CHLORIDE TOTAL MAXIMUM DAILY LOAD (TMDL) ACTION PLAN, LOWER ACCOTINK CREEK

FOR

U.S. ARMY GARRISON FORT BELVOIR, VIRGINIA

General VPDES Permit for Discharges of Stormwater
From Small Municipal Separate Storm Sewer Systems
Permit VAR040093

Prepared For:

Department of the Army
U.S. Army Garrison, Fort Belvoir
Directorate of Public Works
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ACRONYMS AND ABBREVIATIONS

AAFES	Army and Air Force Exchange Services
Ac	Acres
ADFE	Amazon Data Facility East
AR	Army Regulation
BMP	Best Management Practice
CBP	Chesapeake Bay Program
CWA	Clean Water Act
CGP	Construction General Permit
CUA	Census Urban Area
DAAF	Davison Army Airfield
DC	District of Columbia
DECA	Defense Commissary Agency
DES	Directorate of Emergency Services
DLA	Defense Logistics Agency
DOD	Department of Defense
DPW	Directorate of Public Works
EISA	Energy Independence and Security Act
EMS	Environmental Management System
EOC	Emergency Operation Center
EPA	United States Environmental Protection Agency
ESC	Erosion and Sediment Control
FBNA	Fort Belvoir North Area
FOG	Fats, Oils, and Greases
ft	feet
GIS	Geographic Information System
HPF	High Profile Facility
HUC	Hydrologic Unit Code
HVAC	Heating, Ventilation, and Air Conditioning
ICPRB	Interstate Commission on the Potomac River Basin
ISW	Industrial Stormwater
IDDE	Illicit Discharge Detection and Elimination
L	liter
lbs	Pounds
MCM	Minimum Control Measures
MEP	Maximum Extent Practicable
MgCl	Magnesium Chloride
Mg/L	Milligrams per Liter
MOS	Margin of Safety
MS4	Municipal Separate Storm Sewer System

NaCl	Sodium Chloride
NGA	National Geospatial Agency
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PCB	Polychlorinated Biphenyl
POC	Pollutants of Concern
RO	Representative Outfall
SaMS	Salt Management Strategy
SCF	SES Construction and Fuel Services LLC
sq.yd.	Square Yard
SWCB	Soil Water Control Board
SWPPP	Stormwater Pollution Prevention Plan
SWM	Stormwater Management
TMDL	Total Maximum Daily Load
VADEQ	Virginia Department of Environmental Quality
VARNG	Virginia Army National Guard
VDOT	Virginia Department of Transportation
VPDES	Virginia Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program
WIP	Watershed Implementation Plan
WLA	Waste Load Allocation

EXECUTIVE SUMMARY

The purpose of this Lower Accotink Creek Chloride Total Maximum Daily Load (TMDL) Action Plan is to comply with Part II.B - Local TMDL Special Condition of the 2018 – 2023 General Virginia Pollution Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4), No. VAR040093 issued to Fort Belvoir.

SES Construction and Fuel Services LLC (SCF) developed this Action Plan to provide a review of the current MS4 program and demonstrate Fort Belvoir's ability to comply with the requirements set forth in the Accotink Creek Chloride TMDL approved by the State Water Control Board (SWCB) on April 12, 2018 and approved by the Environmental Protection Agency (EPA) on May 23, 2018. The Action Plan includes the requisite planning items found in permit Part II.B, according to the procedures provided in the Virginia Department of Environmental Quality (VADEQ) Guidance Memo No. 16-2006 dated November 21, 2016 (Guidance).

The focus of the Action Plan is to provide the means and methods and a general level of effort that will be needed for Fort Belvoir to adhere to the requirements of the Lower Accotink Creek Chloride TMDL developed by the VADEQ. In addition, the plan focuses on defining Fort Belvoir's contribution to the aggregate wasteload as well as focusing on the verification, maintenance, and annual evaluation of Best Management Practices (BMPs) in order to maintain acquired credits for the lifetime of the following two permit cycles, 2018-2023 and 2023-2028.

The area served by the MS4 includes those areas draining to a regulated stormwater outfall. Lands that are regulated under a separate VPDES stormwater permit, lands that sheet flow directly to waters of the state, wetlands and open waters, and forested areas are not considered part of the MS4 service area. Fort Belvoir's GIS impervious cover and storm sewer data were used to determine the estimated size and extent of the regulated MS4 service area. Due to significant changes in land use and additional stormwater permits being acquired, SCF used updated local ArcGIS data and tools, a review of other state stormwater permits under the VPDES program, and 2010 census data coving urban areas for the Washington DC Metropolitan Area.

After determining the regulated areas based on 2010 census data and removing areas covered under a separate VPDES Permit, Fort Belvoir was left with a general Service area that is covered under the MS4 General Permit. This area was not all encompassing of the current or proposed urban area projected in the Fort Belvoir Master Plan, therefore, some additional areas were considered by Fort Belvoir to be regulated urban in respect to this Action Plan. The MS4 Service Area was determined to be approximately 3,200 acres in size while the MS4 Service Area within the Lower Accotink Creek Watershed, where the Chloride TMDL is applicable, was determined to be approximately 1,429.5 acres.

An aggregate Waste Load Allocation (WLA) of 3,294,323 lbs/year was given by VADEQ through the Volume III Chloride TMDLs for the Lower Accotink Creek Watershed for all MS4 Service Areas, split between four MS4 Systems: Fairfax County, Fairfax County Public Schools, Virginia Department of Transportation, and Fort Belvoir. It should be noted that regulated areas within the MS4 service area have significantly changed since publication of this document, which used 2010 census data, and it is recommended that data for Fort Belvoir is re-evaluated in years to come as the removal of areas within the MS4 Service Area due to additional VPDES Permits has occurred. A re-evaluation for the purpose of this TMDL has been included within this plan in Section 3.

In order to effectively control chloride loads leaving Fort Belvoir, SCF completed an assessment of current conditions to be used as a baseline for future improvements to the program. The assessment, covered in Section 4, considered existing source loads from historical data as well as conducted a program evaluation to determine an average load. The evaluation also looked at current program BMP's and compared them to recommended strategies developed in the Salt Management Strategy (SaMS) Guide.

The program evaluation covers the existing systems in place such as:

- Current processes and practices,
- Baseline and target application rates,
- Storage practices, and
- Training/education/outreach.

The average total amount of Chloride containing products used by Fort Belvoir within the Lower Accotink Creek Watershed was calculated as 77,051 lbs/year, which accounts for 2.34% of the aggregate wasteload of 3,294,323 lbs/year. Additionally, an average application rate of Chloride usage of 102.79 pounds per lane mile, per event was determined for the entirety of Fort Belvoir, while an application rate of 175.81 pounds per lane mile, per event was determined for areas within the Lower Accotink Creek Watershed. Both values proved to be lower than the recommended minimum of 325 pounds per lane mile, per event developed by the Salt Institute Standards.

Recommendations for improvement are covered in Section 5 of this plan as required by Permit Part II.B.3. These recommendations were based on the baseline assessment completed in Section 4 and a review of SaMS practices. This section covers areas of the program where improvements made would be most effective.

The overall goal of this Action Plan would be to achieve reductions using the adaptive iterative approach, as described throughout. To achieve this, this plan should be assessed and updated annually to determine the efficacy of the program as well as improve the program where necessary. Section 6 describes the process for using reported data each year to calculate application rates to see if goals were met or if additional BMPs are required to be implemented. This self-assessment will continue to refine operations at Fort Belvoir and may be used to give both operators and supervisors an idea of how things currently run as well as common issues that arise.

As part of this Plan, an implementation schedule is also included in Section 7 with target dates of completion mostly by the end of the upcoming Permit Cycle (October 32, 2023).

A Draft Lower Accotink Creek Chloride TMDL Action Plan is being submitted as required under Part I.C.5.b of the current General Permit. The Action Plan was posted for public comment on the Fort Belvoir Home Page under Environmental Documents for Stormwater on April 7, 2021. A Notice of Availability for the document was posted on the Fort Belvoir DPW Stormwater Facebook page and on the main Fort Belvoir Facebook page. The notice was subsequently published in the Fort Belvoir newspaper, the Belvoir Eagle, on April 15, 2021. Fort Belvoir kept the public comment period open until April 30, 2021 as required under Part II.B.7 of the current permit. Details of the public comment period on the Draft document are included in this Final Document under Section 8.

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.

Fort Belvoir consists of more than 7,700-acres on Main Post and an 800-acre detachment parcel, Fort Belvoir North Area (FBNA), which is located on the west side of Interstate 95 as shown in Figure 1 in Appendix A. The Main Post is situated between Interstate 95 and Pohick Bay and Gunston Cove on the Potomac River. US Route 1 divides the Main Post into two distinct geographical areas, referred to as North Post and South Post.

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 39,000 civilian and military personnel, and provides support services for over 200,000 military personnel, dependents, and retirees in the region. Development along US Route 1 consists of mixed-use commercial businesses and scattered residences. The surrounding area is developed with residential and commercial/retail businesses.

Fort Belvoir currently holds a General Virginia Pollution Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4), No. VAR040093, effective November 29, 2018 through October 31, 2023. The purpose of this Chloride Total Maximum Daily Load (TMDL) Action Plan is to comply with Part II.B of 9VAC25-890-40. This Action Plan has been developed to provide a review of the current MS4 program and to demonstrate Fort Belvoir's ability to comply with the Accotink Creek Chloride TMDL approved by the EPA on May 23, 2018 and approved by the Soil Water Control Board (SWCB) on April 12, 2018.

The Action Plan includes the requisite planning items found in permit Part II. The focus of the Action Plan is to provide the means and methods needed to satisfy the Accotink Creek Chloride TMDL developed by the Virginia Department of Environmental Quality (VADEQ).

The Accotink Creek Chloride TMDL contains aggregate waste load allocations (WLAs) for regulated stormwater, as such, no WLA for chloride within the Lower Accotink Creek Watershed has been specifically assigned to Fort Belvoir's MS4. Volume III Chloride TMDLs for the Accotink Creek Watershed published on August 30, 2017 is the state's primary planning tool to establish strategies, targets, and expectations for different sectors: including urban stormwater for local governments. It requires the implementation of urban stormwater controls or Best Management Practices (BMP) to better existing conditions and achieve reductions to address the TMDL and identifies the use of state-issued stormwater permits as the tool for compliance by requiring target reductions for the TMDL.

The Volume III Chloride TMDLs for the Accotink Creek Watershed, provides an overall Loading Capacity and aggregate wasteload for all MS4s within the Lower Accotink Watershed for which Fort Belvoir falls within, as summarized in Table 1 below. In the table, the Total WLA is a combination of the Aggregate MS4 WLA, the Aggregate Industrial Stormwater WLA, and Future Growth. Future Growth was accounted for by setting aside 5% of the TMDL for the creation of new point sources and any growth in MS4 service areas or other regulated stormwater, due to anticipated expansion in regulated stormwater. Load Allocation covers loads from outside either MS4 service areas or the drainage areas to industrial stormwater outfalls. A Margin of Safety (MOS) was necessary to consider the uncertainty in the relation between pollutant loading rates and water quality. An explicit MOS of 10% was used in addressing the chloride impairments of Accotink Creek. Lastly, the TMDL is the sum of all the parts and pieces above.

Table 1: Summary of TMDL for Lower Accotink Creek

Source	Load (lbs/yr)	Load (lbs/day)	Percent of TMDL
Total WLA	3,723,479	20,541	60%
Aggregate MS4 WLA	3,294,323	18,181	53%
Aggregate Industrial Stormwater WLA	117,071	638	2%
Future Growth	312,084	1,722	5%
Load Allocation	1,894,040	10,453	30%
Margin of Safety	624,169	3,444	10%
TMDL	6,241,688	34,437	100%

The Lower Accotink Creek Watershed Chloride TMDL includes and lists four MS4 Systems: Fairfax County (VAR0088587), Fairfax County Public Schools (VAR040104), the Virginia Department of Transportation (VAR0092975), and Fort Belvoir (VAR040093).

Between these four MS4 Systems, the total Waste Load Allocation is set at a maximum of 3,294,323 lbs/yr or 18,181 lbs/day as shown. It should be noted that the Fairfax County Public Schools MS4 Permit was absorbed by the overall Fairfax County MS4 Permit and no longer exists. Therefore the WLA presented now only includes three MS4s.

According to the MS4 General permit, the permittee is required to reduce the load of Chlorides from existing developed lands served. Reductions should be achieved through the iterative implementation of BMPs approved by the VADEQ and/or described within the Salt Management Strategy (SaMS) Toolkit. Since Fort Belvoir has no numerical goals, to reduce chloride loads from regulated areas by a certain percentage. This plan instead focuses on an assessment and overview of the current system with recommendations on how to build upon and improve current practices. The overall goal would be to achieve reductions using the adaptive iterative approach, as described in this Action Plan.

This Action Plan details Fort Belvoir's efforts and focuses on meeting the requirements in the current Volume III Chloride TMDLs for the Accotink Creek. The Action Plan contains an analysis of existing BMPs, projects that are currently in the planning and design phase, potential strategies that may be implemented throughout the rest of this permit cycle (2021-2023), and the annual evaluation process to determine effectiveness of implemented practices that would be sufficient to satisfy the requirements of the Accotink Creek Chloride TMDL. The following is required for Local TMDL Action Plans per Part II.B of the MS4 permit:

- The TMDL Project Name
- The EPA approval date of the TMDL
- The wasteload allocated to the permittee, if applicable
- Identification of the significant sources of the pollutants of concern (POC) discharging to the permittee's MS4 and that are not covered under a separate VPDES permit.
- Recommendations for Additional Reductions
- A schedule of anticipated actions planned for implementation during this permit term
- An opportunity for public comment proposed to meet the local TMDL action plan requirements for no less than 15 days Public Comment on Draft Plan

2. CURRENT PROGRAM AND LEGAL AUTHORITIES

The MS4 Program strives to improve environmental compliance and quality within the MS4 Service Area through effective management and implementation of technical guidelines, criteria, and practices for stormwater management and erosion and sediment control. The collective efforts under the MS4 Program result in significant reduction of all pollutants that may be discharged from the regulated MS4. In addition, Fort Belvoir has specifically developed its MS4 Program and other support programs such as local TMDL Action Plans to address specific pollutants, including the pollutants of concern (POCs) of the Accotink Creek Chloride TMDL (Chlorides).

Pollutant reductions from the implementation of best management practices (BMPs) that address the six Minimum Control Measures (MCM) were the first to be accounted for in the evaluation of goals for meeting the Accotink Creek Chloride TMDL. To achieve this, a review of the current MS4 Program Plan, dated December 2020, as well as existing, new, and modified legal authorities was conducted.

2.1. MS4 PROGRAM PLAN

As specified in the Local TMDL Special Condition of the MS4 General Permit Part II.B, the permittee shall include the means and methods that will be utilized to address discharges into the MS4 from new sources. Implementation of the following existing BMPs from Belvoir's MS4 Program Plan represents implementation to the maximum extent practicable (MEP) and demonstrates adequate progress for this permit cycle and Belvoir's ability to meet the Special Condition of the MS4 General Permit:

a. Implementation of a Public Education and Outreach Program in accordance with the minimum control measures in Part I.E.1 related to salt management directed at Fort Belvoir tenant agencies, schools, and community partners.

   - These controls are addressed in BMP's 1.1, 2.1, and 2.2 of the MS4 Program Plan.

b. Implementation of Operational BMP Fact Sheets and Stormwater Pollution Prevention Plans (SWPPPs) in accordance with the minimum control measures in Part I.E.6 related to High Profile Facilities (HPF) and pollution prevention/good housekeeping for operations and maintenance groups.

   - The development of Operational BMP Fact Sheets and SWPPPs are addressed in BMP 6.1 and 6.2 respectively of the MS4 Program Plan.

c. Implementation of Level 1-3 General Awareness training in accordance with the minimum control measures in Part I.E.6 related to field personnel or employees at HPF's receiving salt management direction.

   - These controls are addressed in BMP 6.4 of the MS4 Program Plan.

Table 2 below provides a summary of BMPs found in the December 2020 MS4 Program Plan that assist in addressing Chloride discharges and reducing levels of effluent into the Lower Accotink Creek to meet Chloride TMDLs.

Table 2: Current MS4 Program BMP Description Summary

BMP	NAME	DESCRIPTION
BMP 1.1	Implement a Public Education and Outreach Plan	Distribution of educational materials regarding methods to reduce introduction of the POCs into stormwater runoff including: 1. Quarterly Newsletters 2. Newspaper Articles 3. Seasonal Social Media Posts
BMP 2.1	Maintain a webpage dedicated to the MS4 Program and Stormwater Pollution Prevention	The webpage contains the following information and features available to the public: 1. Effective MS4 Permit and coverage letter 2. Most current MS4 Program Plan 3. Annual reports for each year of the term covered by the current permit 4. Copies of TMDL Plans being implemented, 5. An avenue for reporting stormwater pollution to the MS4 Program
BMP 3.1	Develop and Maintain an Accurate MS4 Map and Information Table	Maintain mapping data for all MS4 outfalls and stormwater management facilities. This mapping data assists Fort Belvoir in determining the spatial location of stormwater system components. The MS4 map includes MS4 outfalls discharging to surface waters, a unique identifier for each mapped item, name and location of receiving waters to which the MS4 outfall or point of discharge discharges, MS4 regulated service area, and stormwater management facilities owned by Fort Belvoir.
BMP 3.2	Prohibit Unauthorized Non-Stormwater Discharges into the MS4	Maintaining Fort Belvoir Policy Memorandum #71, *Prohibition of Illicit/Unauthorized Discharges into the Municipal Separate Storm Sewer System (MS4) and Waterways*. • This policy prohibits unauthorized non-stormwater discharges into the MS4
BMP 3.3	Maintain and Implement an Illicit Discharge Detection and Elimination (IDDE) Plan	Implement an IDDE Program that includes written procedures to detect, identify, and address non-stormwater discharges, including illegal dumping, to the small MS4. • The IDDE Program addresses the Illicit Discharges through staff training, windshield inspections, and annual outfall screening
BMP 6.1	Written Procedures for Operations and Maintenance (O&M) Activities	Develop and Maintain BMP Fact Sheets that can be distributed to various O&M contractors/tenant commands/privatized housing performing operations and maintenance functions on Fort Belvoir. Each fact sheet contains a description of the activity, guidelines that identify best management practices for stormwater pollution prevention, any maintenance,

BMP	NAME	DESCRIPTION
		and spill response procedures. Current Fact Sheets, related to chloride use and storage include: 1. Good Housekeeping 2. Spill Preparedness & Response 3. Secondary Containment 4. Above Ground Storage Tanks 5. Outdoor Storage and Handling of Materials and Waste 6. Outdoor Storage and Handling of Raw Materials and Waste 7. Salt Storage and Loading (Appendix D-1) 8. Salt Application (Appendix D-2) 9. Brine Mixing (Appendix D-3) 10. Aircraft Deicing Operations (Appendix D-4)
BMP 6.2	Implement Stormwater Pollution Prevention Plans (SWPPPs)	Implement the Fort Belvoir Master SWPPP and update Master and High Priority Facility SWPPPs as needed. • Provides an avenue for annual evaluation and enforcement of site practices at facilities determined to be High Priority which includes those involved in the storage of winter maintenance materials.
BMP 6.4	Implement Written Training Plan	Continue to implement required training and update training content as necessary. • TMDL information is included in both SWPPP required training and Stormwater General Awareness Training.

2.2. LEGAL AUTHORITIES

As specified in the Local TMDL Special Condition of the MS4 General Permit Part II.B, the permittee shall include the means and methods that will be utilized to address discharges into the MS4 from new sources. Implementation of the following existing legal authorities and Fort Belvoir Policies initiated as required by Part I.B represents implementation to the maximum extent practicable (MEP) and demonstrates adequate progress for this permit cycle and Belvoir's ability to meet the Special Condition of the MS4 General Permit.

2.2.1. 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 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 Lower Accotink Creek is listed as impaired due to Chloride.

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 loadings of a pollutant's waste load allocation (WLA) needed to achieve and maintain water quality standards.

The Accotink Creek Chloride TMDL, approved by the EPA on May 23, 2018 identifies the necessary pollution reduction of chloride and sets goals necessary to meet applicable water quality standards in the Lower Accotink Creek. Virginia's efforts and strategies are guided by the Chesapeake Bay Program, the Chesapeake Bay TMDL, and Phase I and II WIPs.

2.2.2. 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 USEPA to comply with Section 402 of the CWA. The 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, 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 National Pollutant Discharge Elimination System (NPDES) permits must be consistent with assumptions and requirements of any applicable TMDL WLA. The Commonwealth of Virginia, Virginia Department of Environmental Quality (VADEQ), regulates the management of pollutants carried by stormwater runoff under the Virginia Pollutant Discharge Elimination System (VPDES) program.

2.2.3. US ARMY REGULATION (AR) 200-1, ENVIRONMENTAL PROTECTION AND ENHANCEMENT

The 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 (for example, Army and Air Force Exchange Services (AAFES), Defense Commissary Agency (DECA)) (Army, 2007).

Chapter 4-2 of the AR requires compliance with all requirements, substantive and procedural, for control and abatement of water pollution, as outlined in the CWA, including implementation of TMDL regulations to ensure that mission and non-mission activities and construction designs utilize BMPs to minimize TMDL Impacts. Chapter 4-2 requires a program that:

> *"(a) Assesses the installation watershed impacts as appropriate, considering upstream and downstream water quality data or other background levels, proximity to potentially designated impaired waters, and any effects on mission activities.*
>
> *(b) Carries out Army activities consistent with EPA/State approved plans/strategies to restore impaired or threatened water bodies to their designated use.*
>
> *(c) Controls soil erosion in accordance with applicable and appropriate Federal, State, or local requirements."*

2.2.4. FORT BELVOIR GENERAL VPDES PERMIT FOR DISCHARGES OF STORMWATER FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4), MS4 GENERAL 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 special conditions for Local TMDLS found within the General VPDES Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems found at 9VAC-25-890-40 Part II.B.1 are stated as follows:

> *"The permittee shall develop 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.1.a and 1.b:"*

EPA Approved the Chloride TMDL for the Lower Accotink in May 2018 and therefore, Part II.B.1.b is applicable and reads:

> *"For TMDLs approved by EPA on or after July 1, 2013, and prior to June 30, 2018, and in which an individual or aggregate wasteload has been allocated to the permittee, the permittee shall develop and initiate implementation of action plans to meet the conditions of Part II.B.3, B.4, B.5, B.6, and B.7 as applicable for each pollutant for which wasteloads have been allocated to the permittee's MS4 no later than 30 months after the permit effective date."*

As outlined above, the due date for this Chloride TMDL would be on May 29, 2021, 30 months after the permit effective date of November 29, 2018.

2.2.5. MS4 PROGRAM PLAN

The MS4 Program plan documents Fort Belvoir's compliance with Part II.B of the MS4 General Permit and was revised December 2020 as per the schedule listed in permit Table 1. The Program Plan satisfies the requirements of this Part as well as the appropriate water quality requirements of the Clean Water Act and regulations. The Plan includes six (6) minimum control measures as listed in Part I.E and details the implementation of best management practices to reduce pollutants, protect water quality, and ensure compliance with water quality standards.

As per Part II B.8 of the MS4 general permit, all approved Local TMDL Action Plans shall be incorporated into the current MS4 Program Plan by reference. The new permit became effective on November 29, 2018, and the MS4 Program Plan is updated to reflect the additional requirements presented in Part I.B and Part.II.B.8 of the 2018-2023 Permit which state, respectively:

> *"The MS4 Program Plan as required by Part I.B of this permit shall incorporate each local TMDL action plan."*

> *"The MS4 program plan as required by Part I B of this permit shall incorporate each local TMDL action plan. Local TMDL action plans may be incorporated by reference into the MS4 program plan provided that the program plan includes the date of the most recent local TMDL action plan and identification of the location where a copy of the local TMDL action plan may be obtained."*

2.2.6. FORT BELVOIR GARRISON POLICY MEMORANDUM #28, ENVIRONMENTAL POLICY

Fort Belvoir's Environmental Policy was signed and took effect on June 24, 2014, the most up to date policy can be seen on the Fort Belvoir Homepage. Section 4 of this policy restates Fort Belvoir's commitment to the protection of the environment and accountability for its decisions. In support of this environmental policy, Fort Belvoir will comply with legal and other requirements applicable to the conduct of Fort Belvoir's mission while continually improving Fort Belvoir's environmental performance, including:

> *"Proactively manage environmental issues and act promptly and responsibly to correct incidents or conditions that endanger health, safety, or the environment."*

This policy provides an avenue of enforcement for requirements set forth by AR 200-1.

2.2.7. FORT BELVOIR GARRISON POLICY MEMORANDUM #71, STORMWATER POLLUTION PREVENTION

An installation-wide stormwater policy was developed to address compliance with the MS4 Permit, the ISW major permit and other stormwater regulations. The policy was signed and took effect on August 2, 2018 and the most up to date policy can be seen on the Fort Belvoir Homepage. The policy outlines proper protocols for minimizing stormwater pollution during activities that directly and indirectly impact water quality of the receiving waters. Section 4.c. 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."*

This policy also specifically speaks to management of materials storage regarding Chlorides in Section 4.d.(1), stating:

> *"Personnel responsible for bulk storage areas for items such as salt, mulch, compost, and soil stockpiles will implement best management practices to insure that material does not enter the MS4 and waterways during a storm event. Any liquid materials must be stored in adequate secondary containment."*

Lastly, the policy outlines the use of Deicing Materials in Section 4.d.(5), which states:

> *"Application of any deicing agents containing urea or ethylene glycol or other forms of nitrogen or phosphorous to parking lots, roadways, runways or other paved surfaces is prohibited."*

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

2.2.8. FORT BELVOIR POLICY MEMORANDUM #73, STORMWATER POLLUTION PREVENTION PLAN

Memorandum #73 provides guidance for the development, implementation, and maintenance of required facility and construction Stormwater Pollution Prevention Plans (SWPPPs) to ensure compliance with Fort Belvoir VPDES MS4 General and ISW Major Permits. Section 4.b. of this policy applies to TMDL conditions as stated below:

> *"Reference a. requires Army installations to comply with TMDL requirements and develop and implement a Stormwater Pollution prevention Plan (SWPPP) by integrating all aspects of the National Pollutant Discharge Elimination System (NPDES) program and ensuring that mission and non-mission activities utilize Best Management Practices (BMPs) to prevent exceeding TMDL limits of pollutants of concern to impaired waters."*

This policy provides an avenue of enforcement for requirements set forth by Fort Belvoir's Master SWPPP and SWPPPs required under VADEQs Construction General Permit (CGP). The updated Fort Belvoir Policy Memorandum #73, Stormwater Pollution Prevention Plan Requirements was signed and came into effect August 2, 2018.

All current Garrison policies can be found in full at:

https://home.army.mil/belvoir/index.php/about/us-army-garrison-policy-memorandums.

3. DELINEATION OF THE MS4 SERVICE AREA

Fort Belvoir's MS4 permit is the regulatory mechanism used to require implementation of stormwater quality BMPs necessary to meet the Accotink Creek Chloride TMDL. The MS4 permit requires Fort Belvoir to define the size and extent of the existing impervious and pervious area within the MS4 service area. Areas of Fort Belvoir that sheet flow directly to waters of the state, or otherwise drain to waters of the state through means other than a regulated outfall, are not considered part of the MS4 service area. Properties within the jurisdictional boundary that are regulated under a separate VPDES stormwater permit, forested areas, wetlands, and open waters are also not considered part of the MS4 service area.

The first step in the analysis involved distinguishing between regulated and unregulated land areas to define the MS4 service area. To perform this analysis, Fort Belvoir utilized local ArcGIS data and tools, a review of other state stormwater permits under the VPDES program, and 2010 census data covering urban areas for the Washington DC Metropolitan Area. After determining the regulated areas based on 2010 census data and removing areas covered under a separate VPDES Permit, Fort Belvoir was left with a general area that is covered under the MS4 General Permit.

Since the 2010 Census data was collected, Fort Belvoir has adjusted land use in some areas that were not considered urban at the time. These now developed lands were also considered in the overall assessment although most were found to be outside of the Lower Accotink Creek Watershed.

The above approach rendered a delineation of regulated and non-regulated areas. Non-regulated areas include land with direct drainage to surface waters with no connection to the MS4, stream corridors, and areas covered under separate MS4 or VPDES industrial stormwater permits. The exclusion of these categories from the MS4 regulated area was based on guidance provided by the Chesapeake Bay TMDL Action Plan guidance and current (2018) MS4 general permit. The approach and steps are detailed in the following sections.

3.1. TOTAL JURISDICTIONAL BOUNDARY

Fort Belvoir is broken into two separate land masses known as the Main Post and the Belvoir North Area as discussed in the Introduction and Background section above. The Main Post covers approximately 7,776 acres while the North Area covers an additional 803 Acres for a total of about 8,579 acres as shown in Figure 1 in Appendix A.

3.2. AREAS COVERED UNDER A SEPARATE VPDES PERMIT

Lands associated with separate individual or general MS4 or industrial stormwater permits were removed from the determined Fort Belvoir Jurisdictional area totals. Only three other VPDES Permits are known to cover areas within the jurisdictional boundary shown in Figure 1. Areas associated with these permits are not considered a part of the MS4 service area, details for these permits are summarized in Table 3 and shown in Figures 2 and 3.

Fort Belvoir currently holds a separate Individual Major Permit for Stormwater Discharges from Industrial (ISW) Activities (VA0092771). The permit has 31 representative outfalls and covers discharges from those industrial facilities. Drainage areas associated with these 31 outfalls, totaling 762.5 acres, were removed from the total Jurisdictional Area. The Permit covers approximately 751 acres on the Main Post and 11.5 acres on the Belvoir North Area.

The Virginia Department of Transportation (VDOT) holds easements for multiple portions of roads along the jurisdictional boundary. VDOT easements cover approximately 117 Acres on the Main Post to include sections of Route 1, Fairfax County Parkway, and Jeff Todd Way and 158 Acres in the Belvoir North Area covering areas of Fairfax County Parkway and Rolling/Barta Roads.

Fairfax County (Fairfax Co.) Permit covers a small section (19.8 acres), associated with Fort Belvoir Elementary School, of the jurisdictional area.

Table 3: Areas Under Separate VPDES Permits

Permit Holder	Permit Type	Permit Number	Total Acres	Acres on Main Post	Acres in North Area
VDOT	MS4	VA040115	275	117	158
Fort Belvoir	Industrial	VA0092771	762.5	751	11.5
Fairfax Co.	MS4	VA0088587	20	20	0

With the removal of the areas associated with these permits the MS4 service area are further refined. The potential MS4 service area on the Main Post is now approximately 6,892 acres while the North Area is now 633.5 acres for a total of about 7,525.5 acres as shown in Figures 2 and 3 in Appendix A.

3.3. REGULATED VS. NON-REGULATED

In further refining the MS4 service area, the 2010 Census data for urban areas was layered over the remaining areas as defined after removing lands associated with separate VPDES Permits. Because land use on Fort Belvoir has changed since the 2010 census data was collected, future service areas likely to be covered after the 2020 Census were identified for informational and planning purposes. These additional areas were previously considered non-urban but have since been developed or there are proposed projects that will occur that would significantly affect land use.

Figure 4 shows the 2000 and 2010 regulated urban areas in red. Figure 5 shows the additional future service areas after the 2020 Census as areas considered for future coverage in green. The additional 744 acres from newly developed land considered are shown in green in Figure 5. The Hospital, Stables, Theote road, and 300 Area were not within the Lower Accotink Watershed, and therefore, not further considered in this plan. The additional 84 acres associated with the Army Museum does fall within the Lower Accotink Creek Watershed and is thus considered as part of this plan. A breakdown of the areas is presented in Table 4.

Table 4: Summary of Urban Areas on Fort Belvoir

Location	Acres	Totals
Regulated Areas Based on 2010 Census Data		
Urban Area - Stables	28	3038
Urban Area - DAAF	22	
Urban Area - ADFE	137	
Urban Area - Berman Tract	21	
Urban Area - Woodlawn	97	
Urban Area - Main Post	1930	
Urban Area - North Post	803	
Potential Additional Service Areas after 2020 Census		
Additional Area – Hospital, Stables, Theote, and 300 Area	660	744
Additional Area – Army Museum	84	

To properly determine the acreage for the MS4 regulated areas it was necessary to determine the acres covered under separate permits based on its regulatory status. Therefore, the acres covered under the VDOT or the Fort Belvoir ISW Permit were broken down into three categories; Regulated, Non-Regulated, and within Additional coverage areas. Table 5 below shows the breakdown of areas covered under other permits.

Table 5: Summary of Separate VPDES Permits Based on Regulatory Status

Permit	Location	Total Area*	Regulated	2020 Census Coverage	Currently Non-Regulated
Fort Belvoir Industrial Stormwater Individual Permit (VA0092771)	RO-001 - Airfield North	14.5	0	0	14.5
	RO-002 - Airfield East	180	0	0	180
	RO-003 - Airfield South	132	0	0	132
	RO-004 - Cullum Woods	34	0	0	34
	RO-005 - Hazwaste	1	0	1	1
	RO-006 - VARNG Motorpool	1	0	1	1
	RO-007 - 21st Street	56	45	11	11
	RO-008 - ADFE NE	70	66	0	4
	RO-009 – Golf Course	103	9	0	94
	RO-011 - Wash Rack	3	3	0	0
	RO-012 - Mosby Reserve	3.5	0	0	3.5
	RO-013 - Arby's	1	1	0	0
	RO-014 - Class Six	2	2	0	0
	RO-015 – Base-ops	61	46	15	15
	RO-016 - Dogue Creek Marina	2	2	0	0
	RO-017 - Recycling Center	4.5	0	4.5	4.5
	RO-019 - 300 North	8	6	0	2
	RO-020 - 300 Middle	8.5	8	0.5	0.5
	RO-021 - 300 South	4	4	0	0
	RO-022 - 300 Area Marina	3.5	0	3.5	3.5
	RO-023 - Warehouses	1	0	1	1
	RO-024 - ADFE SW	11	11	0	0
	RO-025 - Meade Road	5	5	0	0
	RO-026 - Markham Landfills	15	15	0	0
	RO-027 - Theote Road Landfill	2.5	0	0	2.5
	RO-028 - Kingman Road Landfill	15	0	0	15
	RO-029 - Mulligan Road Landfill	2.5	0	0	2.5
	RO-030 - Pohick Landfill	4	0	0	4
	RO-031 - NGA Pond 6	2	2	0	0
	RO-032 - NGA Pond 8	9.5	9.5	0	0
	RO-033 - 249th Motorpool	2.5	0	0	2.5
TOTAL Acres covered under VA0092771		**762.5**	**234.5**	**37.5**	**490.5**

Permit	Location	Total Area*	Regulated	2020 Census Coverage	Currently Non-Regulated
VDOT Permit (VA040115)	Richmond Highway (Route 1)	60	35	0	25
	Fairfax County Parkway (Main)	42	28	0	14
	Fairfax County Parkway (North)	147	147	0	0
	Backlick Road (North)	11	11	0	0
	Backlick Road	3	3	0	0
	Jeff Todd Way	12	0	0	12
TOTAL Acres covered under VA040115		**275**	**224**	**0**	**51**
FC	Fort Belvoir Elementary School	20	0	0	20
TOTAL Acres covered under VA0088587		**20**	**0**	**0**	**20**

*All Areas are presented in terms of acres and were rounded to the nearest 0.5 acre.

Based on the above analysis, the estimated land areas draining from the MS4 was calculated by starting with the original full jurisdictional area of 8,579 acres. The appropriate acreages from the analysis, totaling 1,057.5 acres, were removed from the associated MS4 land mass, depending on location. The remaining land was divided between regulated and non-regulated areas based on either the 2010 census or current and proposed land use. The total regulated MS4 service area, the additional future MS4 service areas after the 2020 Census selected by Fort Belvoir, and non-regulated areas are summarized in Table 6.

Table 6: Summary of Regulated vs. Non-Regulated areas

Land Area	Calculation	Final MS4 Acreage
MS4 Service Area – North Area *Based on 2010 Census Urban Area data*	Total Jurisdictional Area (803) - VDOT Easement (158) - ISW Permitted (11.5) = MS4 Service Area (633.5)	633.5
MS4 Service Area – Main Post *Based on 2010 Census Urban Area data*	Regulated Area (2235) - VDOT Easement (66) - ISW Permitted (223) = MS4 Service Area (1946)	1,946
Additional future MS4 Service Area *After the 2020 Census, based on current and proposed land use*	Additional Area Considered (744) - ISW Permitted (37.5) = MS4 Service Area (706.5)	706.5
	Total Regulated MS4 Service Area	**3,286**
Non-Regulated Areas	Total Jurisdictional Area (7776) - Regulated Area (2235) - Additional Areas Considered (744) - VDOT Easement (51) - Fort Belvoir Elementary (20) - ISW Permitted (490.5) = Non-Regulated Area (4235.5)	4,235.5
	Total Non-Regulated Area within the MS4	**4,235.5**
	Total Area Managed Under a Separate VPDES Permit	**1,057.5**
	Total Jurisdictional Area of Fort Belvoir	**8,579**

3.4. ACCOTINK CREEK WATERSHED DRAINAGE AREA

As this Chloride TMDL only applies within the Lower Accotink Creek Watershed, the service area was further be refined to include only areas within this watershed. Table 7 below shows a breakdown by watershed.

Table 7: Regulatory Status by Watershed and Acreage

Watersheds	Total Acres	Regulated Acres	Additional Coverage	Non-Reg Acres	Separate VPDES
Accotink Bay	607	89	157	238	123
Accotink Creek	3284	712	321	1717	533
Accotink Creek – FBNA	803	633.5	0	0	169.5
Dogue Creek	1777	970	51	588	168
Gunston Cove	680	128	160	331	61
Pohick Bay	566	0	0	566	0
Pohick Creek	625	18	18	589	0
Potomac River	237	28	0	206	3
Totals	***8,579***	***2,579***	***707***	***4,235***	***1,058***

The Accotink Creek watershed was broken down in the same manner as the 2010 Census data and was divided into categories based on the regulatory status. 237 of the 321 acres considered in Table 7 above under Additional Coverage for Accotink Creek is outside of the Lower Accotink Creek Watershed as defined in the Volume III Chloride TMDLs for the Accotink Creek Watershed. Therefore, this area was excluded from this analysis. The results from the analysis are summarized in Table 8 below. These results are used to calculate the baseline loads and reductions for the Lower Accotink Creek Chloride TMDL.

Table 8: MS4 Service Area – Lower Accotink Creek Watershed

Land Area	Total MS4 Acreage
MS4 Service Area – North Area *Based on 2010 Census Urban Area data*	633.5
MS4 Service Area – Main Post *Based on 2010 Census Urban Area data*	712
Future 2020 MS4 Service Area *Based on current and proposed land use*	84
Total Regulated Area	***1,429.5***
Non-Regulated Areas	1,801

These new values for the MS4 Service Area will be used throughout the calculations as Fort Belvoir saw a significant change in regulated urban area when compared to the areas shown within the Volume III Chloride TMDLs for the Accotink Creek Watershed. This change in regulated MS4 area was due to a smaller area being classified as urban between 2000 and 2010 (Figure 4), additional easements being given to VDOT, and the addition of an Industrial Stormwater Permit that covers sections of the Garrison.

4. EXISTING SOURCE LOADS AND PROGRAM EVALUATION

Calculation of existing loads, or a baseline, for Chloride is needed to determine current conditions and identify management strategies to meet the overall Accotink Creek Chloride TMDL Requirements. Establishment of a baseline is the best way to determine recommendations for Best Management Practices (BMP's) moving forwards and to assist with reducing loads in years to come. As such, this section will focus on determining and calculating existing source loads and conditions as well as analyzing the key elements of the existing winter maintenance program.

Section 5 focuses on recommendations for improvements in future years through use of the iterative process of assessment and implementation of practices.

4.1. CURRENT PROCESSES AND PRACTICES

The first step used in determining effectiveness of the current program and how it relates to the Accotink Creek Chloride TMDL was to analyze the current salt management operations and controls throughout Fort Belvoir. The following sections will go over the current equipment, practices, application rates, analysis, and goals for Fort Belvoir.

4.1.1. KEY PERSONNEL AND DUTIES

As outlined within the Virginia Salt Management Strategy (SaMS) Toolkit, defining the key personnel and duties for the removal of snow is a necessary step in defining the winter maintenance program. This includes the managers, operators, contract, or seasonal staff that would be utilized for salt treatment or snow removal.

At Fort Belvoir, almost all snow removal is accomplished by the Base Operations Contractor, Aleut, which would be considered contract staff, as a five-year contract is written and signed into effect which includes the snow removal process and procedures. Aleut is also responsible for the majority of anti and de-icing implementation (including plowing) across Fort Belvoir, except for areas controlled by autonomous tenant agencies such as Defense Logistics Area (DLA), National Geospatial Agency (NGA), and Aerospace Defense Facility East (ADFE). These areas shall be discussed in Sections 4.3.1, 4.3.2, and 4.3.5 respectively.

Aleut keeps 17 trucks staged at eight different locations across the installation. Until snow has accumulated a depth of two inches, only sand and salt are to be applied. After the two-inch mark, plowing operations shall commence. For the full list of snow removal requirements, see the Snow Plan included within Appendix C-1.

Per their contract, roads, parking areas, airfields, and sidewalks on the installation are to be cleared of snow and ice and salted or sanded only to the extent necessary to permit free movement of vehicular and pedestrian traffic. All these surfaces are prioritized within Appendices A-D of the snow plan. 11 roads are considered the highest priority for clearing and are a part of the designated primary snow emergency route through the installation. For a list of levels of service and priorities, see Section 4.1.4.

The Managers for the Base Operations Contractor is the Fort Belvoir Directorate of Public Works (DPW), Operations and Maintenance (O&M) Division. The O&M Division is responsible for ensuring that conditions of the contract with Aleut are met as well as keeping and maintaining records of deliverables as required and outlined by the contract. The O&M Division is also responsible for weekly meetings with Aleut for pre- and post-planning operations, which includes meetings to ensure requirements for snow operations are understood and being followed. The contract oversight provided by the O&M division ensures smooth operations and a consistent service level.

In addition to the Managers and Contract staff, Fort Belvoir also has Operator staff within the Emergency Operation Center (EOC) at the Directorate of Emergency Services (DES). This unit is activated whenever

snowfall is predicted to accumulate more than two inches and is manned continuously during any snow emergency. The EOC is responsible for notifying all commanders, directors, and chiefs of activities (to include tenants) of adverse winter weather conditions using the emergency notification system.

In summary, the DPW O&M Division is the managerial staff for snow operations, while the EOC at DES acts mostly as operator staff with some managerial duties, and the Base Operations Contractor Aleut would be considered contract staff. A simplified version of the Standard Operating Procedure for Snow Removal is summarized below:

1. The EOC places a phone call to the DPW O&M Contract Officer for the Base Operations contractor requesting the need for snow removal based on the weather forecast.
2. DPW O&M then directs the Base Operations Contractor to prepare for brine application or snow removal based on the predicted weather.
3. Trucks are mobilized and prepared, set up at eight staging locations across Fort Belvoir.
4. Aleut initiates snow removal or anti-icing operations with salt or brine.

4.1.2. CURRENT EQUIPMENT

The Fort Belvoir Base Operations Contractor, Aleut, is responsible for the majority of Salt Application throughout the entirety of Fort Belvoir. They are responsible for keeping and maintaining all their own salt application equipment, which is mostly stored at the Roads and Grounds facility on the corner of 16th street and Theote Road. For a more detailed breakdown of storage in this area, see Section 4.3.4.

Equipment on record consists of approximately 72 pieces ranging from snowplows, blowers, power brushes, sand/salt spreaders, loaders, and additional smaller machines for use on sidewalks or pedestrian areas. Of these pieces, 17 of them are trucks.

The entire list of snow removal equipment owned and operated by Aleut is shown in Appendix C-2.

In addition to the equipment used by Aleut, Defense Logistics Agency (DLA) uses several pieces of equipment as they are an autonomous tenant of Fort Belvoir responsible for their own salt usage and maintenance. They have four trucks with mounted spreaders, two Kubota utility vehicles, and hand spreaders.

Additional information on DLA is covered within section 4.3.1.

4.1.3. CALIBRATION PROTOCOLS

Equipment and machinery owned and operated by the Base Operations Contractor Aleut does not currently go through any calibration process. In the past, during the beginning of the winter season, Virginia Public Works Equipment visited Fort Belvoir to calibrate the brine solution equipment. This was last completed in October 2019. Funding was short for 2020 and so calibration for the equipment did not occur.

There are currently no calibration protocols for the sand and salt spreaders.

Recommendations for establishing a calibration protocol is necessary and is covered within Section 5.5.

4.1.4. LEVEL OF SERVICE AND PRIORITIES

Areas on Fort Belvoir are treated based on degree of use as well as mission necessity. Areas of higher traffic volumes are treated prior to areas of lower traffic. Similarly, areas with higher need or that are considered “mission essential” are treated prior to areas that are non-essential. Several roadways at Fort Belvoir have been designated as primary snow emergency routes. These routes will be treated and deemed safe to use prior to moving to other routes, parking areas, or sidewalks.

Parking lots are also prioritized for treatment with higher priorities given to those that provide mission essential services, such as Davison Army Airfield (DAAF), the Fort Belvoir Hospital, Military Police, and the Fire Department.

The Snow Plan for Fort Belvoir states that the priority of snow removal will be:

1. Main post roads, gates, and DAAF
2. Parking areas
3. Family housing roads and parking areas
4. Main post sidewalks

For a full list of snow removal priorities at Fort Belvoir, see the Snow Plan included within Appendix C-1. A map detailing the staging of trucks and routes is included in Appendix C-4.

4.1.5. USE OF NON-CHLORIDE DEICERS (ALTERNATIVES)

There are currently several alternatives that are used at Fort Belvoir in location-specific areas.

At DAAF, there are no Chloride products used for clearing of ice or snow from the Airfield. The use of Cryotech NAAC Solid Runway Deicer as well as Cryotech E36 Liquid Runway Deicer are the two primary compounds utilized for keeping the Airfield operational during adverse weather events.

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

While these two alternatives 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.

At NGA, beet juice is used as an additive to the brine mixture already used on site. Beet juice is an additive that may be used as part of a deicing brine solution to assist the salt brine in working at lower temperatures, lowering the freezing point of water to as low as -20 degrees Fahrenheit in certain scenarios. This has been found to be particularly effective for icy or snow packed surfaces. This also allows the final mixture of anti-icing or de-icing brine to be less toxic than just using salt alone, as well as cut down on overall costs.

Although, Beet juice does not eliminate the use of chloride-based brines, it does reduce the amount of salt used in the brine and works to make it more effective. The use of beet juice increases the stickiness of the brine and helps bond the salt to the road surface. Beet juice, when used as an anti-icing agent, has been shown to prevent ice crystals from forming, which then helps with the removal of snow and ice from the roads, by plowing instead of salting.

4.1.6. TRACKING AND REPORTING

The Base Operations Contractor, Aleut, uses a system of weighing trucks before and after spreading any products to determine the amount of product used. In previous years (pre-December 2020), specific information regarding how much was applied post-wide as well as what specific products were used were reported to the Fort Belvoir Operations and Maintenance Division via email shortly after an event where anti- or de-icing use was required.

Since December 2020, a new system has been implemented and is now required after each snow event where any product is used. A Salt Tracking and Reporting Data Sheet (provided by SaMS) is submitted to report the amount and type of each product used to the Fort Belvoir Operations and Maintenance Division. This data sheet covers more information and has a checklist to ensure BMP's are functional and are remaining effective, as well as assessing if continued use is feasible.

See Appendix E for a copy of any Salt Tracking and Reporting Data Sheets obtained thus far as well as a copy of the blank form. This new reporting system has replaced the bulk reporting system from previous years and will continue to be used in the future. Newly completed Salt Tracking and Reporting Data Sheets shall be inserted into Appendix E as received. These sheets will be used to perform the annual assessment at the end of the season.

Information on the annual assessment is covered in Section 6.

4.1.7. POST SEASON PRACTICES

Chloride products are only used on Fort Belvoir during the winter season when snow or ice may accumulate, October through March. During the off season, it is important that these materials are handled and stored appropriately to prevent any Chloride containing products from coming in contact with stormwater.

At the end of the season, equipment is washed and cleaned at a wash rack located at the corner of Meade Road and Gunston Road. The drainage from this wash rack drains to a sedimentation basin which is cleaned out on an annual basis. This sedimentation basin includes an Oil Water Separator and ultimately drains to the sanitary sewer. The entire area of this practice is also outside of the Lower Accotink Creek Watershed. As such, the analysis of this aspect is not included within this TMDL Action Plan.

Application equipment is then stored in an open area at the eastern side of the Base Operations Contractor Yard, east of Building 1117 and north of building 1114, until the season begins again. Application equipment is only used temporarily during the winter months as the trucks are modified for the purposes of anti or de-icing operations. The contractor uses the same trucks during the rest of the year for other applications like landscaping.

Off season storage of chloride products is the same as the active season storage and are further covered in Section 4.3.

4.2. BASELINE AND TARGET APPLICATION RATES

Optimizing the rate at which deicing products are applied to maintain public safety while minimizing environmental impacts has been acknowledged as a difficult process. However, keeping the iterative process for improvement in mind, Fort Belvoir understands that setting a target application rate and having an evaluation process in place can serve as a resource for identifying areas of improvement.

As recommended by SaMS, the process involves selecting a target application rate(s), determining the quantity of deicer used, evaluating whether the levels of service were achieved, and evaluating if the target application rate(s) was/were achieved. The result of the evaluations can highlight challenges and/or areas for improvement.

To begin this process, as a part of this TMDL Action Plan, current or baseline application rates were calculated and were compared to numeric application rate guidelines provided by the Salt Institute Standards. A summary of the recommended application rates is shown in Table 9 below. Only the first four levels of mobilization are considered as temperatures rarely drop below 20°F and plowing is initiated if over two inches of snow is possible. These are further discussed in Section 5.3.

Table 9: Recommended Application Rates

Weather Forecast	Mobilization Level	Response Plan	Recommended Application Rate
Ice/Snow Possible Temp: 30-36°F	Anti-Ice	Pre-Treatment	Liquid Mag: 36 gal/lane mile Liquid Salt Brine: 50 gal/lane mile Salt: 325 lbs/lane mile
Snow Possible Temp: 30-36°F	1	Salt/Sand Mixture	325 lbs/lane mile
Up to 1 Inch Snow Possible Temp: 25-29°F	2	Light Salting operation	400 lbs/lane mile
Up to 2 Inch Snow Possible Temp: 20-24°F	3	Salting Operation	325 lbs/lane mile

The following evaluation will be used to determine the effectiveness of the overall program across the installation and will show where Fort Belvoir currently falls in comparison to the Salt Institute Standards.

4.2.1. HISTORIC PRODUCT USAGE

The Base Operations Contractor (Aleut) uses salt/sand spreaders and brine sprayers for application on roads and parking lots. The contract specifies that approximately 13 million square yards of impervious surfaces will be treated during snow events over the entire installation, with 6,168,127 square yards of roadways and 6,821,433 square yards of parking lots.

The Base Operations Contractor uses a system of weighing trucks before and after spreading any products to determine the amount of product used. Values for product usage were reported via email to O&M, after each storm event, for the 2017-2019 winter seasons. Starting in 2020, after each snow event where any product is used, a Salt Tracking and Reporting Data Sheet was required to be submitted, reporting the amount and type of each product used. The Data Sheet is based on recommendations by SaMS.

Appendix E shows a record of reported product usage and provides a blank Salt Tracking and Reporting Data Sheet. Additional information on Tracking and Reporting of data is covered in Section 4.1.6.

DLA is an autonomous tenant of Fort Belvoir who is responsible for their own salt usage and management. The entire drainage area of DLA falls within the Lower Accotink Creek Watershed and is

therefore considered in this Chloride TMDL Action Plan. DLA specifically uses Ice Melt as their product for application and keeps track of their usage individually from the Base Operations contractor. DLA treats approximately 142,950 square yards or 29.54 acres of area within their lease area. It should be noted that only 2020 – 2021 winter season data was available for DLA.

Additional information on operational practices used at the DLA facility for product storage is covered within Section 4.3.1.

DLA provided data for the nine (9) events in the 2020-2021 winter season totaled 150,000 pounds of product used, which equated to 75 tons per year. This number was added to the total of 1.2 tons of Ice melt used by the Base Operations Contractor for the rest of Fort Belvoir during the same season.

Table 10 shows recorded values of product usage between 2017 and 2020, by weight or volume, over the entirety of Fort Belvoir property. The Ice Melt totals for 2020, includes product application by both the Base Operations contractor and by Defense Logistics Agency (DLA).

Table 10: Recorded Data on Product Use across Fort Belvoir

Treatment Product	2017	2018	2019	2020	Average
80/20 Magnesium Chloride (MgCl) and Sand Mixture (tons)	380	775	581	83.5	454.9
MgCl Brine (gallons)	23,813	8,848	15,900	3,650	13,053
Ice Melt (tons)	0	0	7.2	1.2 + 75	20.85
E36 Liquid Runway Deicer (gallons)	1,850	1,000	1,500	950	1,325
NAAC Solid Runway Deicer (tons)	1.1025	10.61	5.5	2.2	4.85

4.2.2. APPLICATION RATES ACROSS FORT BELVOIR

Due to tracking and reporting of product usage being done on an installation wide level, this baseline assessment began with the total average of salt used across the entirety of Fort Belvoir. As stated above, a total of 12,989,560 square yards of roads and parking lots are treated during snow events over the entirety of Fort Belvoir by the Base Operations Contractor Aleut. DLA treats an additional 142,950 square yards, but only uses the ice melt product. This makes a total of 13,132,510 square yards. It should be noted that the 12,989,560 square yards will be used for calculation of the 80/20 MgCl/Sand Mixture and MgCl Brine, while the 13,132,510 square yards will be used for calculation of the Ice Melt usage. These numbers first need to be converted into acres using the conversion factor of 4,840 sq.yd. in an acre:

$$\left(12{,}989{,}560\ sq.yd.\left(\frac{1\ acre}{4{,}840\ sq.yd.}\right)\right) = 2{,}683.79\ acres$$

$$\left(13{,}132{,}510\ sq.yd.\left(\frac{1\ acre}{4{,}840\ sq.yd.}\right)\right) = 2{,}713.33\ acres$$

Acreage can then be converted into lane miles salted using the conversion factor of one acre = one lane mile rule of thumb, making 2,683.79 total lane miles (for 80/20 MgCl/Sand and MgCl Brine) and 2,713.33 total lane miles (for Ice Melt) treated during any given event.

Table 10 above showed the average amount of each product used per year. These values can further be refined to the exact amounts of components within them using the following assumptions:

- For the 80/20 MgCl/Sand mix, only 80% of this is MgCl
- For the MgCl Brine mix, approximately 8.34 lbs of MgCl are used per gallon to make the Brine Mixture.
- For the Ice Melt, the product used is Eco Melt by Ossian, Inc. It is composed of approximately 98% Sodium Chloride (NaCl), 1% Polymetric Colorant, and 1% Accelerating Agent(s).
- E36 Liquid Runway Deicer as well as the NAAC Solid Runway Deicer are not considered in this baseline assessment as these two products do not contain any Chlorides (see Section 4.1.5 on alternatives for more information).

The following Table gives a summary of the average times over the past four years (2017-2020) where each treatment product was used, the application rate in pounds per year, and the application rate based on Chloride concentrations in each product. These values are used in calculating the baseline application rate in pounds per lane mile for comparison to the Salt Institute Standards presented in Table 9 above.

Table 11: Average Times and Rates for Each Treatment Product Used (2017-2020) on Fort Belvoir

Treatment Product	Average Times Used per Year	Average Amount in pounds/year (lbs/yr)	Application Based on Chloride concentrations (lbs/yr)
80/20 Magnesium Chloride (MgCl) and Sand Mixture	3.5	909,800	727,840
MgCl Brine	2.0	108,862	108,862
Ice Melt	3.0	41,700	40,866

The average amount of 80/20 Magnesium Chloride and Sand mix came in at 454.9 tons per year, or 909,800 pounds per year. That number was further refined as only 80% of this mix is Magnesium Chloride, making 727,840 pounds per year on average over the entirety of Fort Belvoir. Spread over 3.5 events on average when this product was used, this comes in at:

$$\left(\left(\frac{727{,}840\ lbs}{3.5\ events}\right) \div 2{,}683.79\ lane\ miles\right) = 77.49 \frac{lbs}{lane\ mile}\ per\ event$$

The average amount of Magnesium Chloride Brine came in at 13,053 gallons per year. Approximately 8.34 lbs/gallon of MgCl is used to make the brine mix, resulting in 108,862 pounds per year on average over the entirety of Fort Belvoir. Spread over 2.0 events on average when this product was used, this comes in at:

$$\left(\left(\frac{108{,}862\ lbs}{2.0\ events}\right) \div 2{,}683.79\ lane\ miles\right) = 20.28 \frac{lbs}{lane\ mile}\ per\ event$$

The average amount of Ice Melt Product came in at 20.85 tons per year, or 41,700 pounds per year. Approximately 98% of this product is Sodium Chloride, resulting in 40,866 pounds per year on average

over the entirety of Fort Belvoir. Spread over 3.0 events on average when this product was used, this comes in at:

$$\left(\left(\frac{40{,}866\ lbs}{3.0\ events}\right) \div 2{,}713.33\ lane\ miles\right) = 5.02\,\frac{lbs}{lane\ mile}\ per\ event$$

Adding these together results in a total average in Chloride usage of 102.79 pounds per lane mile, per event used at Fort Belvoir. This is well below the Salt Institute Standards' recommended 325 lbs per lane mile for salt application as well as the 36 gallon per lane mile for liquid magnesium chloride and shows that current practices are adequate in controlling discharges of chlorides during application.

4.2.3. APPLICATION RATES WITHIN LOWER ACCOTINK CREEK WATERSHED

Due to the Chloride TMDL only being applicable for the Lower Accotink Creek Watershed the evaluation continued to consider only loads within the defined TMDL area. Following that same process shown above the average pounds per lane mile for the Lower Accotink Creek Watershed has been calculated to address effectiveness of the current program regarding the TMDL.

Of the total area treated during each event at Fort Belvoir, only 764,897 square yards are within the Lower Accotink Creek Watershed and within the MS4 Service Area. This area accounts for 5.82% of the total area where chloride products are used on Fort Belvoir throughout any given year. A breakdown of this area is provided in the Table below.

Table 12: Areas Treated within Lower Accotink Creek Watershed and MS4 Service Area

Facility, Road, or Parking Lot Name	Area (sq.yd.)
Defense Logistics Agency (DLA)	142,950
National Geospatial Agency (NGA)	99,593
Road B (ADFE)	44,068
Barta Road	17,118
Beulah Street	264,409
Wills Road	151,138
Building 2901 Parking Lot	40,572
Barta Road Parking Lot	5,049
Total:	***764,897***

Given that the Lower Accotink Creek Watershed only accounts for a portion of the total area where salt is applied throughout any given year, the application rates for this area can be inferred based on a ratio assuming the application is consistent throughout the installation. Based on this the potential load within the Lower Accotink Creek Watershed was calculated using 4.79% for areas treated by the Base Operations Contractor. As DLA is responsible for its own area, only uses Ice Melt, and only had data for 2020, the 142,950 sq.yd. considered above were only used in determining the load for that year and product.

The following Table summarizes the potential load within the Lower Accotink Creek Watershed.

Table 13: Recorded Data on Product Use within the Lower Accotink Creek Watershed

Treatment Product	2017	2018	2019	2020	Average
80/20 Magnesium Chloride (MgCl) and Sand Mixture (tons)	18.20	37.12	27.83	4.00	21.79

MgCl Brine (gallons)	1,141	424	762	175	626
Ice Melt (tons)	0	0	0.34	0.08 + 75	18.86

This results in a total load of 77,051 lbs/year on average of Chloride containing products within the Lower Accotink Creek Watershed and MS4 Service Area at Fort Belvoir. As the amount of this material that makes it into the actual Lower Accotink Creek is unknown, Fort Belvoir will take a conservative approach and estimate that 100% of this will make it to the actual Lower Accotink Creek.

Since Volume III Chloride TMDLs for the Accotink Creek Watershed sets the aggregate wasteload for the Lower Accotink Creek for MS4 Service Areas as 3,294,323 lbs/year, the amount of contribution from Fort Belvoir comes in at 2.34% of the entire TMDL.

A total of 764,897 square yards of the total 13,132,510 square yards of roads and parking lots are plowed or salted during snow events over the entirety of Fort Belvoir by both Aleut as well as DLA. As DLA only uses the Ice Melt Product, removing their footprint results in 621,947 square yards. These numbers first need to be converted into acres using the conversion factor of 4,840 sq.yd. in an acre:

$$\left(621{,}947\ sq.yd.\left(\frac{1\ acre}{4{,}840\ sq.yd.}\right)\right) = 128.50\ acres$$

$$\left(764{,}897\ sq.yd.\left(\frac{1\ acre}{4{,}840\ sq.yd.}\right)\right) = 158.04\ acres$$

Acreage can then be converted into lane miles salted using the conversion factor of one acre = one lane mile rule of thumb, making 128.50 lane miles (for calculation of 80/20 MgC1/Sand and MgCl Brine) and 158.04 lane miles (for calculation of Ice Melt) salted for any given event.

The following Table gives a summary of the average times over the past four years (2017-2020) where each treatment product was used, and the average amount used per year as shown in Table 11.

Table 14: Average Times and Rates for Each Treatment Product Used (2017-2020) Within Watershed

Treatment Product	Average Times Used per Year	Amount Within Lower Accotink Creek Watershed	Average Amount in pounds/year (lbs/yr)	Average Based on Chloride concentrations (lbs/yr)
80/20 Magnesium Chloride (MgCl) and Sand Mixture	3.5	21.79 tons	43,580	34,864
MgCl Brine	2.0	626 gallons	5,221	5,221
Ice Melt	3.0	18.86 tons	37,720	36,966

The average amount of 80/20 Magnesium Chloride and Sand mix came in at 21.79 tons per year, or 43,580 pounds per year. This number may further be refined as only 80% of this mix is Magnesium Chloride, making 34,864 pounds per year on average over the entirety of Fort Belvoir. Spread over 3.5 events on average when this product was used, this comes in at:

$$\left(\left(\frac{34{,}864\ lbs}{3.5\ events}\right) \div 128.50\ lane\ miles\right) = 77.52 \frac{lbs}{lane\ mile}\ per\ event$$

The average amount of Magnesium Chloride Brine came in at 626 gallons per year. As shown in Section 4.2.2, approximately 8.34 lbs/gallon of MgCl is used to make the brine mix, resulting in 5,221 pounds per year on average within the Lower Accotink Creek Watershed. Spread over 2.0 events on average when this product was used, this comes in at:

$$\left(\left(\frac{5{,}221\ lbs}{2.0\ events}\right) \div 128.50\ lane\ miles\right) = 20.32 \frac{lbs}{lane\ mile}\ per\ event$$

The average amount of Ice Melt Product came in at 18.86 tons per year, or 37,720 pounds per year. As shown in Section 4.2.2, approximately 98% of this product is Sodium Chloride, resulting in 36,966 pounds per year on average over the entirety of Fort Belvoir. Spread over 3.0 events on average when this product was used, this comes in at:

$$\left(\left(\frac{36{,}966\ lbs}{3.0\ events}\right) \div 158.04\ lane\ miles\right) = 77.97 \frac{lbs}{lane\ mile}\ per\ event$$

Adding these together results in a total average in Chloride usage of 175.81 pounds per lane mile, per event used at Fort Belvoir within the Lower Accotink Creek Watershed. This is consistent with calculation on an installation wide level and remains well below the Salt Institute Standards' recommended 325 lbs. per lane mile for salt application as well as the 36 gallon per lane mile for liquid magnesium chloride. This shows that current practices are adequate in controlling discharges of chlorides during application within the Lower Accotink Creek Watershed as well as Fort Belvoir as a whole.

Although application across Belvoir fell below recommended standards, most of the amount applied was attributed to the usage of Ice Melt, particularly the usage by DLA, as discussed in Section 4.2.1 and 4.2.2. An analysis of their practices and recommendations for improvement within the DLA facility are covered in the following sections.

4.3. SALT STORAGE PRACTICES

Salt storage across the entirety of Fort Belvoir is analyzed in the following Sections 4.3.1 through 4.3.5. This includes most of the larger organizations on Fort Belvoir and all locations where a considerable amount of salt is stored and/or used. Small holdings, such as what an individual resident may have or use on their personal property, is not considered in the assessment as it is virtually impossible to determine or keep track of.

For an area to contribute towards the baseline assessment for the purposes of this Accotink Creek Chloride TMDL Action Plan, it needs to be within the MS4 Service Area, not within an ISW Outfall, and within the Lower Accotink Creek Watershed. Specific storage areas are covered within Sections 4.3.1 through 4.3.5, while analysis of usage at facilities, roads, and parking lots is covered above in Section 4.2 above. The following Table 15 shows a summation of storage areas as well as usage throughout Fort Belvoir.

Table 15: Summary of Storage and Usage on Fort Belvoir

Area	Section	Within MS4 Service Area?	Within an ISW Outfall?	Within Lower Accotink Creek Watershed?	Contributes to Chloride Loading?
DLA	4.3.1	Yes	No	Yes	Yes
NGA	4.3.2	Portions	Yes, RO-032	Yes	Yes
Golf Course	4.3.3	No	Yes, RO-009	Portions	N/A
Base-Ops	4.3.4	No	Yes, RO-015	No	N/A
ADFE	4.3.5	Yes	Yes, RO-008	No	N/A
Roads & Parking Lots	4.2.3	Yes	No	Yes	Yes, 77,051 lbs/yr

Given this information, there are only three potential sources of Chloride loadings within the Accotink Creek Watershed as well as within the MS4 Service Area at Fort Belvoir required to be addressed in this TMDL Plan. These would include:

- The application of chloride products on Fort Belvoir Roads and Parking Lots within the Lower Accotink, which was considered in Section 4.2.3 above.
- The salt storage area and application of chloride products at DLA.
- The brine storage and chloride application at NGA facility

Although not required by the MS4 permit, due to how data is currently tracked and collected on an installation wide level, Fort Belvoir was unable to identify a feasible way to directly distinguish contributions from individual sources. Therefore, a conservative approach was taken and all salt areas across the installation were considered regardless of permit coverage. The sections below describe the evaluation of each known salt storage location and practices and analyzes available quantitative data.

4.3.1. DEFENSE LOGISTICS AGENCY

The Defense Logistics Agency (DLA) is part of Fort Belvoir Main Post, and all this area falls within the Lower Accotink Creek Watershed and is covered within the service area of the MS4 Permit. DLA is considered an autonomous tenant of Fort Belvoir and therefore, has its own winter management practices and is responsible for treatment of roads and parking areas within its borders. A portion of the DLA is used as general laydown area for construction projects as well as for landscaping and seasonal storage is covered as High-Profile Facility (HPF) 003 under the MS4 Permit. DLA stores salt within this area during the winter months. HPF-003 is located at the baseball field just northeast of the physical building along the fence line for the DLA property.

Salt Storage in this area consists of:

- One lined roll-off unit surrounded by Jersey Barriers which is covered using a tarp, containing approximately 25 pallets or 50,000 pounds of Ice Melt Product.

Figure 6 within Appendix A shows the location of HPF-003 as well as the Salt Storage. The entire baseball field is surrounded by silt fence which is maintained and in good condition per the last Fort Belvoir Annual Comprehensive Stormwater Inspection dated January 17, 2020.

Storage of salt in this area only occurs during the winter months. Most of this area drains southwest to storm drain inlets in the parking lot vicinity of DLA via sheet flow or shallow concentrated flow before ultimately discharging to a stormwater pond that is just southwest of the building. From there, the stormwater pond discharges to an unnamed tributary to Accotink Creek.

Because chloride products are stored in a lined container, is kept covered to prevent contact with precipitation, there is no direct connection to the Lower Accotink, and all runoff would be collected in a large stormwater pond, storage of products is not considered a significant source.

4.3.2. NATIONAL GEOSPATIAL AGENCY

The National Geospatial Agency (NGA) is part of Fort Belvoir North Area, which is shown in Figure 3 in Appendix A. Within this area, 633.5 acres are within the MS4 service area and 11.5 acres are covered under ISW Permit as Outfalls 031 and 032. All this area falls within the Lower Accotink Creek Watershed. NGA stores salt in two areas, one within the ISW outfall drainage area for RO-032 that is located at the southern portion of the main building, and another at the southeast corner of the overflow parking lot. Storage areas at NGA are shown in Figure 7 within Appendix A and includes:

- The winter supply storage area is located on the southern corner of Building 5104. This area is used for seasonal storage of salt and 'Ice Beeter - Treated Ice Melter'.
    - The salt is stored in a covered dumpster lined with an industrial grade coating that inhibits rust and maintains the integrity of the container.
    - The beet deicer additive is kept in the original manufacturer container (55-gal poly drums) until used and is raised off the ground on pallets preventing contact with runoff and making any leaks easily detectable.
- Winter brine tanks are stored in a dedicated area located at the southeast corner of the overflow parking lot.
    - Two brine tanks (3,000 gal) are also used during the winter season. These brine tanks are kept within a 66-ft berm, able to hold 110% of tank contents, used as secondary containment throughout the season.

Other operational controls employed by the facility work to prevent these materials from encountering stormwater runoff. The area used to store these materials is cordoned off with reflective barrels preventing access and accidents. The brine tanks are not to be filled to more than 90% capacity. Site personnel receive training reiterating the precautions for the storage and application of salts as described in Fort Belvoir BMP Fact Sheets 4 and 5 covering salt handling, storage, and application. Daily and post storm inspections, maintenance and incident response are being conducted in accordance with site operating procedures and are documented on a dedicated form. In addition, the site keeps spill supplies on-hand in case any incidental releases occur.

Although this area of NGA is currently covered under a separate VPDES permit, if permit coverage under the Industrial permit was ever terminated it would remain within the Fort Belvoir MS4 Service Area. Due to the potential for this to occur and the fact that it would meet the requirements of a High-Priority Facility (HPF) under 9VAC25-890-1 for its salt storage, it is therefore considered in this TMDL Action Plan.

ISW Outfall RO-032 is sampled semi-annually and chloride samples are taken during the winter season (October – March). Because quantitative data is available, Fort Belvoir was able to compare actual discharges to the Virginia numerical water quality criteria (WQC) for chlorides in surface waters. As all analysis is done using grab samples, the Acute WQC of 860 mg/L was used. Table 16 provides quantitative data of chloride concentrations in discharges from NGA as compared to the Virginia WQC, exceedances are highlighted in red.

Table 16: Summary of Chloride Concentrations at ISW Outfall RO-032

Sample Date	3/20/18	12/9/19	10/29/20	WQC
Chloride (mg/L)	**21.8**	**16.0**	**13.4**	860

Based on Chloride monitoring at this outfall where concentrations averaged 17 mg/L, the storage and application of chloride products at NGA is not considered a significant source of this POC to state waters.

4.3.3. FORT BELVOIR GOLF COURSE

The Fort Belvoir Golf Course is predominantly within the Lower Accotink Creek Watershed, with some area outside of this watershed. The Fort Belvoir Golf Course does not store or apply any salt due to the nature of their operations. However, ISW Outfall RO-009 is a stormwater monitoring point within the golf course and is used to sample discharges leaving Fort Belvoir. It provides for data characterizing discharges from the northeast areas of Fort Belvoir near the Beulah Road gate.

Although this area is currently covered under a separate VPDES permit, if permit coverage under the Industrial permit was ever terminated it may fall within the Fort Belvoir MS4 Service Area after the 2020 census. Due to the potential for this occur and the fact that it would meet the requirements of a High-Priority Facility (HPF) under 9VAC25-890-1 for its outdoor material storage, it is therefore considered in this TMDL Action Plan.

Outfall RO-009 is sampled semi-annually and chloride samples are taken during the winter season (October – March). Because quantitative data is available, Fort Belvoir was able to compare actual discharges to the Virginia numerical water quality criteria (WQC) for chlorides in surface waters. As all analysis is done using grab samples, the Acute WQC of 860 mg/L was used. Table 17 provides quantitative data of chloride concentrations in discharges from this northeast area of Fort Belvoir as compared to the Virginia WQC, exceedances are highlighted in red.

Table 17: Summary of Chloride Concentrations at ISW Outfall RO-009

Sample Date	2/4/18	7/17/18	3/8/19	12/9/19	4/23/20	11/11/20	WQC
Chloride (mg/L)	**107**	**16.7**	**0.90**	**0.582**	**<2.0**	**1.23**	860

Based on Chloride monitoring at this outfall where concentrations averaged 21 mg/L, the storage and application of chloride products in this area is not considered a significant source of this POC to state waters.

4.3.4. BASE OPERATIONS CONTRACTOR - ALEUT

The Fort Belvoir Base Operations Roads and Ground Lot is located on Fort Belvoir South Post at the corner of 16th street and Theote road, shown on Figure 8 in Appendix A. The contractor also stores non-chloride alternatives used for deicing at DAAF at buildings 1419 and 1420, which are indoor warehouses located on Jackson Loop, shown on Figure 9 in Appendix A. These areas do not discharge stormwater into the Lower Accotink Creek Watershed. It was evaluated because it is the main location where chloride products used throughout Fort Belvoir are stored and staged. Storage by the contractor includes:

- The Roads and Grounds Lot on 16th and Theote

- A Large salt dome, building 1117, holds up to 600 tons of an 80% Magnesium Chloride (MgCl) and 20% sand mixture and provides storm-resistant shelter. Concrete barriers are located on each side of the building entrance to mitigate the spread of residual salt during loading and unloading activities. Repairs to the salt dome were completed and confirmed to be effective in July 2018.
- A new brine salt storage building constructed within a bermed area, providing secondary containment, has three solid walls, roof, a concrete floor, and a vinyl curtain to protect the chlorides from the elements. It was completed in August 2020 and houses 25 tons of MgCl brine salt.
- 1x 1,000 gallon and 1x 3,000 liquid de-icing tanks within the bermed area shared with 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.
- About 240 x 50 lb. bags of Ice Melt is stored indoors at Building 1114.

- Indoor warehouses, buildings 1419 and 1420, on Jackson Loop
  - Approximately 13.2 tons of Cryotech NAAC Solid Runway Deicer stored indoors.
  - Six 250-gallon totes of Cryotech E36 Liquid Runway Deicer stored indoors.

Although this area is currently covered under a separate VPDES permit and is outside of the Lower Accotink Creek Watershed, if permit coverage under the Industrial permit was ever terminated it would remain within the Fort Belvoir MS4 Service Area and TMDL requirements could potentially expand in the future. Due to the potential for this to occur and the fact that it would meet the requirements of a High-Priority Facility (HPF) under 9VAC25-890-1 for its salt storage, it is therefore considered in this TMDL Action Plan.

ISW Outfall RO-015 is the monitoring point for this facility and samples are collected at the end of a grassed channel running north on the west side of Building 1117, the salt dome. The outfall is sampled semi-annually, and chloride samples are taken during the winter season (October – March). As quantitative data is available, Fort Belvoir was able to compare actual discharges to the Virginia numerical water quality criteria (WQC) for chlorides in surface waters. As all analysis is done using grab samples, the Acute WQC of 860 mg/L was used. Table 18 provides quantitative data of chloride concentrations in discharges from the Roads and Ground Lot as compared to the Virginia WQC, exceedances are highlighted in red.

Table 18: Summary of Chloride Concentrations at ISW Outfall RO-015

Sample Date	2/28/17	1/23/18	3/8/19	7/11/19	4/23/20	11/11/20	WQC
Chloride (mg/L)	**1,050**	**7,010**	**499**	**425**	**56.6**	**18.2**	860

There were several high detections of chloride during initial sampling done in 2017 and 2018 and therefore, site investigations were conducted. Damage to the salt dome at the Base Operations Facility was identified and work orders for repairs were submitted. After the completion of repairs in July 2018 there was a significant drop in future chloride detections, which showed an average of 250 mg/L post repairs. Sampling results showed that repairs were successful in limiting exposure and all chloride detections post repairs were substantially lower than the Virginia acute water quality standards.

Belvoir also decided to implement additional controls at the facility, including the installation of an additional brine storage location, between 2019 and 2020, which was officially accepted by the Fort Belvoir Directorate of Public Works in August 2020 (see documentation in the Memorandum located in Appendix C-3). The installation of this closed storage facility resulted in further reductions, with

detections in 2019 averaging 462 mg/l and those in 2020 averaging 37.4 mg/L, showing that the new brine storage area was successful in eliminating exposure. Therefore, salt storage is not considered a significant source of this POC to state waters.

4.3.5. AEROSPACE DATA FACILITY EAST

Aerospace Data Facility East (ADFE) is part of Fort Belvoir Main Post, and although it is within the MS4 service area it does not drain to the Lower Accotink Creek. Additionally, large portions of ADFE are currently covered under a separate VPDES permit. ADFE is considered an autonomous tenant of Fort Belvoir and is responsible for its own winter maintenance. ADFE uses de-icing products on roads and parking lots within its borders and stores salt within the ISW Drainage area for RO-008, as shown in Figure 10 in Appendix A. Storage consists of:

- American Rock Salt (Sodium Chloride product) in an estimated quantity of 180-200 tons is stored within a salt dome at the roads and grounds lot.
- Ice Control Salt (Sodium Chloride product) in an estimated quantity of 380 x 50-pound bags (19,000 pounds) within a warehouse area at the roads and grounds lot.

Runoff from this area drains southeast towards the monitoring point for Outfall RO-008, which is within the Dogue Creek Watershed. Although this area of ADFE is currently covered under a separate VPDES permit, if permit coverage under the Industrial permit was ever terminated it would remain within the Fort Belvoir MS4 Service Area. Due to the potential for this occur and the fact that it would meet the requirements of a High-Priority Facility (HPF) under 9VAC25-890-1 for its salt storage, it is therefore considered in this TMDL Action Plan.

ISW Outfall RO-008 is sampled semi-annually and chloride samples are taken during the winter season (October – March). As quantitative data is available, Fort Belvoir was able to compare actual discharges to the Virginia numerical water quality criteria (WQC) for chlorides in surface waters. As all analysis is done using grab samples, the Acute WQC of 860 mg/L was used. Table 19 provides quantitative data of chloride concentrations in discharges from NGA as compared to the Virginia WQC, exceedances are highlighted in red.

Table 19: Summary of Chloride Concentrations at ISW Outfall RO-008

Date of Sample	3/18/17	3/20/18	8/13/19	10/29/20	WQC
Chloride (mg/L)	**218**	**149**	**273**	**7.78**	860

Based on Chloride monitoring at this outfall where concentrations averaged 161.9 mg/L, the storage and application of chloride products in this area is not considered a significant source of this POC to state waters.

4.4. TRAINING, EDUCATION, AND OUTREACH

Fort Belvoir has implemented and maintains several programs focused on training, education, and outreach. The following subsections covers details on these programs and their applicability to this Chloride TMDL Action Plan.

4.4.1. PUBLIC EDUCATION AND OUTREACH PLAN

As part of Minimum Control Measure 1 as defined by the Fort Belvoir MS4 Permit, a public education and outreach plan has been developed and implemented as part of the Fort Belvoir MS4 Program Plan. The Public Education and Outreach Program assists to inform all personnel, residents, and contractors about the steps that can be taken to reduce stormwater pollution to the Maximum Extent Practicable (MEP). The goal of this plan is to:

- Increase the public's knowledge of how to reduce stormwater pollution, placing priority on reducing impacts to impaired waters and other local water pollution concerns;
- Increase the public's knowledge of hazards associated with illegal discharges and improper disposal of wastes, including pertinent legal implications; and
- Implement a diverse program with strategies that are targeted toward individuals or groups most likely to have significant stormwater impacts.

This plan outlines specific Pollutants of Concern to be targeted for educational materials, of which chloride is included. Educating the general population on the proper storage and application of salts during the winter months will assist Fort Belvoir in managing Chloride loads. Specific audiences have been identified as part of this plan, which include housing residents, contractor personnel, military personnel, and civilian personnel. As part of the identified audiences, specific outreach strategies have been identified as well to include traditional written materials (fact sheets and brochures), media materials (electronic media to include mass emails, Facebook posts, and newspaper articles), and training materials (see Section 4.4.5 for more details on training).

Chloride is the targeted POC in December for housing residents, military personnel, and civilian personnel through a Newspaper article in the *Belvoir Eagle*. It is also targeted in January for Military personnel and civilian personnel through a Stormwater Newsletter.

4.4.2. FORT BELVOIR WEBPAGE

Fort Belvoir has implemented an environmental webpage for posting and compiling information and documents to be readily available to the public. The webpage is specific to the Fort Belvoir Directorate of Public Works (DPW) Environmental Division and serves as a hub for all of the environmental programs. The following link is the webpage's location:

https://home.army.mil/belvoir/index.php/about/Garrison/directorate-public-works/environmental-division

The webpage was made in association with BMP 2.1 for the MS4 Permit regarding the requirement to maintain a public webpage. Per Part I.E.2.b. of the MS4 Permit, required documents include the effective MS4 Permit and coverage letter, most current MS4 Program Plan, and annual reports for each year of the term covered by the current permit. In addition to this, the webpage serves as a location to post items such as this TMDL Action Plan for public comment and incorporation. The webpage is updated as needed to incorporate any revisions to documents.

The webpage also has a newly added feature allowing direct reporting of any potential issues. This feature allows the public to directly report through the online form any potential issues seen to be flagged for follow up. This allows the Fort Belvoir DPW Environmental Division increased oversight and the ability to identify potential sources of pollution earlier in order to minimize potential impacts.

In addition to the Fort Belvoir Environmental webpage, the Fort Belvoir DPW Environmental Division keeps and maintains a Facebook page to better interact with the public. The Facebook page is available at the following location:

https://www.facebook.com/pg/FortBelvoirEnvironmental/posts/?ref=page_internal

Posting for public comment periods for plans, such as this TMDL Action Plan, are also publicly posted at the Facebook location. This helps to ensure better public outreach through multiple platforms.

Posting on the Fort Belvoir Environmental Facebook page focuses on Chloride as the targeted POC in winter months. This includes educational materials such as links to the Newspaper articles published through the *Belvoir Eagle* as well as the Stormwater Newsletter. Summaries of tips and tricks are also provided through this avenue in order to directly engage the public.

4.4.3. WRITTEN PROCEDURAL BMP FACT SHEETS

Fort Belvoir has several written procedural BMP Fact Sheets that are all posted publicly and widely distributed throughout the installation to pertinent tenant operations. While these fact sheets cover a variety of information, there are four that are specifically related to chloride products. These are posted publicly and available online on the Fort Belvoir webpage (see Section 4.4.2) under the "Programs and Documents" tab, under the "Industrial Stormwater Program" drop down.

These fact sheets are also distributed to tenant operations such as Industrial Stormwater Facilities, MS4 High Priority Facilities, various operations and maintenance contractors, tenant commands, as well as privatized housing performing operations and maintenance functions at Fort Belvoir. They were developed as required under MCM 6 under the MS4 Permit which requires written procedures for Operations & Maintenance Activities. Each fact sheet contains a description of the activity, guidelines identifying best management practices for stormwater pollution prevention, any maintenance if required, and spill response procedures. The fact sheets, shown in Appendix D, related to this Chloride TMDL are:

- BMP Factsheet 4 – Salt Storage and Loading
- BMP Factsheet 5 – Salt Application
- BMP Factsheet 13 – Brine Mixing
- BMP Factsheet 14 – Aircraft Deicing Operations

4.4.4. MS4 HIGH PRIORITY FACILITIES & SWPPP'S

Fort Belvoir has several High Priority Facilities (HPF's) which have been identified to have a potential of discharging pollutants. These facilities are each identified within the MS4 Program Plan and the Fort Belvoir Master Stormwater Pollution Prevention Plan (SWPPP) developed, implemented, and maintained. A HPF facility is classified as any facility having higher potential for discharging pollutants and including those facilities that are not covered under a separate VPDES permit, per Permit Part I.E.5.b. A HPF is defined under 9VAC25-890-1 as:

> *"Facilities owned or operated by the permittee that actively engage in one or more of the following activities: (x) composting, (ii) equipment storage and maintenance, (iii) materials storage, (iv) pesticide storage, (v) storage for public works, (vi) recycling, (vii) salt storage, (viii) solid waste handling and transfer, and (ix) vehicle storage and maintenance."*

As part of these HPF's, their developed SWPPPS include all BMP fact sheets within them (see Section 4.4.3). In addition to this, all HPF's receive both inspections and training at minimum once per year from the Fort Belvoir DPW Environmental Stormwater Personnel. If any issues are identified during these inspections or from a complaint, corrective actions may be initiated that have the potential to increase the trainings or inspections.

Increases of inspections or trainings will always have a stronger focus on the issue that caused the corrective action in the first place. Two out of the ten HPF's at Fort Belvoir are considered high priority due to salt storage. This includes the housing area laydown lot, which is outside of the watershed, and the DLA Contract Yard, which is covered further in Section 4.3.1.

4.4.5. WRITTEN TRAINING PLAN

As required by the Fort Belvoir MS4 Permit, a Written Training Plan was developed for the installation. This plan is updated and maintained under BMP 6.4 for the MS4 Program Plan regarding implementing required training. The plan is a Combined ISW and MS4 Stormwater Pollution Prevention Training Plan which was last updated in May 2019. While the training plan itself is a large document and available upon request, certain aspects applicable to this Chloride TMDL Action Plan are summarized below.

There are six levels of training that are implemented as part of the combined Written Training Plan developed for Fort Belvoir as follows:

1. ISW SWPPP Training
2. MS4 SWPPP Training
3. General Stormwater Pollution Prevention Training
4. Illicit Discharge Training
5. Pre-Construction Training
6. Corrective Action Training

TMDL Information as well as salt management practices to include storage and handling is specifically covered in both the ISW and MS4 SWPPP Training, as well as the General Stormwater Pollution Prevention Training. Employees performing road, street, and parking lot maintenance receive training in pollution prevention and good housekeeping associated with those activities no less than once a year. Additionally, employees working in and around maintenance, public work, or recreational facilities receive training in good housekeeping and pollution prevention practices associated with those facilities no less than once every 24 months as well.

As discussed in Section 4.1.1 *Key Personnel and Duties*, there are managers, operators, and contract staff involved in the removal of snow or anti-icing and de-icing operations at Fort Belvoir. For the contract staff, the Base Operations and Maintenance Contractor (Aleut) who is responsible for all road, street, and parking lot maintenance across the installation, they receive both Levels 1, 3, and 4 Training conducted by Stormwater Program Personnel. For the management staff, the Fort Belvoir DPW O&M Division, they also receive both Levels 3 and 4 Training. The operator staff, Fort Belvoir Emergency Operation Center at the Directorate of Emergency Services, do not receive any stormwater training in these regards as they do not have any direct involvement with usage or equipment.

4.5. SUMMARY OF OPERATIONAL CONTROLS IN PLACE

In summation, Fort Belvoir already has in place several operational BMP's that are outlined within the Virginia Salt Management Strategy (SaMS) Guide. The following Table outlines the above sections within Section 4, operational controls, and a brief overview of status:

Table 20: Summary of Existing Operational Controls

Topic	Section	Summary of Status
Key Personnel and Duties	4.1.1	Fort Belvoir has contract, operator, and managerial staff in place for salt management.
Current Equipment	4.1.2	Approximately 72 pieces of equipment are utilized for mixing, plowing, and spreading of anti- and de-icing products by Aleut, as well as 7+ pieces of equipment used by DLA.
Calibration Protocols	4.1.3	Calibration protocols do not meet requirements and needs to be updated.
Level of Service and Priorities	4.1.4	An established plan is in place that specifies priorities for snow removal and routes.
Non-Chloride Deicers (Alternatives)	4.1.5	There are several alternative practices that are in use at Fort Belvoir, most specifically at DAAF and NGA.
Tracking and Reporting	4.1.6	A system of tracking salt usage and reporting quantities is in place at Fort Belvoir.
Off Season Storage and Handling	4.1.7	A system for cleaning equipment at the end of each season has been established and materials are stored in warehouses or buildings to prevent contact with any stormwater in the off season.
Historic Product Usage	4.2.1	Fort Belvoir has accurate records of product usages dating back to 2017.
Application Rates Across Fort Belvoir	4.2.2	Fort Belvoir currently achieves a total average usage of 102.79 pounds per lane mile, per event across Fort Belvoir in its entirety.
Application Rates within Lower Accotink Creek Watershed	4.2.3	Fort Belvoir currently achieves a total average usage of 175.81 pounds per lane mile, per event across the Lower Accotink Creek Watershed. Additionally, Fort Belvoir accounts for approximately 2.34% of the overall Lower Accotink Creek Chloride TMDL.
Salt Storage Practices	4.3	All known storage locations at Fort Belvoir have been assessed and are covered in Sections 4.3.1 through 4.3.5.
Public Education and Outreach Plan	4.4.1	A Public Education and Outreach Plan has been developed and implemented and incorporates strategies on minimizing Chloride usage.
Fort Belvoir Webpage	4.4.2	An Environmental Webpage and Facebook page have been implemented for public outreach at Fort Belvoir.
Written Procedural BMP Fact Sheets	4.4.3	Four individual Procedural BMP Fact Sheets associated with Chloride usage have been developed and are provided to tenant organizations.
MS4 High Priority Facilities & SWPPP's	4.4.4	All High Priority Facilities have a developed SWPPP which includes BMP's on Chloride usage.
Written Training Plan	4.4.5	A combined Industrial Stormwater and MS4 Stormwater Written Training Plan has been developed and implemented that focuses on six levels of training, of which TMDL information is covered in three of these levels.

5. INITIAL RECOMMENDED ACTIONS FOR IMPROVEMENTS

Permit Part II.B.3 requires the permittee to define the means and methods, such as management practices and retrofit programs that will be utilized to meet the Lower Accotink Creek Chloride TMDL requirements.

To meet the reduction requirements, permittees are to implement BMPs as presented in the Virginia Salt Management Strategy, or SaMS, prepared by the Interstate Commission on the Potomac River Basin (ICPRB). Implementation of BMPs included in this Action Plan demonstrates compliance with the required reductions. Fort Belvoir has used these BMPs as the means and methods that fit this stipulation to meet the requirements.

As there are no specific required reductions stipulated within the Volume III Chloride TMDLs for the Accotink Creek Watershed, Fort Belvoir has decided to pursue recommendations to achieve additional reductions within the current implemented system as described in Section 4. Many of the recommended BMPs within the Virginia SaMS guidance document have already been implemented.

Additionally, as shown in the baseline assessment of application rates completed in Section 4.2, Fort Belvoir contributes approximately 77,051 lbs/year which accounts for only 2.34% of the total Waste Load Allocation (WLA) for MS4 Permits within the Lower Accotink Creek Watershed. Fort Belvoir also has an average salt usage of 175.81 pounds per lane mile, per event within the Lower Accotink Creek Watershed. This is found to be below the recommended application rates as defined by the Salt Institute Standards shown within Table 9. This number is slightly higher yet still consistent with the overall average salt usage for the entirety of Fort Belvoir, which was calculated at 102.79 pounds per lane mile.

As described in the overall assessment of salt storage areas in Section 4.3 and confirmed using quantitative data collected between 2017-2020, chloride storage at Fort Belvoir is not a significant source of chlorides to state waters.

The following sections will go over these recommendations based on the baseline assessment completed in 2021. As this is the initial assessment, annual assessments shall occur to determine efficacy of the current program and implemented BMPS in meeting specified limits through an iterative process. This process is covered in detail in Section 6.

5.1. CONTINUED MAINTENANCE OF EXISTING PROGRAMS

It is recommended that all the existing programs which have been established are continued. As shown in section 4 of this Lower Accotink Creek Chloride TMDL Action Plan, the strategies outlined have been effective at keeping Chloride salt usage at a minimum across Fort Belvoir. As the aspects of the current program have shown to be effective, continued maintenance to these processes should remain in place.

5.2. REVISION OF PRACTICES AT DEFENSE LOGISTICS AGENCY

As shown in Section 4.2, the application of Ice Melt by DLA showed they were the largest contributor or source of chlorides for the area within the actual Lower Accotink Creek Watershed. It is clear from these calculations as well as data provided by DLA that too much salt is being used in this area. As DLA is a High Priority Facility (HPF) under Fort Belvoir MS4 Permit, additional training to HPF personnel as well as a revision of practices is recommended in order to adjust the frequency and application rates of Ice Melt Products that are being used within this Agency. This will ensure a decreased risk and lower contribution of salt into the Lower Accotink Creek Watershed during rain events. The following table shows a summary of salt usage at DLA including temperatures and recorded snowfall. It should be noted that 40 bags of Ice Melt product are on one pallet, and one bag holds 50 pounds.

Table 21: Recorded Data on Product Use at DLA

Date	Temperature High/Low °F	Precipitation	Pallets Used	Bags Used	Pounds Used
1/31/21	32.4/28.6	2.3” Snow, 0.39” Rain	14	560	28,000
2/1/21	32.4/26.8	0.2” Snow, 0.14” Rain	9	360	18,000
2/2/21	36.5/30.4	0.7” Snow, 0.04” Rain	12	480	24,000
2/3/21	42.3/31.5	None	2	80	4,000
2/12/21	31.6/27.9	Trace Snow & Rain	8	320	16,000
2/14/21	36.3/27.1	Trace Snow & Rain	6	240	12,000
2/16/21	44.1/27.9	0.45” Rain	9	360	18,000
2/17/21	37.9/25.0	None	3	120	6,000
2/18/21	30.7/25.2	0.6” Snow, 0.46” Rain	12	480	24,000
		TOTALS:	75	3,000	150,000

After evaluating information in the above Table, it is noted that the application frequency by DLA could be reduced. Dates that were immediately following another application date could be skipped as Chloride products were placed the day prior. Additionally, the application on February 3rd, 12th, 14th, 16th, and 17th could have been skipped as only trace amounts were seen on the 12th and 14th, rain was only seen on the 16th, and no snow or rain were seen at all on the 3rd and the 17th. Furthermore, as the DLA facility is currently closed due to COVID and the majority of personnel teleworking, the amount of salt usage should have been lower than actual amounts used as full coverage was unnecessary due to decreased staff and usage of the facility.

While this table shows the data acquired, it should be noted that ground conditions on site could be more variable and include the potential for ice formation overnight. While the possibility of all applications described above were necessary by DLA, it is the point of this section to suggest that additional thought or processes are established to ensure that application only occurs when necessary.

5.3. UPDATE BASE OPERATIONS CONTRACTOR SNOW PLAN

As outlined in Section 4, the Base Operations Contractor, Aleut, is responsible for removal of snow as well as anti- and de-icing procedures. A snow plan was developed as part of the contract with the Base Operations Contractor in November 2011, see Appendix C-1 for a copy of this plan.

Policies, procedures, and equipment have been updated since this date, while the snow plan itself has not been updated since inception. It is recommended that this Snow Plan is updated to better reflect the current standards and equipment used, as well as incorporate references to this Lower Accotink Creek Chloride TMDL Action Plan.

It is also recommended to describe a clear strategy for when anti- or de-icing operations shall be conducted. A clear definition of conditions that are needed to trigger an anti- or de-icing event should be outlined within the Snow Plan. The following Table should be used to clearly define the guidelines for winter weather mobilization, based on recommendations from the Salt Institute Standards.

Table 22: Winter Weather Mobilization Guidelines

Weather Forecast	Mobilization Level	Response Plan	Salt Application Rate
Precipitation: 20% or Greater Accumulation: Ice/Snow Possible Ambient or Pavement Temp: 30-36°F	Anti-Ice	Spot treatment of critical structures and locations	Application Liquid Mag: 36 gal/lane mile Application Liquid Salt Brine: 50 gal/lane mile Application Salt: 325 lbs/lane mile
Precipitation: 20-49% or Greater Accumulation: Snow Possible Ambient or Pavement Temp: 30-36°F	1	Spot treatment of critical structures and locations	325 lbs/lane mile
Precipitation: 50-100% chance Accumulation: Up to 1 inch of snow Ambient or Pavement Temp: 25-29°F	2	Light Salting Operation	400 lbs/lane mile
Precipitation: 50-100% chance Accumulation: Up to 2 inches of snow or up to 1/10 inch of ice Ambient or Pavement Temp: 20-24°F	3	Salting Operation	475 lbs/lane mile
Precipitation: 50-100% chance Accumulation: Up to 6 inches of snow or up to ¼ inch of ice Ambient or Pavement Temp: 15-19°F	4	Salting/Plow Operation	550 lbs/lane mile
Precipitation: 50-100% chance Accumulation: More than 6 inches of snow or more than ¼ inch of ice Ambient or Pavement Temp: 10-14°F	5	Salting/Heavy Plow Operation; All resources deployed	625 lbs/lane mile

5.4. REVISE SALT BRINE MIXING RATES

As shown in Section 4.2.2, the current mixing rate of brine at Fort Belvoir uses approximately 8.34 lbs/gallon of Magnesium chloride. This will produce a brine which is much higher in salt percentage than necessary. It has been 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 lbs/gallon of Magnesium chloride, roughly 70% less salt than is currently being used for this practice.

It is recommended to revise the current practice at Fort Belvoir to this new mixing rate, and to monitor applications of this new rate to determine effectiveness. If shown to be effective, this new mixing rate should become the standard which will result in both savings as well as a reduced usage of Chloride containing products.

5.5. ESTABLISH A CALIBRATION PROCESS

As discussed in Section 4.1.3, there is currently no calibration protocols in place for salt equipment. In previous years, calibration for the Brine solution would occur annually around the beginning of the winter season but has not occurred since October 2019. Establishing a calibration process could result in high potential cost savings as well as a more accurate picture of the amount of chloride containing products used at Fort Belvoir. It is recommended that DPW ensures that the brine mixer is calibrated at least annually by obtaining and maintaining calibration document from the Base Operation Contractor. This may have to be added as a deliverable in the contract.

SaMS recommends that calibration should occur for all salt application equipment that considers flow settings, conveyor/auger and spinner speeds, ground speed, and material (size, density, etc.). This 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). The equipment should be calibrated to application rates for the minimum required deicer output as defined in Table 21 from Section 5.3. Documentation of settings, rates, and maximum deicer output should be kept at every calibration within manuals for the equipment as well as a main binder on site. Calibration of equipment should also be included in training during the pre-season meetings.

This is a relatively simple process that only requires a few pieces of inexpensive equipment or supplies. Having calibrated spreaders will help to achieve the target application rates, promoting the efficient use of deicer and enabling a more precise actual application rate. This will allow for a more efficient achievement of levels of service and safety, as well as reducing material costs and impacts to the public health, environment, and infrastructure.

A calibration form and instructions are provided in Appendix F.

5.6. TARGETED TRAINING

As discussed in Section 4.4, Fort Belvoir currently has a written Training Plan in place that focuses on a variety of issues and audiences. It is recommended that the training program be updated to include additional salt management training that is particularly focused towards salt applicators, supervisors, and decision-makers. Improved awareness, at all levels, will improve overall operations as well as assist in identifying areas for improvement and potential cost savings.

This training should include more in-depth information pertaining to this TMDL Action Plan, as well as focusing on what is described above in Section 5.4 and 5.5 regarding Salt Brine Mixing Rates as well as a Calibration Process. This training should take place at least once annually, preferably pre-season, prior to the first storm event requiring application of chloride products. Topics to consider including in the training include:

- Plowing Practices
    - Suggest that mechanical removal should be the first approach to snow removal, the benefits of doing so and how to best do it. (To the extent possible, it is better to remove snow/ice by plowing than using deicers to “burn off” any accumulations).
    - Keeping up with snow/ice accumulations through frequent plowing limits the time for snow/ice to compact and bond with the pavement.
    - When plowing, avoid placing snow into bodies of water, wetlands, or stormwater infiltration/retention structures.
    - Recommendations for selecting the best plows, shovels, pushers, blowers, blades, and brooms for the area.
- Equipment Calibration

  - The importance of calibration, how to calibrate equipment, how often to calibrate, and the importance of documentation.
  - Calibration should consider flow settings, conveyor/auger and spinner speeds, ground speed, and material (size, density, etc.).
  - Calibration should occur in the preseason, mid-season, and any time changes are made to equipment or change is made to the material used.
- Level of Service and Clearing Priorities
  - Cover priority roads and parking areas, staging areas, responsibilities, and different application rates.
  - Use of street sweepers to clean up left over deicers/abrasives after the snow/ice has melted away.
- Anti-Icing, Brine Mixing
  - Differences between anti-icing and deicing is explained, as well as the benefits of anti-icing: reduced material usage and effort. Details on how anti-icing works, how to account for pavement temperature, when it should be used, and how to calculate how much material is needed and provided.
  - Provide guidelines for when it is and is not appropriate to use anti-icing. Cover how to make brine, document procedure, and concentration made. Emphasis should be placed on the best temperatures to use each liquid type and the advantages and disadvantages of each.
- Application Practices, Varying Application Rates, Use of Deicers at Different Temperatures
  - Highlight the conditions for using direct liquid application, the benefits of pre-treating salt, recommendation to plow first, and encouragement to check pavement temperature before applying salt.
  - Application practices are in terms of the “5 Rs of Salt Management.” The “5 Rs” are “Right material,” “Right time,” “Right amount,” “Right place,” “Retain it.”
  - How to calculate the amount of salt needed for a given area and the corresponding application rate.
  - Use of dyed deicers to observe and show product presence, providing visual confirmation especially to members of the public.
  - Use of abrasives to provide traction during 1) freezing rain events, 2) in slow-moving traffic areas, and 3) when deicers are ineffective because it is too cold. Cover the fact that abrasives should not be used in a blend with deicers as they may counteract each other.
- Salt Storage and Handling
  - The reasons for proper storage and handling and best management practices, general procedures for storage and handling, as well as how to treat solids and liquids differently.
  - Enclosing or covering storage piles to prevent exposure to precipitation, store on an impervious surface. Have stormwater diversions for storage piles. Collect and contain all runoff in impervious basins or underground units, that can potentially be reused.
  - Store liquids in double walled tanks or have secondary containment in case of a leak or spill.
  - Proper loading/unloading, spill response, equipment cleaning, and wastewater containment.
- Winter Maintenance Planning (Weather Forecasting/Surface Temperature Information)
  - The basics of weather and forecasting as well as how this interacts with road conditions.
  - The benefits of using advanced forecasts for winter road maintenance.
- Tracking and Reporting
  - Cover the “You can’t manage what you don’t measure” mindset.
  - How to use, fill out, and submit daily logs or tracking sheets.

Implementing this training would ensure that all employees working in the salt application field would be informed of Fort Belvoir specific practices and how they can minimize the environmental impact of application while performing their regular duties. Additionally, properly training personnel will make operations more efficient and effective, reducing the amount of materials used and the associated costs.

6. ANNUAL EVALUATION AND REPORTING REQUIREMENTS

This TMDL Action Plan is required to be assessed and updated annually to determine the efficacy of the program as well as improve the program where necessary. This document serves as the baseline analysis for the current program and will be utilized moving forwards with each update.

Annual assessment shall occur post-season, to begin on or around April 1st and to be completed by no later than the end of the permit cycle, June 30 of each year. This update shall incorporate all received Salt Tracking and Reporting Data Sheets for the season in Appendix E. Using reported data for the year, the application rate for each product shall be calculated to see if goals were met or if additional BMPs are required to be implemented. The annual application rate compared to program goals will be reported in the Annual Report to VADEQ.

In addition to the application rates, the overall operational practices of the program will be evaluated using the self-assessment form (Appendix G-1) and the Salt Tracking and Reporting Data Sheet #3 (Appendix G-2). This will result in a re-assessment of the program and will assist in identifying changes that should or need to be made.

A self-assessment worksheet to be completed by the Directorate of Public Works Environmental Division shall be utilized to evaluate operations and determine areas for improvement on a scale of one to four, with four being rated the best level. The assessment worksheet should be used as follows:

1. Identify categories of the worksheet where the facility rated below a level of 4.
2. For each of these categories, identify short-term and long-term actions that may be taken to improve in that category.
3. Define a proposed schedule of implementation for each action (BMP).
4. Define measurable goals for each action defined (e.g., ensure 100% of equipment is fitted with calibration units by year 5, ensure 100% of personnel are trained annually, etc…)

This self-assessment will continue to refine operations at Fort Belvoir and can be used to give both operators and supervisors an idea of how things currently run and common issues that arise. Through this annual evaluation, it will become clear where improvements can be made. Results of the self-assessment compared to program goals will be reported in the Annual Report to VADEQ.

The completed forms shall be incorporated into Appendix G once complete and Section 7 – implementation Schedule of this TMDL plan will be updated to reflect new and achieved goals.

As this TMDL Action Plan is a public document, the updated version shall be posted to the Fort Belvoir Environmental Homepage as described in Section 4.4.2 after each update to ensure the public is aware of any changes made.

Any updates or changes to this TMDL Action Plan shall also be summarized within the MS4 Annual Report as required by the Fort Belvoir MS4 Permit which is due annually on October 1st.

7. IMPLEMENTATION SCHEDULE

VA TMDL Guidance and Permit Part II.B.3.h. provides an overall timeline for when all pollutant load reductions must be implemented. Recommendations to improve the overall system can always be made and improved upon. The following Table provides a summary of recommendations, proposed implementation dates, and estimated cost.

Table 23: Implementation Schedule and Cost Estimate

Recommendation	Section	To be Completed by:	Estimated Cost
Continued Maintenance	5.1	N/A	No Additional Cost
Revision of Practices at DLA	5.2	End of Permit Cycle (Oct 31, 2023)	Minimal
Update Base-Ops Snow Plan	5.3	During next contract update (Oct 31, 2023)	Minimal
Revise Salt Brine Mixing Rates	5.4	End of Permit Cycle (Oct 31, 2023)	Cost Savings Recommendation
Establish Calibration Process	5.5	End of Permit Cycle (Oct 31, 2023)	Minimal
Targeted Training	5.6	End of Permit Cycle (Oct 31, 2023)	Minimal
Annual Evaluation and Reporting	6	After Winter Season (June 30 annually)	Minimal

As shown above, the estimated cost for most of these recommendations is minimal and is considered feasible for Fort Belvoir to implement.

Because Fort Belvoir relies on contractors working within long term contracts for the storage and application of chloride products, there may be restriction on how quickly contracts can be amended to accommodate new BMPs. If there are issues with meeting goals due to contracting limitations, it will be reported so in the Annual Report to VADEQ.

8. PUBLIC COMMENT

Part II B.7 of the General Permit requires that Fort Belvoir provides an opportunity for receipt and consideration of public comment regarding any Local TMDL Action Plan. The EPA states in Federal Register Volume 64, No. 235, page 68,750 on December 8, 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.

This Lower Accotink Creek Chloride TMDL Action Plan was completed as per Part II.B of the 2018-2023 General Permit. This 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 April 8, 2021
- Posted on the Fort Belvoir Home Page on April 7, 2021
- Published in the Fort Belvoir newspaper, *The Belvoir Eagle* on April 15, 2021

Fort Belvoir provided for the public comment period to be open until April 30, 2021 allowing for at least 15 days for public comment as required under Part II.B.7. Fort Belvoir DPW did not receive any comments during this period therefore, this is the only section updated prior to submittal of this Final Lower Accotink Creek Chloride TMDL Action Plan to VADEQ.

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2021

APPENDIX A

FIGURES

FORT BELVOIR ACCOTINK CREEK CHLORIDE TMDL ACTION PLAN

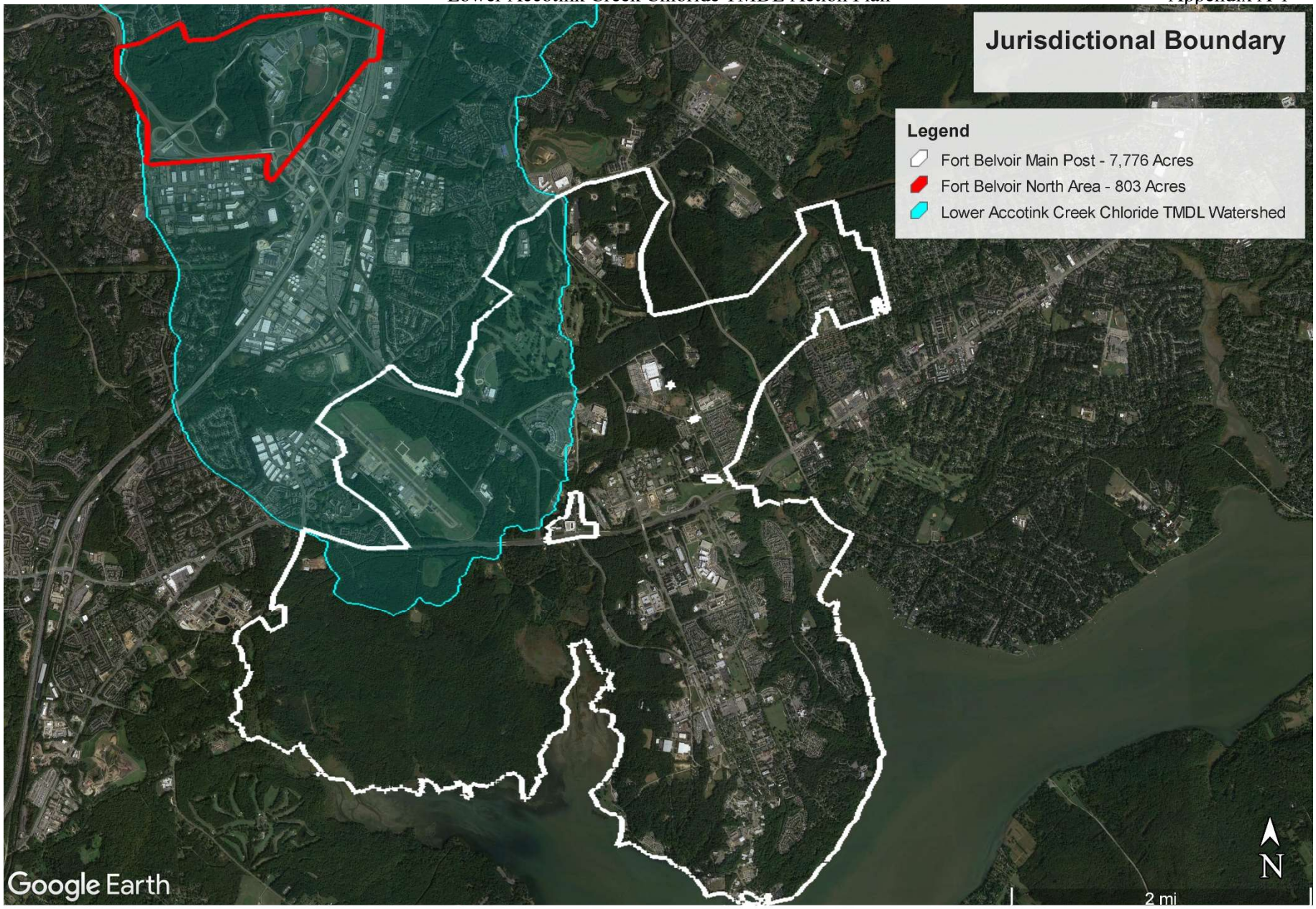


Figure 1: Total Fort Belvoir Jurisdictional Boundary

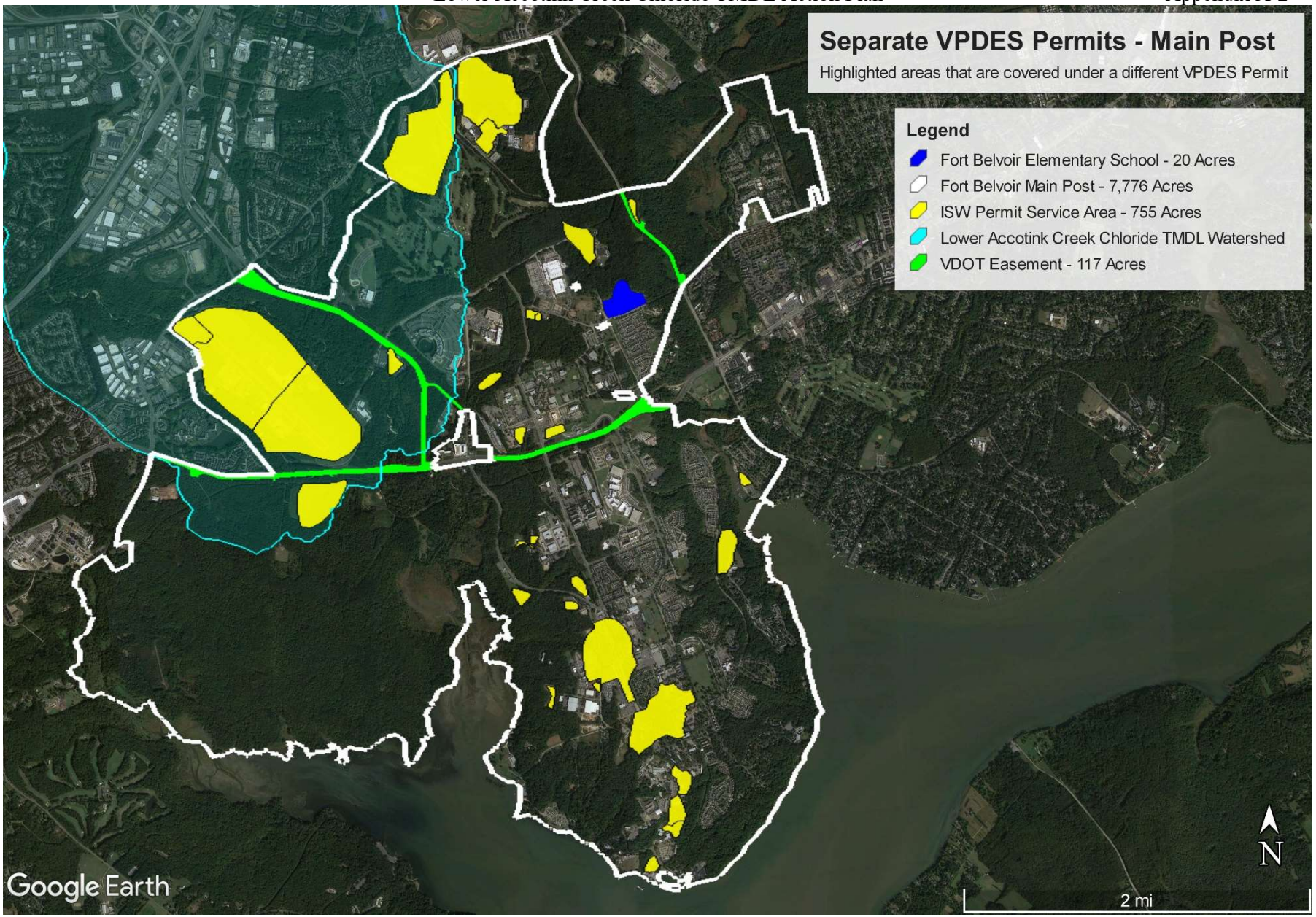


Figure 2: Areas Covered Under a Separate VPDES Permit on the Main Post

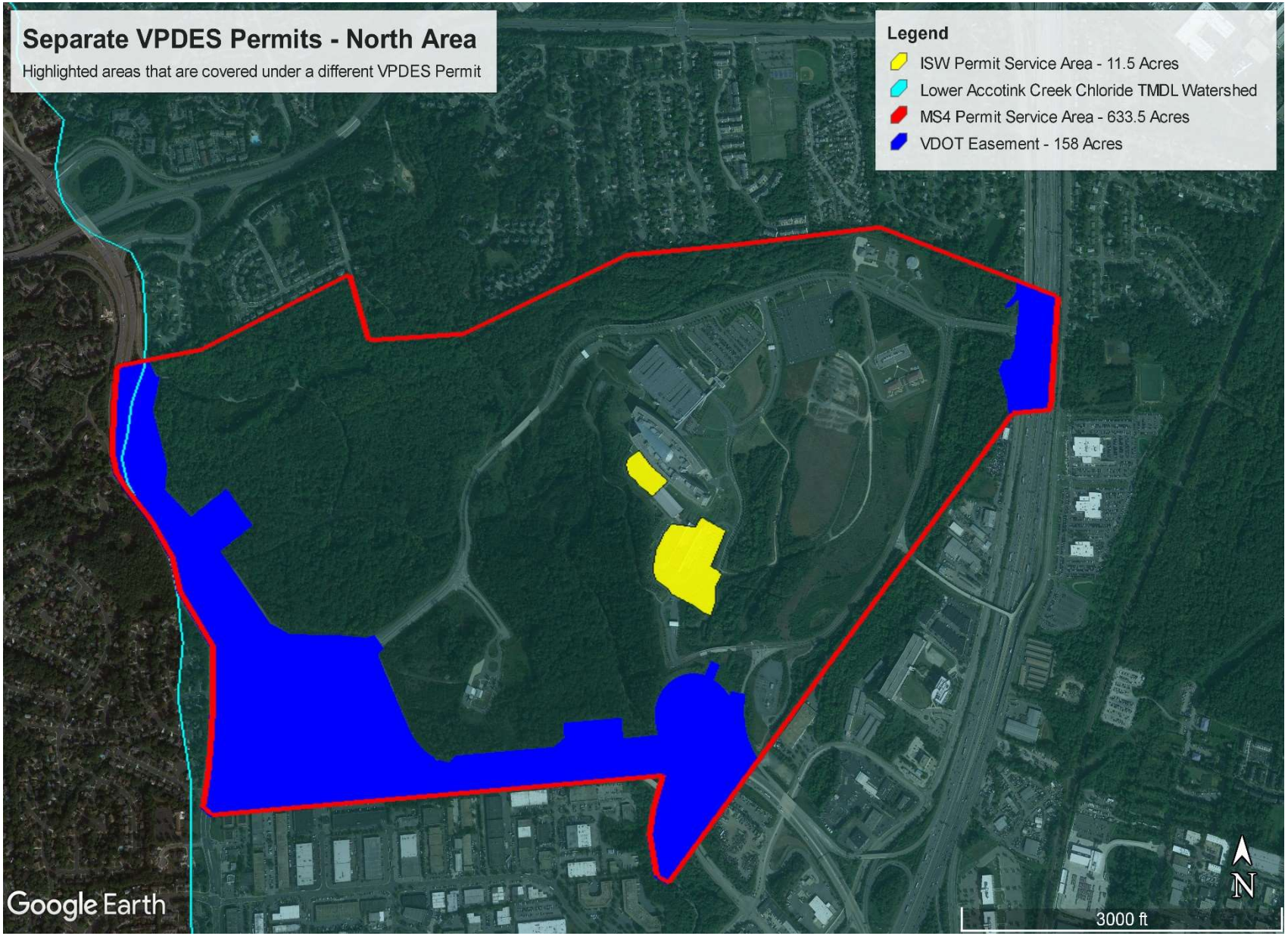


Figure 3: Areas Covered Under a Separate VPDES Permit at Fort Belvoir North Area

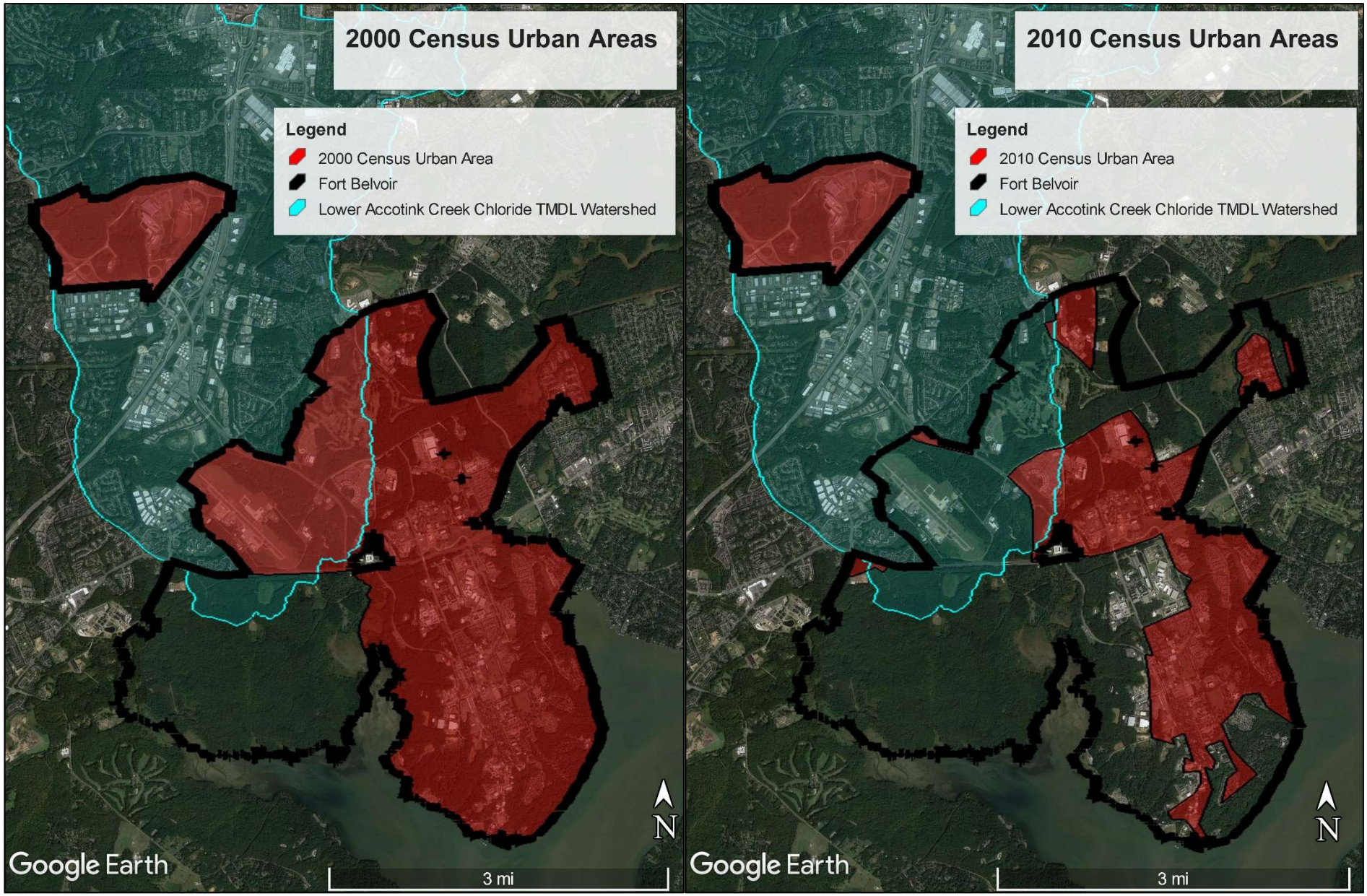


Figure 4: Fort Belvoir's Urbanized Areas Based on 2000 and 2010 Census Data

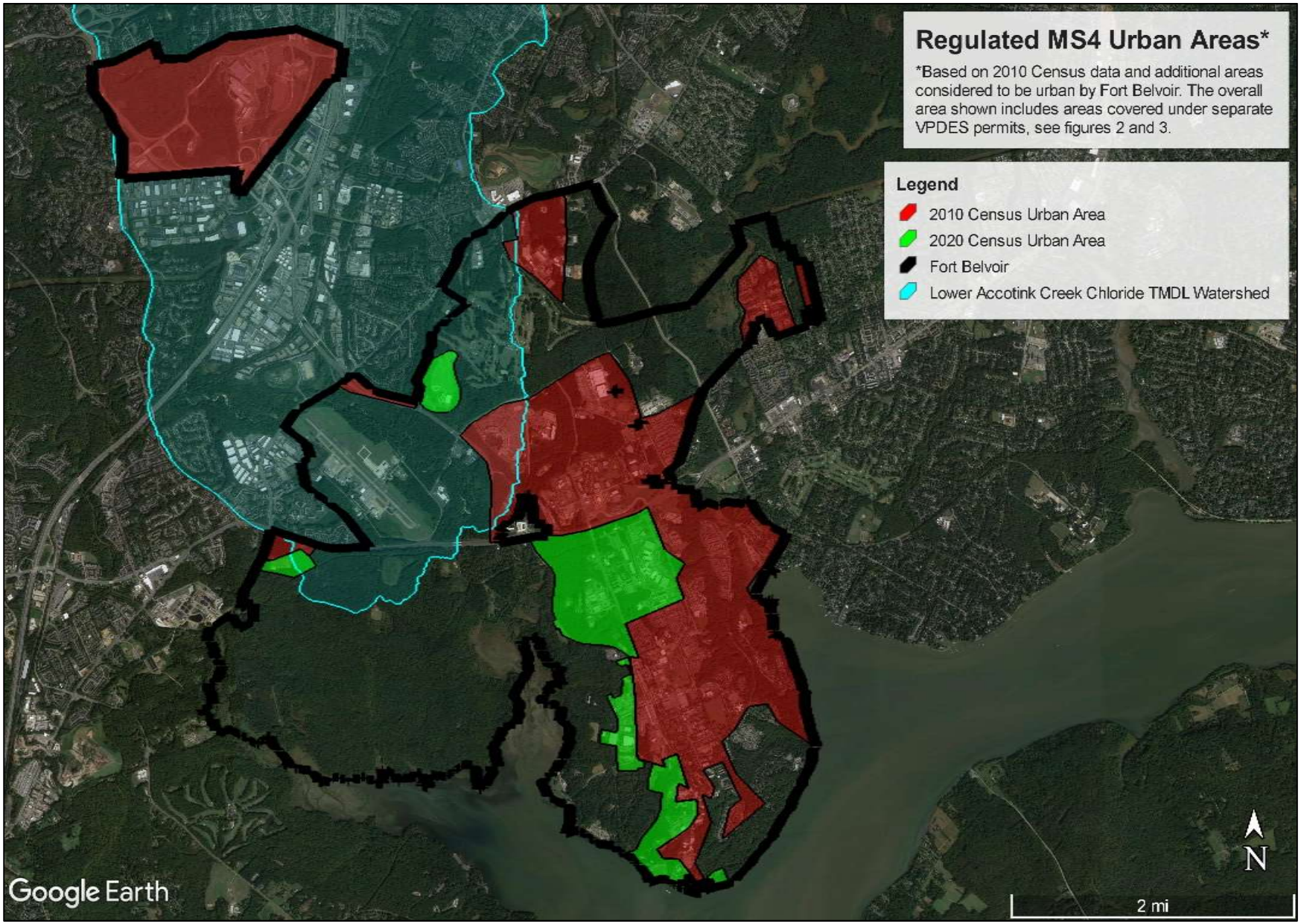


Figure 5: Additional Areas Considered to be Urban Based on Current and Projected Land Use

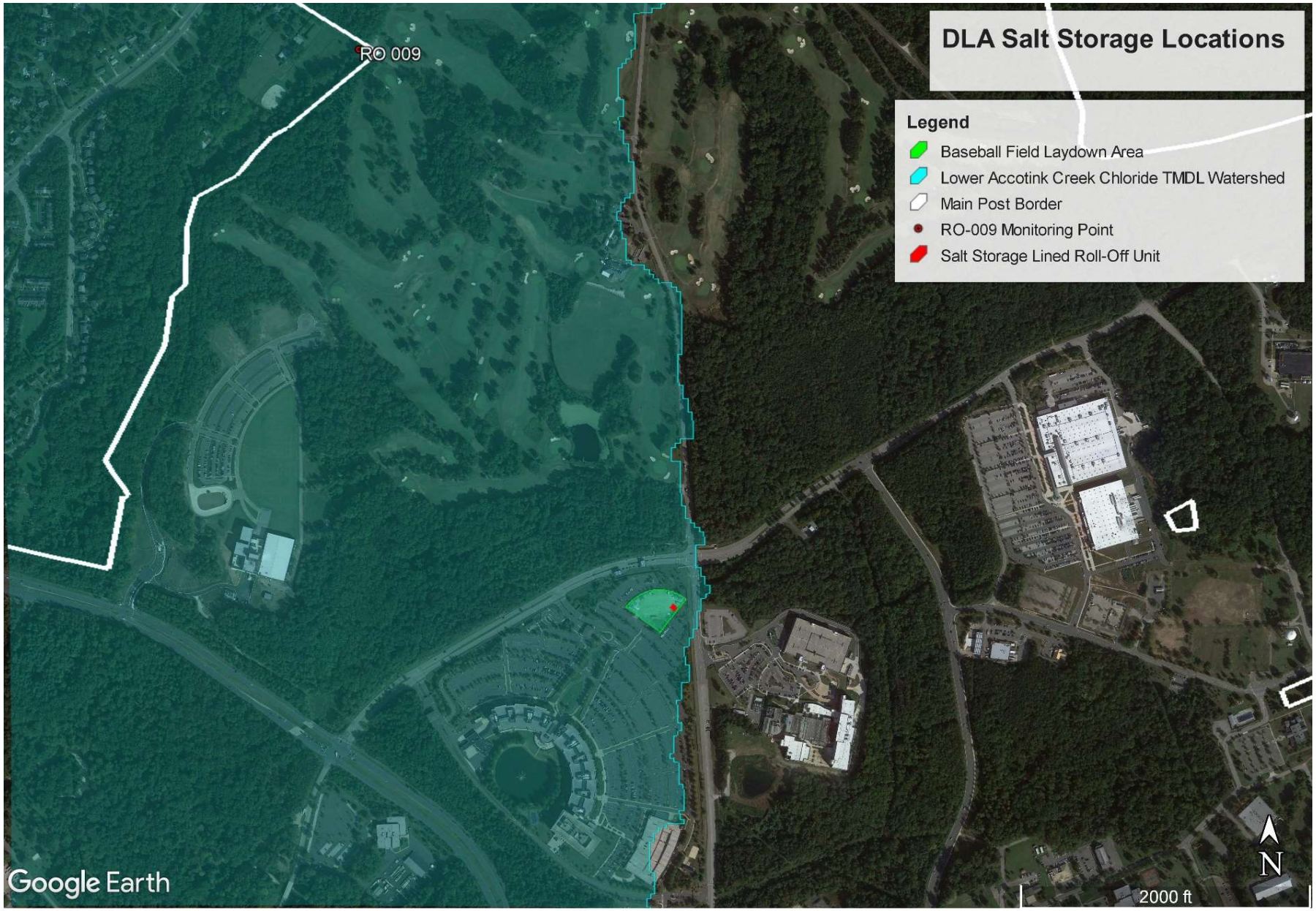


Figure 6: DLA Salt Storage Locations

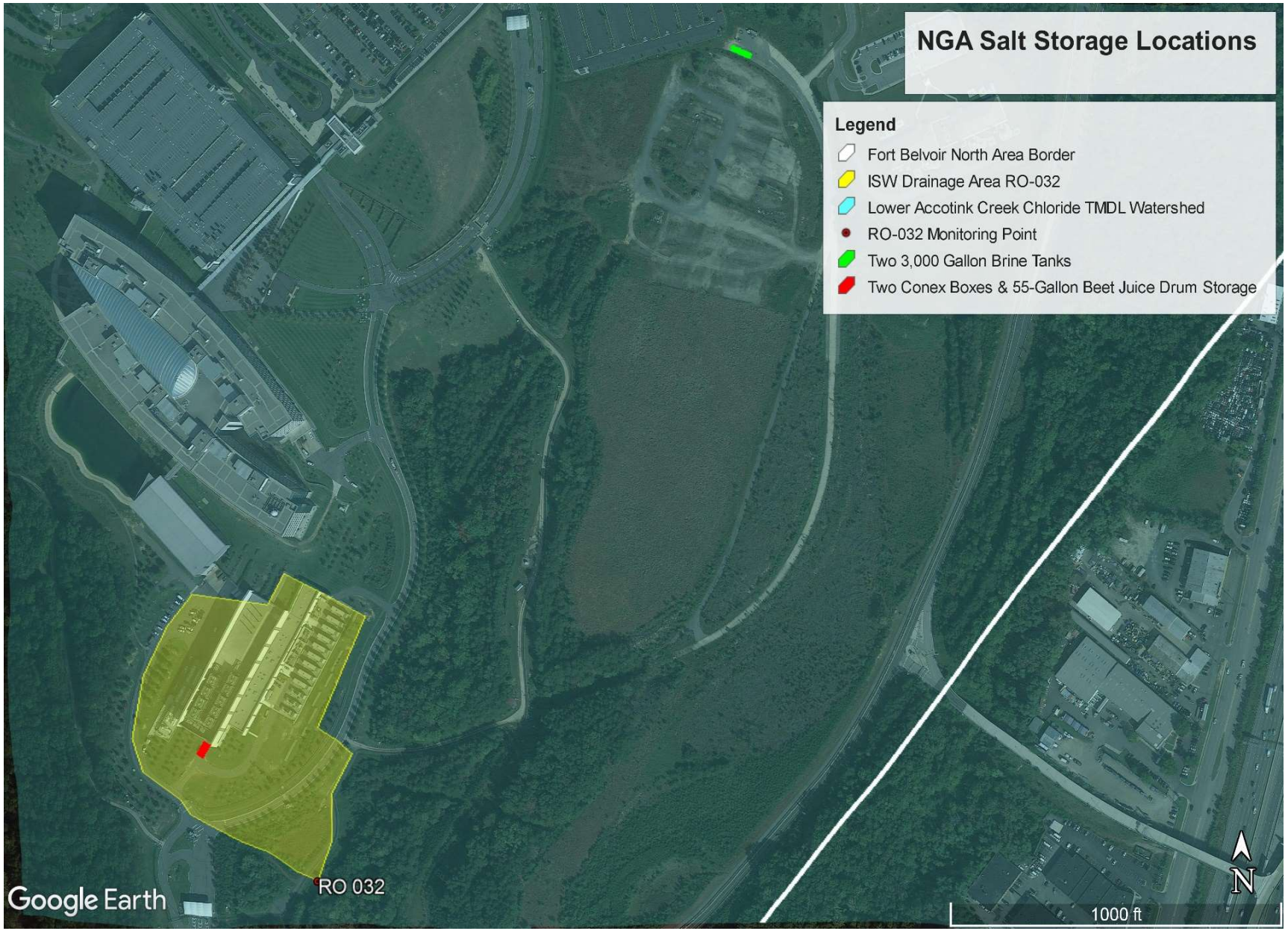


Figure 7: NGA Salt Storage Locations

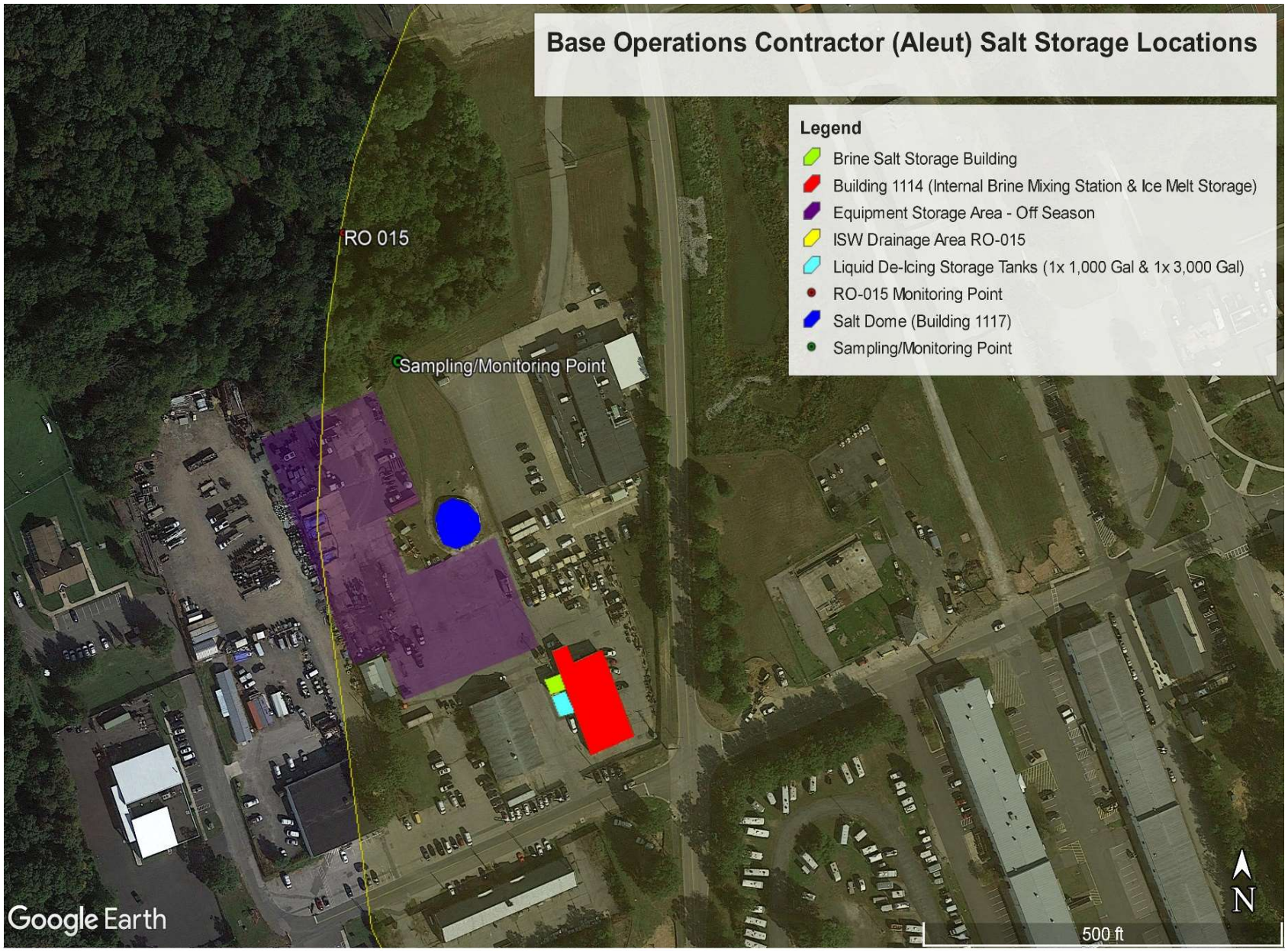


Figure 8: Base Operations Contractor (Aleut) Salt Storage Locations

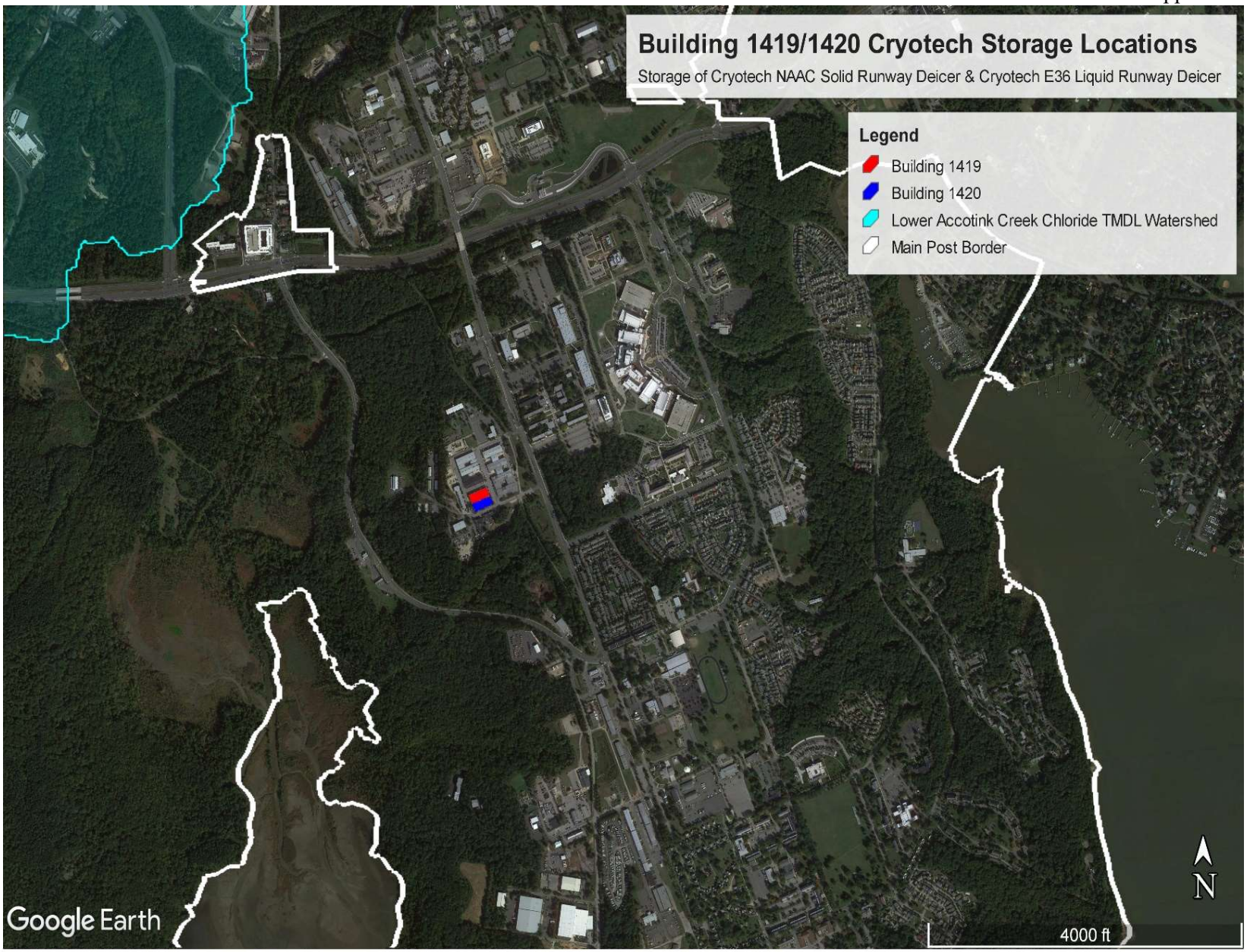


Figure 9: Building 1419/1420 Cryotech Storage Locations

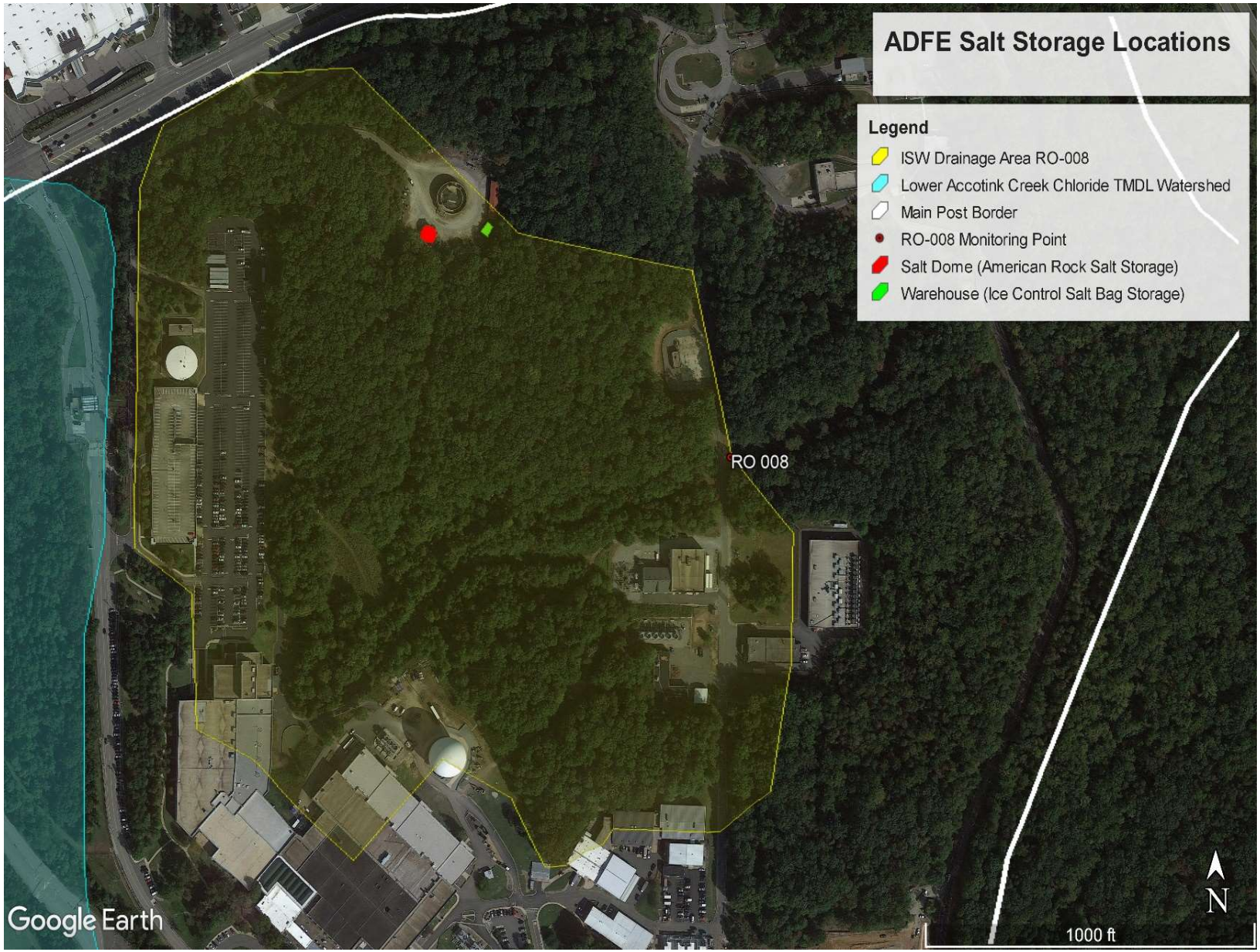


Figure 10: ADFE Salt Storage Locations

2021

APPENDIX B

PUBLIC COMMENT

FORT BELVOIR ACCOTINK CREEK CHLORIDE TMDL ACTION PLAN

MS4 Stormwater Program | 703-806-3406

MS4 Stormwater Program | 703-806-3406

Fort Belvoir has permit coverage for stormwater discharges that are not associated with industrial activities under the Virginia Small Municipal Separate Storm Sewer System (MS4) General Permit. A copy of the General Permit can be found HERE. Part I.E. of the permit requires the implementation of Best Management Practices (BMPs) to meet the goals of six minimum control measures (MCMs).Fort Belvoir's MS4 Program Plan identifies BMPs that will be implemented to meet these goals. Additionally, an annual report is required to be submitted to the Commonwealth of Virginia that documents the progress that has been made during the permit year. Annual reports for the current permit cycle may be found below.

The MS4 Permit and coverage letter, the most current MS4 Program Plan, and annual reports are made available below to meet the permit requirements specified in Part I.E.2 for public involvement and participation. Public comment on the MS4 Program Plan is accepted throughout the permit cycle.

Total Maximum Daily Load (TMDL) Action Plans require a public review and comment period of a minimum of 15 days as is specified in Part II.A.-B of the permit. TMDL Action Plans will be made available below for public review and comment when a plan has been drafted. Outside of the public review and comment period, TMDL Action Plans are available by contacting the MS4 Stormwater Program Administrator.

To report illicit discharges, improper disposal or spills to the MS4, complaints regarding land disturbing activities or other potential stormwater pollution concerns, OR to provide comments on any documents listed below, please contact the MS4 Stormwater Program Administrator via telephone at 703-806-3406, EMAIL or FACEBOOK.

Permit Documents

MS4 Permit Registration Statement (May 29, 2018)

MS4 Permit #VAR040093 (November 29, 2018 - October 31, 2023)

Open for Public Review and Comment

Comments for the MS4 Program Plan can be submitted at any time via EMAIL.

MS4 Program Plan (Revised December 2020)

As required by the Garrison's Municipal Separate Storm Sewer System (MS4) Permit, Fort Belvoir Directorate of Public Works, Environmental Division is accepting comments in writing on the Draft 2021 Chloride Total Maximum Daily Load (TMDL) Action Plan for the Lower Accotink Creek until 30 April 2021. Submit comments via EMAIL

Chloride TMDL Action Plan (April 7, 2021)

Fort Belvoir Environmental Division
April 8 at 9:26 AM ·

NOTICE: As required by the Garrison's Municipal Separate Storm Sewer System (MS4) Permit, Fort Belvoir Directorate of Public Works, Environmental Division is accepting comments in writing on the Draft 2021 Chloride Total Maximum Daily Load (TMDL) Action Plan for the Lower Accotink Creek until April 30.

The documents can be found on the Fort Belvoir web page (home.army.mil/belvoir) First, search for "Environmental Division." Once on the page, scroll down to the box marked "Programs and Documents" and click on it. Then click on "MS4 Stormwater Program." Links to all relevant documents can be found here.

Submit comments by email to Yari Chiro at yarelis.chiro.civ@mail.mil or at usarmy.belvoir.id-sustainment.mbx.dpw-enrd-stormwater@mail.mil.

HOME.ARMY.MIL
U.S. Army Fort Belvoir
U.S. Army Fort Belvoir: Leaders In Excellence - Serving Those Who Serve

Like Comment Share

Belvoir Community Briefs

MS4 Stormwater Program

"As required by the Garrison's Municipal Separate Storm Sewer System (MS4) Permit, Fort Belvoir Directorate of Public Works, Environmental Division is accepting comments in writing on the Draft 2021 Chloride Total Maximum Daily Load (TMDL) Action Plan for the Lower Accotink Creek until April 30.

The documents can be found on the Fort Belvoir web page, home.army.mil/belvoir. First, search for "Environmental Division." Once on the page, scroll down to the box marked "Programs and Documents" and click on it. Then click on "MS4 Stormwater Program. Links to all relevant documents can be found here.

Submit comments, by email, to Yari Chiro at yarelis.chiro.civ@mail or atusarmy.belvoir.id-sustainment.mbx.dpw-enrd-stormwater@mail.mil.

Healthy Eating Workshop

Join the Family Advocacy Program for a virtual Healthy Eating Workshop. Enjoy samples of a healthy plate, discuss portion sizes, and receive a booklet with family friendly recipes. Each workshop is from 10 - 11 a.m., April 16 and July 28. Participants must register by calling 571-231-7001.

Virtual Storytime

Join your library team every Wednesday at 10:30 a.m. on the Belvoir MWR Facebook page for a virtual group reading experience. Storytime targets ages 5 and under, but all ages are welcome to join.

MWR Library 4-night Stuffie Sleepaway Camp

Every Thursday, Children are invited to drop off a stuffie at the MWR Library for a fun-filled adventure. Each stuffie will go home on the following Monday with a craft, personalized library books, and photos of their adventure at the library. Drop-offs are Thursdays, March 25 - June 3, 11 a.m. - 5 p.m. Staff will notify customers the following Monday when stuffies can be picked up from the library.

DADS 101

Let the New Parent Support team show you how to overcome your fears and get comfortable in your paternal role. Whether a first-time dad or a first-time attendee, these sessions will empower you with advice and tricks to become the best dad you can be. This virtual class is from 3 - 4 p.m., April 28. Participants must register by calling 571-231-7028.

Play Morning

Play Mornings, hosted by Army Community Service, allow the opportunity for families to connect virtually and have a playgroup experience together through crafts, story time and other activities. Classes are biweekly, 10 a.m., Fridays. The next sessions will be April 23 and May 7, with additional sessions through June. Participants will be notified of any changes in the schedule. Registration is required by calling 571-231-7028.

Community Scavenger Hunt

April is National Child Abuse Prevention Month, Autism Awareness Month and Month of the Military Child. The Community Scavenger Hunt is a month-long effort that fosters family fun and bolsters social and emotional well-being. Each scavenger hunt activity will take participants to a physical location, a website or encourage a family activity. The Community Scavenger Hunt runs now through April 30 at 12 a.m. For the list of tasks and rules and eligibility, visit belvoir.armymwr.com.

MWR/SHARP 5K

Fort Belvoir's Sexual Harassment/Assault Response and Prevention Program, in partnership with MWR, will host the annual MWR/SHARP 5K Run/Walk. The 5K will be virtual, with the first 100 participants receiving an MWR/SHARP 5K shirt. Registration closes April 23 at 7 p.m. To register, visit belvoir.armymwr.com.

2021

APPENDIX C

STANDARD OPERATING PROCEDURES & BASE OPERATIONS CONTRACTOR MATERIALS

C-1 – BASE-OPS CONTRACTOR SNOW PLAN TECHNICAL EXHIBIT
C-2 – BASE-OPS CONTRACTOR EQUIPMENT LIST
C-3 – BASE-OPS CONTRACTOR BRINE SALT STORAGE BUILDING ACCEPTANCE
C-4 – SNOW TRUCK STAGING & ROUTES MAP

FORT BELVOIR ACCOTINK CREEK CHLORIDE TMDL ACTION PLAN

TECHNICAL EXHIBIT SA-3

SNOW PLAN

Updated: November 2011

DEPARTMENT OF THE ARMY
U.S. ARMY FORT BELVOIR

USAFB Regulation
No. 420-12

Revised 6 July 2011

Facilities Engineering
ICE AND SNOW REMOVAL AND ROAD SANDING

1. PURPOSE. This regulation establishes policy and responsibilities for removing snow and ice and for sanding hazardous areas on the roads, parking areas, airfields, and sidewalks of Fort Belvoir. It also furnishes guidance for handling snow emergencies off the installation should such action be required. Other administrative responsibilities and procedures for winter emergency conditions are covered in Fort Belvoir Regulation 115-1.

2. POLICY.

a. Roads, parking areas, airfields, and sidewalks on the installation will be cleared of snow and ice and sanded only to the extent necessary to permit free movement of vehicular and pedestrian traffic. The responsibility for control of snow removal operations for the installation is assigned to the public work. Missions other than snow removal will be controlled by the Director of Plans, Training and Mobilization (DPTM).

b. When snowfall is predicted to accumulate more than two (2) inches, the Emergency Operation Center (EOC) at DIS will be activated. DIS will man the EOC continuously during the snow emergency and have overall responsibility for EOC operations.

This regulation supersedes Fort Belvoir Regulation 420-12, dated 15 Jan 82.

3. RESPONSIBILITIES

a. DIS will:

(1) Have the responsibility for all snow removal operations.

(2) Establish the priorities for snow removal effort.

(3) Determine where all snow removal assets will be used.

(4) Establish an emergency operation center in Building 1442 (telephone 806-3005).

(5) Maintain a current list of key personnel to be contacted for snow removal operations at the post Fire Department (Bldg. 191).

(6) Arrange billeting of personnel that must remain at duty stations or are unable to leave the installation.

(7) Designate site for dumping snow that must be hauled away (Coal Area/TBA).

b. The DPTM will:

(1) During duty hours, notify all commanders, directors and chiefs of activities (to include tenants) of adverse winter weather conditions, using the emergency notification system outlines in FB Reg 525-5.

(2) Coordinate with DIS and Headquarters Command to establish and publish a list of buildings which will require troop labor to clear steps and sidewalks.

c. The PM will:

(1) Make determination and inform DPTM of road conditions (i.e., green, yellow, red) and make recommendations to DPTM concerning travel.

(2) Provide traffic control teams as required, to include blocking roads and re-routing traffic.

(3) Immediately notify DIS 806-3005 of road conditions and areas that require sanding and snow removal.

(4) Immediately notify the Plans and Operations division, Directorate of Logistics (DOL) (telephone 805-1407) road conditions for coordinating the suspension of administration use vehicle dispatches.

d. Directorate of Logistics (DOL) will:

(1) Upon notification by DIS, DOL (Plans and Operations Division) will activate the Logistics Operations Center (LOC) in Bldg 714, telephone 805-2407.

(2) Provide any organizational and support maintenance repairs required during the snow removal effort.

(3) Make arrangements for providing MOGAS, diesel fuel and wrecker service as required for servicing/removing non-tactical vehicles.

(4) Provide dinning facility for DOYEN Corp personnel.

e. All commanders, directors, and chiefs of activities will ensure that ice and snow are removed for all exit steps and sidewalks leading from their buildings to the common use sidewalk.

4. PROCEDURES AND COORDINATION.

a. All requests for snow removal operations, including DAAF, will be called into 805-3005 Snow removal equipment will only be redirected by DIS personnel.

b. Until snow has reached a depth of two inches, only sand and salt will be applied; after two inches, plowing operations begin. A salt/sand mixture is available for issue to facility coordinators and housing occupants from stockpile in the yard adjacent to U-Improve-It Store, Bldg. 2412. Salt and calcium chloride will not be used on any facilities at DAAF.

c. All snow removal control elements will remain functional until all tasks are completed or operations are terminated by DIS.

5. SAFETY.

a. Snow removal equipment used on highways and roadways, whose operation is low moving or otherwise creates an unsafe condition, will be equipped with rotating or flashing amber lights.

b. Personnel on snow removal details working on or adjacent to roadways will be equipped with reflectorized vests.

c. Road guides will be equipped with reflectorized vests and will carry an 18-inch square flag or reflectorized material, yellow-orange in color. During hours of darkness, guides will also be equipped with an amber light capable of being seen by approaching motorists from a distance of at least 200 yards. Guides will be instructed in the correct method of rendering hand signals.

6. SNOW REMOVAL PRIORITIES. The priority of snow removal will be: First, main post roads and DAAF; second, parking areas; third, family housing roads and parking areas; and Fourth, main post sidewalks. As established by DIS.

7. REFERENCES.

a. AR 385-55.

b. AR 420-72.

c. FB Reg 115-1.

d. FB Reg 525-1.

FOR THE COMMANDER:

OFFICIAL:

ROBERT R. HARDIMAN
COL, EN
Deputy Commander

BETTY J. P. OSWEILER
LTC, AG
Adjutant General

DISTRIBUTION:
STOP 113 (10)
STOP 62 (10)
STOP 235 (10)
STOP 52 (10)
STOP 123B(10)

FB Reg 420-12 (6 Feb 89)
App A

APPENDIX A

SNOW REMOVAL PRIORITIES FOR FORT BELVOIR ROADS

*1. Belvoir Road from 23rd Street to U.S. Highway #1.

*2. 21st Street from Gunston Road to Mt. Vernon Road to State Route 235. (Includes access to Bldg. 231 from 21st St.)

*3. Pohick Road from Route #1 to 12th Street to Farell Road to U.S. DeWitt Army Community Hospital, emergency entrance and service loops.

*4. Gunston Road. (Includes access to Bldg. 1084 from Gunston Road)

*5. Constitution Drive.

*6. Goethals Road to State Route 618.

*7. Meers Rd.

*8. 16th Street, Dalrymple, King, Pratt, Theote, Warren and Swift Roads.

*9. 18th Street, Flager Kuhn, Gaillard and Harris Roads.

10. 23d Street from Gunston Road to Belvoir Drive.

*11. Abbot, Wright and Parke Roads. (Includes access to Bldg. 1822).

12. INSCOM.

13. Meade, Stuart and Foster Roads.

14. Belvoir, Fairfax, Woodlawn and Mason Drives; Patrick Road and Sultan Loop.

15. Middleton Road.

16. Hurley, Surveyor, Taylor, Woodbury and Gillespie Roads.

17. 15th, 19th and 20th Streets, Harding and Mitchie Places.

18. 9th Street, Arnold Road, and Langfitt Loop.

* Designates primary snow emergency route. This route will be kept open prior to moving to other routes. Abandoned vehicles along this route will be hauled to holding area established by Provost Marshal.

19. Beauregard, Franklin and Black Roads.

20. Hall Road, 1st, 3d, 4th, 5th, 6th and 10th Streets, and Chapek Road.

21. Morrow, Johnson, and Deakyne Roads and Spengler Loop.

22. Lowen Road.

23. Poe Road.

24. Casey Road.

25. Cissna Road (EPG/North Area), Backlick Road Entrance to Rolling Road Gate and Road to Buildings 2034 and 2073.

26. Sharon Lane.

27. Snyder Road.

APPENDIX B

SNOW REMOVAL PRIORITIES FOR FORT BELVOIR PARKING AREAS

Priority	Parking Area
1	Bldg 808 (Hospital), 801, 805, 806, 807, and 815
2	MP Bldg 1131
3	Bldg 191 and 2119 (Fire Dept)
4	Bldg 1442 DIS
5	DAAF
6	Bldg 2310
7	Main Post PX Parking, Bldg 1138, 1188, 1189, 1199, 1150, 1153 and 1154
8	Bldg 2302 Commissary
9	Bldg 1745 Child Development Center
10	Flagler and Kuhn Roads (Streets in front and back of Post HQS)
11	Bldg 247 Parking Area
12	Bldg 470 and 498
13	Bldg 219 and 231
14	Bldg 201 and 202 (front and rear)
15	Bldg 702 and 701
16	From BRADC (front gate) to Bldgs 714, 707, 1115 and 1116
17	Transportation Motor Pool
18	Bldg 1084
19	Bldg 1822 Con II
20	Bldg 1099 Dental Clinic
21	Bldg 1018, 1024, 1028, 1025; Library Parking Lot
22	Bldg 200, 238, and 240 Rec Center and Wallace Theater
23	Bldg 211, 256, 214 and 215 (front and rear) and 216, 213, 235
24	Bldg 220 (both lots)
25	Bldg 257, 505, 506, 507 and 509

26	Bldg 1460, 1465, 1467, 1468, 1469, 1410 and 1409, 1492, 1495, 1498, and 1499
27	Bldg 1200 (NCO Club)
28	Bldg 20 (Officers' Club)
29	Bldg 193
30	Bldg 601, 630, 610, Vet Clinic
31	Bldg 736, 733, 773, 778
32	Bldg 1934
33	Lyman Loop
34	Bldg 1103 and 1126, 1153, 1150
35	Bldg 1009, 1101, 1000, 1003
36	Bldg 1911, 1912, 1907, 1903, 1902 and 1901
37	Bldg 1801, 1803, 1804, 1810 and 1809
38	Bldg 1835, 1836, 1834 and 1831
39	Bldg 1355 (Mosby Reserve Center)
40	Bldg 2120 (Wood Theater)
41	Bldg 2101, 2105, 2113 (McRee Barracks) (EOD)
42	All parking areas on North Post not previously covered
43	Bldg 97

FB Reg 420-12 (6 Feb 89)
App D

APPENDIX D

PRIORITY LISTING FOR CLEARING OF SIDEWALKS

Bldg Number	1st Priority
2444	INSCOM
808	Dewitt
268	29th Div Headquarters
269	Abbott Hall
270	Learning Resource Center
246	Communications Center
247	Humphreys Hall
2302	Commissary
1200	Main Club/(O Club)
1028 and 1245	Child Care Facilities
	2nd Priority
1161	Red Cross Bldg
1003	Youth Center
1001	One Stop Employment Center
1100 Area	PX Complex
1193	Thrift Shop
1194	Bank, United Virginia National
1195	Credit Union
1196	Laundromat
1199	Bowling Center
612	Print Plant
	3rd Priority
240	Wallace
200	Recreation Center, SOSA
202	DSMC

201	Dir Tng Dev
215	Dir of Tng and Doc
216	CPO
219	AMO and Finance
258	Central Accounting BR, Finance
221	Dir Tng Dev
223	Dir Tng Dev

4th Priority

257	SJA & DOES
T-230	Dir Tng Dev
T-733, T-734 & T-735	Installation Supply
1024	Van Noy Library

Aleut Snow Removal Equipment List

DESCRIPTION	Quantity	MANUF/MODEL #	SERIAL #
LOADER	1	CASE / W200	ID#9155815
LOADER	1	CATERPILLAR / CAT 920	62K8488
30" SNOW BLOWER	1	ARIENS / 921018	SER# 008304
36" GRAVELY PRO POWER SNOW BRUSH	1	GRAVELY / 926510	SER# 000146
47" SNOW BLOWER ATTACHMENT	1	JOHN DEERE	M01081X080092
47" SNOW BLOWER ATTACHMENT	1	JOHN DEERE	M01081X080087
47" SNOW BLOWER ATTACHMENT	1	JOHN DEERE	M01081X080088
47" SNOW BLOWER ATTACHMENT	1	JOHN DEERE	M01081X080091
BLADE: SNOW PLOW	1	MEYER / PART# 09286	
BLADE: SNOW PLOW	1	MEYER / HM-10	PART#09239
BLADE: SNOW PLOW	1	MEYER / MOD: C-8	PART#09286
BLADE: SNOW PLOW	1	MEYER / HM-10	
BLADE: SNOW PLOW	1	MEYER / MOD: C-8	PART#09286
BLADE: SNOW PLOW	1	MEYER / MOD: C-8	PART#09286
BLADE: SNOW PLOW	1	MEYER / MOD: C-8	PART#09286
BLADE: SNOW PLOW	1	MEYER / MOD: C-8	PART#09286
BLADE: SNOW PLOW	1	WILBAR	
BLADE: SNOW PLOW	1	MEYER / MOD: C-7.5, PART#09240	263709240
BLADE: SNOW PLOW	1	MEYER / MOD: C-7.5, PART#09240	245109240
BLADE: SNOW PLOW	1	MEYER / MOD: C-7.5, PART#09240	245209240
BLADE: SNOW PLOW	1	MEYER / MOD: C-7.5, PART#09240	245309240
BLADE: SNOW PLOW	1	MEYER / MOD: C-7.5, PART#09240	245009240

Aleut Snow Removal Equipment List

BLADE: SNOW PLOW	1	MEYER	
BLADE: SNOW PLOW	1	MEYER / 9286	
BLADE: SNOW PLOW	1	MEYER / MOD: C-8	PART#09286
BLADE: SNOW PLOW	1	MEYER / 9286	
BLADE: SNOW PLOW	1	MEYER / 9239	
BLADE: SNOW PLOW	1	MEYER / C - 8.5	303909983
BLADE: SNOW PLOW	1	MEYER / C - 8.5	307509983
SNOW PLOW HEAVY DUTY 10'	1	SMART SIELD / THE BOSS	243017
SNOW PLOW HEAVY DUTY 9'	1	SMART SIELD / THE BOSS	BC189279
SNOW PLOW HEAVY DUTY 10'	1	SMART SIELD / THE BOSS	BC189278
SNOW PLOW 8' 6" SUPER DUTY	1	BOSS/ STB03168	401463786
SNOW PLOW WESTERN MVP PLUS 8.5 (#081)	1	WESTERN / 4447	165725
SNOW PLOW WESTERN MVP PLUS 8.5 (#080)	1	WESTERN / 4447	165723
GATOR BLADE	1	JOHN DEERE	
GATOR BLADE	1	JOHN DEERE	
GATOR BLADE	1	JOHN DEERE	
GATOR BLADE	1	JOHN DEERE	
LOADER (ATTACHMENT)	1	JOHN DEERE/ 553	W00553X002469
SAND AND SALT SPREADER	1	CURTIS / TS-17	115209
SAND AND SALT SPREADER	1	FISHER / TS-17	5233
SAND AND SALT SPREADER	1	SWENSON	
SAND AND SALT SPREADER	1	CURTIS / TS-17	525129
SAND AND SALT SPREADER	1	CURTIS	115208

Aleut Snow Removal Equipment List

SAND AND SALT SPREADER	1	CURTIS / TS-17	521217
SAND AND SALT SPREADER	1	SWENSON	91220
SAND AND SALT SPREADER	1	SWENSON	
SAND AND SALT SPREADER ATTACHMENT	1	WESTERN PRODUCTS	
SAND AND SALT SPREADER HYDRAULIC MOTOR	1	BUYERS / 14005 SERIES	10503
SAND AND SALT SPREADER HYDRAULIC MOTOR	1	BUYERS / 14005 SERIES	10506
SAND AND SALT SPREADER 10'	1	SALT DOGG / WG68	S15031810-276
SAND AND SALT SPREADER (#080)	1	HENDERSON /FSP2X8XHONDA	FSP2-15012
SAND AND SALT SPREADER (#081)	1	HENDERSON /FSP2X8XHONDA	FSP2-14854
SPREADER	1	EARTHWAY	
SPREADER	1	EARTHWAY	
SPREADER	1	EARTHWAY	
SPREADER	1	EARTHWAY	
WALK BEHIND SNOW BLOWER	1	TORO 1132 / 38580	9000214
WALK BEHIND SNOW BLOWER	1	ARLENS COMPANY / 932104	11641
WALK BEHIND SNOW BLOWER	1	CRAFTSMAN / 536-886260	916505278
WALK BEHIND SNOW BLOWER	1	ARLENS COMPANY / 932104	19743
WALK BEHIND SNOW BLOWER	1	ARLENS COMPANY / 932104	14415
WALK BEHIND SNOW BLOWER	1	TORO 1132/ 38580	9000108
WALK BEHIND SNOW BLOWER	1	TORO 1132/ 38580	9000215
WALK BEHIND SNOW BLOWER	1	ARIENS8524 / 932104	26503
SNOW PLOW	3	ON KUBOTA	

Aleut Snow Removal Equipment List

SWISHER SPREADER	**3**	**ON KUBOTA**	

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BELVOIR
9820 FLAGLER ROAD, SUITE 213
FORT BELVOIR, VIRGINIA 22060-5928

REPLY TO ATTENTION OF

IMBV-PW

ISW REP 015: BRINE SALT STORAGE BUILDING INSPECTION, 27 AUG 2020

Subject: Final Inspection of Brine Salt Storage Building Construction for Representative Outfall 015 under Industrial Stormwater Major Virginia Pollution Discharge Elimination System (VPDES) Permit Number VA0092771

1. Purpose: This memorandum is to document the final construction acceptance for the Brine Salt Storage Building at the Roads and Grounds Facility on 16th Street. The Facility is covered under the Industrial Stormwater Major VPDES Permit Number VA0092771 under Representative Outfall 015 through the Virginia Department of Environmental Quality (VADEQ

2. Background

The permit requires that the raw materials, which include the chloride (salt) that is being used to produce the brine for roads and other paved surfaces is stored in secondary containment and unexposed to the elements (precipitation). The chloride was previously stored in a manner that was not fully compliant for salt storage. Although it was stored under a roof with a tarp covering inside the secondary containment, rain and snow was able to interact with the chloride and create a brine solution inside the secondary containment that was prohibited to drain since it would have resulted in an unauthorized discharge under the VPDES permit. The liquid inside the secondary containment had to be collected and disposed of.

3. Disposition

The inspection was requested by Kenny Konietzko, the O&M project manager. Specifically, he requested me to inspect the facility with him to ensure that it meet regulatory compliance prior to him closing the contracted work out, accepting the product. I arrived at the location with Ashley Clark at approximately 10:00 hours. When Mr. Konietzko did not arrive, Ms. Clark and myself proceeded to inspect the facility. I took 3 photographs of the facility. The facility has three solid wall, roof, concrete floor and a vinyl curtain to protect the chloride adequately from the elements. The facility was constructed inside of the secondary containment. The determination was made that the facility is compliant with the VPDES permit. Upon returning to the office at approximately 10:30 hours, I notified Mr. Konietzko via email that the facility meets regulatory requirements and that I have no objections from the regulatory perspective that the facility is acceptable.

IMBV-PW

Subject: Facility Compliance Requirements under Industrial Stormwater Major Virginia Pollution Discharge Elimination System (VPDES) Permit Number VA0092771

4. No Corrective Action Form was outstanding for Representative Outfall 015.

5. Point of contact is Sybille Vega, Industrial Stormwater Program Manager, at 703-806-0627 or via email at sybille.r.vega.civ@mail.mil.

VEGA.SYBILLE.R.1131884890

Digitally signed by VEGA.SYBILLE.R.1131884890
Date: 2020.09.02 10:24:22 -04'00'

FORT BELVOIR ROUTINE FACILITY INSPECTION PICTURES

Comment: Brine Storage Faciltiy looking towards 16th Street at the Roads and Grounds Facilities Yard

Photo #: 1

Taken By: Sybille Vega **Date:** 27 Aug 2020

Comment: Brine Storage Facility entrance and brine tank in the background.

Photo # 2

Taken By: Sybille Vega **Date:** 27 Aug 2020

FORT BELVOIR ROUTINE FACILITY INSPECTION PICTURES

Comment: Brine Storage Facility looking away from 16th Street.

Photo #: 3

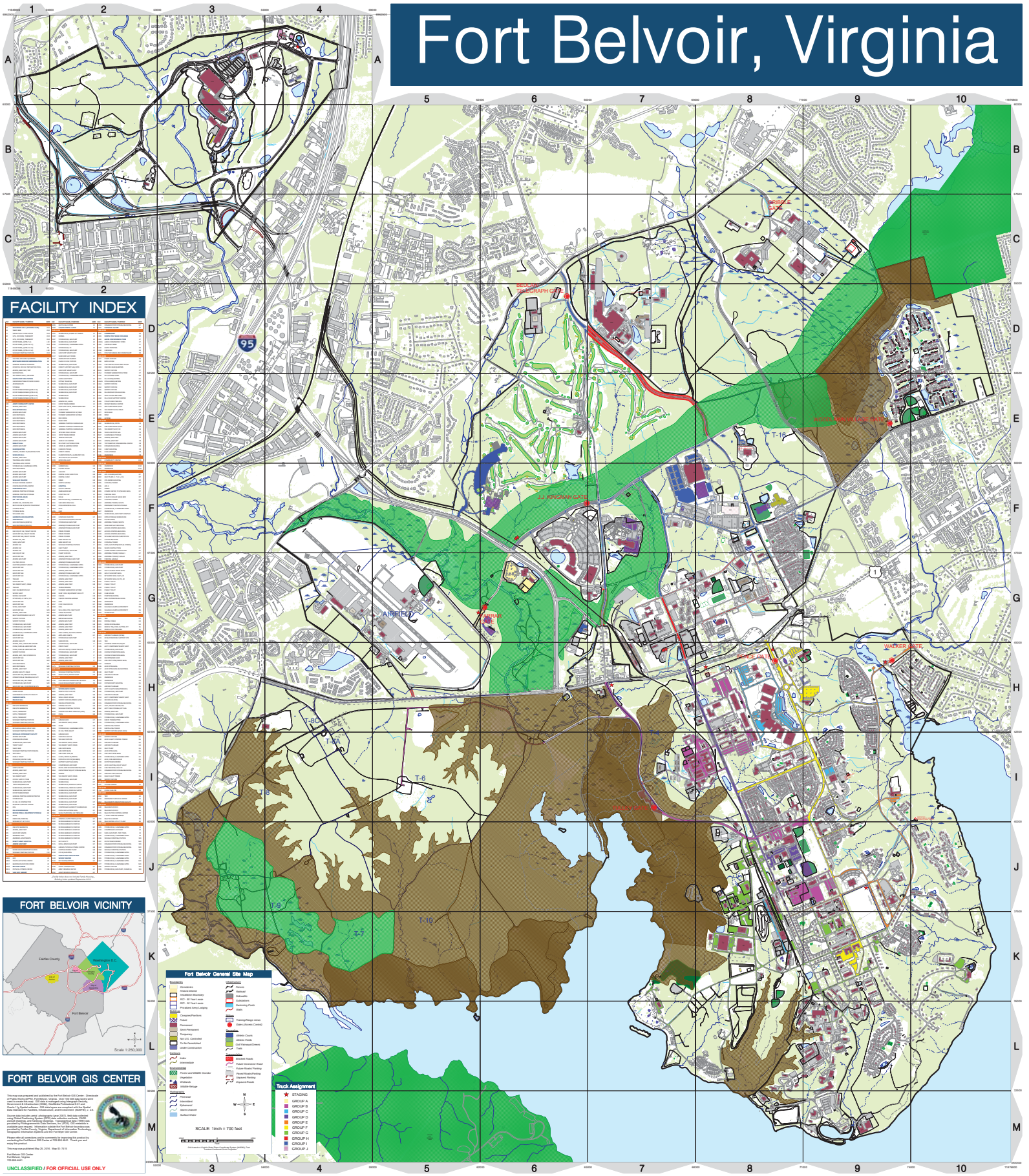
Taken By: Sybille Vega **Date:** 27 Aug 2020

Comment:

Photo #

Taken By: **Date:**

Fort Belvoir, Virginia



2021

APPENDIX D

FACT SHEETS & EDUCATIONAL MATERIALS
(SEE TRAINING PLAN FOR ADDITIONAL EDUCATIONAL MATERIALS)

D-1 – SALT STORAGE AND LOADING BMP FACTSHEET 4
D-2 – SALT APPLICATION BMP FACTSHEET 5
D-3 – BRINE MIXING BMP FACTSHEET 13
D-4 – AIRCRAFT DEICING OPERATIONS BMP FACTSHEET 14

FORT BELVOIR ACCOTINK CREEK CHLORIDE TMDL ACTION PLAN

SALT STORAGE AND LOADING BMP FACTSHEET 4 Rev. 04/2019

Targeted Pollutants	
Sediment	X
Nutrients	
Trash	
Metals	
Bacteria	
Oil & Grease	
Chemicals	
Salt	X

Objectives	
Cover	X
Contain	X
Educate	X
Reduce/Minimize	X
Product Substitution	

DESCRIPTION

"Salt" means salt, salt solutions, salt mixtures, or salt substitutes in solid or liquid form (brine). It includes: Sodium chloride (NaCl), Potassium chloride (KCl), Calcium chloride (CaCl2), Magnesium chloride (MgCl2), and mixtures of the same substances with abrasives such as sand, cinder, slag, etc. It is important to follow proper procedures so that pollutants do not migrate by stormwater into our natural waterways. Salt is toxic to many forms of aquatic life and can kill fish and other aquatic organisms. This is a large concern during the winter months when salt is spread on roads, walkways, and parking lots to aid in ice and snow melt. Following procedures will provide compliance with the Industrial Stormwater permit and chloride pollution limits.

Application of any deicing agents containing urea or ethylene glycol or other forms of nitrogen or phosphoruous to parking lots, roadways, runways, sidewalks or other paved surfaces is **PROHIBITED** per the two stormwater permits issued to Fort Belvoir by Virginia Department of Environmental Quality.

GUIDELINES

- All salt should be stored “high and dry”, in an enclosed structure and in a manner so that it does not come in contact with stormwater.
- Covered containers used for salt storage must be corrosive resistant as salt is extremely corrosive.
- There should be no storm drains in the immediate vicinity of salt storage structures or containers.
- All salt must be completely contained within a structure or container. If the structure is three-sided, the salt should be kept pushed back from the open side to prevent exposure. Stormwater must not be allowed to pond inside structure or drain to storm drains.
- Salt storage facilities should be maintained in a manner that will assure physical integrity consistent with original design criteria. Keeping structures in good repair will prevent releases.
- Make sure equipment operators fully understand how to operate and maintain spreaders, sprayers, loaders and other equipment being used.
- Loading/mixing salt should be done on a properly constructed pad as close to the storage area as possible.
- During loading and unloading of materials it is important to anticipate any possible accidents. Make sure your loading/unloading areas are able to contain possible spills or overflows.
- Salt and sand/salt mixtures that are spilled during the loading process should be collected and returned to storage immediately after loading is completed.
- Sand and salt mixing and loading of spreaders should be indoors. If it is necessary to mix outdoors, it should be done during dry weather and the mixture should be immediately loaded to a spreader or to storage.
- Deliveries should be arranged such that salt is placed under cover as soon as possible upon arrival.

SALT STORAGE AND LOADING BMP FACTSHEET 4

MAINTENANCE/GOOD HOUSEKEEPING

- Make sure equipment operators fully understand how to operate and maintain spreaders, sprayers, loaders and other equipment being used.
- Keep covers in place at all times when work is not occurring to reduce exposure of materials to rain.
- Clean loading/unloading areas regularly to remove potential sources of pollutants.
- Inspect the outside of the container and/or facility for signs of deterioration, discharges, or accumulation of salt inside diked areas. This visual inspection is intended to be a routine walk-around and include the container's supports and foundations and the facility's roof and walls.
- If the stockpiles are too large and cannot feasibly be covered and contained, implement erosion control practices at the perimeter of your site and at any storm drains to prevent erosion of the stockpiled material from moving off-site.

SPILL PREVENTION

Common causes of spills at facilities include:

- **Operator error**
  - ⇒ Container overfilled
  - ⇒ Containers left open
  - ⇒ Poor transfer procedures
  - ⇒ Lack of product monitoring
  - ⇒ Potential problems not recognized
  - ⇒ Poor maintenance/good housekeeping practices
- **Storage Tank Problems**
  - ⇒ Tank design and construction
  - ⇒ Inadequate foundation or tanks setting directly on the ground
  - ⇒ Tank bottom and seams rusted, shell pitted, weeping or leaking
  - ⇒ Improper venting

SPILL RESPONSE CONSIDERATIONS

In the event of a salt spill for when salt has not reached storm drain:

- Survey the incident to identify the source of release
- Stop the source
- Sweep or vacuum salt and dispose of properly
- **DO NOT WASH SALT DOWN STORM DRAINS OR DISCHARGE STORMWATER CONTAMINATED SALT INTO STORM DRAIN**

SPILL RESPONSE PROCEDURES

In the event of a spill or leak follow the appropriate Spill Response Procedures posted at your facility or refer to the BMP Factsheet Overview.

- **Survey the incident** from a safe distance. Identify the source of release and the material being released.
- Call the Ft. Belvoir Fire Department if spills are *greater than 5 gallons.* If ANY amount of leaked materials has entered a storm drain or waterway call the Ft. Belvoir Fire Department at 703- 781-1800 and DPW Environmental Division (Env. Div.) at 703-806-3694.
- Provide the Safety Data Sheet of the spilled material to the spill response personnel.
- Fill out Spill Incident Report in your SWPPP.
- REPORT ALL SPILLS TO DPW/ENV. DIV AND THE FIRE DEPARTMENT!

REPORT SPILLS TO DPW/ENV. DIV. BY:

- E-mailing your Spill Incident Report to gerald.j.sheehan3.civ@mail.mil
- Calling 703-806-3694

SALT APPLICATION
BMP FACTSHEET 5 Rev. 04/2019

Targeted Pollutants	
Sediment	X
Nutrients	
Trash	
Metals	
Bacteria	
Oil & Grease	
Chemicals	
Salt	X

Objectives	
Cover	X
Contain	X
Educate	X
Reduce/Minimize	X
Product Substitution	

DESCRIPTION

"Salt" means salt, salt solutions, salt mixtures, or salt substitutes in solid or liquid form (brine). It includes: Sodium chloride (NaCl), Potassium chloride (KCl), Calcium chloride (CaCl2), Magnesium chloride (MgCl2), and mixtures of the same substances with abrasives such as sand, cinder, slag, etc. It is important to follow proper procedures so that pollutants do not migrate with stormwater into our natural waterways. Salt is toxic to many forms of aquatic life and can kill fish and other aquatic organisms. This is a large concern during the winter months when salt is spread on roads, walkways, and parking lots to aid in ice and snow melt. Following procedures will provide compliance with the Industrial Stormwater permit and chloride pollutant limits.

APPLICATION OF ANY DEICING AGENTS CONTAINING UREA OR ETHYLENE GLYCOL OR OTHER FORMS OF NITROGEN OR PHOSPHOROUS TO PARKING LOTS, ROADWAYS, RUNWAYS, SIDEWALKS OR OTHER PAVED SURFACES IS PROHBITED per the two stormwater permits issued to Fort Belvoir by Virginia Department of Environmental Quality. See Fort Belvoir Policy Memo #71 for more details.

GUIDELINES

- All salt should be stored “high and dry”, in an enclosed structure and in a manner so that it does not come in contact with stormwater.
- Covered containers used for salt storage must be corrosive resistant as salt is extremely corrosive.
- There should be no storm drains in the immediate vicinity of salt storage structures or containers.
- Always use shovels, snow blowers and ice scrapers to remove a majority of the snow and ice first before applying salt to avoid pushing it away.
- Read the manufactures application instruction to determine how much salt should be applied.
- Consider temperature when determining volume of salt to apply. Dry salt becomes ineffective below 15°F; if possible wait until the temperature rises before applying salt.
- Only use the amount that is needed. Simply using more product does not necessarily make snow and ice melt more quickly or completely.
- Use the least toxic materials available for any practices associated with road and street maintenance.
- Sweep up any extra ice melt and save it to use again after another snowfall.
- Avoid using salts as spring approaches to avoid damage to plants that are getting ready to grow.
- Beware of “environmentally safe” designation/labeling of products. These products are still harmful to the environment, just less harmful compared to other products that serve the same purpose.

SALT APPLICATION BMP FACTSHEET 5

DEICING SALTS

There are four primary deicing salts for ice and snow removal:

1. Magnesium chloride: Continues to melt snow and ice until the temperature reaches -15°F. This type of salt release 40% less chloride into the environment than either rock salt of calcium chloride. The is the BEST choice because it is less damaging to concrete and plants, and releases less chloride to the environment

2. Potassium Chloride: Only melts ice when the air temperature is above 15°F , but when combined with other chemicals, it can melt at ice at lower temperatures. It is not a skin irritant and does not harm vegetation. This is a good choice.

3. Calcium Chloride: Comes in the form of rounded white pellets and works at very low temperatures. Concentrations of calcium chloride can chemically attack concrete. It can cause skin irritation if your hands are moist when using it.

4. Sodium Chloride (rock salt): The most common deicing salt and most economical. Rock salt releases the highest amount of chloride when it dissolves. Chloride can damage concrete and metal. It also pollutes streams, rivers and lakes. It should be avoided.

Application rate of dry salt in lbs/per 1000 square foot area during snow or freezing rain.

Temperature	Amount
30°F	0.75-1.75
25°F-30°F	1.5-2.25
20°F-25°F	2.75-3
15°F-20°F	2.75-3
0°F-15°F	Not recommended
0°F or below	Not recommended

The table to the left shows estimated application rates of dry salt in lbs/per 100 square feet. Please note, the best application rate will be indicated on the manufacturer instructions. In addition, dry salt is NOT RECOMMENDED for temperatures below 0°F as it is not effective.

SPILL RESPONSE PROCEDURES

In the event of a spill or leak follow the appropriate Spill Response Procedures posted at your facility or refer to the BMP Factsheet Overview.

- **Survey the incident** from a safe distance. Identify the source of release and the material being released.
- Call the Ft. Belvoir Fire Department if spills are *greater than 5 gallons*. If ANY amount of leaked materials has entered a storm drain or waterway call the Ft. Belvoir Fire Department at 703- 781-1800 and DPW Environmental Division (Env.Div.) at 703-806-3694.
- Provide the Safety Data Sheet of the spilled material to the spill response personnel.
- Fill out Spill Incident Report in your SWPPP.
- REPORT ALL SPILLS TO DPW/ENV. DIV. AND THE FIRE DEPARTMENT!

REPORT SPILLS TO DPW/ENV. DIV. BY:

- E-mailing your Spill Incident Report to gerald.j.sheehan3.civ@mail.mil
- Calling 703-806-3694

BRINE MIXING
BMP FACTSHEET 13 Rev. 04/2019

Targeted Pollutants	
Sediment	X
Nutrients	
Trash	
Metals	X
Bacteria	
Oil & Grease	
Chemicals	
Salt	X

Objectives	
Cover	X
Contain	X
Educate	X
Reduce/Minimize	X
Product Substitution	

DESCRIPTION

"Salt" means salt, salt solutions, salt mixtures, or salt substitutes in solid or liquid form (brine). Salt brine includes: Sodium chloride (NaCl), Potassium chloride (KCl), Calcium chloride (CaCl2), and Magnesium chloride (MgCl2). It also includes mixtures of the same substances with abrasives such as sand, cinder, slag, etc. Any mixture that contains 1% or more of the above chlorides including sand and salt mixtures is considered a brine.

DO NOT DISCHARGE BRINE DIRECTLY TO A STORM SEWER SYSTEM due to potential impacts to surface water and groundwater quality. Appropriate disposal of brine waste should be handled using federal, state and local regulations and procedures.

GUIDELINES

Proper handling of materials during stockpiling, mixing, loading, and off-loading of brine can prevent contact of salt with stormwater, thereby minimizing salty runoff and preventing ground and surface water contamination. Proper handling of brine mixtures includes:

- Making sure equipment operators fully understand how to operate and maintain hoses, sprayers, loaders and other equipment being used.
- Mixing should be conducted on a properly constructed pad as close to the storage area as possible.
- During the loading and unloading of materials it is important to anticipate any possible accidents. Therefore make sure your loading/unloading areas are able to contain possible spills or overflows.
- Understand the capacity of your tanks and application devices. A gallon of salt brine weighs over 2 pounds more than a gallon of water. Make sure that the tanks you purchase are of sufficient strength to be able to handle the additional weight.
- Ensure type of salt used is compatible with the manufacturer directions of the bring mixing equipment.

BRINE MIXING
BMP FACTSHEET 13

GUIDELINES (continued)

Brine storage facilities must meet all of the following conditions:

- Salt solutions are extremely corrosive. Ensure that the equipment that comes in contact with the brine is made of a corrosion resistant material such as high density polyethylene, stainless steel, or glass fiber.
- Liquid deicing materials, such as salt brine or magnesium chloride, should be stored in well-maintained and **labeled** storage tanks.
- **Outdoor** storage areas with 1000 gallons or more of brine must have secondary containment structures. Secondary containment structures should be made out of materials compatible with salt and constructed with a roof.
- **Secondary containment** must be constructed to contain the larger volume of the following:
  ⇒10% of the total volume of all of the containers within the containment structure, or
  ⇒110% of the volume of the largest storage container within the containment structure.
- *Secondary containment structures* must allow for inspections of the tanks or containers, the timely detection of any leaks and recovery of any spillage, and the removal and proper disposal of any captured precipitation so that the minimum required capacity is maintained at all times.
- Brine stored indoors must be managed so that no releases can reach drains, groundwater or surface waters. If there is a floor drain, it must be plugged unless it is connected to a holding tank, or approved in a discharge permit that the facility has obtained from the Virginia Department of Environmental Quality. Your facility SWPPP should contain documentation of any permits held.

MAINTENANCE/GOOD HOUSEKEEPING

Brine Storage and Facility Maintenance

Many of the problems associated with contamination of local waterways stem from the improper storage and maintenance of deicing materials (salt brines). Proper maintenance of brine storage areas will keep structures in good repair and will prevent releases to the environment. Proper **maintenance** practices for salt brine operations include:

- Scheduled maintenance should be performed on the storage tanks along with fittings, valves and pumps. Any leaking or dripping should be addressed in a timely manner.
- It is recommended that the brine tank be cleaned out at least once every season (spring) or when a large build-up of non-dissolvable material has begun to accumulate. Cleaned out liquids and solids will need to be collected and properly disposed of. Under no circumstance should cleaned-out liquids and solids be washed onto the ground, into a storm drain, or down into a structural Best Management Practice.
- Detailed maintenance records should be kept to ensure proper upkeep on equipment.
- Make sure equipment operators fully understand how to operate and maintain brine mixers and other equipment being used.
- Keep covers in place at all times when work is not occurring to reduce exposure of materials to rain.
- Clean loading/unloading areas regularly to remove potential sources of pollutants.
- Inspect the outside of the container and/or facility for signs of deterioration, discharges, or accumulation of salt inside diked areas. This visual inspection is intended to be a routine walk-around and include the container's supports and foundations and the facility's roof and walls.

BRINE MIXING
BMP FACTSHEET 13

SPILL RESPONSE PROCEDURES

In the event of a spill or leak follow the appropriate Spill Response Procedures posted at your facility or refer to the BMP Factsheet Overview.

- **Survey the incident** from a safe distance. Identify the source of release and the material being released.
- Call the Ft. Belvoir Fire Department if spills are *greater than 5 gallons*. If ANY amount of leaked materials has entered a storm drain or waterway call the Ft. Belvoir Fire Department at 703- 781-1800 and DPW Environmental Division (Env. Div.) at 703-806-3694.
- Provide the Safety Data Sheet of the spilled material to the spill response personnel.
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REPORT SPILLS TO DPW/ENV. DIV. BY:

- E-mailing your Spill Incident Report to gerald.j.sheehan3.civ@mail.mil
- Calling 703-806-3694

AIRCRAFT DEICING OPERATIONS BMP FACTSHEET 14 Rev. 04/2019

Targeted Pollutants	
Sediment	X
Nutrients	
Trash	
Metals	X
Bacteria	
Oil & Grease	
Chemicals	
Salt	X

Objectives	
Cover	X
Contain	X
Educate	X
Reduce/Minimize	X
Product Substitution	

DESCRIPTION

Many facilities on Fort Belvoir operate aircraft and other types of equipment that must be deiced during the colder months. It is very important to follow proper procedures when handling, applying, and storing deicing materials so that they **do not** come into contact with stormwater. If proper procedures and precautions are not followed harmful pollutants can migrate by means of stormwater run-off into our natural waterways. The compounds that are found in many deicing agents (such as glycols and ethylene glycol) pose a threat to receiving waters due to their high biochemical oxygen demand (BOD). Essentially these compounds deplete oxygen levels in the water and deprive aquatic life of oxygen, as well as being toxic to many types of aquatic and mammalian organisms. They are also hazardous air pollutants as defined under the Clean Air Act. SafeTemp ES Plus is an aircraft deicing agent used at Fort Belvoir which contains propylene glycol. Propylene glycol can contribute to harmful nutrient loading so it is very important when using products like SafeTemp ES Plus to follow product guidelines **and only use the minimal amount needed.**

APPLICATION OF ANY DEICING AGENTS CONTAINING UREA OR ETHYLENE GLYCOL OR OTHER FORMS OF NITROGEN OR PHOSPHOROUS TO PARKING LOTS, ROADWAYS, RUNWAYS, SIDEWALKS OR OTHER PAVED SURFACES IF PROHBITED per the two stormwater permits issued to Fort Belvoir by Virginia Department of Environmental Quality. See Fort Belvoir Policy Memo #71 for more details.

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY GUIDELINES

Virginia Department of Environmental Quality (VADEQ) states that if a facility uses deicing material, the facility must comply with the following:

- During deicing season, Industrial Stormwater facilities are required to increase their self-inspections frequency from quarterly to monthly.
- Deicing record is required and must include the following:
  - ⇒ Time and date of deicing material
  - ⇒ Application
  - ⇒ Quantity of deicing material used per event
  - ⇒ SDS of deicing materials
  - ⇒ Amount recovered of deicing materials
- VADEQ requires a minimum of 60% recovery of the product applied.

AIRCRAFT DEICING OPERATIONS BMP FACTSHEET 14

GUIDELINES (continued)

- Keep good housekeeping practices. Reference BMP Factsheet Overview for more details.
- Store, handle, and apply deicing/anti-icing materials in a manner consistent with chemical/product specific instructions provided by the manufacturer on the Safety Data Sheet (SDS).
- Restrict deicing/anti-icing material storage and handling to trained personnel only.
- If possible, perform handling and application operations of deicing materials away from storm drains or temporarily block nearby drains.
- Clean areas following deicing/anti-icing material transfers.
- Use only enough deicing/anti-icing chemicals to ensure safe operation of aircraft. Excess chemicals add to storm water contamination from drip and shear of deicing/anti-icing chemicals.
- Avoid overspray of deicing/anti-icing chemicals.
- Perform aircraft deicing/anti-icing only in the approved designated areas or aircraft hangers.
- Provide for the immediate clean-up of deicing pads following deicing activity.

MAINTENANCE/GOOD HOUSEKEEPING

General Storage Protocols:

- Store deicing and anti-icing materials within designated contained areas. Ideally these areas should be away from direct traffic routes to prevent accidental spills. See Salt Storage BMP Factsheet 4 for more information.
- Where possible, store deicing/anti-icing materials indoors or in a sheltered area.
- Surface on which materials are stored must be free of cracks or holes and it must be able to handle the weight of the materials.
- Avoid storing materials close to storm drains.
- Store materials in a manner consistent with chemical/product specific instructions provided by the manufacturer on the Safety Data Sheet (SDS).
- Make sure all containers are labeled properly and lids are secure. Routinely inspect containers and tanks for leaks or signs of corrosion.
- Maintain adequate supplies of spill response equipment (spill kits) in storage locations and make sure it is easily accessible.
- Ensure material storage containers have **secondary containment** and that all drain plugs are in place and not leaking.
- **Secondary containment:** The purpose of secondary containment is to prevent deicing products like propylene glycol from flowing onto the ground or into the water in the event of a spill at an AST facility. Spill containment measures, including secondary containment are required by the Environmental Protection Agency (EPA) at AST facilities. Secondary containment:
  - ⇒ Must be large, high and strong enough to hold the contents of the largest tank plus 10% for local precipitation.
  - ⇒ Must be constructed or lined with material that will hold deicing products and prevent them from seeping into the ground.
  - ⇒ The liner should be covered with sand or gravel to prevent ripping and to provide protection from the weather.
  - ⇒ Double walled aboveground storage tanks are not required to be located within a secondary containment area provided they have a high liquid level alarm, and a flow restrictor or automatic shut off device
  - ⇒ *Secondary containment structures* must allow inspections of the tanks or containers, the timely detection of any leaks and recovery of any spillage, and the removal and proper disposal of any captured precipitation so that the minimum required capacity is maintained at all times.

AIRCRAFT DEICING OPERATIONS BMP FACTSHEET 14

SPILL PREVENTION

Common causes of spills at facilities include:

- **Operator error**
  ⇒ Container overfilled
  ⇒ Containers left open
  ⇒ Poor transfer procedures
  ⇒ Lack of product monitoring
  ⇒ Potential problems not recognized
  ⇒ Poor maintenance practices
- **Storage Tank Problems**
  ⇒ Tank design and construction
  ⇒ Inadequate foundation or tanks setting directly on the ground
  ⇒ Tank bottom and seams rusted, shell pitted, weeping or leaking

SPILL RESPONSE

In the event of a salt spill for when deicer has not reached storm drain

- Survey the incident to identify the source of release
- Stop the source
- Use absorbent pads and booms to collect deicer
- **DO NOT WASH DEICING MATERIALS DOWN STORM DRAINS OR DISCHARGE STORMWATER CONTAMINATED WITH DEICING MATERIAL INTO STORM DRAIN**

SPILL RESPONSE PROCEDURES

In the event of a spill or leak follow the appropriate Spill Response Procedures posted at your facility or refer to the BMP Factsheet Overview.

- **Survey the incident** from a safe distance. Identify the source of release and the material being released.
- Call the Ft. Belvoir Fire Department if spills are *greater than 5 gallons*. If ANY amount of leaked materials has entered a storm drain or waterway call the Ft. Belvoir Fire Department at 703- 781-1800 and DPW Environmental Division (Env. Div.) at 703-806-3694.
- Provide the Safety Data Sheet of the spilled material to the spill response personnel.
- Fill out Spill Incident Report in your SWPPP.
- REPORT ALL SPILLS TO DPW/ENV. DIV AND THE FIRE DEPARTMENT!

REPORT SPILLS TO DPW/ENV. DIV. BY:

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- Calling 703-806-3694

2021

APPENDIX E

SALT TRACKING & REPORTING DATA SHEETS

FORT BELVOIR ACCOTINK CREEK CHLORIDE TMDL ACTION PLAN

Historical Salt Usage Data 2017-2020

Date	80/20 MgCl & Sand Mixture (tons)	MgCl Brine (gallons)	Ice Melt (tons)	E36 Liquid Runway Deicer (Gallons)	NAAC Solid Runway Deicer (tons)
1/5/2017	0	10,960	0	0	0
1/7/2017	22.5	0	0	0	0
1/8/2017	7.5	0	0	0	0
1/29/2017	0	6,280	0	0	0
3/12-14/2017	300	6,573	0	350	1.1025
12/8/2017	0	0	0	500	0
12/15/2017	0	0	0	500	0
12/29/2017	0	0	0	500	0
12/30/2017	50	0	0	0	0
2017 TOTALS	380	23813	0	1850	1.1025
1/4/2018	0	0	0	500	0
1/5/2018	200	0	0	0	4
1/8-9/2018	200	0	0	0	1.1025
1/16/2018	0	8,848	0	500	0
1/17/2018	75	0	0	0	3.3075
3/21-22/2018	300	0	0	0	2.2
2018 TOTALS	775	8848	0	1000	10.61
1/11/2019	0	8,000	0	500	0
1/16/2019	400	7,900	4.8	500	2.2
1/29/2019	175	0	2.4	0	2.2
2/22/2019	6	0	0	500	1.1
2019 TOTALS	581	15900	7.2	1500	5.5
1/7/2020	50	0	1.2	0	2.2
1/18/2020	4	750	0	450	0
12/16-18/2020*	29.5	2,900	0	500	0
2020 TOTALS	83.5	3650	1.2	950	2.2

* = Derived from submitted Salt Tracking and Reporting Data Sheet Submitted

Salt Tracking and Reporting Data: Sheet #1 - Operations					
Organization Name:					
Geographic Area(s) of Operations:					
Winter Season: year 20		**through 20**		**Number of Storm Operations:**	
Operational Area Description					
Total Highways and Roads (lane miles)					
Total Area of Treated Parking Lots:		**Parking Area Units of Measure (ex: acres or sq ft):**			
Total Area of Treated Sidewalks:		**Sidewalks Units of Measure (ex: linear ft. or sq.ft.):**			
Total Area of "Other" Types of Treated Surfaces:		**Units for "Other" (ex: acres or sq ft):**			

Detailed Property / Route Information					
	Property/ Route #1	**Property/ Route #2**	**Property/ Route #3**	**Property/ Route #4**	**Property/ Route #5**
Property/Route Names/Descriptions:					
Area of each "Property/Route":					
Units for "Property/Route" area entries (acres, sq ft , lane miles)					

Salt Tracking and Reporting Data: Sheet #2 - Storms and Product Use

Organization Name:								
Geographic Area(s) of Operations:								
Winter Season: year 20:	**through year 20:**							

Storm Descriptions

	Storm 1		Storm 2		Storm 3		Storm 4	
Beginning Date, Time of Each Storm Deployment	Date	Time	Date	Time	Date	Time	Date	Time
End Date, Time:	Date	Time	Date	Time	Date	Time	Date	Time
Storm Type (Heavy Snow > 6", Medium 2-6", Light < 2")	H, M, L		H, M, L		H, M, L		H, M, L	
Inches of Snowfall:								
Ice or Freezing Rain? (Y or N):	Y, N		Y, N		Y, N		Y, N	
Road Temperature During Storm (Warm, >32, Mid, 25-32, Cold, <25 degrees F)	W, M, C		W, M, C		W, M, C		W, M, C	
Early Storm Conditions: Starts as Snow, SS; Starts as Rain, SR	SS, SR		SS, SR		SS, SR		SS, SR	
Winds During Storm (Light, < 15 mph, Strong, > 15 mph)	L, H		L, H		L, H		L, H	
Winds After Storm (Light, < 15 mph, Strong, > 15 mph)	L, H		L, H		L, H		L, H	
Post Storm Temps (Same, Rising, Falling)	S, R, F		S, R, F		S, R, F		S, R, F	
Sources Used for Storm Information (NWS, Own Observation, other?)								
Other Notes Describing Storm Conditions (narrative)								

Product Use Data

Treatment Products	**Units of Measure**	**Amount used in Storm 1**	**Amount used in Storm 2**	**Amount used in Storm 3**	**Amount used in Storm 4**	**Season Total Useage**	**Was this product effective? (narrative as applicable):**	**Is product planned for continuation? (Yes/No)**
Sodium Chloride (NaCl): (dry lbs. or tons)								
Magnesium Chloride (MgCl): (dry lbs. or tons)								
Calcium Chloride (CaCl): (dry lbs. or tons)								
Sodium Chloride Brine (gallons):								
Magnesium Chloride Brine: (gallons)								
Calcium Chloride Brine: (gallons)								
Abrasives Applied? (sq. yards or tons)								
Other Products Used? **Name:** _____.								

Salt Tracking and Reporting Data: Sheet #1 - Operations						
Organization Name:	Aleut					
Geographic Area(s) of Operations:	Fort Belvoir					
Winter Season: year 20	20	through 20	21	Number of Storm Operations:	2	
Operational Area Description						
Total Highways and Roads (lane miles)	15.625					
Total Area of Treated Parking Lots:	0	Parking Area Units of Measure (ex: acres or sq ft):				
Total Area of Treated Sidewalks:	0	Sidewalks Units of Measure (ex: linear ft. or sq.ft.):				
Total Area of "Other" Types of Treated Surfaces:	1	Units for "Other" (ex: acres or sq ft):	mile			

Detailed Property / Route Information					
	Property/ Route #1	Property/ Route #2	Property/ Route #3	Property/ Route #4	Property/ Route #5
Property/Route Names/Descriptions:	Fort Belvoir				
Area of each "Property/Route":	Postwide				
Units for "Property/Route" area entries (acres, sq ft , lane miles)					

Salt Tracking and Reporting Data: Sheet #2 - Storms and Product Use

Organization Name:	Aleut							
Geographic Area(s) of Operations:	Fort Belvoir							
Winter Season: year 20:	20	through year 20:	21					

Storm Descriptions

	Storm 1		Storm 2		Storm 3		Storm 4	
Beginning Date, Time of Each Storm Deployment	Date: 12/16/20	Time: 0930	Date: 12/17/20	Time: 2300	Date:	Time:	Date:	Time:
End Date, Time:	Date: 12/17/20	Time: 0400	Date: 12/18/20	Time: 0600	Date:	Time:	Date:	Time:
Storm Type (Heavy Snow > 6", Medium 2-6", Light < 2")	H, M, (L)		H, M, (L)		H, M, L		H, M, L	
Inches of Snowfall:	1/4 inch		1/4 inch					
Ice or Freezing Rain? (Y or N):	(Y) N		Y, (N)		Y, N		Y, N	
Road Temperature During Storm (Warm, >32, Mid, 25-32, Cold, <25 degrees F)	(W) M, C		(W) M, C		W, M, C		W, M, C	
Early Storm Conditions: Starts as Snow, SS; Starts as Rain, SR	SS, (SR)		(SS), SR		SS, SR		SS, SR	
Winds During Storm (Light, < 15 mph, Strong, > 15 mph)	(L) H		(L) H		L, H		L, H	
Winds After Storm (Light, < 15 mph, Strong, > 15 mph)	(L) H		(L) H		L, H		L, H	
Post Storm Temps (Same, Rising, Falling)	S, (R) F		S, R, F		S, R, F		S, R, F	
Sources Used for Storm Information (NWS, Own Observation, other?)	Weather.com		Weather.com					
Other Notes Describing Storm Conditions (narrative)	Mostly rain		light snow					

Product Use Data

Treatment Products	Units of Measure	Amount used in Storm 1	Amount used in Storm 2	Amount used in Storm 3	Amount used in Storm 4	Season Total Useage	Was this product effective? (narrative as applicable):	Is product planned for continuation? (Yes/No)
Sodium Chloride (NaCl): (dry lbs. or tons)		0	0					
Magnesium Chloride (MgCl): (dry lbs. or tons)	Ton	14.5	10				Y	Y
Calcium Chloride (CaCl): (dry lbs. or tons)		0	0					
Sodium Chloride Brine (gallons):		0	0					
Magnesium Chloride Brine: (gallons)	Gal	2900	0				Y	Y
Calcium Chloride Brine: (gallons)		0	0					
Abrasives Applied? (sq. yards or tons)		0	0					
Other Products Used? Name: E36 De-icer	Gal	500	0				Y	Y

Salt Tracking and Reporting Data: Sheet #3 - Best Management Practices (BMPs)

	Organization Name:	Aleut			
	Geographic Area(s) of Operations:	Fort Belvoir			
	Winter Season: year 20:	20	through year 20:	21	

Planning BMPs

	BMPs	Was This BMP Used? (Y, N, N/A)	Was this practice effective? (narrative as applicable):	Is practice planned for continuation? (Yes/No/Revision Planned)	Are there plans to use this practice in the future? (narrative as applicable):
Winter Operations Planning	Winter Maintenance Plan is developed	Y	yes	Yes	
	Preseason meetings are held	Y	yes	Yes	
	Postseason meetings are held	N/A		yes	
	Accountability is at every level	Y	yes	yes	
	Transportation Audiences - Snowplow routes are planned	Y	yes	yes	
	Property Management Audiences - the properties are visited before the season	Y	yes	yes	
Levels of Service	***Transportation Audiences*** - Levels of Service are communicated internally	Y	yes	yes	
	Transportation Audiences - Levels of Service are communicated externally	Y	yes	yes	
	Property Management Audience - Levels of Service are discussed and agreed upon	Y	yes	yes	
Train-ing	Training is held	Y	yes	yes	
Salt Storage/Handling	Deicer piles are properly stored	Y	yes	yes	
	Liquid producs are properly stored	Y	yes	yes	
	Loading and hauling of deicers are done properly	Y	yes	yes	
	Equipment is cleaned and wastewater is contained	Y	yes	yes	
	Property Management Audiences - Storage and handling of deicer bags is done properly	Y	yes	yes	
Calibration	A calibration process is established	Y	yes	yes	
	Equipment is calibrated	Y	yes	yes	
Storm Meetings	Pre-storm meetings are held	Y	yes	yes	
	Post-storm meetings are held	Y	yes	yes	
Weather Forecasts	Accurate weather forecasting is obtained and is a part of decision making	Y	yes	yes	
	Know the surface temperature	Y	yes	yes	
Enhanced Equipment & Technology	Advanced plows are used	Y	yes	yes	
	Advanced spreaders are used	Y	yes	yes	
	Proper/Advanced equipment needed for making liquid products is used	Y	yes	yes	
	Transportation Audiences - Automated Vehicle Location (AVL) is used	Y	yes	yes	
	Transportation Audiences - Maintenance Decision Support System (MDSS) is used	Y	yes	yes	
	Transportation Audiences - Precision Deicing is used	Y	yes	yes	

Salt Tracking and Reporting Data: Sheet #1 - Operations					
Organization Name:	Aleut				
Geographic Area(s) of Operations:	Fort Belvoir				
Winter Season: year 20	20	through 20	21	Number of Storm Operations:	1

Operational Area Description			
Total Highways and Roads (lane miles)	15.625		
Total Area of Treated Parking Lots:	0	Parking Area Units of Measure (ex: acres or sq ft):	
Total Area of Treated Sidewalks:	0	Sidewalks Units of Measure (ex: linear ft. or sq.ft.):	
Total Area of "Other" Types of Treated Surfaces:		Units for "Other" (ex: acres or sq ft):	

Detailed Property / Route Information					
	Property/ Route #1	Property/ Route #2	Property/ Route #3	Property/ Route #4	Property/ Route #5
Property/Route Names/Descriptions:	Fort Belvoir				
Area of each "Property/Route":	Postwide				
Units for "Property/Route" area entries (acres, sq ft , lane miles)					

Salt Tracking and Reporting Data: Sheet #2 - Storms and Product Use

Organization Name:	Aleut			
Geographic Area(s) of Operations:				
Winter Season: year 20:	20	through year 20:	21	

Storm Descriptions

	Storm 1		Storm 2		Storm 3		Storm 4	
Beginning Date, Time of Each Storm Deployment	Date: 1/25/21	Time: 19:00 hrs	Date	Time	Date	Time	Date	Time
End Date, Time:	Date: 1/26/21	Time: 12:00 hrs	Date	Time	Date	Time	Date	Time
Storm Type (Heavy Snow > 6", Medium 2-6", Light < 2")	H, M, (L)		H, M, L		H, M, L		H, M, L	
Inches of Snowfall:	0							
Ice or Freezing Rain? (Y or N):	(Y), N		Y, N		Y, N		Y, N	
Road Temperature During Storm (Warm, >32, Mid, 25-32, Cold, <25 degrees F)	(W), M, C		W, M, C		W, M, C		W, M, C	
Early Storm Conditions: Starts as Snow, SS; Starts as Rain, SR	SS, (SR)		SS, SR		SS, SR		SS, SR	
Winds During Storm (Light, < 15 mph, Strong, > 15 mph)	(L), H		L, H		L, H		L, H	
Winds After Storm (Light, < 15 mph, Strong, > 15 mph)	(L), H		L, H		L, H		L, H	
Post Storm Temps (Same, Rising, Falling)	S, (R), F		S, R, F		S, R, F		S, R, F	
Sources Used for Storm Information (NWS, Own Observation, other?)	Weather.com							
Other Notes Describing Storm Conditions (narrative)	ICY Rain							

Product Use Data

Treatment Products	Units of Measure	Amount used in Storm 1	Amount used in Storm 2	Amount used in Storm 3	Amount used in Storm 4	Season Total Useage	Was this product effective? (narrative as applicable):	Is product planned for continuation? (Yes/No)
Sodium Chloride (NaCl): (dry lbs. or tons)		N/A						
Magnesium Chloride (MgCl): (dry lbs. or tons)	ton	9 tons					yes	y
Calcium Chloride (CaCl): (dry lbs. or tons)		N/A						
Sodium Chloride Brine (gallons):		N/A						
Magnesium Chloride Brine: (gallons)		N/A						
Calcium Chloride Brine: (gallons)		N/A						
Abrasives Applied? (sq. yards or tons)		N/A						
Other Products Used? Name:		N/A						

Salt Tracking and Reporting Data: Sheet #3 - Best Management Practices (BMPs)

	Organization Name:	Aleut			
	Geographic Area(s) of Operations:	Fort Belvoir			
	Winter Season: year 20:	20	**through year 20:**	21	

Planning BMPs

	BMPs	Was This BMP Used? (Y, N, N/A)	Was this practice effective? (narrative as applicable):	Is practice planned for continuation? (Yes/No/Revision Planned)	Are there plans to use this practice in the future? (narrative as applicable):
Winter Operations Planning	Winter Maintenance Plan is developed	Y	Y	Y	
	Preseason meetings are held	Y	Y	Y	
	Postseason meetings are held	N/A			
	Accountability is at every level	Y	Y	Y	
	Transportation Audiences - Snowplow routes are planned	Y	Y	Y	
	Property Management Audiences - the properties are visited before the season	Y	Y	Y	
Levels of Service	***Transportation Audiences*** - Levels of Service are communicated internally	Y	Y	Y	
	Transportation Audiences - Levels of Service are communicated externally	Y	Y	Y	
	Property Management Audience - Levels of Service are discussed and agreed upon	Y	Y	Y	
Train-ing	Training is held	Y	Y	Y	
Salt Storage/Handling	Deicer piles are properly stored	Y	Y	Y	
	Liquid producs are properly stored	Y	Y	Y	
	Loading and hauling of deicers are done properly	Y	Y	Y	
	Equipment is cleaned and wastewater is contained	Y	Y	Y	
	Property Management Audiences - Storage and handling of deicer bags is done properly	Y	Y	Y	
Calibration	A calibration process is established	Y	Y	Y	
	Equipment is calibrated	Y	Y	Y	
Storm Meetings	Pre-storm meetings are held	Y	Y	Y	
	Post-storm meetings are held	Y	Y	Y	
Weather Forecasts	Accurate weather forecasting is obtained and is a part of decision making	Y	Y	Y	
	Know the surface temperature	Y	Y	Y	
Enhanced Equpment & Technology	Advanced plows are used	Y	Y	Y	
	Advanced spreaders are used	Y	Y	Y	
	Proper/Advanced equipment needed for making liquid products is used	Y	Y	Y	
	Transportation Audiences - Automated Vehicle Location (AVL) is used	Y	Y	Y	
	Transportation Audiences - Maintenance Decision Support System (MDSS) is used	Y	Y	Y	
	Transportation Audiences - Precision Deicing is used	Y	Y	Y	

Salt Tracking and Reporting Data: Sheet #1 - Operations						
Organization Name:	Aleut					
Geographic Area(s) of Operations:	Fort Belvoir					
Winter Season: year 20	20	through 20	21	Number of Storm Operations:	1	

Operational Area Description			
Total Highways and Roads (lane miles)	15.625		
Total Area of Treated Parking Lots:	0	Parking Area Units of Measure (ex: acres or sq ft):	
Total Area of Treated Sidewalks:	0	Sidewalks Units of Measure (ex: linear ft. or sq.ft.):	
Total Area of "Other" Types of Treated Surfaces:	1	Units for "Other" (ex: acres or sq ft):	mile

Detailed Property / Route Information					
	Property/ Route #1	Property/ Route #2	Property/ Route #3	Property/ Route #4	Property/ Route #5
Property/Route Names/Descriptions:	Fort Belvoir				
Area of each "Property/Route":	Postwide				
Units for "Property/Route" area entries (acres, sq ft , lane miles)					

Salt Tracking and Reporting Data: Sheet #2 - Storms and Product Use

Organization Name:	**Aleut**			
Geographic Area(s) of Operations:	Fort Belvoir			
Winter Season: year 20:	20	**through year 20:**	21	

Storm Descriptions

	Storm 1		Storm 2		Storm 3		Storm 4	
Beginning Date, Time of Each Storm Deployment	Date: 1/31/21	Time: 0000 hrs	Date	Time	Date	Time	Date	Time
End Date, Time:	Date: 2/2/21	Time: 16:00 hrs	Date	Time	Date	Time	Date	Time
Storm Type (Heavy Snow > 6", Medium 2-6", Light < 2")	H, M, (L)		H, M, L		H, M, L		H, M, L	
Inches of Snowfall:	3.4							
Ice or Freezing Rain? (Y or N):	(Y) N		Y, N		Y, N		Y, N	
Road Temperature During Storm (Warm, >32, Mid, 25-32, Cold, <25 degrees F)	W, (M), C		W, M, C		W, M, C		W, M, C	
Early Storm Conditions: Starts as Snow, SS; Starts as Rain, SR	(SS), SR		SS, SR		SS, SR		SS, SR	
Winds During Storm (Light, < 15 mph, Strong, > 15 mph)	(L), H		L, H		L, H		L, H	
Winds After Storm (Light, < 15 mph, Strong, > 15 mph)	(L), H		L, H		L, H		L, H	
Post Storm Temps (Same, Rising, Falling)	S, (R), F		S, R, F		S, R, F		S, R, F	
Sources Used for Storm Information (NWS, Own Observation, other?)	forcast.weather.gov							
Other Notes Describing Storm Conditions (narrative)								

Product Use Data

Treatment Products	Units of Measure	Amount used in Storm 1	Amount used in Storm 2	Amount used in Storm 3	Amount used in Storm 4	Season Total Useage	Was this product effective? (narrative as applicable):	Is product planned for continuation? (Yes/No)
Sodium Chloride (NaCl): (dry lbs. or tons)		N/A						
Magnesium Chloride (MgCl): (dry lbs. or tons)	Ton	255					Y	Y
Calcium Chloride (CaCl): (dry lbs. or tons)		N/A						
Sodium Chloride Brine (gallons):		N/A						
Magnesium Chloride Brine: (gallons)	Gallons	3500					Y	Y
Calcium Chloride Brine: (gallons)		N/A						
Abrasives Applied? (sq. yards or tons)								
Other Products Used? Name: E36 Liquid De-icer	Gallons	500					Y	Y
• NAAC Solid De-icer	lbs	4400					Y	Y
• Liquid	lbs	7200					Y	Y

Salt Tracking and Reporting Data: Sheet #1 - Operations						
Organization Name:	Aleut					
Geographic Area(s) of Operations:	Fort Belvoir					
Winter Season: year 20	20	through 20	21	Number of Storm Operations:	1	

Operational Area Description			
Total Highways and Roads (lane miles)	14.625		
Total Area of Treated Parking Lots:	0	Parking Area Units of Measure (ex: acres or sq ft):	
Total Area of Treated Sidewalks:	0	Sidewalks Units of Measure (ex: linear ft. or sq.ft.):	
Total Area of "Other" Types of Treated Surfaces:		Units for "Other" (ex: acres or sq ft):	mile

Detailed Property / Route Information					
	Property/ Route #1	Property/ Route #2	Property/ Route #3	Property/ Route #4	Property/ Route #5
Property/Route Names/Descriptions:	Fort Belvoir				
Area of each "Property/Route":	Postwide				
Units for "Property/Route" area entries (acres, sq ft , lane miles)					

Salt Tracking and Reporting Data: Sheet #2 - Storms and Product Use

Organization Name:	Aleut			
Geographic Area(s) of Operations:	Fort Belvoir			
Winter Season: year 20:	20	**through year 20:**	21	

Storm Descriptions

	Storm 1		Storm 2		Storm 3		Storm 4	
Beginning Date, Time of Each Storm Deployment	Date: 02/07/21	Time: 0400	Date	Time	Date	Time	Date	Time
End Date, Time:	Date: 02/07/21	Time: 1300	Date	Time	Date	Time	Date	Time
Storm Type (Heavy Snow > 6", Medium 2-6", Light < 2")	H, M, (L)		H, M, L		H, M, L		H, M, L	
Inches of Snowfall:	.25 inches							
Ice or Freezing Rain? (Y or N):	(Y), N		Y, N		Y, N		Y, N	
Road Temperature During Storm (Warm, >32, Mid, 25-32, Cold, <25 degrees F)	(W), M, C		W, M, C		W, M, C		W, M, C	
Early Storm Conditions: Starts as Snow, SS; Starts as Rain, SR	SS, (SR)		SS, SR		SS, SR		SS, SR	
Winds During Storm (Light, < 15 mph, Strong, > 15 mph)	(L), H		L, H		L, H		L, H	
Winds After Storm (Light, < 15 mph, Strong, > 15 mph)	(L), H		L, H		L, H		L, H	
Post Storm Temps (Same, Rising, Falling)	S, (R), F		S, R, F		S, R, F		S, R, F	
Sources Used for Storm Information (NWS, Own Observation, other?)	Forcast.weather.gov							
Other Notes Describing Storm Conditions (narrative)								

Product Use Data

Treatment Products	Units of Measure	Amount used in Storm 1	Amount used in Storm 2	Amount used in Storm 3	Amount used in Storm 4	Season Total Useage	Was this product effective? (narrative as applicable):	Is product planned for continuation? (Yes/No)
Sodium Chloride (NaCl): (dry lbs. or tons)								
Magnesium Chloride (MgCl): (dry lbs. or tons)	Ton	2.5						
Calcium Chloride (CaCl): (dry lbs. or tons)								
Sodium Chloride Brine (gallons):								
Magnesium Chloride Brine: (gallons)								
Calcium Chloride Brine: (gallons)								
Abrasives Applied? (sq. yards or tons)								
Other Products Used? Name:								

Salt Tracking and Reporting Data: Sheet #1 - Operations					
Organization Name:	Aleut				
Geographic Area(s) of Operations:	Fort Belvoir				
Winter Season: year 20	20	through 20	21	Number of Storm Operations:	1

Operational Area Description			
Total Highways and Roads (lane miles)	15.625		
Total Area of Treated Parking Lots:	0	Parking Area Units of Measure (ex: acres or sq ft):	
Total Area of Treated Sidewalks:	0	Sidewalks Units of Measure (ex: linear ft. or sq.ft.):	
Total Area of "Other" Types of Treated Surfaces:	1	Units for "Other" (ex: acres or sq ft):	mile

Detailed Property / Route Information					
	Property/ Route #1	Property/ Route #2	Property/ Route #3	Property/ Route #4	Property/ Route #5
Property/Route Names/Descriptions:	Fort Belvoir				
Area of each "Property/Route":	Postwide				
Units for "Property/Route" area entries (acres, sq ft , lane miles)					

Salt Tracking and Reporting Data: Sheet #2 - Storms and Product Use

Organization Name:	Aleut									
Geographic Area(s) of Operations:	Fort Belvoir									
Winter Season: year 20:	20	**through year 20:**	21							

Storm Descriptions

	Storm 1		Storm 2		Storm 3		Storm 4	
Beginning Date, Time of Each Storm Deployment	Date: 02/10/21	Time: 16:00	Date	Time	Date	Time	Date	Time
End Date, Time:	Date: 02/11/21	Time: 10:00	Date	Time	Date	Time	Date	Time
Storm Type (Heavy Snow > 6", Medium 2-6", Light < 2")	H, M, (L)		H, M, L		H, M, L		H, M, L	
Inches of Snowfall:	0"							
Ice or Freezing Rain? (Y or N):	(Y), N		Y, N		Y, N		Y, N	
Road Temperature During Storm (Warm, >32, Mid, 25-32, Cold, <25 degrees F)	(W), M, C		W, M, C		W, M, C		W, M, C	
Early Storm Conditions: Starts as Snow, SS; Starts as Rain, SR	SS, (SR)		SS, SR		SS, SR		SS, SR	
Winds During Storm (Light, < 15 mph, Strong, > 15 mph)	(L), H		L, H		L, H		L, H	
Winds After Storm (Light, < 15 mph, Strong, > 15 mph)	(L), H		L, H		L, H		L, H	
Post Storm Temps (Same, Rising, Falling)	S, (R), F		S, R, F		S, R, F		S, R, F	
Sources Used for Storm Information (NWS, Own Observation, other?)	Weather.com							
Other Notes Describing Storm Conditions (narrative)	4 slush							

Product Use Data

Treatment Products	Units of Measure	Amount used in Storm 1	Amount used in Storm 2	Amount used in Storm 3	Amount used in Storm 4	Season Total Useage	Was this product effective? (narrative as applicable):	Is product planned for continuation? (Yes/No)
Sodium Chloride (NaCl): (dry lbs. or tons)								
Magnesium Chloride (MgCl): (dry lbs. or tons)								
Calcium Chloride (CaCl): (dry lbs. or tons)								
Sodium Chloride Brine (gallons):								
Magnesium Chloride Brine: (gallons)	gal	4250						
Calcium Chloride Brine: (gallons)								
Abrasives Applied? (sq. yards or tons)								
Other Products Used? Name:								

Salt Tracking and Reporting Data: Sheet #1 - Operations					
Organization Name:	Aleut				
Geographic Area(s) of Operations:	Fort Belvoir				
Winter Season: year 20	20	through 20	21	Number of Storm Operations:	1

Operational Area Description			
Total Highways and Roads (lane miles)	15.625		
Total Area of Treated Parking Lots:	0	Parking Area Units of Measure (ex: acres or sq ft):	
Total Area of Treated Sidewalks:	0	Sidewalks Units of Measure (ex: linear ft. or sq.ft.):	
Total Area of "Other" Types of Treated Surfaces:	1	Units for "Other" (ex: acres or sq ft):	mile

Detailed Property / Route Information					
	Property/ Route #1	Property/ Route #2	Property/ Route #3	Property/ Route #4	Property/ Route #5
Property/Route Names/Descriptions:	Fort Belvoir				
Area of each "Property/Route":	Postwide				
Units for "Property/Route" area entries (acres, sq ft , lane miles)					

Salt Tracking and Reporting Data: Sheet #2 - Storms and Product Use

Organization Name:	Aleut
Geographic Area(s) of Operations:	Fort Belvoir
Winter Season: year 20:	20 through year 20: 21

Storm Descriptions

	Storm 1		Storm 2		Storm 3		Storm 4	
Beginning Date, Time of Each Storm Deployment	Date: 2/12/21	Time: 20:00	Date	Time	Date	Time	Date	Time
End Date, Time:	Date: 2/13/21	Time: 16:00	Date	Time	Date	Time	Date	Time
Storm Type (Heavy Snow > 6", Medium 2-6", Light < 2")	H, M, (L)		H, M, L		H, M, L		H, M, L	
Inches of Snowfall:	1/4"							
Ice or Freezing Rain? (Y or N):	(Y) N		Y, N		Y, N		Y, N	
Road Temperature During Storm (Warm, >32, Mid, 25-32, Cold, <25 degrees F)	W, (M), C		W, M, C		W, M, C		W, M, C	
Early Storm Conditions: Starts as Snow, SS; Starts as Rain, SR	SS, (SR)		SS, SR		SS, SR		SS, SR	
Winds During Storm (Light, < 15 mph, Strong, > 15 mph)	(L) H		L, H		L, H		L, H	
Winds After Storm (Light, < 15 mph, Strong, > 15 mph)	(L) H		L, H		L, H		L, H	
Post Storm Temps (Same, Rising, Falling)	(S), R, F		S, R, F		S, R, F		S, R, F	
Sources Used for Storm Information (NWS, Own Observation, other?)	Wunderground.com							
Other Notes Describing Storm Conditions (narrative)	Winter Mix							

Product Use Data

Treatment Products	Units of Measure	Amount used in Storm 1	Amount used in Storm 2	Amount used in Storm 3	Amount used in Storm 4	Season Total Useage	Was this product effective? (narrative as applicable):	Is product planned for continuation? (Yes/No)
Sodium Chloride (NaCl): (dry lbs. or tons)								
Magnesium Chloride (MgCl): (dry lbs. or tons)	Tons	117					Y	Y
Calcium Chloride (CaCl): (dry lbs. or tons)								
Sodium Chloride Brine (gallons):								
Magnesium Chloride Brine: (gallons)								
Calcium Chloride Brine: (gallons)								
Abrasives Applied? (sq. yards or tons)								
Other Products Used? Name:								

Salt Tracking and Reporting Data: Sheet #1 - Operations						
Organization Name:	Aleut					
Geographic Area(s) of Operations:	Fort Belvoir					
Winter Season: year 20	20	through 20	21	Number of Storm Operations:	1	
Operational Area Description						
Total Highways and Roads (lane miles)	15.625					
Total Area of Treated Parking Lots:	0	Parking Area Units of Measure (ex: acres or sq ft):				
Total Area of Treated Sidewalks:	0	Sidewalks Units of Measure (ex: linear ft. or sq.ft.):				
Total Area of "Other" Types of Treated Surfaces:	1	Units for "Other" (ex: acres or sq ft):	mile			

Detailed Property / Route Information					
	Property/ Route #1	Property/ Route #2	Property/ Route #3	Property/ Route #4	Property/ Route #5
Property/Route Names/Descriptions:	Fort Belvoir				
Area of each "Property/Route":	Postwide				
Units for "Property/Route" area entries (acres, sq ft , lane miles)					

Salt Tracking and Reporting Data: Sheet #2 - Storms and Product Use

Organization Name:	Aleut								
Geographic Area(s) of Operations:	Fort Belvoir								
Winter Season: year 20:	20	**through year 20:**	21						

Storm Descriptions

	Storm 1		Storm 2		Storm 3		Storm 4	
Beginning Date, Time of Each Storm Deployment	Date: 02/18/21	Time: 04:00	Date	Time	Date	Time	Date	Time
End Date, Time:	Date: 02/19/21	Time: 16:00	Date	Time	Date	Time	Date	Time
Storm Type (Heavy Snow > 6", Medium 2-6", Light < 2")	H, (M), L		H, M, L		H, M, L		H, M, L	
Inches of Snowfall:	2.5							
Ice or Freezing Rain? (Y or N):	(Y), N		Y, N		Y, N		Y, N	
Road Temperature During Storm (Warm, >32, Mid, 25-32, Cold, <25 degrees F)	W, (M), C		W, M, C		W, M, C		W, M, C	
Early Storm Conditions: Starts as Snow, SS; Starts as Rain, SR	(SS), SR		SS, SR		SS, SR		SS, SR	
Winds During Storm (Light, < 15 mph, Strong, > 15 mph)	(L), H		L, H		L, H		L, H	
Winds After Storm (Light, < 15 mph, Strong, > 15 mph)	(L), H		L, H		L, H		L, H	
Post Storm Temps (Same, Rising, Falling)	S, (R), F		S, R, F		S, R, F		S, R, F	
Sources Used for Storm Information (NWS, Own Observation, other?)	Wundergroond.com							
Other Notes Describing Storm Conditions (narrative)	Wintery Mix							

Product Use Data

Treatment Products	Units of Measure	Amount used in Storm 1	Amount used in Storm 2	Amount used in Storm 3	Amount used in Storm 4	Season Total Useage	Was this product effective? (narrative as applicable):	Is product planned for continuation? (Yes/No)
Sodium Chloride (NaCl): (dry lbs. or tons)								
Magnesium Chloride (MgCl): (dry lbs. or tons)	Ton	300						
Calcium Chloride (CaCl): (dry lbs. or tons)								
Sodium Chloride Brine (gallons):	gal	4500						
Magnesium Chloride Brine: (gallons)								
Calcium Chloride Brine: (gallons)								
Abrasives Applied? (sq. yards or tons)								
Other Products Used? Name: E36 liquid de-icer	gal	500						

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APPENDIX F

RECOMMENDATION MATERIALS

FORT BELVOIR ACCOTINK CREEK CHLORIDE TMDL ACTION PLAN

CALIBRATION CHART (US)

Agency: _____

Location: _____

Truck No: _____ Spreader No: _____

Date: By:

Gate Opening _____ (inches) (Hopper Type Spreaders)				**DISCHARGE RATE** (pounds discharged per mile)								
	A	**B**	**C**	**TRAVEL SPEED AND COMPUTATION MULTIPLIER ( )**								
Control Setting	Shaft RPM (Loaded)	Discharge per Revolution (pounds)	Discharge per Minute (lb) (A x B)	5 mph (x 12.00)	10 mph (x 6.00)	15 mph (x 4.00)	20 mph (x 3.00)	25 mph (x 2.40)	30 mph (x 2.00)	35 mph (x 1.71)	40 mph (x 1.50)	45 mph (x 1.33)
1			-	-	-	-	-	-	-	-	-	-
2			-	-	-	-	-	-	-	-	-	-
3			-	-	-	-	-	-	-	-	-	-
4			-	-	-	-	-	-	-	-	-	-
5			-	-	-	-	-	-	-	-	-	-
6			-	-	-	-	-	-	-	-	-	-
7			-	-	-	-	-	-	-	-	-	-
8			-	-	-	-	-	-	-	-	-	-
9			-	-	-	-	-	-	-	-	-	-
10			-	-	-	-	-	-	-	-	-	-
11			-	-	-	-	-	-	-	-	-	-

THE ACTUAL APPLICATION RATE (POUNDS PER LANE MILE) **ON THE HIGHWAY IS THE DISCHARGE RATE DIVIDED BY THE NUMBER OF LANES BEING TREATED**

SPREADER CALIBRATION PROCEDURE

Calibration is simply calculating the pounds per mile discharged for each control setting at various travel speeds by first counting the number of auger or conveyor shaft revolutions per minute, measuring the weight of salt discharged in one revolution, then multiply the two to obtain discharge per minute, and finally multiplying the discharge per minute by the time it takes to travel 1 mile. Most spreaders have multiple gate openings; so you must calibrate for specific gate openings.

Equipment needed:

1. Scale to weigh salt
2. Salt collection device
3. Marking device
4. Watch with second hand

Calibration steps:

1. Remove, by-pass or turn off spinner.
2. Warm truck's hydraulic oil to normal operating temperature with spreader system running.
3. Put partial load of salt on truck.
4. Mark shaft end of auger or conveyor.
5. Dump salt on auger.
6. Rev truck engine to operating RPM.
7. Count number of shaft revolutions per minute at each spreader control setting, record.
8. Collect salt discharged for one revolution, weigh it and deduct the weight of the container. (For greater accuracy, collect salt for several revolutions and divide by that number of revolutions to get the weight for one revolution.)
9. Multiply Column A by Column B to get Column C; then multiply Column C by the number of minutes to travel one mile ( ) at various truck speeds to get pounds Discharged per mile.*

##########

CALIBRATION OF AUTOMATIC CONTROLS

Automatic controls may be calibrated using the following steps:

1. Remove, by-pass or turn of spinner.
2. Set control on given number.
3. Tie sack or heavy canvas under spreader discharge area.
4. Mark specific distance on a highway or other paved area, such as 1000 ft. .
5. Drive that distance with spreader operating.
6. Weigh salt collected.
7. Multiply weight of salt by 5.28 (in case of 1000 ft.).

Answer will be salt discharged per mile which remains constant regardless of speed, but calibration must be done for each control setting. Some automatic control manufacturers have "simulators" which eliminate need for on-road operation for calibration.

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APPENDIX G

ANNUAL EVALUATION & REPORTING FORMS

G-1 – SELF-ASSESSMENT OPERATION WORKSHEET
G-2 – SALT TRACKING AND REPORTING DATA SHEET #3: BMP'S

FORT BELVOIR ACCOTINK CREEK CHLORIDE TMDL ACTION PLAN

Self-Assessment - Operation Worksheet

Corporation _____ **Site address** _____ _____ _____ **Person(s) Completing this Worksheet** _____	**Instructions for Self-Assessment - Operation** For each **PRACTICE** select the rating (1-4) that best describes your operation. Write your rating in the second last (**YOUR RATING)** column. In the last (**ACTION PLAN**) column describe the actions you plan to take to improve your rating where appropriate. **8 Resource sheets** are available that describe each practice, ratings for it and some ideas for improvement.

Brief Description of Operation: (eg. Type of equipment, materials used, salt tracking system, training, etc.)

Self-Assessment - Operation Worksheet

PRACTICE	RATING				YOUR RATING	ACTION PLAN
	4 - BEST	3	2	1		
GETTING A HANDLE ON THE AMOUNT OF MATERIAL USED						
Equipment Calibration *See Resource Sheet #1*	Equipment is calibrated at start of each season. **and** Equipment calibration is checked. **and** Equipment is recalibrated whenever salt delivery system is serviced. **and** Calibration records are kept.	Equipment is calibrated at start of each season. **and** Equipment calibration is checked.[1] **and** Equipment is recalibrated whenever salt delivery system is serviced.	Equipment is calibrated at start of each season but never checked. **or** Equipment is calibrated whenever the salt delivery system is serviced.	Equipment is not calibrated.		
Material Application Rates *See Resource Sheet #2*	The application rates are known and documented. **and** The application rate is adjusted to suit the current and forecast conditions. **and** Pavement temperatures are used in determining the material to use and the application rate. **and** Staff is trained in and understands the material application rates.	The application rates are known. **and** The application rate is adjusted to suit the current and forecast conditions.	The application rates are estimated. **and** The amount of material applied is adjusted to suit conditions	The application rate is <u>not</u> known. **and** A single application rate is used for all conditions.		

[1] The calibration check can simply be a comparison of the amount of salt actually applied to the amount that was planned. Where there is a significant difference then the system should be checked.

Self-Assessment - Operation Worksheet

PRACTICE	RATING				YOUR RATING	ACTION PLAN
	4 - BEST	3	2	1		
Tracking Material Usage *See Resource Sheet #3 and the Tracking section*	Material use is tracked by event and location. **and** Material use is reviewed to assess compliance with BMPs. **and** Practices are reviewed to reduce material use.	Material use is tracked by event and location. **and** Material use is reviewed to assess compliance with BMPs.	Annual material use is tracked and compared year-to-year.	Material use is not tracked.		
REDUCING AN OPERATIONS IMPACT ON THE ENVIRONMENT						
Use of Liquid Materials *See Resource Sheet #4*	Direct liquid application[2] is used. **and** All solid salt is pre-wetted[3] or pretreated[4].	All solid salt is pre-wetted[3] or pre-treated[4].	Some solid salt and/or sand is pre-treated[4].	Liquids are not used.		
Use of Low or Non-Chloride Based Snow and Ice Control Materials[5] *See Resource Sheet #5*	Low or non-chloride based materials are always used instead of road salt where warranted to reduce the amount of chloride entering the environment.	Low or non-chloride based materials are frequently used instead of road salt where warranted.	Some low or non-chloride based materials have been tried.	Only chloride based snow and ice control materials are used.		

[2]/ **Direct liquid application** means the application of a liquid material (e.g. salt brine) directly onto a pavement or concrete surface using a spray or dribble bar system.

[3]/ **Pre-wetting** means the application of a liquid to a solid material at the spinner or broadcast point just before application the parking lot or road. It is also called **on-board pre-wetting** to indicate that the liquid is also carried on the vehicle and sprayed on the solid just before it is applied.

[4]/ **Pre-treating** means the application of a liquid to a solid material while it is in storage or as it is being loaded on the truck. With pre-treating, the liquid is in contact with the solid for a significant period of time before it is applied to the road.

[5] Always check the chemical content list on the bag. Many products claiming to have low chloride content or be environmentally friendly still have high chloride content.

Self-Assessment - Operation Worksheet

PRACTICE	RATING				YOUR RATING	ACTION PLAN
	4 - BEST	3	2	1		
Salt Storage *See Resource Sheet #6*	All salt is stored on impermeable pad. **and** All salt is covered by a roof. **and** All salt impacted drainage is collected and properly disposed of. _____ **or** Salt is never stored on-site	All salt is stored on impermeable pad. **and** All salt is covered by a roof.	All salt is stored on impermeable pad. **and** All salt is covered by a tarp.	Salt is stored outside on a permeable pad. **or** Salt is uncovered.		
Sand/salt Mix Storage *See Resource Sheet #6*	All mix is stored on impermeable pad. **and** All mix is covered by a roof. **and** All salt impacted drainage is collected and properly disposed of. _____ **or** Mix is not stored on-site during the winter months.	All mix is stored on impermeable pad. **and** All mix is covered by a roof.	All mix is stored on impermeable pad. **and** All mix is covered by a tarp.	Sand/salt mix is stored on a permeable pad. **or** Sand/salt/mix is uncovered.		
Liquid Storage *See Resource Sheet #6*	All liquid is stored in a tank or totes on an impermeable pad. **and** Collision protection is provided. **and** Secondary containment is provided. _____ **or** Liquid is not stored on-site during the winter months.	All liquid is stored in a tank or totes on an impermeable pad. **and** Collision protection is provided.	All liquid is stored in a tank or totes on an impermeable pad.	All liquid is stored in a tank or totes on a permeable pad or earth.		
Material Storage Over Summer *See Resource Sheet #6*	No material is stored on-site over the summer months.	All material is securely stored in tanks or on an impermeable pad covered with a roof.	All material is stored in secure tanks or on an impermeable pad covered with a tarp or similar cover.	All material is stored in simple tanks/totes or on a permeable pad uncovered.		

Last Revision: May 6, 2011

Self-Assessment - Operation Worksheet

OPERATIONAL IMPROVEMENTS AND BASIC STORM RESPONSE						
Plowing *See Resource Sheet #7*	PROACTIVE RESPONSE			REACTIVE RESPONSE		
	Plowing is used to remove accumulated snow before it becomes a hazard. **and** Plowing is scheduled to allow applied materials time to work. **and** Plowed snow is stockpiled so as to avoid problems with meltwater or snowdrifting.	Plowing is used to remove accumulated snow before it becomes a hazard. **and** Plowing is usually planned to allow applied materials time to work.	Plowing is used to remove accumulated snow before it becomes a hazard.	Plowing is only used when the accumulation of snow becomes a hazard.		
Salt Management Training *See Resource Sheet #8 and the Training section*	Supervisors[7] are trained in best salt management practices. **and** Operators[6] are trained in best salt management practices. **and** Annual salt management refresher training is held. **and** Training records are maintained.	Supervisors[7] are trained in best salt management practices. **and** Operators[6] are trained in best salt management practices.	Supervisors[7] are trained in best salt management practices.	No salt management training is carried out.		

Additional comments:

[6] **Operators** are those people operating winter maintenance equipment (plows and spreaders).

[7] **Supervisor** refers to those people making salt application decisions.

Self-Assessment - Operation Worksheet

8 Resource Sheets are available to help you complete this Worksheet.

# 1 – Equipment Calibration	# 2 – Material Application Rates
# 3 – Tracking Material Usage	# 4 – Use of Liquids
# 5 – New and Alternative Snow and Ice Control Materials	# 6 – Improved Material Storage
# 7 – Plowing to Improve Salt Management	# 8 – Salt Management Training

Next Steps

1. Implement the Salt Management Action Plan.
2. Monitor the implementation and take the necessary actions to reduce salt use.
3. Transfer this information to the Annual Certification Report.

Salt Tracking and Reporting Data: Sheet #3 - Best Management Practices (BMPs)

Organization Name:

Geographic Area(s) of Operations:

Winter Season: year 20: **through year 20:**

Planning BMPs

	BMPs	Was This BMP Used? (Y, N, N/A)	Was this practice effective? (narrative as applicable):	Is practice planned for continuation? (Yes/No/Revision Planned)	Are there plans to use this practice in the future? (narrative as applicable):
Winter Operations Planning	Winter Maintenance Plan is developed				
	Preseason meetings are held				
	Postseason meetings are held				
	Accountability is at every level				
	Transportation Audiences - Snowplow routes are planned				
	Property Management Audiences - the properties are visited before the season				
Levels of Service	***Transportation Audiences*** - Levels of Service are communicated internally				
	Transportation Audiences - Levels of Service are communicated externally				
	Property Management Audience - Levels of Service are discussed and agreed upon				
Train-ing	Training is held				
Salt Storage/Handling	Deicer piles are properly stored				
	Liquid producs are properly stored				
	Loading and hauling of deicers are done properly				
	Equipment is cleaned and wastewater is contained				
	Property Management Audiences - Storage and handling of deicer bags is done properly				
Calibration	A calibration process is established				
	Equipment is calibrated				
Storm Meetings	Pre-storm meetings are held				
	Post-storm meetings are held				
Weather Forecasts	Accurate weather forecasting is obtained and is a part of decision making				
	Know the surface temperature				
Enhanced Equpment & Technology	Advanced plows are used				
	Advanced spreaders are used				
	Proper/Advanced equipment needed for making liquid products is used				
	Transportation Audiences - Automated Vehicle Location (AVL) is used				
	Transportation Audiences - Maintenance Decision Support System (MDSS) is used				
	Transportation Audiences - Precision Deicing is used				

Salt Tracking and Reporting Data: Sheet #3 - Best Management Practices (BMPs)

Storm Related BMPs

		Was This BMP Used? (Y, N, N/A)	Was this practice effective? (narrative as applicable):	Is practice planned for continuation? (Yes/No/Revision Planned)	Are there plans to use this practice in the future? (narrative as applicable):
Anti-icing	Anti-icing is used				
Plowing Practices	Plowing early and often is common practice				
	Transportation Audiences - Plowing activities are coordinated				
	Transportation Audiences - Plow trains are used				
	Property Management Audiences - The right plow, shovel, pusher, blower, blade, or broom for the property is used				
	Property Management Audiences - Opportuniteis to close areas with a small footprint,				
	Property Management Audiences - Snow is placed in proper places				
Product Application Practices	Dyed deicers are used				
	Use of Abrasives				
	Deicers are cleaned up after storm				
	Transportation Audiences - Spinners set-are up properly				
	Transportation Audiences - Plows drive 17-25 mph on non-high-speed roads				
	Transportation Audiences - On high-speed roads deicer is applied to the center o the road or high side of a curve				
	Transportation Audiences - Auger, shoots, or conveyors are turned off when stopped				
	Transportation Audiences - Deicer application rate is reduced on successive passes				
	Property Management Audiences - Spread patterns that prevent overlapping applications are used				
	Property Management Audiences - Drop spreaders or rotary spreaders with shields are used for sidewalks				
Vary Application to Conditions	Variable application rates are used for surface temperature, precipitation type/rate, and intended levels of service				
	Deicers are used within their temperature range				
Use of Liquids	Deicers are pretreated				
	Deicers are prewetted				
	Direct Liquid Application is used				
Measure-ment	Deicer use is measured and recorded				
Additional BMPs and Notes	**Additional BMPs and Comments: Seasonal or Storm-specific**				