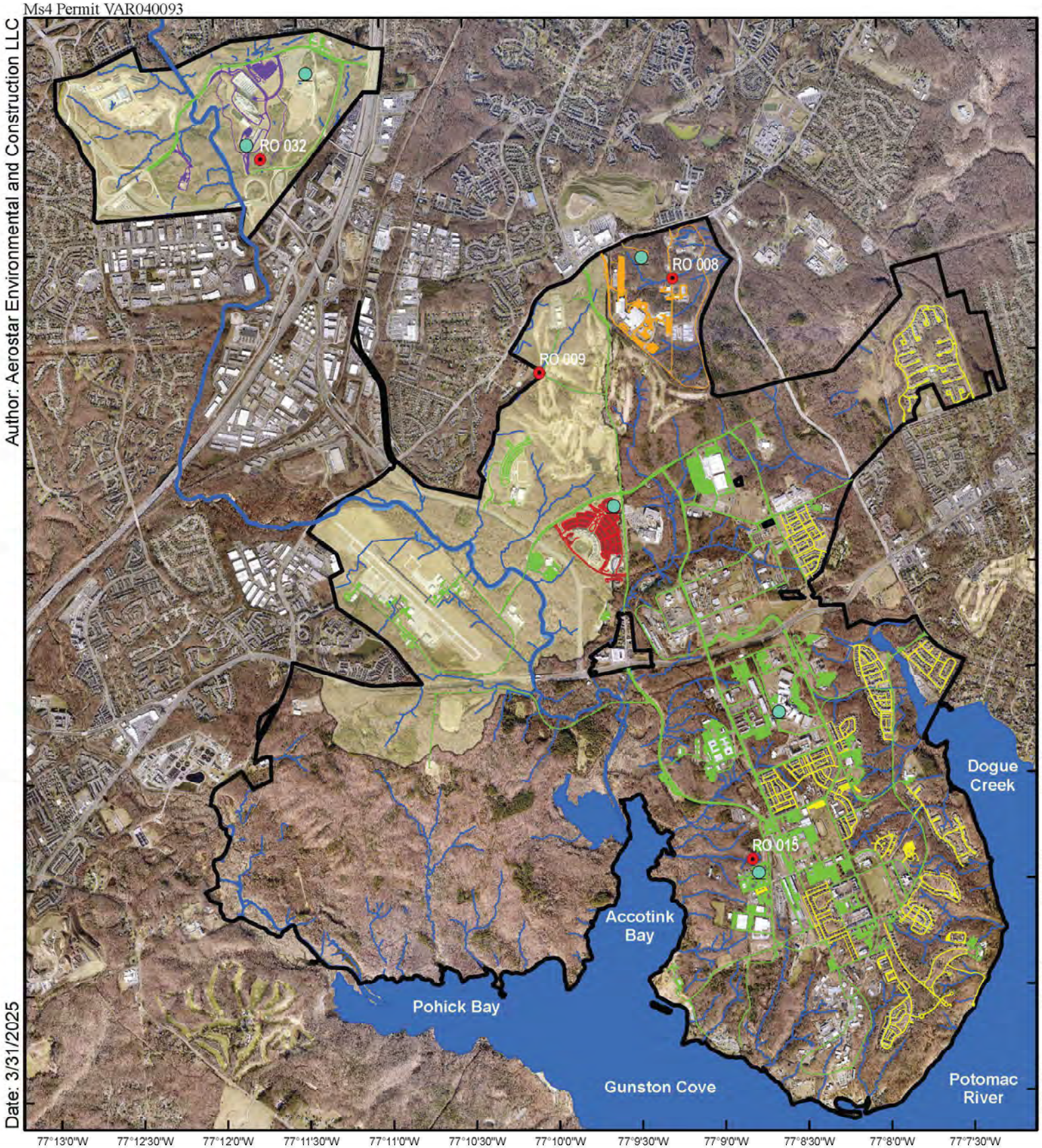

Figure 7:
Treatment and Storage Areas, and Sample Locations

N

2,750 1,375 0 2,750 5,500 Feet

Legend

- Fort Belvoir Boundaries
- Major Waterway
- Impaired Watershed Drainage Area
- Salt/Brine Storage Locations
- Sampling Locations (2017-2024)

Winter Treatment General Operational Areas

- Base Operations (DPW)
- Housing/Hotels (Privatized)
- NGA
- DLA
- ADFE

Fort Belvoir 2025 Chloride TMDL
Sources: Fort Belvoir, USEPA, Fairfax County

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4.1. Contribution to MS4 Aggregate Wasteload

As noted in the Introduction and Background, the WLA for chloride in the Lower Accotink Watershed is set as an aggregate of 3,294,323 lbs./year from three MS4s within the Lower Accotink Watershed – Fairfax County (which now includes Fairfax County Public Schools), VDOT, and Fort Belvoir.

Fort Belvoir's contribution to chloride loading in the impaired segment was determined by performing an analysis of the storm-specific response by each of the installation's winter maintenance providers. This analysis yielded season total chloride usage in the impaired segment as well as a general understanding of chloride application rates by entity. Methods of data reporting have changed and improved through implementation of the 2021 Plan. For this analysis, data provided by the winter maintenance entities was used when available. When original data sources were unavailable, data originating from the 2021 Action Plan and MS4 Annual Reports was used.

Table 5 provides a summary of findings, with the blue columns showing total chlorides used within the Lower Accotink Watershed at Fort Belvoir and the corresponding percentage of the aggregate WLA from 2017 through 2024. It should be noted that because Base Operations treatment area within the impaired watershed is a fraction of its overall treatment area, its product usage within the impaired segment is calculated based on the assumption that they apply products uniformly across their full area of responsibility. The percentage calculation is based on the most conservative assumption that all applied chlorides will enter the Lower Accotink Creek. The results indicate the following:

- Fort Belvoir's total annual chloride wasteload has ranged from 16,960 lbs. to 550,687 lbs., accounting for between 0.6% to 16.7% of the aggregate WLA.
- Base Operations' area of responsibility is approximately 50% of the installation's treated area within the impaired segment of the watershed, and the areas of DLA and NGA are approximately 25% each of the area. However, the amount of chloride products used by DLA and NGA are typically disproportionally more than 25% of total chlorides used.
- The available chloride usage data has become more advanced as implementation of the Chloride TMDL Action Plan progresses, producing better tracking ability and allowing for more targeted actions for improvement.

Table 5: Summary of Annual Application Rates and Total Chloride in Impaired Segment

Entity	Total Chlorides[1] (lbs.)	% WLA	No. Deployments (Partial & Full)	Annual Average Application Rates[2]			Number of Exceedances of Target Application Rates
				Bulk Solids (lbs./ ln mile)	Bagged Solids (lbs./ ln mile)	Brine (gal/ ln mile)	
2017-2018							
Base Ops.	278,758	8.5	6	1188	0	42	6
2018-2019							
Base Ops.	215,264	6.5	4	1613	34	38	5
2019-2020							
Base Ops.	19,001	0.6	2	320	15	15	1

Entity	Total Chlorides[1] (lbs.)	% WLA	No. Deployments (Partial & Full)	Annual Average Application Rates[2]			Number of Exceedances of Target Application Rates
				Bulk Solids (lbs./ ln mile)	Bagged Solids (lbs./ ln mile)	Brine (gal/ ln mile)	
2020-2021							
Base Ops.	311,881	9.5	8	1126	34	18	4
DLA	73,500	2.2	unknown	0	3766	0	1
	385,381	***11.7***	***Season Totals***				
2021-2022							
Base Ops.	240,787	7.3	4	1305	0	20	3
DLA	176,400	5.4	4	0	2260	0	4
NGA	133,500	4.1	7	627	4276	66	7
	550,687	***16.7***	***Season Totals***				
2022-2023							
Base Ops.	0	0	0	0	0	0	0
DLA	1,960	0.1	1	0	1960	0	1
NGA	15,000	0.5	1	337	0	34	0
	16,960	***0.6***	***Season Totals***				
2023-2024							
Base Ops.	81,696	2.5	4	462	0	21	2
DLA	43,120	1.3	3	0	736	0	2
NGA	96,250	2.9	5	465	796	14	5
	221,066	***6.7***	***Season Totals***				

[1] Base Operations chloride usage within the impaired segment must be calculated based on the assumption that they apply products uniformly across their full area of responsibility.

[2] Assumptions regarding storm-specific treated areas were required for several application rate calculations. Consequently, calculations provide a general approximation of application rates.

4.1.1. APPLICATION RATES

Table 5 also provides a summary of seasonal data by entity, including number of deployments, average application rates by general type of product, and the number of exceedances of target application rates. Application rate calculations are based on several assumptions regarding storm-specific treated areas. Thus, the results provide a general estimation of actual rates, and it was determined that analyzing the storm response of the three entities collectively is more instructive than a separate analysis of each entity. Appendix F, G, and H contain annual application rate analysis for Base Operations, DLA, and NGA respectively.

All calculated application rates were compared to target application rates provided in Salt Institute Standards found in the SaMS Toolkit and included in Appendix C of this Action Plan. The storm-specific analysis as well as the data provided in Table 5 indicate the following:

- All three entities consistently exceeded target application rates.
- Bagged ice melt, which is used mostly by DLA and NGA, had the highest application rates.

- Base Operations routinely exceeded target application rates for bulk solids but had the lowest application rates for bagged solids. Their brine application rates have remained below target application rates since the 2019-2020 season.
- DLA uses bagged solids exclusively. Their average chloride application rates are trending down but are still above target application rates.
- All application rates for NGA have decreased since the 2021-2022 season. Their brine application rates are below target rates, but their application rates for bulk and bagged solids remain above target rates.
- NGA tends to deploy more frequently than Base Operations or DLA. That may be due in part to the 24/7 operations at the facility as well as to the need to treat the roof and/or exterior stairwells of the parking garage, which, like bridges, freeze before road surfaces. It was noted, however, that NGA pretreated with bulk and bagged solids or brine three times over the course of the three years of available data and then no storm occurred.
- Overall application rates are decreasing for all three entities.

Control measures currently employed by each entity and progress made since the implementation of the 2021 Action Plan are described in the following sections.

4.2. Base Operations

Except for privatized areas such as housing that have their own provider, the Base Operations contractor is responsible for most winter storm maintenance on Fort Belvoir, accounting for approximately 305 acres of treatment areas across the installation of which 20%, or 61.2 acres, falls within the impacted drainage area. Treatment areas considered in this 2025 Action Plan were based on calculations completed using GIS data and differ substantially from those in the 2021 Action Plan. Available information at the time provided for less accuracy, consisting of a list of roads and parking lots where Base Operations was responsible for winter maintenance. The areas known to be within the impaired watershed were selected from the list, acreages were determined, and it was concluded that the Base Operations' treatment area within the Lower Accotink Watershed was 4.79% of its total treatment area.

As shown in Figure 5 and Figure 6, the area that Base Operations is responsible for within the Lower Accotink Watershed consists of two distinct areas:

- FBNA areas that lie outside of the NGA fence line
- Main Post areas that are within the Lower Accotink Watershed.

The total area at each location as well as a breakout by parking lots and roadways are provided in Table 6. Base Operations is also responsible for winter maintenance at DAAF, small portions of which are covered under Fort Belvoir's ISW Major VPDES Permit Number VA0092771. A discussion of winter maintenance operations at DAAF is provided in the Davison Army Airfield section.

Table 6: Base Operations Treatment Areas within Lower Accotink

Base Operations Treatment Area	Total Treated Area (Acres)	Parking Lots (Acres)	Roadways (Acres)
FBNA	17.4	2.1	15.3
Main Post[1]	43.8	21.5	22.3
Total	**61.2**	**23.6**	**37.6**

[1] Includes access roads and parking areas at DAAF, small portions of which may fall into the industrial service area

4.2.1. CONTRACT SPECIFICATIONS

Base Operations contracts are effective for five years, and a new contract is scheduled to be awarded in 2025. The current Base Operations contract includes Technical Exhibits (TEs) including one titled *Pavement Clearance (4-408)* dated 4 June 2018 and provided in Appendix B. Section 1.1 of the TE specifically states that:

> *Services shall commence when snow height is two inches or above, or when ¼ of an inch of ice accumulation occurs*

This TE identifies comprehensive requirements for Base Operations' winter maintenance activities such as ensuring at least one installation access control point is operational at all times, primary roads support safe movement of emergency vehicles, and FBNA roads are trafficable. It describes specific requirements for clearing streets, parking areas, sidewalks, stairs, catch basins, and areas around dumpsters and HVAC units as well as requirements for clearing the DAAF runway, taxiways, and parking ramps. The TE addresses snow stockpiling (when needed), pre-treatment activities, types of materials to be used, storage and minimum material supply requirements, pavement sweeping, and safety requirements.

Relevant aspects of the TE regarding operations that may impact chloride application and storage in Lower Accotink Watershed include:

- The Base Operations contractor is required to develop and update annually a Snow and Ice Removal Plan that contains specifically identified elements, including an inventory of materials for snow and ice removal
- A requirement to use a regenerative air sweeper to sweep pavement areas following completion of snow and ice removal and at the end of the snow removal season to maintain compliance with Fort Belvoir's TMDL Action Plans
- To reduce the hazard of refreezing, a sand and salt mixture should be applied to parking lots, excluding those with pervious pavement
- At DAAF, the use of ethylene glycol and deicing agents containing urea or other forms of nitrogen or phosphorus are specifically prohibited. The contractor is required to submit Safety Data Sheets to Fort Belvoir for approval of abrasives, chemicals, and application methods prior to use.
- Provision for pre-treatment of roads, parking lots, and sidewalks with de-icing material, salt and/or sand, or salt-brine
- Brine mixing must be done in accordance with Fort Belvoir's Brine Mixing Fact Sheet (available upon request) and applied in accordance with manufacturer's recommendations
- The contractor must ensure that all de-icing materials, sand, and salt are in compliance with local procedures and are acceptable to the Contracting Officer's Representative (COR).

The TE includes Fort Belvoir Regulation (FB Reg) 525-1, *Ice and Snow Removal and Road Sanding*, dated 30 December 2011, which prescribes policies, responsibilities, and procedures for ice and snow removal and road sanding on the installation. FB Reg 525-1 states that the following is Fort Belvoir policy:

> *Airfields, parking areas, roads, and sidewalks on the installation will be cleared of snow and ice and sanded only to the extent necessary to permit free movement of pedestrian and vehicular traffic.*

The regulation requires activation of the Installation Emergency Operations Center if snowfall is forecast to accumulate more than two (2) inches, and it assigns specific responsibilities to the Directorates of Plans, Training, Mobilization, and Security (DPTMS); Public Works (DPW); and Emergency Services (DES) as well as all commanders, directors, chiefs of activities, and partner agencies and commands. It also discusses communication and coordination efforts as well as safety requirements.

Finally, FB REG 252-1 includes appendices with prioritized lists of roads, parking areas, and sidewalks for snow and ice removal. According to personnel in the Operation and Maintenance Division, the lists do not account for the entire treatment area on the installation as it only includes high priority locations and designated snow routes. Essentially, Base Operations is responsible for clearing all roads and parking areas not covered under other operators.

The 2025 contract is expected to maintain similar installation requirements as noted above. Appendix B will be used to maintain current contract specifications, plans, and inventories for the Base Operations contract, with updates conducted as needed.

4.2.2. EQUIPMENT MAINTENANCE PRACTICES

The Base Operations contractor is responsible for maintaining their own winter storm maintenance equipment with most equipment stored at their facility located on the corner of 16th Street and Theote Road, which lies outside of the boundaries of the impaired segment of the Lower Accotink Watershed. A detailed list of snow removal and treatment equipment owned and operated by the Base Operations contractor, including snow blowers, plow blades of various sizes, and sand and salt spreaders, is provided in Appendix B.

Calibrating equipment, such as spreaders and brine mixers, provides a means to quantify and control the amount of chloride applied during winter storm maintenance. The SaMS Toolkit recommends that calibration should occur for all salt application equipment including components that control flow settings, conveyor/ auger and spinner speeds, ground speed, and material (size, density, etc.). Calibration is recommended in the pre-season (October), mid-season (December-January), and any time changes are made to equipment or change is made to the material (to include dry deicer to pretreated/pre-wetted salt). Brine mixing equipment should be calibrated at least once annually.

- Establishing an equipment calibration process was identified as a BMP in the 2021 Action Plan. A calibration form and instructions were identified by Fort Belvoir DPW and are included in Appendix E. Annual calibration for salt and sand spreaders as well as the brine mixer was initiated around the beginning of the 2022-2023 winter season.

At the end of each season, the Base Operations contractor conducts winter season demobilization. This includes cleaning equipment at a wash rack located at the corner of Meade and Gunston Roads, outside of the Lower Accotink Creek Watershed. This wash rack drains to a sedimentation basin equipped with an oil water separator and discharges to the sanitary sewer. Consequently, this practice does not contribute to chloride loading into the Lower Accotink Creek Watershed. The clean equipment is then stored in an open area on the eastern side of the Base Operations facility until the following season.

4.2.3. SALT STORAGE

The Base Operations contractor stores all chloride products at their facility located on Fort Belvoir Main Post at the corner of 16th Street and Theote Road, as shown in Figure 7. This facility is not located within the boundaries of the impaired segment of the Lower Accotink Watershed.

A large dome storage building, Building 1117, is used to store up to 600 tons of bulk material, typically an 80% MgCl and 20% sand mixture. The dome provides storm-resistant shelter, and concrete barriers are located on each side of the building entrance to mitigate the spread of residual salt during loading and

unloading operations. Brine mixing and loading operations occur within and adjacent to Building 1114, which is located just southeast of the salt dome.

- Construction of a brine salt storage building which holds up to 25 tons of bulk MgCl brine salt, adjacent to Building 1114, was completed in August 2020. It was built within a bermed area to provide secondary containment, has a roof, three solid walls, a concrete floor, and a vinyl curtain to protect chlorides from the elements.
- Two brine tanks - one 1,000-gallon and one 3,000-gallon - are located within a secondary containment berm next to the brine salt storage building. These tanks are used to load applicator trucks with brine for anti-icing operations.
- A brine mixing machine is located within Building 1114 and feeds brine mixture into a 500-gallon MgCl brine salt tank attached to the western side of the building.
- Approximately 240 – fifty-pound bags of ice melt are also stored inside the building.

Historically, the Base Operations facility has been covered under Fort Belvoir's ISW Major VPDES permit. In accordance with the ISW permit and due to safety concerns with accessing nearby ISW Representative Outfall (RO)-015, sampling is conducted at the end of a grassed channel located at the north end of the facility and less than 300 feet from the salt dome, as shown in Figure 7.

- Sampling results for available chloride are provided in Section 4.6 Chloride Sampling Results. Three exceedances of the Virginia Acute Water Quality Criteria (WQC) have occurred since chloride sampling was initiated in 2017. Following thorough investigations, corrective actions, including salt dome repairs, were implemented, and subsequent sampling results were below the WQC.

With the reissuance of the ISW Permit, expected in April 2025, it is anticipated that this facility will be moved to the MS4 service area and will be managed as a high priority facility (HPF) with a facility-specific Stormwater Pollution Prevention Plan (SWPPP) that includes BMPs for chloride storage. Although this salt storage area is not located within the boundaries of the Lower Accotink Watershed and is therefore not considered a source of chlorides to the watershed, Fort Belvoir recognizes that a SWPPP that includes BMPs for salt storage and management must be maintained for this facility.

4.2.4. MATERIALS TRACKING AND REPORTING

The Base Operations contractor uses a system of weighing trucks before and after spreading any bulk solid treatment products to determine the amount of product used. By applying recommendations found in the SaMS Toolkit, the data that is reported by Base Operations has evolved significantly since the implementation of the 2021 Action Plan.

- In the 2017-2019 winter seasons, only product usage data was reported.
- Starting in 2020, a Salt Tracking and Reporting Data Sheet has been submitted and includes storm data, storm-specific product usage, and an evaluation of the effectiveness of BMPs.

Brine mixing rates have also changed through the implementation of the 2021 Action Plan.

- The 2021 Action Plan indicates that the brine mixing rate, at that time, was determined to be 8.34 lbs./gallon.
- In November 2022, in preparation for the 2022-2023 winter season, the brine mixing rate was revised to 2.5 lbs./gallon to aim to achieve a 23.3% salt solution and has remained at this mixing rate.

During production of this 2025 Action Plan, product usage data for Base Operations from 2017 through 2024 was reviewed. A summary is provided in Table 7. Since Base Operations reports total product usage which includes application onto treatment surfaces across the installation, a calculation must be used to approximate the amount of product used within the Lower Accotink Watershed. The calculation assumes that Base Operations applies products uniformly across the installation and uses the ratio:

$$\frac{Base\ Ops.\ Treatment\ Area\ within\ Watershed}{Base\ Ops.\ Total\ Treatment\ Area} = \frac{Base\ Ops.\ Product\ Used\ in\ Watershed}{Base\ Ops.\ Total\ Product\ Used}$$

Thus, multiplying Base Operations total product used by the percentage that the Lower Accotink treatment area makes up of Base Operations' total area of treatment will yield the amount of chloride products used in the watershed.

- In the 2021 Action Plan, the Base Operations treatment area within the Lower Accotink Watershed was calculated to be 4.79% of the total area treated by Base Operations across the installation.
- In this 2025 Plan more accurate GIS data was available and determined that 20% of Base Operations' overall treatment area is within the Lower Accotink Creek Watershed.

Table 7 shows the amount of total product usage by Base Operations for the season on the light gray bar in black text. The product usage within the Lower Accotink Watershed and MS4 service area, based on 20% of the total product usage, is shown in blue text.

Table 7: Base Operations Product Usage by Season

Treatment Season	80/20 Magnesium Chloride (MgCl) and Sand Mixture (tons)	MgCl (tons)	NaCl (tons)	Abrasives (tons)	Ice Melt (lbs.)	MgCl Brine (gallons)	NaCl Brine (gallons)
2017-2018[1]	825	0	0	n/a	0	8,848	0
	165	**0**	**0**	**n/a**	**0**	**1770**	**0**
2018-2019[1]	581	0	0	n/a	14,400	15,900	0
	116	**0**	**0**	**n/a**	**2880**	**3180**	**0**
2019-2020[1]	54	0	0	n/a	2,400	750	0
	11	**0**	**0**	**n/a**	**480**	**150**	**0**
2020-2021[2,3]	0	713	0	0	7,200	10,650	4,500
	0	**143**	**0**	**0**	**1440**	**2130**	**900**
2021-2022[2]	0	548.8[4]	0	137.2[4]	0	12,750	0
	0	**110**	**0**	**27**	**0**	**2550**	**0**
2022-2023[2]	0	0	0	0	0	0	0
	0	**0**	**0**	**0**	**0**	**0**	**0**
2023-2024[2,3]	0	0	190.4[4]	47.6[4]	0	0	11,060
	0	**0**	**38**	**10**	**0**	**0**	**2212**

[1] Based on a Historical Salt Usage Data Spreadsheet
[2] Based on completed Salt Tracking and Reporting Data Sheets
[3] Values from operator tracking sheets and differ from the reported information on the MS4 Annual Report
[4] Note that chlorides and abrasives (sand) were reported separately and when combined account for an 80/20 mixture.

A review of the 2021 Action Plan and MS4 Annual Reports from 2021-2022, 2022-2023, and 2023-2024 noted the following:

- Product usage in the 2021 Action Plan was reported on a calendar year basis in lieu of a seasonal basis and included four (4) years of data from Base Operations and one (1) year of data from DLA. During this 2025 update, application by operators have been separated and reorganized by winter season (October-March).
- The 2021 Action Plan and the three annual reports reported that three products – 80/20 MgCl and sand mixture, MgCl brine solution, and ice melt - were used by Base Operations throughout the period from 2017-2024. As seen in Table 7, Base Operations reported utilizing more products than the three originally accounted for.

4.2.5. DAVISON ARMY AIRFIELD (DAAF)

DAAF is located within the Lower Accotink Watershed and portions of it are covered under Fort Belvoir's ISW Major VPDES Permit Number VA0092771. Although it is not entirely a part of Fort Belvoir's MS4 service area, due to its location within the Lower Accotink Watershed, Fort Belvoir did consider its winter maintenance operations as part of this plan.

Treatment operations at DAAF are performed by Base Operations and can be divided into two distinct areas as shown in Table 8:

Table 8: Base Operations Treatment Areas at DAAF

Treatment Area	Total Area Treated (Acres)	Parking Lots (Acres)	Roadways (Acres)	Chloride-Containing Treatment Product
Runway and Other Air Traffic Areas	50.3	0	0	No
Access Roads and Parking Lots	16.7	9.2	7.5	Yes
Total Area	67	9.2	7.5	

The runway and other air traffic areas at DAAF are treated with non-chloride products, which is a specific requirement of the Base Operations' contract TE that states *"salt will not be used on any paved surfaces at DAAF"*. The two primary products used on the runway and other air traffic areas are:

- Cryotech NAAC Solid Runway Deicer
    - Sodium Acetate solution (~97% anhydrous Sodium Acetate, <1% Corrosion Inhibitors)
- Cryotech E36 Liquid Runway Deicer
    - Potassium Acetate solution (~50% Potassium Acetate, ~50% Water, <1% Corrosion Inhibitors)

While these two products are found to have a moderate toxicity and Biological Oxygen Demand when compared to standard chloride products, they tend to work faster at lower temperatures and need less material for application. It has been determined that they are necessary for mission essential operation at DAAF, and use of these products is restricted to this area alone. These non-chloride products are stored inside Building 1114 located at the Base Operations contractor facility, as shown in Figure 7, and are not within the impaired segment of the Lower Accotink Watershed.

The access roads and parking lots at DAAF are treated with the same chloride-containing products that the Base Operations contractor uses on all other roads and parking lots on the installation. DPW continues to work with Base Operations to improve salt management practices and optimize salt application rates across the installation. Therefore, the application of chloride products on the access roads and parking lots at DAAF as a source of chlorides in the impaired segment is addressed by the overall efforts to improve Base Operations' salt management practices.

Chloride Usage Totals at DAAF

As discussed in the Introduction and Background, the VADEQ aggregate Industrial Stormwater WLA for the Lower Accotink is 117,071 lbs./year. An analysis was performed to determine the total chloride usage at DAAF such that it can be compared to the aggregate WLA. This analysis was performed for the 2023-2024 season - the most recent season that brine was applied since the brine mixing rate was reduced - using data from the Salt Tracking and Reporting Data Sheet submitted by the Base Operations contractor.

First, the total pounds of chlorides applied by Base Operations across the installation was determined as shown in Table 9:

Table 9: Calculation of Total Pounds of Chloride Used Across Fort Belvoir for 2023-2024

Product	Amount	Conversion to Pounds	Amount of Product (lbs.)
NaCl	190.416 tons	x 2,000 lbs./ton	380,832
NaCl Brine	11,060 gallons	x 2.5 lbs./gallon	27,650
Total Pounds Chlorides Applied Across Fort Belvoir			408,482

Then, a calculation was made to determine the percentage of treatment area that DAAF roads and parking areas make up as part of Base Operations total treatment area:

$$\frac{Treated\ Areas\ at\ DAAF}{Total\ Treated\ Areas\ by\ Base\ Operations} = \frac{16.7\ acres}{305.25\ acres} = 5.47\%$$

Based on the assumption that Base Operations applies chloride products uniformly throughout the installation, the number of pounds of chlorides applied at DAAF was calculated as 5.47% of the total pounds applied that season:

$$408{,}482\ lbs/year \times 0.0547 = 22{,}344\ lbs/year$$

Finally, the total of 22,344 lbs./year was compared to the VADEQ aggregate Industrial Stormwater WLA of 117,071 lbs./year:

$$\frac{22{,}344\ lbs/year}{117{,}071\ lbs/year} = 19\%$$

Thus, for the 2023-2024 season, it was estimated that application of chlorides on the access roads and parking areas of DAAF contributed 22,344 lbs., or 19% of the aggregate Industrial Stormwater WLA for the Lower Accotink Watershed.

4.3. DEFENSE LOGISTICS AGENCY (DLA)

DLA headquarters are located on Fort Belvoir Main Post, with the majority of the DLA complex located within the Lower Accotink Watershed and covered within the service area of the MS4 Permit. The facility is an autonomous tenant, and they are responsible for their own winter maintenance which is contracted to an outside company. Figure 6 delineates DLA's treatment area, which consists of a total of 28.3 acres of which 20.6 acres are parking lots and the remainder is 7.7 acres of roadway surface.

4.3.1. SALT STORAGE

Salt storage at DLA is located on an old baseball field inside the DLA complex, southwest of the intersection of John J. Kingman Road and Beulah Street. Figure 7 shows the location of the site, which is within the Lower Accotink Watershed and the MS4 service area. Construction and landscaping materials, grounds maintenance equipment and materials, and winter maintenance materials are stored at the facility, and due to these storage activities, this lot is considered a HPF which requires a facility-specific SWPPP under Part I.E.6.i.(1)-(9) of the MS4 General Permit, effective 1 November 2023.

According to the HPF inspection and evaluation conducted on 6 December 2023, during the winter months, bags of salt are stored in this area on pallets and covered with a weighted down tarp. The bags of salt are removed in offseason months. Winter maintenance equipment is stored on site, and all salt applicators are stored covered with strapped down tarps whether on a truck or on a pallet, effectively preventing rain accumulation and exposure.

The site is considered to have a low potential for discharging pollutants as it is comprised of gravel and grass that naturally supports infiltration. No stormwater infrastructure exists within the lot, and it relies on surface runoff to the surrounding parking areas to the north, south, and west. Stormwater that does not infiltrate flows offsite as sheet flow into the existing stormwater system via curb/area inlets located in the adjoining parking areas. The baseball field fence is still in place delineating the perimeter of the lot, and silt fence has been installed along the bottom of the southwest side of the fence to add a barrier to sediment movement.

Inlets located in the parking area to the south and west of the lot collect and direct flow from the site towards a stormwater management facility (SMF) located at the southwestern perimeter of the DLA campus. Flows from the SMF discharge to a piped stream under Fairfax County Parkway via an outfall to the west. A small portion of the site directs runoff to the north where it would be captured by a curb inlet and directed northeast to an outfall which flows to an unnamed tributary to Accotink Creek.

Due to the location of salt storage and the best management practices taken to protect it from precipitation and runoff, salt storage at DLA is not considered a significant source of chloride to the Lower Accotink Watershed.

4.3.2. MATERIALS TRACKING AND REPORTING

DLA exclusively uses bagged ice melt reported as containing approximately 98% chlorides throughout the complex. The amount of ice melt used per storm is tracked by the number of pallets used. One pallet consists of 40 bags each weighing fifty (50) pounds, or one pallet is one ton. DLA reports the number of pallets, bags, and pounds of product used per storm event to Fort Belvoir's DPW. Table 10 provides a summary of product usage by DLA by season.

Table 10: DLA Product Usage by Season

Treatment Season	Ice Melt		
	Pallets	Bags	Pounds
2020-2021	75	3000	150,000
2021-2022	90	3600	180,000
2022-2023	1	40	2,000
2023-2024	22	880	44,000

4.4. NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA)

NGA is located at Fort Belvoir North Area (FBNA). The entirety of FBNA is located within the Lower Accotink Watershed and covered within the service area of the MS4 Permit. NGA is an autonomous tenant responsible for winter maintenance activities within its fence line, which are contracted to an outside company. The Base Operations contractor is responsible for all winter maintenance at FBNA that is outside the NGA fence line. Figure 5 delineates NGA's treatment area, which consists of a total of 26.6 acres. Parking lots, including the roof of a parking garage, account for 11.7 acres and the remainder consists of 14.9 acres of roadway surface.

Historically, two areas of FBNA were covered under Fort Belvoir's ISW Major VPDES permit with those areas draining to RO-031 and RO-032. It is anticipated that these areas will be moved to coverage under Fort Belvoir's MS4 Permit with onsite salt storage areas managed as an HPF. Thus, these areas have been considered in this plan.

It should be noted that there are multiple construction projects currently occurring at FBNA, which will add winter maintenance area to FBNA. This Chloride TMDL plan will be updated to reflect the changes when appropriate.

4.4.1. SALT STORAGE

Salt storage at NGA occurs seasonally in two locations on the eastern half of FBNA as shown on Figure 7. At the end of the season, all products are removed from the facility.

One storage area is located on the southern corner of Building 5104 and within the drainage area for ISW outfall RO-032. Bulk salt is stored in a blocked, covered impoundment area that holds approximately 40 tons of material. A nearby area is used to store bagged deicer that is kept covered to prevent exposure to stormwater.

Winter brine tanks are stored in a dedicated area located at the southeast corner of the overflow parking lot. Two 3,000-gallon brine tanks are kept within a 66-foot vinyl berm used as secondary containment and capable of holding 110% of tank contents.

NGA facility personnel employ several operational controls to prevent chloride materials from encountering stormwater runoff. The brine tanks are not to be filled to more than 90% capacity. Spill supplies are kept readily available in case any incidental releases occur. Site personnel receive training for salt handling, storage, and application as described in Fort Belvoir BMP Fact Sheets 4 and 5 (available upon request). Daily and post storm inspections as well as maintenance and incident response are conducted in accordance with site operating procedures and are documented on a dedicated form. Additionally, a weekly walkthrough of the exterior of the building includes an inspection of salt storage locations for any signs of spillage or illicit discharge.

In accordance with the ISW permit, nearby ISW Outfall RO-032 is sampled semi-annually, and chloride samples are taken during the winter season (October – March). Chloride concentrations have been monitored since 2018, and sample results have never exceeded WQC for chlorides in surface waters. Results can be found in the Chloride Sampling Results section. It is anticipated that this facility will be moved to the MS4 service area and will be managed as an HPF with a SWPPP that includes BMPs for chloride storage and usage.

The best management practices employed at this facility as well as the chloride monitoring results at RO-032 indicate that the storage of chloride products at NGA is not considered a significant source of this POC to state waters.

4.4.2. MATERIALS TRACKING AND REPORTING

NGA uses a Winter Weather Treatment Product Tracking/Reporting Form to track winter deicing product deliveries, onsite storage amounts, and storm characteristics data as well as the type and amount of product used, and square footage of area treated per storm event.

NGA uses bulk product, bagged ice melt, and brine as shown in Table 11.

- NGA reports its brine specifications annually, which is made up of 2.06 lbs./gallon NaCl and 0.44 lbs./gallon MgCl.
- Bagged products consist of various brands depending on what is available at the time of purchase and thus the chemical makeup of the chloride products varies. For example, the data that NGA provided to Fort Belvoir DPW for the 2023-2024 season lists three different brands of products delivered on one-ton pallets, each consisting of forty 50-pound bags. Because the makeup of the deicers used varied, NGA calculated average concentration percentages of deicer chemicals.

Table 11: NGA Product Usage by Season

Treatment Season	80/20 Magnesium Chloride (MgCl) and Sand Mixture (lbs.)	Bulk NaCl (lbs.)	Ice Melt (lbs.)	NaCl & MgCl Brine (gallons)
2021-2022[1]	0	114,000	14,000	2,200
2022-2023[2]	12,000	0	0	1,200
2023-2024[1]	0	44,000	51,000	500

[1] Based on completed Salt Tracking and Reporting Data Sheets
[2] Based on 2022-2023 MS4 Annual Report

A review of the 2021 Action Plan and MS4 Annual Reports from 2021-2022, 2022-2023, and 2023-2024 noted the following:

- NGA chloride product usage was not considered in the 2021 Action Plan. Separate reporting of NGA's product usage and application rates were initiated with the 2021-2022 MS4 Annual Report.
- The Salt Tracking and Reporting Data Sheets completed by NGA for 2021-2022 and 2023-2024 indicate that bulk 99%+ NaCl was used during these two seasons. The corresponding MS4 Annual Reports reported that NGA used an 80/20 MgCl and sand mixture, which was not used according to NGA tracking and reporting.

- The Salt Tracking and Reporting Data Sheets completed by NGA for 2021-2022 and 2023-2024 indicate that the brine solution is made up of 2.06 lbs./gallon NaCl and 0.44 lbs./gallon MgCl. The corresponding MS4 Annual Reports reported that NGA used an MgCl brine.
- The Salt Tracking and Reporting Data Sheets completed by NGA for 2021-2022 and 2023-2024 indicate that the ice melt contains 100% chlorides. The corresponding MS4 Annual Reports state that the ice melt was 98% chlorides.
- The Salt Tracking and Reporting Data Sheets completed by NGA for 2023-2024 indicate that 44,000 lbs. of bulk NaCl was used. This was not reported in the corresponding MS4 Annual Report. The MS4 Annual Report states that 1,520 lbs. of 80/20 MgCl and sand mixture was used, which was not found on NGA's tracking and reporting sheet.
- The Salt Tracking and Reporting Data Sheets completed by NGA for 2023-2024 indicate that 51,000 lbs. of ice melt was used. The corresponding MS4 Annual Report states that 49,980 lbs. of ice melt was used.

4.5. Aerospace Data Facility - East (ADFE)

ADFE is located on the north side of Fort Belvoir Main Post. As shown on Figure 6, a small portion of Road B at the access control point for ADFE, consisting of 1.4 acres of road surface, is located within the Lower Accotink Watershed and Fort Belvoir's MS4 service area. Due to the negligible size of this area making up just 1.2% of Fort Belvoir's total treatment area within the Lower Accotink Watershed and Fort Belvoir's MS4 service area, Fort Belvoir determined that including appropriate winter maintenance personnel from ADFE in Salt Management Training is the most effective way to address this area.

4.5.1. Salt Storage

Salt storage occurs at ADFE at a grounds maintenance storage facility located in the north central part of the ADFE complex as shown in Figure 7. This facility is located within the Dogue Creek Watershed and has no impact on the Lower Accotink Creek Watershed.

Historically, several acres of ADFE, including the salt storage area, has been covered under Fort Belvoir's ISW Major VPDES Permit Number VA0092771, with this area draining to ISW RO-008. Monitoring for chlorides has been conducted at RO-008 since 2017. Sample results, found in the Chloride Sampling Results section, have never exceeded WQC for chlorides in surface waters. It is anticipated that this facility will be moved to the MS4 service area and will be managed as a HPF with a SWPPP that includes BMPs for chloride storage.

4.6. CHLORIDE SAMPLING RESULTS

Four (4) representative outfalls across Fort Belvoir, as shown on Figure 7, have been consistently sampled for chlorides in accordance with the installation's ISW Major VPDES Permit between 2017 and 2024. Two (2) outfalls –RO-009 and RO-032 - are within the Lower Accotink Watershed. All four outfalls are sampled semi-annually with chloride samples taken during the winter season (October – March). This information provides good quantitative data showing the direct impacts from storage activities and application of products for key locations on the installation.

The following provides background information for each outfall as well as a summary of sampling results. Analysis is done using grabs samples, and therefore, the results are compared to the Virginia Acute WQC for chlorides in surface waters of 860 mg/L. Exceedances are shown in red text.

- **RO-008** is located within the ADFE complex, is within the Dogue Creek Watershed, and has no impact on the Lower Accotink Creek Watershed. It drains approximately 8.1 acres of the ADFE complex, including the salt storage area at their ground maintenance storage facility, a fuel storage area, a vehicle fueling location, roads, parking areas, roofs, a BMP area, and forested area.

  As noted in Section 4.5, it is anticipated that the storage area will be moved to coverage under Fort Belvoir's MS4 permit as an HPF. Table 12 provides a summary of sampling results for RO-008 between 2017 and 2024. Based on chloride monitoring at this outfall, the storage and application of chloride products in this area is not considered a significant source of this POC to state waters – specifically the unnamed tributary to Dogue Creek.

Table 12: Chloride Sampling Results for RO-008

Sample Date	Sample Results (mg/L)
WQC	**860**
3/18/2017	**218**
3/20/2018	**149**
8/13/2019	**273**
10/29/2020	**7.78**
1/10/2021	**10.4**
10/29/2021	**54.9**
3/9/2022	**65.3**
12/6/2022	**70.7**
2/16/2023	**17.4**
1/9/2024	**27.2**
7/12/2024	**33.3**
Average Detection	**84.27**

- **RO-009** is located within the boundaries of the Fort Belvoir Golf Course and is within the Lower Accotink Watershed. This outfall drains approximately 103 acres located to the north of the outfall, consisting of the southern portion of the golf course maintenance facility, a BMP area, a portion of Swank Road, forested area, and portions of the golf course. It was previously thought that salt was stored at the maintenance facility, but no salt is stored at the golf course due to the nature of their operations.

It is anticipated that the golf course maintenance facility will be moved to coverage under Fort Belvoir's MS4 permit as an HPF. Table 13 provides a summary of sampling results for RO-009. Based on chloride monitoring at this outfall, activities in this area are not considered a significant source of this POC to the Lower Accotink Watershed.

Table 13: Chloride Sampling Results for RO-009

Sample Date	Sample Results (mg/L)
WQC	**860**
2/4/2018	**107**
7/17/2018	**16.7**
3/8/2019	**0.90**
12/9/2019	**0.582**
4/23/2020	**<2.0**
11/11/2020	**1.23**
3/31/2021	**3.56**
9/1/2021	**<2.0**
2/3/2022	**14.4**
11/11/2022	**5.25**
2/16/2023	**1.33**
1/9/2024	**3.23**
7/12/2024	**4.85**
Average Detection	**12.2**

- **RO-015** is located on Fort Belvoir Main Post and is not within the boundaries of the impaired segment of the Lower Accotink Watershed. It drains approximately 70.3 acres, including a portion of the Base Operations facility, the 249th Maintenance Facility, the LRC Maintenance Facility, streets, parking areas, grassed areas, and a large BMP area. Due to safety concerns with accessing RO-015, sampling is conducted at the end of a grassed channel located just north of the Base Operations facility and less than 300 feet from the salt storage dome, Building 1117. It is anticipated that the Base Operations facility, the 249th Maintenance Facility, and the LRC Maintenance Facility will be moved to coverage under Fort Belvoir's MS4 permit as HPFs.

  Table 14 provides a summary of sampling results for RO-015. As highlighted in red, there have been three exceedances of the Acute WQC for chloride. The exceedances in 2017 and 2018 were determined to be due to damage to the salt dome. Upon completion of repairs, the chloride sample results dropped below the WQC. An exceedance in February 2022, was attributed to several factors, including damage to the salt dome and deteriorated brine piping connections as well as housekeeping. Corrective actions (CA) were identified and implemented, repairs were completed, and subsequent sampling results have been below the WQC.

Table 14: Chloride Sampling Results for RO-015

Sample Date	Sample Results (mg/L)
WQC	**860**
2/28/2017	**1,050**
1/23/2018	**7,010**
3/8/2019	**499**
7/11/2019	**425**
4/23/2020	**56.6**

Sample Date	Sample Results (mg/L)
WQC	**860**
11/11/2020	**18.2**
10/29/2021	**29.1**
2/23/2022	**11,700**
12/6/2022	**121**
1/25/2023	**38.4**
11/21/2023	**15.3**
1/9/2024	**113**
Average Detection (Overall)	**1756.3**
Average Detection (Post CAs in 2022)	**71.93**

- **RO-032** is located at FBNA and is within the Lower Accotink Watershed. It drains an area that consists of a fuel storage area, a seasonal salt storage area, a roadway, roofs, grassed areas, and multiple BMP areas.

  It is anticipated that this facility will be moved to coverage under Fort Belvoir's MS4 permit as an HPF. Table 15 provides a summary of sampling results for RO-032. Based on chloride monitoring at this outfall, the storage and application of chloride products in this area is not considered a significant source of this POC to the Lower Accotink Watershed.

Table 15: Chloride Sampling Results for RO-032

Sample Date	Sample Results (mg/L)
WQC	**860**
3/20/2018	**21.8**
12/9/2019	**16.0**
10/29/2020	**13.4**
6/22/2021	**35.0**
10/29/2021	**27.4**
3/17/2022	**99.0**
12/15/2022	**30.4**
6/21/2023	**28.1**
11/21/2023	**23.8**
7/12/2024	**24.0**
Average Detection	**31.89**

5. EVALUATION OF 2021 ACTION PLAN

Part II.B.2.a. of the 2023-2028 MS4 General Permit requires that the permittee provide an evaluation of the results achieved by the previous action plan. The following provides an evaluation of the results of Fort Belvoir's 2021 Action Plan along with any adaptive management strategies incorporated into this 2025 Action Plan based on the evaluation.

5.1. CONTINUED MAINTENANCE OF EXISTING PROGRAMS

The 2021 Action Plan calls for Fort Belvoir to continue all established programs focused on training, education, and outreach, which includes continued implementation of the education and outreach plan, maintenance of the webpage and Facebook page, and high-priority facility SWPPP training. DPW Environmental uses several types of media to educate the Fort Belvoir public (tenants, partners, employees, contractors, and housing residents) about the harmful effects of road salt on local streams, basics of chloride and how pollution occurs, and tips for minimizing chlorides in stormwater runoff.

Evaluation: Continuing these programs has been effective in raising awareness about chloride in stormwater runoff and in promoting best management practices for chloride storage and application. Individuals and entities responsible for storing and applying chloride products across the installation are more aware of the harmful effects of road salt and more cognizant of their practices, resulting in practice improvements.

- Between 2021 and 2024 Fort Belvoir consistently implemented the established programs focused on training, education, and outreach. Each year Fort Belvoir DPW utilized various media that targeted certain aspects of the installation's public, including
    - Publishing articles and a Stormwater Newsletter that discusses chloride issues, best practices, and tips for minimizing chlorides in stormwater runoff
    - Posting on the Fort Belvoir Environmental Facebook page with a focus on chloride as the targeted POC in winter months
    - Posting and distributing BMP Factsheets that provide information about salt storage, loading, and application; brine mixing; and aircraft deicing operations
    - Discussing salt storage and handling practices during both ISW and MS4 SWPPP training for personnel responsible for storing and applying chloride products. The requirement for HPFs to maintain SWPPPs provides another means of monitoring these sites.

Changes to Strategy: As of 15 April 2021, the *Fort Belvoir Eagle* is no longer being published in a hard copy format but continues publication online. Although Fort Belvoir will continue to periodically publish articles, the MS4 Program has switched its focus from hardcopy publications towards more electronic distribution of materials and social media posts. This change in practices maintains and potentially increases the reach of outreach materials. This BMP has been consolidated with other practices related to education and outreach and is reflected in the updated BMP CL.4 of this 2025 Action Plan.

5.2. Revision of Practices at Defense Logistics Agency

The 2021 Action Plan stated that an evaluation of application rates determined that DLA, an autonomous tenant on the installation, was the largest contributor or source of chlorides from Fort Belvoir within the Lower Accotink Creek Watershed. The plan called for Fort Belvoir to provide additional training for personnel and to work with DLA to revise practices by adjusting the frequency and application rates of ice melt products that are being used by this agency.

Evaluation: This goal has not yet been fully achieved, but this continues to be a valid strategy.

- DLA personnel have been identified as an audience in the MS4 training plan, and have been designated as a target audience for winter maintenance training in the Action Plan since 2021
- During the period from May 2021 to October 2023, Fort Belvoir DPW met with DLA facility managers once on 9 November 2022, during a targeted prewinter season meeting/training. The meeting/training was brief, and DLA did not indicate any plans to revise their practices during this meeting.

Changes to Strategy: Not applicable. Based on reported DLA salt application rates, providing training and working with DLA personnel to revise their salt application practices continues to be a valid strategy for reducing chlorides in the Lower Accotink Watershed. This strategy is included in this plan as BMP CL.1 and now focuses on just a revision of the application rates and frequency.

5.3. Update Base Operations Contractor Snow Plan

The 2021 Action Plan calls for the Base Operations contract TE, also known as the Snow Plan, to be updated to better reflect the current standards and equipment used and incorporate references to this Lower Accotink Creek Chloride TMDL Action Plan.

Evaluation: This goal has not yet been achieved.

- The update to the Base Operations contract TE will be completed in conjunction with the issuance of a new Base Operations contract, which was previously scheduled to be awarded in 2023. This timeline was extended, and the contract issuance is now scheduled for 2025.

Changes to Strategy: Not applicable. Updating the Base Operations contract TE is still a valid strategy and is in process. This strategy is included in this plan as BMP CL.2.

5.4. Revise Salt Brine Mixing Rates

The 2021 Action Plan calls for Fort Belvoir to revise the salt brine mixing rate. It was determined through historical salt application data that Base Operations' mixing rate for brine was approximately 8.34 lbs./gallon, which is substantially higher than the mixing rate of 2.5 lbs./gallon recommended by SaMS.

Evaluation: This strategy is an effective method for reducing chloride waste loads to the Lower Accotink Watershed. During the 1 November 2022, prewinter season meeting/training with facility managers, it was agreed that the salt mixing rate at Fort Belvoir would be revised to 2.5 lbs./gallon to aim to achieve a 23.3% salt solution. Subsequent brine mixing adhered to the new rate and was determined to be effective.

- Although data indicates that no brine was used by Base Operations during the 2022-2023 season, NaCl brine with a 23.3% salt solution was used by Base Operations four times during the 2023-2024 season. Brine mixed at this rate was noted as effective, and the reduction in the rate by Base Operations is estimated to have reduced chloride usage by over 3,000 lbs. in this one season.
- The brine mixing rate at NGA prior to 2021 is unknown, but NGA has adhered to a rate of 2.5 lbs./gallon since the 2021-2022 season. NGA treated with brine during the 2021-2022, 2022-2023 and 2023-2024 seasons.

Changes to Strategy: Salt brine mixing rates were changed to a 23.3% salt solution starting with the 2022-2023 season, and thus far have been determined to be effective in meeting performance requirements as well as reducing chloride loading to the Lower Accotink Watershed. Since this practice has been established this BMP has been consolidated into a single strategy that includes maintaining three (3) established strategies and is included in this plan as BMP CL.5.

5.5. Establish a Calibration Process

The 2021 Action Plan calls for a calibration process to be established for salt application equipment used on Fort Belvoir. SaMS recommends calibrating salt application equipment in the pre-season (October), mid-season (December-January), and any time changes are made to equipment or change is made to the material. Calibrating equipment allows for control of application rates. Likewise, calibrating brine mixing equipment at least once annually is recommended as a means of regulating mixing rates.

Evaluation: This strategy is an effective method for reducing chloride waste loads to the Lower Accotink Watershed. Ensuring calibration is completed for the Base Operations salt application equipment has resulted in a reduction in application rates for bulk products. Calibration of brine mixing equipment has kept the new brine mixing rate at 2.5 lbs./gallon; brine application rates have stayed below Salt Institute Standards target application rates. The following actions have been taken to ensure equipment calibration is conducted:

- Current practices were reviewed and discussed at a pre-winter season meeting/training with facility managers in November 2022.
- A calibration form and instructions based on the New Hampshire DOT procedures for their equipment were provided for use by Base Operations, who have used the established calibration process since the 2022 winter season.
- DPW continues to ensure that Base Operations equipment is calibrated at least once annually at the beginning of the winter season by requiring submittal of the completed calibration chart for each piece of equipment.
- The brine mixing machine, which is government furnished property, is serviced and calibrated internally by the Army using Logistics Readiness Center (LRC) personnel.

Changes to Strategy: An equipment calibration process was established prior to the 2022 winter season and thus far has been determined to be effective in meeting performance requirements as well as reducing chloride loading to the Lower Accotink Watershed. Since this process has been established this BMP has been consolidated into a single strategy that includes maintaining three (3) established strategies and is included in this plan as BMP CL.5.

5.6. TARGETED TRAINING

The 2021 Action Plan calls for Fort Belvoir to update its written Training Plan to include Salt Management Training that specifically targets salt applicators, supervisors, and decision-makers by October 2023. Training plays an important role in the adaptive iterative approach to process improvement by raising awareness and providing relevant information that can be used to shift operational practices toward the use of best management practices.

Evaluation: Providing targeted training to Fort Belvoir's salt applicators, supervisors, and decision-makers is an important aspect of the adaptive iterative approach and has resulted in heightened awareness of the harmful effects of chloride in stormwater and in practice improvements, such as regular equipment calibration, reduced brine mixing rates, application practices, and enhanced tracking and reporting practices.

Recent reporting from Base Operations and NGA includes additional details that indicate a heightened awareness and possibly a more measured storm response by these two entities. It was noted that Base Operations started reporting details, such as very specific areas, consisting of hills and bridges, that were pretreated for one storm event as well as the number of passes made with their trucks during another storm event. Recent reports from NGA provide details of storm response activities, such as specific areas that were pretreated for one storm event and a note that the *"parking roof only* [was] *treated"* for another storm event.

- The MS4 Program completed updates to the Training Plan in August 2022 which included identification of audiences requiring Chloride TMDL training - identified in the plan as 'Level 7'. Training slides were originally developed with this plan update and included topics such as background information on the Chloride TMDL, Best practices for Salt storage and loading, and an overview of the tracking and reporting requirements.
    - During the 2022-2023 reporting period, training was delivered to 35 individuals from five (5) different agencies

- The slides were updated prior to the 2023-2024 winter season with a shift in focus towards winter maintenance training and expanded to include: Plowing Practices, Equipment Calibration, Level of Service and Clearing Priorities, Anti-Icing Brine Mixing, Application Practices, Varying Application Rates, Use of Deicers at Different Temperatures, Salt Storage and Handling, Winter Maintenance Planning (Weather Forecasting/Surface Temperature Information) and Tracking and Reporting.
    - During the 2023-2024 reporting period, training was delivered to 72 individuals from five (5) different agencies.

Changes to Strategy: Not applicable. This practice was found to be effective as is and did not result in any new/ changing requirements in this 2025 Action Plan. Continuing to deliver Level 7 training and completing updates to it, as needed, will be targeted during implementation of this 2025 Action Plan. This strategy is included in this plan as BMP CL.4.

5.7. ANNUAL ASSESSMENT AND REPORTING

The 2021 Action Plan calls for Fort Belvoir to calculate the application rate for each product for each season and for the operational practices of the program to be evaluated by completing a Self-Assessment – Operation Worksheet (Appendix D) recommended in the SaMS Toolkit, which includes eleven (11) comprehensive aspects of salt management. The combination of looking at operational practices and resulting application rates allows for identifying practice improvements and

refining operations at Fort Belvoir. The outcomes of the calculated application rates and self-assessment were designated as part of annual reporting to VADEQ.

Evaluation: The Self-Assessment – Operation Worksheet was completed for Base Operations each year, and seasonal application rates for each product used were reported for Base Operations, DLA, and NGA each year.

- While the Self-Assessment – Operation Worksheet provides beneficial guidance for improving salt management, due to specific situations on Fort Belvoir, some of the provided BMPS on the worksheet (rating of 4 on a 1 to 4 rating system) would be costly or extremely difficult to implement on the installation. For instance, one category on the worksheet assesses whether material application rates are unknown (rating 1), estimated (rating 2), or known (ratings 3 and 4). Because the Lower Accotink Watershed is a portion of the area treated by Base Operations, chloride usage and the application rate within the watershed are estimated. It would be operationally difficult or impossible to determine the exact amount of chloride products used within the watershed, and thus the exact application rate without implementing individual truck monitoring equipment such as GPS. Other factors face similar challenges. The only actual change to the numerical ratings on the worksheet across three seasons was an improvement to the Salt Management Training from a rating of 1 to 4. All other numerical ratings remained the same across three seasons of evaluation and reporting.
- While the Self-Assessment – Operation Worksheet was only completed for Base Operations, using its content as guidance has been beneficial to making step improvements to operations at both Base Operations and NGA.
- Seasonal application rates were calculated, reported, and compared to Salt Institute Standards target application rates. For solid materials, it was noted that the calculated application rates were consistently compared to a target application rate of 325 lbs./lane mile. However, as seen in the guidance found in Appendix C, target application rates vary with storm conditions. Reporting application rates on a seasonal basis does not allow for comparison to storm-specific target application rates. Calculating and reporting storm-specific application rates may yield more useful information for improving application practices as well as highlight actual improvements.
- It should be noted that while application rates for each entity were reported, several issues with data transfer resulted in calculating and reporting inaccurate application rates. Inconsistencies in reported acreages treated as well as types, amounts, and chloride content of product used were identified.
- During this permit term, numerous improvements were made to data reporting between Base Operations and Fort Belvoir DPW as well as between NGA and Fort Belvoir DPW. Spreadsheets were developed and used to record storm-specific data, such as storm conditions, storm response, and product usage.

Changes to Strategy: Several changes will be made to the annual assessment and reporting under this 2025 Action Plan as listed below. Fort Belvoir will:

1. Evaluate annually the practices and application rates of each entity responsible for salt management individually – Base Operations, DLA, and NGA – using guidance such as the example assessment form in Appendix D to identify BMPS for improving salt management practices.
2. Calculate and report application rates on a storm-specific basis by entity and compare application rates to appropriate storm-specific target rates

3. Calculate the total chlorides used in the Lower Accotink Watershed for the season and the percentage of the aggregate WLA for the Watershed
4. Report any notes from the winter maintenance entities to provide insight into salt application practices
5. Continue to use and as needed, update spreadsheets that the entities use to report chloride usage and storm data

This revised strategy is included in this plan as BMP CL.6.

6. CHLORIDE REDUCTION STRATEGY

Promoting efficient management and application of anti-icing and deicing materials while maintaining public safety can be a challenging process. Utilizing the adaptive iterative approach allows for adjusting and refining practices as new information and experience is gained. As a result, BMPs are established that can then facilitate further application of the adaptive iterative approach.

BMPs can be either structural/engineered or operational control measures that are put in place to mitigate the effects of pollutant sources on water quality. The selection of BMPs is dependent on the situation, such as site characteristics and operational practices, as well as the pollutant of concern. For this TMDL Action Plan, the pollutant of concern is chlorides mainly due to the storage of and treatment with salt for winter maintenance operations.

As discussed in Section 4: Chloride Source Assessment, there are four entities that conduct winter maintenance activities within the Lower Accotink Watershed and Fort Belvoir's MS4 service area on behalf of Fort Belvoir, with two of these entities also storing chloride products seasonally within this same area. Because each of these entities has its own operational practices and products used, the strategy for managing chlorides in this 2025 Action Plan has been revised to assess each entity separately.

Fort Belvoir's strategy for optimizing chloride usage and storage within the Lower Accotink Watershed includes six (6) BMPs.

- BMP CL.1 and BMP CL.2 address goals for specific treatment entities.
- BMP CL.3 makes provision for addressing any changes to the treated areas within the Lower Accotink Watershed.
- BMP CL.4 includes Fort Belvoir's Education and Outreach Strategy, which specifically addresses the requirements in Part II.B.8.a. and b. of the 2023-2028 MS4 Permit.
- BMP CL.5 is focused on maintaining three (3) strategies established during the implementation of the 2021 Action Plan that include the written procedures and practices targeting equipment calibration, brine mixing rates, and salt storage.
- BMP CL.6 is focused on the tracking and reporting aspect of this 2025 Action Plan, and enhanced BMPs that promote efficient management and application of anti-icing and deicing materials while maintaining public safety, as required by Part II.B.8.c of the 2023-2028 MS4 Permit.

6.1. BMP CL.1 REVISE SALT APPLICATION PRACTICES AT DLA

Calculated salt application rates at DLA indicate that salt usage at their complex is well above Salt Institute Standards target application rates. Details of winter treatment practices at DLA need to be clarified.

- ***Measurable Goal:*** Meet with DLA facility managers to discuss and revise application practices as needed. Possible topics of discussion include:
  - The Chloride TMDL Action Plan
  - DLA's historical application rates as compared to target rates
  - A possible summary sheet of the number of bags of ice melt product required for the DLA complex to achieve application rates in accordance with manufacturer recommendations

- Other practices that may be contributing to DLA's above-target application rates, such as the trigger for a treatment event or number of passes that trucks make over the treated area
- Possible enhancements in data reporting between DLA and Fort Belvoir's MS4 Program.

- ***Reporting and Record Keeping:***
  In the annual report:
  - Indicate the date of the meeting and provide a summary of the meeting discussion and actions agreed to be taken
  - Report any revisions to salt application strategies used by DLA
  - Continue to report storm-specific product usage and application rates under BMP CL.6

6.2. BMP CL.2 Update Base Operations Contract Technical Exhibit for Winter Storm Response

The issuance of a new Base Operations contract with an updated TE will clarify and contractually dictate the requirements for winter storm response. The new Base Operations contract is scheduled to be issued in 2025, and any updates to the TE with regard to chloride application will need to be incorporated into this plan.

- ***Measurable Goal:*** Issuance of a new Base Operations contract with an updated TE for winter storm response. Review and approve any Snow Plan developed as a part of the new contract
- ***Reporting and Record Keeping:***

  In the annual report:
  - Provide the effective date of the new contract and any changes which impact this 2025 Action Plan
  - Provide status of development and approval for the new Snow Plan

  In the Chloride TMDL Action Plan:
  - Update Appendix B with any new or revised TE, Snow Plan, or other changes to Base Operations procedures or equipment.

6.3. BMP CL.3 Update the Area Covered by the TMDL Action Plan as Needed

Impervious surfaces requiring winter storm response may be added or removed from the Lower Accotink Watershed and MS4 service area. Updates to this TMDL Action Plan should be made to maintain an accurate accounting of chloride waste loads and application rates within the watershed and, if a new entity with winter maintenance responsibilities is added, to ensure they receive Salt Management Training (Level 7) and are aware of tracking and reporting requirements under this 2025 Action Plan

- ***Measurable Goal:*** Consistently monitor for new or proposed projects occurring within the Lower Accotink Watershed and MS4 service area that can impact the amount of impervious surface and thus winter response requirements, chloride waste loads, and application rates.
- ***Reporting and Record Keeping:***

  In the annual report:

- Provide a summary of any development projects within the Lower Accotink Watershed and MS4 service area that will result in changes to impermeable surfaces and subsequent changes to winter storm response.

In the Chloride TMDL Action Plan:

- As needed, update treated areas, operating practices, chloride loading, application rates, and other necessary data when impermeable surfaces are added/removed from the Lower Accotink Watershed and MS4 service area.

6.4. BMP CL.4 IMPLEMENT EDUCATION AND OUTREACH STRATEGY

Educational programs work best when they increase the level of environmental awareness in the target audience and convey a clear link between people's activities and stormwater quality impacts. A program should raise awareness, increase knowledge, and prompt needed changes in operational practices. In this case, educational programs aim to promote responsible salt management practices.

- ***Measurable Goals:*** Maintain, develop, and distribute education and outreach materials in accordance with the Education and Outreach Strategy as required by Part II.B.8.a. and b. of the 2023-2028 MS4 Permit. This includes those items developed under MCM 1: Public Education and Outreach Program and/or MCM 6: Pollution prevention and good housekeeping - which include information on the Chloride TMDL, strategies and tips for the proper application, handling, and storage of chloride products, and targeted winter maintenance training identified in this Plan by:

  1. Continuing to provide Stormwater Pollution Prevention Plan Training (Levels 1 and 2) to facilities considered to be a High Priority Facility - which covers general Chloride TMDL information and management strategies
  2. Continuing to provide Salt Management Training (Level 7) to the operators identified in this 2025 Action Plan including salt applicators, supervisors, and decision-makers which includes the following topics:
     - Plowing Practices, Equipment Calibration, Level of Service and Clearing Priorities, Anti-Icing Brine Mixing, Application Practices, Varying Application Rates, Use of Deicers at Different Temperatures, Salt Storage and Handling, Winter Maintenance Planning (Weather Forecasting/Surface Temperature Information) and Tracking and Reporting.
  3. Utilizing at least one (1) strategy, annually during the winter months, targeting Chloride as a high-priority stormwater issue under the Public Education and Outreach Program.
  4. Maintaining BMP Fact Sheets covering *Salt Storage and Loading, Salt Application, Brine Mixing,* and *Aircraft Deicing Operations* on the Fort Belvoir Webpage, and distributing as necessary

- ***Reporting and Record Keeping:***

  In the annual report:

  - Provide a summary of the audiences reached via the training program.
  - Provide a list of the education and outreach activities conducted during the reporting period, the estimated number of people reached, and a list of strategies used.
  - Provide a summary of any updates and/or revisions made to educational materials.

6.5. BMP CL.5 CONTINUE IMPLEMENTATION OF PREVIOUSLY ESTABLISHED PRACTICES

As discussed in Sections 4 and 5 of this 2025 Action Plan, implementation of the previous plan resulted in establishing multiple procedures and practices, including equipment calibration, brine mixing rates, and monitoring of salt storage facilities, that have proven to lower and/or minimize chloride loads to the Lower Accotink Creek.

- ***Measurable Goals:***
  1. Ensure that Base Operations continues to regularly calibrate equipment using the following guidelines:
     - SaMS recommends that calibration should occur in the pre-season (October), mid-season (December-January), and any time changes are made to equipment or change is made to the material (to include dry deicer to pretreated/pre-wetted salt). It is also recommended that the Base Operations brine mixer be calibrated at least annually at the beginning of the winter season. A calibration form and instructions are provided in Appendix E.
  2. Continue to monitor use of the established brine mixing rate and effectiveness of the brine. The guideline being used is currently:
     - Studies have shown that a brine solution needs to be at least 23% salt or have a specific gravity of 1.176 when measured with a hydrometer. Mixing a solution of this specific gravity requires approximately 2.5 pounds/gallon of magnesium chloride.
  3. Continue to monitor salt storage areas within the Lower Accotink Watershed as part of the annual inspections conducted at Fort Belvoir's HPFs.
     - Regularly inspecting salt storage facilities provides a means for ensuring that BMPs for salt storage are continually implemented. Two (2) known salt storage facilities - at DLA and NGA – are within the Lower Accotink Watershed and Fort Belvoir's MS4 service area. Due to salt storage, these facilities are HPFs, and therefore, in accordance with Fort Belvoir's MS4 program, they are inspected annually.
- ***Reporting and Record Keeping:***

  In the annual report:
  - Indicate when equipment calibration was conducted by Base Operations
    - Report any changes to calibration procedures in the Annual Report
  - Provide the brine mixing rates used by Base Operations and NGA
    - If Base Operations' or NGA's assessments of the effectiveness of the brine application indicate that a change is needed, then provide any updates to the brine mixing rate.
  - Provide the date of the annual inspections for HPFs which store chloride products within the Lower Accotink Watershed
    - Report any findings that required corrective action
    - Provide the date that the corrective action was completed

6.6. BMP CL.6 CONTINUE ANNUAL REPORTING AND ASSESSMENT

An annual assessment of operations along with calculating and evaluating storm-specific and entity-specific chloride waste loads and application rates work together as part of the adaptive iterative approach to identify BMPs that can reduce chloride waste loads in the Lower Accotink Watershed. The assessment of the previous Action Plan contained in Section 5, revealed some lessons learned and resulted in the following revised strategy for annual assessment under this 2025 Action Plan:

- Annually evaluate the individual practices and application rates on a storm-specific basis for each entity responsible for salt management, using spreadsheets developed during this 2025 update.
    - To standardize calculations - A spreadsheet was developed for each entity to calculate chlorides applied and application rates. Equations used in the developed spreadsheet are shown for Base Operations, DLA, and NGA in Appendices F, G, and H, respectively.
- Compare calculated application rates to appropriate storm-specific target rates.
    - Storm-specific target application rates and response actions are provided for comparison in Appendix C and include example rates from the SaMS Toolkit as well as rates from two additional sources. The two additional sources consider more detailed information than the examples provided by SaMS, such as temperature trends and whether treatment materials are prewetted or applied dry. As Fort Belvoir's program continues to develop, comparing actual application rates to the target rates from these two sources, or other appropriate sources, may provide more insight into Fort Belvoir's winter storm response within the Lower Accotink Watershed.
- Calculate the total chlorides used in the Lower Accotink Watershed for the season and the percentage of the aggregate WLA for the Watershed
- Report any notes from the winter maintenance entities to provide insight into changes in storm response practices
- Continue to use and as needed, update spreadsheets that the entities use to report chloride usage and storm data to Fort Belvoir DPW. Example tracking sheets are provided in Appendix D
- Annually review practices for each entity that may include pre-season, season and post-season activities to identify BMPs for improving salt management practices. Example assessment forms are provided in Appendix D

- ***Measurable Goal:***
    1. Annually evaluate the storm-specific response practices and application rates individually for each entity responsible for salt management, determine total chlorides used and percent of WLA, and identify areas for improvement.
    2. Continue to use and as needed, update spreadsheets that the entities use to report chloride usage and storm data to the MS4 program
    3. Conduct an annual assessment of practices for each entity that may include pre-season, season and post-season activities

- ***Reporting and Record Keeping:***

  In the annual report:

  - Report storm-specific and entity-specific total chlorides applied and application rates within the Lower Accotink Watershed. Identify the source of target application rates (SaMS, etc.) used for the analysis. Appendix I provides a concept for winter storm response reporting.
  - Include available data/notes about storm-specific response activities for each entity
  - Provide an annual assessment of practices for each entity that may include pre-season, season and post-season activities
  - Provide the total chlorides used for the season and the percentage of the aggregate WLA for the Lower Accotink Watershed

  In the Chloride TMDL Action Plan:

  - Annually include the completed tracking spreadsheets from each entity that performs winter storm response in Appendices F, G, and H, as appropriate.
  - Annually include the completed comparison to the WLA using a summary table or reporting such as the concept in Appendix I

7. IMPLEMENTATION SCHEDULE

During the 2023-2028 permit cycle, Fort Belvoir will implement the BMPs discussed in Section 6 above to bring awareness to and continue to safely reduce the amount of salt used for winter storm response, which will result in a reduction of chlorides discharged to surface waters. Part II.B.4.h requires that TMDL action plans include a schedule of anticipated actions planned for implementation during this permit term. Fort Belvoir has established a good foundation for this program with additional work required to build and maintain regular program activities as well as to further develop certain aspects of the program. Therefore, the schedule presented in Table 16 below is split between building and maintaining current programs and continuing to develop specific aspects of the program.

Table 16: Implementation Schedule

Action Plan BMP	Control Measures	Implementation Schedule
CL 1	Meet with DLA facility managers	Prior to the start of the 2025-2026 winter season
CL 2	Issuance of a new Base Operations contract with an updated TE for winter storm response	Scheduled to be completed in 2025
CL 3	Consistently monitor for new or proposed projects occurring within the Lower Accotink Watershed and MS4 service area that can impact the amount of impervious surface and thus winter response requirements, chloride waste loads, and application rates	**Regularly** through the already established NEPA Plan Review Process
CL 4	Maintain, develop, and distribute education and outreach materials and provide winter maintenance training in accordance with the Education and Outreach Strategy discussed in Section 6.4	**Annually**
CL 5.1	Ensure that regular equipment calibration continues	**Annually** prior to the start of and through the winter season
CL 5.2	Continue to monitor use of the established brine mixing rate and effectiveness of the brine	**Annually** obtain data
CL 5.3	Continue to monitor salt storage areas within the Lower Accotink Watershed as part of the annual inspections conducted at Fort Belvoir's HPFs	**Annually** inspect
CL 6.1	Utilize the spreadsheet or other methods that calculate storm-specific and entity-specific total chlorides applied and application rates, determine total chlorides and percent of WLA, and identify areas for improvement.	**Annually** at the end of the winter season prior to 30 June

Action Plan BMP	Control Measures	Implementation Schedule
CL 6.2	Continue to use and as needed, update spreadsheets that the storm response entities use to report chloride usage and storm data to Fort Belvoir	**Annually** obtain completed data tracking spreadsheets from entities at the end of the winter season and refine as needed for better data tracking prior to the next winter season.
CL 6.3	Evaluate the storm-specific response practices and application practices and rates individually for each entity responsible for salt management to identify areas for improvement, as needed	**Annually** at the end of the winter season prior to 30 June

8. PUBLIC COMMENT

Part II B.9 of the General Permit requires that Fort Belvoir provides an opportunity for receipt and consideration of public comment for no less than 15 days regarding the proposed actions to meet the local TMDL. The EPA states in Federal Register Volume 64, No. 235, page 68,750 on 8 December 1999, regarding "public" and its applicability to MS4 programs, the following:

> *"EPA agrees with the suggested interpretation of "public" for DOD facilities as "the resident and employee population within the fence line of the facility." The department recommends that nontraditional MS4 operators, such as state and federal entities and local school districts, utilize this statement as guidance when determining their applicable "public" for compliance with this permit"*

Therefore, Fort Belvoir has adopted this definition and defines the "public" as anyone who lives or works within the jurisdictional boundary of the Garrison as shown in Figure 1.

The Lower Accotink Creek Chloride TMDL Action Plan was completed as per Part II.B of the 2018-2023 General Permit. The Lower Accotink Creek Chloride TMDL Action Plan allowed for a public comment period by being posted on the Fort Belvoir Home Page under Environmental Documents for Stormwater in April 2021. A Notice of Availability for the document was posted on the Fort Belvoir Environmental Facebook page on 8 April 2021, and on the Fort Belvoir Home Page on 7 April 2021, and was published in the Fort Belvoir newspaper, *The Belvoir Eagle* on 15 April 2021. Fort Belvoir provided for the public comment period to be open until 30 April 2021, allowing for at least 15 days for public comment. Fort Belvoir DPW did not receive any comments during this period. The Final 2021 Chloride TMDL Action Plan was submitted to VADEQ on 1 May 2021.

This 2025 Chloride TMDL Action Plan for Lower Accotink Creek provides for updates to, evaluation of the previous plan, and any adaptive management strategy as required by Part II.B.2 of the 2023-2028 MS4 Permit.

A Notice of Availability for the Draft Action Plan was posted on the Fort Belvoir Environmental Facebook page which appears on the Fort Belvoir Environmental Webpage on 9 April 2025. The plans were made available for review at the DPW Environmental Office as well as through direct email to the MS4 Program Manager. Fort Belvoir provided for the public comment period to be open until 28 April 2025, allowing for at least 15 days as required by Part II.B.9 of the 2023-2028 MS4 Permit.

No comments were received during this comment period therefore no formal responses were required, and the plan was finalized. The Final 2025 Chloride Action Plan will be made available on the public facing website throughout the permit term, allowing for the public to submit comments at any point in time. If any comments are received, Fort Belvoir will evaluate the need for updating the plan and provide a formal response to the commenter. Any comments received and changes made in the plan will be reported in the MS4 annual status report as required under Part I.D.5.

Any comments received during this initial public comment period or during the permit cycle will be reviewed and all substantive comments will be considered and formally addressed. Table 17 below summarizes the comments received and how they were addressed. Further details are available upon request.

Table 17: Public Comments on Draft 2025 Chloride TMDL Action Plan

Comment	Response
N/A	N/A

REFERENCES

Army, D. o. (2007, December 13). Environmental Protection and Enhancement. *Army Regulation 200–1*. Washington, DC: Headquarters - Department of the Army.

Atkins. (2014). *Real Property Master Plan; Installation Vision and Development Plan.* Fort Belvoir, Virginia: Installation Management Command.

Interstate Commission on the Potomac River Basin (ICPRB). (2020, August). *Virginia Salt Management Strategy (SaMS).* Woodbridge, VA: VADEQ.

Interstate Commission on the Potomac River Basin. (n.d.). *Enhanced Winter Maintenance Training Manual.* Maryland: Maryland Department of the Environment.

Legislative Information System. (2021). *LIS*. Retrieved from 9VAC25-890-40. General Permit VAR04: https://law.lis.virginia.gov/admincode/title9/agency25/chapter890/section40/

SES Construction and Fuel Services, LLC. (May, 2019). *U.S. Army Garrison Fort Belvoir Stormwater Pollution Prevention Training Plan.* Fort Belvoir, VA: Fort Belvoir. - Updated 2023

U.S. Army Garrison, Fort Belvoir. (2024, December 19). *Fort Belvoir Policy Memorandum #25, Prohibition of Illicit/Unauthorized Discharges to the Municipal Separate Storm Sewer.* Fort Belvoir, VA: Department of the Army.

U.S. Army Garrison, Fort Belvoir. (December, 2020). *Municipal Separate Storm Sewer System (MS4) Program Plan.* Fort Belvoir, VA: Fort Belvoir Environmental Division.

U.S. EPA. (2002). *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on those WLAs.* Washington, DC: U.S. EPA.

University of Minnesota. (2012). *Minnesota Snow and Ice Control Field Handbook for Snowplow Operators, Manual Number 2005-01 REV.* Minnesota Loacl Road Research Board.

University of New Hampshire: Technology Transfer Center. (2018). *Pass the Salt: Effective Snow & Ice Management.* New Hampshire: New Hampshire Department of Environmental Services.

VADEQ. (2013, September 23). Virginia Register. *VA.R. Doc. No. R14-3682 October 23, 2013, 30(2)*. Richmond, Virginia, USA: Virginia Register of Regulations. Retrieved from http://register.dls.virginia.gov/details.aspx?id=3944

VADEQ. (2016, December). Virginia Pollutant Discharge Elimination System (VPDES) Permit No. VA0092771. Virginia, USA.

VADEQ. (2017, August 30). *Volume III Chloride TMDLs for the Accotink Creek Watershed.* Fairfax County, VA: VADEQ.