SEDIMENT 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
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ACRONYMS AND ABBREVIATIONS

AAFES	Army and Air Force Exchange Services
Ac	Acres
AR	Army Regulation
BANCS	Bank Assessment for Non-point source Consequences of Sediment
BMP	Best Management Practice
CBP	Chesapeake Bay Program
CBPO	Chesapeake Bay Program Office
CWA	Clean Water Act
CGP	Construction General Permit
CUA	Census Urban Area
CAST	Chesapeake Bay Assessment and Scenario Tool
DC	District of Columbia
DECA	Defense Commissary Agency
DOD	Department of Defense
DPW	Directorate of Public Works
EISA	Energy Independence and Security Act
EMS	Environmental Management System
EOS	Edge of Stream
EPA	United States Environmental Protection Agency
ESC	Erosion and Sediment Control
FBNA	Fort Belvoir North Area
ft	feet
g	grams
GIS	Geographic Information System
GPS	Global Positioning System
ISW	Industrial Stormwater
IDDE	Illicit Discharge Detection and Elimination
L	liter
L2	Level 2
Lbs	Pounds
LID	Low Impact Development
MCM	Minimum Control Measures
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NMP	Nutrient Management Plans
NPDES	National Pollutant Discharge Elimination System
NEIEN	National Environmental Information Exchange Network
POC	Pollutants of Concern

RO	Representative Outfalls
RPA	Resource Protection Areas
RSC	Regenerative Stormwater Conveyance
SCF	SES Construction and Fuel Services LLC
SWPPP	Stormwater Pollution Prevention Plan
SWM	Stormwater Management
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
VADEQ	Virginia Department of Environmental Quality
VDOT	Virginia Department of Transportation
VPDES	Virginia Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program
WIP	Watershed Implementation Plan
WLA	Waste Load Allocation
WQGIT	Water Quality Goal Implementation Team

EXECUTIVE SUMMARY

The purpose of this Lower Accotink Creek Sediment Total Maximum Daily Load (TMDL) Action Plan is to comply with Part II "Special condition for Local TMDL" 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 required reductions set forth in the Accotink Creek Sediment 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., according to the procedures provided in the Virginia Department of Environmental Quality (VADEQ) Guidance Memo No. 16-2006 dated November 21, 2016 (Guidance).

The main 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 meet the 55% Lower Accotink Creek TMDL reduction targets in the MS4 permit for sediment developed by the Virginia Department of Environmental Quality (VADEQ). In addition, Section 5 focuses on the verification and maintenance of Best Management Practices (BMPs) in order to maintain acquired credits for the life time of the following two permit cycles, 2018-2023 and 2023-2028. The calculation of existing pollutant loads and the targeted reductions are proportional to the amount of pervious and impervious land cover in the Fort Belvoir's MS4 service area. 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 with approximately 615 of those acres being impervious. The MS4 Service Area within the Lower Accotink Creek Watershed was determined to be approximately 1,429.5 acres in size with approximately 242.5 of those acres being impervious.

A Waste Load Allocation (WLA) of 235 tons/year as well as a Baseline Load of 519 tons/year was already given by VADEQ through the Volume II Sediment TMDLs for the Lower Accotink Creek Watershed. However, 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 the baseline load 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 4. Based off this re-evaluation, a Baseline Load of 315.98 tons/year was calculated, with a target reduction of 80.98 tons/year of sediment is to be achieved. The WLA assigned of 235 tons/year is not disputed.

SCF then considered all projects implemented by Fort Belvoir since the 2009 progress run for credits as described in VADEQ Guidance Memo No. 20-XXXX which will replace Guidance Memo No. 15-2005

as guidance for meeting local TMDL waste load allocations for nutrients and sediment. The archived reductions from each implemented BMP was compared to the required load reduction to determine if goals for the WLA of 235 tons/year were met. Analysis found that Fort Belvoir has both met and exceeded the required reductions. The table below summarizes the progress towards meeting the 100% reductions.

Pollutants Of Concern	BMP	Required Reduction (lbs. /yr.)	Reductions Achieved (lbs. /yr.)	Percentage of Required Reduction
Total Suspended Solids	Urban Structural BMP's	***161,960***	110,359.56	68.14%
	Stream Restoration		5,113.94	3.16%
	Street Sweeping		21,380.34	13.20%
	Storm Drain Cleaning		18,438.11	11.38%
	Land Use Change		15,742.23	9.72%
Total Suspended Solids Reduction Achieved			***171,034.18***	***105.60%***

A Draft Lower Accotink Creek Sediment TMDL Action Plan was submitted as required under Part I.C.5.b of the current General Permit. The Application package was submitted by May 29, 2021 as per the then most recent guidance by VADEQ. The Draft Lower Accotink Creek Sediment TMDL Action Plan was posted on the Fort Belvoir Home Page under Environmental Documents for Stormwater on 8 January, 2021. A Notice of Availability for the document was posted on the Fort Belvoir DPW Stormwater Facebook page, on the main Fort Belvoir Facebook page, and published in the Fort Belvoir newspaper, the Belvoir Eagle, around 8 February, 2021. Fort Belvoir kept the public comment period open until 15 February, 2021. Details of the public comment period on the Draft document are included in this Final Document under Section 7.

The Draft Lower Accotink Creek Sediment TMDL Action Plan was subsequently updated to incorporate the zero comments received during the public comment period. In addition, since the Draft document was posted and submitted to VADEQ, Fort Belvoir completed efforts to verify the long-term performance of older stream restorations. Data and details from these verification efforts were used to update existing restoration data and to adjust credits achieved based on the ground proofed lengths found to still be working as designed to reduce the sediment loads.

1. INTRODUCTION AND BACKGROUND

The U.S. Army Garrison Fort Belvoir is located 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 1, 2018 through November 1, 2023. The purpose of this Sediment 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 required target reductions.

The Action Plan includes the requisite planning items found in permit Part II, according to the procedures provided in the Virginia Department of Environmental Quality (VADEQ) Guidance Memo No. 16-2006 dated November 21, 2016. The main focus of the Action Plan is to provide the means and methods needed to satisfy the Lower Accotink Creek TMDL reduction targets for sediment developed by the Virginia Department of Environmental Quality (VADEQ) in August 2017.

The Sediment TMDL contains aggregate waste load allocations (WLAs) for regulated stormwater, and a WLA of 235 tons/year for sediment within the Lower Accotink Creek Watershed has been assigned to Fort Belvoir's MS4. The Accotink Sediment TMDL was approved by the EPA on May 23, 2018. Volume II Sediment TMDLs for the Lower 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.

The Volume II Sediment TMDLs for the Lower Accotink Creek Watershed requires the implementation of urban stormwater controls to meet specific sediment 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.

According to the MS4 permit, a permittee is required to reduce the load of total suspended solids from existing developed lands served. Reductions should be achieved through implementing BMPs approved by the Chesapeake Bay Program (CBP), BMPs approved by the DEQ, or a trading program described in

Part II.A.10 from 9VAC25-890-1. Fort Belvoir has goals, as presented in the Volume II Sediment TMDLs for the Lower Accotink Creek and enforced by the MS4 permit, to reduce a certain percent of Total Suspended Solids (TSS) loads from impervious regulated acreage and pervious regulated acreage within the Lower Accotink Creek Watershed. Fort Belvoir has achieved the required reductions to meet the WLA as described in this Action Plan.

This Action Plan details Fort Belvoir's efforts and focus on meeting the reduction requirements in the current Volume II Sediment TMDLs for the Lower Accotink Creek. The Action Plan contains analyses that focuses on credits for existing BMPs, projects that are currently in the planning and design phase, potential strategies that may be implemented during the next permit cycle (2023-2028), and the cost to implement the required reductions that would be sufficient to meet the Lower Accotink Creek Sediment TMDL reduction requirements. The following steps are required per the MS4 permit and VADEQ Guidance Memo No. 16-2006:

- Review of Current Program and Legal Authority
- Delineation of the MS4 Service Area
- Existing Source Loads and Calculation of Target Reductions
- Means and Methods to Meet Target Reductions
- Implementation Schedule and Costs
- 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 Lower Accotink Creek Sediment TMDL (suspended solids). Pollutant removal from the implementation of best management practices (BMPs) that address the six Minimum Control Measures (MCM) should be accounted for in the evaluation of goals for meeting waste load allocation (WLA) targets, including those reductions required by the Lower Accotink Creek Sediment TMDL. In accordance with Section II.B.5 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 the minimum control measures in Part I.E.4 related to construction site stormwater runoff control in accordance with the MS4 Permit shall address discharges from transitional sources: BMPs 4.1 through 4.6 of the MS4 Program Plan address the controls in place in relation to construction site runoff.

b. Implementation of the means and methods to address discharges from new sources in accordance with the minimum control measures in Part I.E.5 related to post-construction stormwater management in new development and development of prior developed lands: These controls are addressed in BMPs 5.1 through 5.9 of the Program Plan as well as in the Fort Belvoir General Plan for Stormwater Management Facility Inspection and Maintenance, dated September 2019.

c. 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 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.

In addition to these BMPs, the MS4 Program Plan identifies BMPs that assist in addressing Total Suspended Solids of the Lower Accotink Creek Sediment TMDL. Table 1 below provides a summary of BMPs found in the December 2020 MS4 Program Plan that are implemented at Fort Belvoir.

Table 1: 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.
BMP 2.1	Maintain a webpage dedicated to the MS4 Program and Stormwater Pollution Prevention	Maintain the webpage with the following information as required by Part I.E.2.b.: Effective MS4 Permit and coverage letter, most current MS4 Program Plan, annual reports for each year of the term covered by the current permit. Update the MS4 Program Plan at a minimum once per reporting period by 30 June.
BMP 2.2	Public Involvement Activities	Involvement of tenant agencies, schools, community partners and other members of the public with the goal of increasing public participation to reduce stormwater pollutant loads, improve water quality and support local restoration and clean-up projects, programs, groups, meetings or other opportunities for public involvement.
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	Maintain Fort Belvoir Policy Memorandum #71, Prohibition of Illicit/Unauthorized Discharges into the Municipal Separate Storm Sewer System (MS4) and Waterways is the existing policy that 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 4.1	Communicate the Requirements of the MS4 Program	Annually review and revise, as needed the Fort Belvoir Directorate of Public Works, Municipal Separate Storm Sewer System (MS4) Program Bulletins. Distribute MS4 permit requirements to designers during initial planning phases of construction projects. All construction contract packages (including designs and specifications) shall incorporate a requirement to conform to the conditions of the MS4 Permit, MS4

BMP	NAME	DESCRIPTION
		Program Plan, and the Virginia Erosion and Sediment Control (ESC) and Stormwater Management (SWM) regulations. Conduct pre-construction training, and post Program Guidance documents, including bulletins, on Fort Belvoir Website. Require construction projects with land disturbance of an acre or greater to obtain a Construction General Permit (CGP) from VADEQ. Incorporate procedures under the utility clearance permit process to determine CGP applicability and verify existence of required erosion control plans prior to utility clearance permit approval.
BMP 4.2	Conduct Erosion and Sediment Control Site Inspections	Conduct ESC inspections with Virginia-certified ESC Inspectors on all construction projects with CGP to ensure adherence to the approved ESC plan and the CGP and to evaluate performance of BMPs and/or engineering controls. Perform site inspections of 100% of active construction sites that involve land disturbance of 10,000 square feet or greater.
BMP 4.3	Progressive Compliance Enforcement Strategy	Implement the compliance and enforcement strategy when construction contractors have repeated non-compliance findings on ESC inspections on an active construction site. Review strategy and revise, as necessary. Track number of enforcement actions.
BMP 5.1	Maintain the Stormwater Management Facility Tracking System	Maintain existing EXCEL database/ACCESS database and associated GIS layer for Stormwater Management Facilities. Database should include information regarding the type of facility/BMP, the latitude and longitude, the total number of acres treated by the facility/BMP to include a breakdown of pervious and impervious acres, the date the facility was brought online, the sixth order hydrologic unit (HUC) code and the name of any impaired water segments within each HUC listed, inspection and maintenance dates/information.
BMP 5.2	Conduct Stormwater Management Site Inspections	Conduct SWM inspections with Virginia-certified SWM Inspectors to determine adherence to the approved design plans and to observe status of the stormwater management facility/BMP during and post construction.
BMP 6.1	Written Procedures for Operations and Maintenance 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

BMP	NAME	DESCRIPTION
		pollution prevention, any maintenance, if required, and spill response procedures. Current Fact Sheets Include: • Good Housekeeping • Spill Preparedness & Response • Secondary Containment • Above Ground Storage Tanks • Outdoor Storage and Handling of Materials and Waste • Outdoor Storage and Handling of Raw Materials and Waste • Salt Storage and Loading • Salt Application • Aircraft, Vehicle, and Equipment Washing and Degreasing Activities • Wash Rack Usage Guide • Aircraft, Vehicle and Equipment Fueling • Aircraft, Vehicle and Equipment Maintenance and Repair Activities • Waste Handling and Disposal • Marina Activities • Fats, Oils and Grease (FOG) Handling • FOG Management Guide • Firefighting Activities • Brine Mixing • Aircraft Deicing Operations • HVAC Coil Cleaning & Maintenance • Dewatering Activities • PCB Awareness • Outdoor Pressure Washing • Blasting & Painting Activities • Landscaping/Ground Maintenance • Portable Toilets • Dumpster Management • Animal Waste
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.
BMP 6.4	Implement Written Training Plan	Continue to implement required training, update training content as necessary. TMDL information is included in both SWPPP required training and Stormwater General Awareness Training.
BMP CHESBAY.1	Chesapeake Bay TMDL Action Plan Implementation	The 2019 update includes a review and revision of the Action Plan. Because Phase III goals have already been achieved by Fort Belvoir, plan updates should occur when new projects can be counted for additional credits. The Plan will be implemented in full and any

BMP	NAME	DESCRIPTION
		additional BMPs implemented not included in the plan would constitute an exceedance of goals through 2025.

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 sediment. The TMDL includes pollution limits that are sufficient to meet state water quality standards for total suspended solids.

States are then required to establish a 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 TMDL, approved by the EPA in May 2018 identifies the necessary pollution reduction of sediment and sets pollution limits 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. 42 USC 17094 - ENERGY INDEPENDENCE AND SECURITY ACT OF 2007 TITLE IV SUBTITLE C SECTION 438

The Energy Independence and Security Act of 2007 (EISA) was enacted by Congress to require federal agencies to reduce stormwater runoff from Federal development projects to protect water resources. The intent of Section 438 of the EISA is to require Federal agencies to develop and redevelop applicable facilities in a manner that maintains or restores stormwater runoff to the maximum extent technically feasible, as stated below:

> *"The sponsor of any development or redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow."*

Federal agencies can comply with Section 438 by using a variety of stormwater management practices including the reduction of impervious surfaces, vegetative practices, porous pavements, cisterns, and green roofs (EPA, 2009).

2.2.3. 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.

2.2.4. VIRGINIA CHESAPEAKE BAY PRESERVATION ACT, TITLE 62.1, CHAPTER 3.1, ARTICLE 2.5 (§62.1-44.15:67 THROUGH §62.1-44.15:79) OF THE CODE OF VIRGINIA

The Chesapeake Bay Preservation Act (Bay Act) was enacted by the Virginia General Assembly in 1988 as a critical element of Virginia's non-point source management program. The Bay Act program is designed to improve water quality in the Chesapeake Bay and other waters of the State by requiring the use of effective land management and land use planning. At the heart of the Bay Act is the concept that land can be used and developed to minimize negative impacts on water quality.

The Bay Act requires that localities (counties, cities, and towns) within Tidewater Virginia employ the criteria promulgated by the Board to ensure that the use and development of land in Chesapeake Bay Preservation Areas shall be accomplished in a manner that protects the quality of state waters consistent with the provisions of this article. The Bay Act defines Chesapeake Bay Preservation Areas as an area delineated by localities in Tidewater Virginia in accordance to criteria established pursuant §62.1-44.15:72. Tidewater Virginia is considered:

> *"The Counties of Accomack, Arlington, Caroline, Charles City, Chesterfield, Essex, Fairfax, Gloucester, Hanover, Henrico, Isle of Wight, James City, King and Queen, King George, King William, Lancaster, Mathews, Middlesex, New Kent, Northampton, Northumberland, Prince George, Prince William, Richmond, Spotsylvania, Stafford, Surry, Westmoreland, and York, and the Cities of Alexandria, Chesapeake, Colonial Heights, Fairfax, Falls Church, Fredericksburg, Hampton, Hopewell, Newport News, Norfolk, Petersburg, Poquoson, Portsmouth, Richmond, Suffolk, Virginia Beach, and Williamsburg."*

2.2.5. VIRGINIA STORMWATER MANAGEMENT ACT, TITLE 62.1, CHAPTER 3.1, ARTICLE 2.3 (§62.1-44.15:24 THROUGH §62.1-44.15:50) OF THE CODE OF VIRGINIA

The Virginia Stormwater Management Law seeks to protect properties and aquatic resources from damages caused by increased volume, frequency and peak rate of stormwater runoff. Additionally, the law seeks to protect those resources from increased non-point source pollution attributed to stormwater runoff. §62.1-44.15:24 defines a Chesapeake Bay Preservation Act land disturbing activity as:

> *"…land disturbance equal to or greater than 2,500 square feet and less than one acre in all areas of jurisdictions designated as subject to the regulations adopted pursuant to the Chesapeake Bay Preservation provisions of this chapter."*

2.2.6. 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.*

2.2.7. 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:"*

As found at 9VAC-25-890-40 Part II.B.1.b:

> *"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 by 9VAC-25-890-40 Part II.V.1.b, the due date for this Sediment TMDL would be on May 29, 2021, 30 months after the permit effective date of November 29, 2018.

2.2.8. 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 1, 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 Permit which states:

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

2.2.9. FORT BELVOIR CHESAPEAKE BAY TMDL ACTION PLAN

The Fort Belvoir Chesapeake Bay TMDL Action Plan addresses the requirement to minimize the pollutants of concern by identifying legal authorities, Best Management Practices (BMPs) and measurable goals for achieving compliance with the approved Phase II Chesapeake Bay TMDL Implementation Plan in accordance with 9VAC25-890-40, Part I.C. Special Conditions for the Chesapeake Bay TMDL of the General VPDES Permit for Discharges of Stormwater from Small MS4s, Permit VAR040093. As per Part II.B.5.b of the current MS4 permit:

> *"The permittee may meet the local TMDL requirements for sediment, phosphorous, or nitrogen through BMPs implemented to meet the requirements of the Chesapeake Bay TMDL in Part II.A as long as the BMPs are implemented in the watershed for which local water quality is impaired."*

The Chesapeake Bay TMDL Phase II Action Plan was most recently revised and approved on October 29, 2019 and included multiple BMPs within the Lower Accotink Watershed.

2.2.10. 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.

2.2.11. 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 5 of this policy states:

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

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

2.2.12. 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 6.e. of this policy requires annual training as stated below:

> *"For construction sites involving land disturbance of one acre or greater, the construction contractor is required to submit a SWPPP to the MS4 Stormwater Program Manager along with a completed Directorate of Public Works SWPPP checklist for review prior to the commencement of construction. The construction contractor shall develop a SWPPP utilizing the U.S. Environmental Protection Agency template located at: https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp. The construction contractor is required to update the SWPPP no later than seven days following any modification to its implementation. The construction contractor is responsible for regulatory compliance with all additional SWPPP requirements as identified in the Construction General Permit (9VAC25-880-70, Part II Stormwater Pollution Prevention Plan)." (U.S Army Garrison, Fort Belvoir, 2018).*

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.

2.2.13. FORT BELVOIR DIRECTORATE OF PUBLIC WORKS MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PROGRAM BULLETIN #1

Fort Belvoir's Bulletin #1 provides details on the procedures for SWM and ESC Plan design, review, and approval as well as compliance requirements for SWM and ESC during land disturbing activities. Because Fort Belvoir lies within direct drainage of the Chesapeake Bay the Bulletin takes into consideration the additional requirements set forth in the Chesapeake Bay Preservation Act. The Bulletin is provided to any persons proposing construction activities within Fort Belvoir and provides DPW-Environmental the ability to perform project reviews for the following:

Table 2: Plan Review Requirements Based on Land Disturbance

Required Plans for Land Disturbance		
Land Disturbance Thresholds	***Plans Required***	***Plan Review and Approval Authority***
Less than 2,499 square feet	*None*	*DPW-Environmental Division*
Between 2,500 and 9,999 square feet	*ESC and SWM Plans*	*DPW-Environmental Division*
Between 10,000 and 43,559 square feet	*ESC and SWM Plans*	*VADEQ (for ESC portion only)*
Greater than or equal to one (1) acre	*ESC and SWM Plans*	*VADEQ (for ESC & SWM)*

The current Bulletin can be found in full at https://home.army.mil/belvoir/index.php/about/Garrison/directorate-public-works/environmental-division.

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 Lower Accotink Creek Sediment 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 but found to be outside of the Lower Accotink Creek Watershed. Finally, the breakdown of impervious and pervious area was determined by using the Open Space Study from the Fort Belvoir Real Property Master Plan (Master Plan).

The above approach coupled with GIS impervious surface data rendered a delineation of impervious versus pervious areas within the 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 660 acres (from additional area – Hospital, Stables, Theote, and 300 Area) shown in green in Figure 5 were not within the Lower Accotink Watershed, and are therefore not further considered in this plan. The additional area of the Army Museum of 84 acres is 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
Main Post	7776	8579
North Area	803	
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	
Future Additional Service Areas after 2020 Census		
Additional Area - Hospital	420	744
Additional Area - Stables	30	
Additional Area - Theote	68	
Additional Area - 300 Area	142	
Additional Area – Army Museum	84	

In order 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**
VDOT Permit (VA04011 [illegible])	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

Permit	Location	Total Area*	Regulated	2020 Census Coverage	Currently Non-Regulated
	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. PERVIOUS VS. IMPERVIOUS AREAS

The required reductions from the Lower Accotink Creek Sediment TMDL are calculated based upon the total pervious and impervious surfaces within the regulated MS4 Service Area. GIS layers for watershed areas and the Fort Belvoir Master Plan for short term (2017) development were used in order to determine the impervious acres which includes airfield strips, buildings, roads, bridges, driveways and parking lots. Any areas that were not impervious were considered open space and include forested and wetland areas. The estimated impervious from the Open Space study of the Master Plan (Table 5.3 in Appendix B) are displayed in Table 7 below. Because these are estimated values and the Master Plan states that impervious areas may vary up to 3% of the value presented, the conservative percentage is used throughout the calculations for this plan.

Table 7: Regulatory Status by Watershed and Acreage

Watersheds	% Impervious	% Conservative	Total Acres	Regulated Acres	Additional Coverage	Non-Reg Acres	Separate VPDES
Accotink Bay	27	**30**	607	89	157	238	123
Accotink Creek	14	**17**	3284	712	321	1717	533
Accotink Creek – FBNA	13	**16**	803	633.5	0	0	169.5
Dogue Creek	16	**19**	1777	970	51	588	168
Gunston Cove	18	**21**	680	128	160	331	61
Pohick Bay	0	**3**	566	0	0	566	0
Pohick Creek	0	**3**	625	18	18	589	0
Potomac River	14	**17**	237	28	0	206	3
Totals			***8579***	***2579***	***707***	***4,235***	***1058***

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. Additionally, 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 shown within the Volume II Sediment TMDLs for the Accotink Creek Watershed. The regulated, non-regulated, and future additional areas covered after the 2020 Census were then multiplied by the conservative impervious surface estimate from the Master Plan, and are summarized in Table 8 below solely for the Accotink Creek watershed considered within the Volume II Sediment TMDLs for the Accotink Creek Watershed.

Table 8: Percent Imperviousness by Fort Belvoir Area – Accotink Creek Watershed

Watersheds	% Impervious*	Regulated Acres	Regulated Impervious Acres	Additional Coverage	Additional Impervious Acres	Non-Reg. Acres	Non-Reg. Impervious Acres
Accotink Creek	**17**	712	121	84	20	1,801	309
Accotink Creek FBNA	**16**	633.5	101.5	0	0	0	0
Totals			***222.5***		***20***		***309***

*All areas are presented in terms of acres and were rounded to the nearest 0.5 acre; Conservative % imperviousness used

Pervious acreages were determined by subtracting the calculated impervious surface acres from the total MS4 Acreage for each of the regulatory categories. The results from the analysis are summarized in Table 9 below. These results will be used to calculate the required reductions for the Lower Accotink Creek Sediment TMDL.

Table 9: Pervious vs. Impervious Surface for the MS4 Service Area – Accotink Creek Watershed

Land Area	Impervious Acres	Pervious Acres	Total MS4 Acreage
MS4 Service Area – North Area *Based on 2010 Census Urban Area data*	101.5	532	633.5
MS4 Service Area – Main Post *Based on 2010 Census Urban Area data*	121	591	712
Future 2020 MS4 Service Area *Based on current and proposed land use*	20	64	84
Total Regulated Area	***242.5***	***1,187***	***1,429.5***
Non-Regulated Areas	309	1,495	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 II Sediment 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 TARGET REDUCTIONS

Calculation of existing loads, or a baseline, for Sediment is needed in order to determine management strategies to meet the overall Lower Accotink Creek sediment pollution reduction requirements. As shown in the Volume II Sediment TMDLs for the Accotink Creek Watershed, Fort Belvoir has a calculated base load of 519 tons/year and has been assigned a Waste Load Allocation (WLA) of 235 tons/year for the Lower Accotink Creek for Sediment, requiring a 55% target load reduction. From the Volume II Sediment TMDLs for the Lower Accotink Creek Watershed, these values were estimated off a total regulated area within the watershed of 2,348 acres. Table 10 below gives a summary of the information presented within the Volume II Sediment TMDLs for the Lower Accotink Creek.

Table 10: Summary of Existing Loads

Pollutant of Concern	Regulated Acres	Baseline Load (tons/yr.)	Waste Load Allocation (tons/yr.)	Target Load Reduction Required	Required Reduction (tons/yr.)
Total Suspended Solids	2,348	519	235	55%	***284***

From the Volume II Sediment TMDLs for the Lower Accotink Creek Watershed, the acreage was broken down into several different types. Table 11 below gives a summary of land use designations in the Lower Accotink Creek Watershed for Fort Belvoir.

Table 11: Land Use Designations for Fort Belvoir

	Commercial	Industrial	Residential	Transportation	Open Space	Water	Total
Acres	956	0	0	90	1,253	27	***2,348***
Percent	41%	0%	0%	4%	54%	1%	***100%***

What is shown in Volume II Sediment TMDLs for the Lower Accotink Creek Watershed differs from current conditions, as various acreages have been removed from the MS4 Service Area due to other VPDES Permits as summarized in Section 3. Fort Belvoir recommends to incorporate and use the values determined in Section 3 of this document and shown in Table 9 in future assessments for the Lower Accotink Creek Watershed in order to provide more accurate information. With this updated information, the WLA and Target Load Reduction calculated in the Volume II Sediment TMDLs for the Lower Accotink Creek Watershed shall not be used as the target goals moving forwards, and target goals have been re-calculated based on current data in this section.

Taking into consideration the reduction in service area as determined in this analysis to 1,429.5 acres compared to the service area evaluated within the Volume II Sediment TMDLs for the Accotink Creek Watershed of 2,348 acres, the baseline load assigned in the TMDL of 519 tons/year should be revised due to this significant decrease.

For calculating the new baseline load off of the pervious and impervious acres shown in Table 9, loading rates from Table 3b of the MS4 Permit Part II A.3 were used. An explicit Margin of Safety of 10% was applied to this as this is necessary to take into account the uncertainty in the relation between pollutant loading rates and water quality. The rates and new baseline load are shown below in Table 12:

Table 12: New Fort Belvoir Baseline Load for Lower Accotink Watershed

Total Acres	Impervious Acres	Loading Rate for Regulated Urban Impervious (lbs./ac./yr.)	Pervious Acres	Loading Rate for Regulated Urban Pervious (lbs./ac./yr.)	Combined Loading Rate or New Baseline Load (tons/yr.)	New Baseline Load with Margin of Safety (tons/yr.)
1,429.50	242.50	1,171.32	1,187.00	175.80	246.36	271.00

This method results in a new estimate baseline load of 271.00 tons/year as shown above in Table 12. This will require a reduction of 36.00 tons/year or 72,000 lbs./year in order to meet the WLA of 235 tons/year as outlined in the Volume II Sediment TMDLs for the Lower Accotink Creek Watershed.

A final method considered in order to determine the new baseline load would be a simple inverse relationship between the 2,348 acres and 519 tons/year values within the TMDL, and the 1,429.5 acres as shown in Section 3. This would result in a baseline load of 315.98 tons/year. In order to reflect the current service area, and as this method is the more conservative of the methods utilized to determine the new baseline load, the new baseline load of 315.98 tons/year which will require a reduction of 80.98 tons/year or 161,960 lbs./year in order to meet the WLA of 235 tons/year will be utilized moving forwards.

5. MEANS AND METHODS TO MEET REQUIRED REDUCTIONS

Permit Part II.B.5 requires the permittee to define the means and methods, such as management practices and retrofit programs that will be utilized to meet the newly required reduction of 80.98 tons/year or 161,960 pounds/year as shown in Section 4.

To meet the reduction requirements permittees are to implement BMPs as presented in the Virginia Stormwater BMP Clearinghouse or those approved by the Bay Program. Implementation of BMPs included in this Action Plans demonstrates compliance with the required reductions. Fort Belvoir has used these BMPs as the means and methods that fit this stipulation to meet the reduction requirements. This type of adaptive management approach is an iterative "all of the above" strategy to identify projects for implementation. This approach puts the greatest number of strategies on the table, and allows Fort Belvoir to consider any and all of the strategies based on conditions present at the time. A mix of the following strategies were or will be implemented, where practicable, to address the required reductions:

- ***Urban Structural BMPs:*** Constructing local stormwater facilities when new development, re-development, and retrofits are considered.
- ***Urban Stream Restoration.*** Urban streams restored using one of the four expert panel report methodologies, as adjusted to account for the unregulated baseline load.
- ***Street Sweeping.*** Removing sediment from roadways before transported offsite in stormwater flows.
- ***Storm Drain Cleaning.*** Removing solids directly from catch basins, within storm pipes, or captured at the storm drain outfalls.
- ***Land Use Change.*** Credit for lands converted to a land use with a lower associated pollutant load.

Each of these strategies are detailed in the following sections to include under what condition credits are earned, the load reduction achieved, and how to maintain credits associated with already implemented BMPs. Table 13 below summarizes the achieved reductions by BMP type.

Table 13: Total Reductions Achieved by BMP Type

POC	BMP	Required Reduction (lbs. /yr.)	Reductions Achieved (lbs. /yr.)
Total Suspended Solids	Urban Structural BMP's	***161,960***	110,359.56
	Urban Stream Restoration		5,113.94
	Street Sweeping		21,380.34
	Storm Drain Cleaning		18,438.11
	Land Use Change		15,742.23
Total Suspended Solids Reduction Achieved			***171,034.18***

5.1. URBAN STRUCTURAL BMPS

Fort Belvoir maintains a current inventory of stormwater management BMPs that have been built to meet Virginia water quality requirements or that have been implemented as retrofits. Data collected from field assessments are used to maintain the Fort Belvoir BMP Database. The BMP Database serves as a tracking and record keeping tool, and can also be used to determine the pollutant reductions provided by implementing various BMPs after submittal to the VADEQ BMP Warehouse. When the Garrison implements any additional stormwater BMPs, the database can be expanded and used to manage urban stormwater BMPs over time.

Currently Fort Belvoir has approximately 250 smaller Urban Stormwater BMPs that have been installed since the 2005 Base Realignment and Closure (BRAC) implementation, which include 49 within the Lower Accotink Creek Watershed. More are being installed regularly in order to meet Virginia's Water quantity and quality requirements for new development and redevelopment projects. Credits attributed to these BMPs are reported via the VADEQ BMP Warehouse as well as secondarily reported through the annual Department of Defense (DoD) Chesapeake Bay Data Call. Only practices located within the Lower Accotink Creek Watershed are considered as a part of this TMDL action plan. Credits taken are only those that have been approved for Fiscal Year 2019, the VADEQ BMP Warehouse, and the National Environmental Information Exchange Network (NEIEN) List. Table 14 below provides a summary of the BMP types currently implemented on Fort Belvoir as reported and approved during the 2019 VA Crediting Report within the Lower Accotink Creek Watershed. These are shown in Figure 6 along with their drainage areas.

Table 14: Fort Belvoir Urban Stormwater BMP Inventory within Lower Accotink Creek Watershed

BMP ID #	BMP Type	Acres Treated	Impervious Acres Treated	Pervious Acres Treated
VAFY171283	Dry Detention Pond	7.63	4.40	3.23
VAFY171287	Dry Detention Pond	9.94	7.34	2.60
VAFY171294	Infiltration Basin	6.27	0.45	5.82
VAFY171295	Infiltration Basin	1.11	0.11	1.00
VAFY171296	Infiltration Basin	1.04	0.17	0.87
VAFY171297	Infiltration Basin	1.49	0.10	1.39
VAFY171303	Infiltration Basin	2.36	2.00	0.36
VAFY171304	Infiltration Basin	11.28	0.19	11.09
VAFY171305	Infiltration Basin	6.99	0.20	6.79
VAFY171308	Infiltration Basin	11.60	1.14	10.46
VAFY171309	Infiltration Basin	14.15	10.60	3.55
VAFY171310	Infiltration Basin	27.89	18.30	9.59
VAFY171311	Infiltration Basin	3.48	0.15	3.33
VAFY171312	Bioretention	0.85	0.75	0.10
VAFY171313	Bioretention	1.02	0.78	0.24
VAFY171314	Bioretention	0.95	0.90	0.05
VAFY171315	Bioretention	1.47	1.30	0.17
VAFY171316	Infiltration Basin	21.48	0.71	20.77
VAFY171320	Bioretention	2.70	2.20	0.50
VAFY171321	Infiltration Basin	2.77	2.40	0.37
VAFY171322	Infiltration Basin	5.61	0.38	5.23
VAFY171469	Dry Swale	0.08	0.04	0.04

BMP ID #	BMP Type	Acres Treated	Impervious Acres Treated	Pervious Acres Treated
VAFY1752	Permeable Pavement w/o sand/veg C/D soils	2.05	2.05	0.00
VAFY1754	Dry Swale	0.18	0.04	0.14
VAFY1756	Infiltration Trench	0.18	0.04	0.14
VAFY17577	Infiltration Basin	21.39	15.50	5.89
VAFY17583	Wet Pond	27.68	1.38	26.30
VAFY17587	Urban Filter Strip Runoff Reduction	9.95	0.90	9.05
VAFY17588	Dry Detention Pond	16.57	1.50	15.07
VAFY17589	Wet Pond	35.52	3.96	31.56
VAFY1760	Bioretention	0.30	0.14	0.16
VAFY17604	Infiltration Basin	1.02	0.90	0.12
VAFY17605	Infiltration Basin	1.30	0.95	0.35
VAFY1761	Bioretention	0.31	0.17	0.14
VAFY17610	Wet Pond	11.91	0.90	11.01
VAFY17613	Infiltration Basin	2.60	2.50	0.10
VAFY17620	Infiltration Basin	1.24	1.10	0.14
VAFY17621	Infiltration Basin	3.05	0.09	2.96
VAFY17624	Infiltration Basin	9.57	0.58	8.99
VAFY240	Bioretention	0.81	0.41	0.40
VAFY241	Bioretention	0.85	0.44	0.41
VAFY243	Cisterns & Rain Barrels	0.85	0.00	0.85
VAFY249	Dry Swale	2.24	1.39	0.85
VAFY250	Infiltration Basin	1.75	1.45	0.30
VAFY253	Infiltration Basin	2.63	1.45	1.18
VAFY263	Bioswale	0.29	0.04	0.25
VAFY270	Bioretention	0.42	0.30	0.12
VAFY279	Dry Detention Pond	9.35	6.48	2.87
VAFY282	Permeable Pavement w/o sand/veg C/D soils	6.31	6.31	0.00
	Totals:	***312.48***	***105.58***	***206.90***
Total Number of BMP's Installed Within Lower Accotink Creek Watershed:				***49***

According to Appendix V.A. of the 2020 Chesapeake Bay TMDL Special Conditions Guidance Document, the BMP must meet all the design requirements that are listed in the Virginia Stormwater BMP Clearinghouse's technical specification for that BMP, not just the one inch requirement for runoff depth treated.

The guidance additionally states that there is no established efficiencies for TSS in the Virginia Stormwater BMP Clearinghouse. In order to calculate the TSS reductions, retrofit curves developed by the Bay Program or the Bay Program Established Efficiencies must be used. In an effort to remain consistent, and as some of the older BMP's on Fort Belvoir within the Lower Accotink Creek Watershed may not meet current Virginia Stormwater BMP Clearinghouse's technical specifications, a conservative approach using the Bay Program Established Efficiencies method will be utilized, and is summarized below in Table 15:

Table 15: Chesapeake Bay Program BMP's, Established Efficiencies

BMP #	BMP	Sediment Percent Effectiveness
1	Bioretention/Raingardens	80%
2	Bioswale	80%
3	Dry Detention Ponds and Hydrodynamic Structures	10%
4	Stormwater to the Maximum Extent Practicable (SW to the MEP)	90%
5	Erosion and Sediment Control	40%
6	Erosion and Sediment Control on non-regulated pervious urban	40%
7	Erosion and Sediment Control on extraction land use	40%
8	Dry Extended Detention Ponds	60%
9	Urban Filtering Practices	80%
10	Urban Forest Buffers	See most recent expert panel reports
11	Urban Infiltration Practices – no sand/veg no underdrain	95%
12	Urban Infiltration Practices – with sand/veg no underdrain	95%
13	Permeable Pavement – no sand/veg with underdrain with AB soils	70%
14	Permeable Pavement – with sand/veg with underdrain with AB soils	70%
15	MS4 Permit Required Stormwater Retrofit	65%
16	Street Sweeping 25 times a year	See most recent expert panel reports
17	Urban Nutrient Management	0%
18	Vegetated Open Channel – Urban	70%
19	Wet Ponds and Wetlands	60%

The next step is to determine which Chesapeake Bay Program BMP from Table 15 is most applicable/equivalent to the BMP's on Fort Belvoir as shown on Table 14. From there, the load can be calculated using the loading rate for Total Suspended Solids for the Potomac River Basin from Table 3b within 9VAC25-890-40 Part II.A.3, and the reduction can be calculated from that. The loading rate for regulated urban impervious area for TSS is 1,171.32 lbs./ac./yr., while the loading rate for regulated urban pervious area for TSS is 175.8 lbs./ac./yr. This information is summarized below in Table 16:

Table 16: Total Suspended Solids Reduction per BMP

BMP ID #	Equivalent Ches. Bay Program BMP #	Load from Impervious Acres Treated (lbs./yr.)	Load from Pervious Acres Treated (lbs./yr.)	Combined Load (lbs./yr.)	Sediment Removal Efficiency	Reduction (lbs./yr.)
VAFY171283	3	5,153.81	567.83	5,721.64	10%	572.16
VAFY171287	3	8,597.49	457.08	9,054.57	10%	905.46
VAFY171294	12	527.09	1,023.16	1,550.25	95%	1,472.74
VAFY171295	12	128.85	175.80	304.65	95%	289.42
VAFY171296	12	199.12	152.95	352.07	95%	334.47
VAFY171297	12	117.13	244.36	361.49	95%	343.42
VAFY171303	12	2,342.64	63.29	2,405.93	95%	2,285.63
VAFY171304	12	222.55	1,949.62	2,172.17	95%	2,063.56
VAFY171305	12	234.26	1,193.68	1,427.94	95%	1,356.54
VAFY171308	12	1,335.30	1,838.89	3,174.19	95%	3,015.48
VAFY171309	12	12,415.99	624.09	13,040.08	95%	12,388.08
VAFY171310	12	21,435.16	1,679.02	23,114.18	95%	21,958.47
VAFY171311	12	175.70	583.02	758.72	95%	720.78
VAFY171312	1	878.49	17.58	896.07	80%	716.86
VAFY171313	1	913.63	42.19	955.82	80%	764.66
VAFY171314	1	1,054.19	8.79	1,062.98	80%	850.38
VAFY171315	1	1,522.72	29.89	1,552.61	80%	1,242.09
VAFY171316	12	831.64	3,651.37	4,483.31	95%	4,259.14
VAFY171320	1	2,576.90	87.90	2,664.80	80%	2,131.84
VAFY171321	12	2,811.17	65.05	2,876.22	95%	2,732.41
VAFY171322	12	445.10	919.43	1,364.53	95%	1,296.30
VAFY171469	18	46.85	7.03	53.88	70%	37.72
VAFY1752	N/A	N/A	N/A	N/A	N/A	0.00
VAFY1754	18	46.85	24.61	71.46	70%	50.02
VAFY1756	11	46.85	24.61	71.46	95%	67.89
VAFY17577	12	18,155.46	1,035.46	19,190.92	95%	18,231.37
VAFY17583	19	1,616.42	4,623.54	6,239.96	60%	3,743.98
VAFY17587	9	1,054.19	1,590.99	2,645.18	80%	2,116.14
VAFY17588	3	1,756.98	2,649.31	4,406.29	10%	440.63
VAFY17589	19	4,638.43	5,548.25	10,186.68	60%	6,112.01
VAFY1760	1	163.98	28.13	192.11	80%	153.69
VAFY17604	12	1,054.19	21.10	1,075.29	95%	1,021.53
VAFY17605	12	1,112.75	61.53	1,174.28	95%	1,115.57
VAFY1761	1	199.12	24.61	223.73	80%	178.98
VAFY17610	19	1,054.19	1,935.56	2,989.75	60%	1,793.85
VAFY17613	12	2,928.30	17.58	2,945.88	95%	2,798.59
VAFY17620	12	1,288.45	24.61	1,313.06	95%	1,247.41
VAFY17621	12	105.42	520.37	625.79	95%	594.50
VAFY17624	12	679.37	1,580.44	2,259.81	95%	2,146.82
VAFY240	1	480.24	70.32	550.56	80%	440.45
VAFY241	1	515.38	72.08	587.46	80%	469.97
VAFY243	N/A	N/A	N/A	N/A	N/A	0.00
VAFY249	18	1,628.13	149.43	1,777.56	70%	1,244.29

BMP ID #	Equivalent Ches. Bay Program BMP #	Load from Impervious Acres Treated (lbs./yr.)	Load from Pervious Acres Treated (lbs./yr.)	Combined Load (lbs./yr.)	Sediment Removal Efficiency	Reduction (lbs./yr.)
VAFY250	12	1,698.41	52.74	1,751.15	95%	1,663.59
VAFY253	12	1,698.41	207.44	1,905.85	95%	1,810.56
VAFY263	2	46.85	43.95	90.80	80%	72.64
VAFY270	1	351.40	21.10	372.50	80%	298.00
VAFY279	3	7,590.15	504.55	8,094.70	10%	809.47
VAFY282	N/A	N/A	N/A	N/A	N/A	0.00
				Total Reduction Achieved:		***110,359.56***

In order to maintain credits associated with any urban stormwater BMP a regular inspection and maintenance schedule shall be followed. The Fort Belvoir General Plan for Stormwater Management facility Inspection and Maintenance shall be followed. This will ensure that inspection of each facility will occur at least once per permit cycle (5 years). If an inspection indicates that the BMP performance has been diminished corrective actions should be taken within one year to ensure credits are maintained. If corrective actions are not completed within the timeframe, credits associated with the BMP will be lost until the facility is restored to full performance.

The current permit cycle 2018 through 2023 requires Fort Belvoir to report all BMPs, including the current status and inspection dates, to the Virginia BMP Warehouse located at https://apps.deq.virginia.gov/BMP/. Prior to this requirement, the DoD Chesapeake Bay Program consolidated records for all DoD facilities and reported them to the BMP Warehouse. In coordination with VADEQ, the DoD Chesapeake Bay Program provided the full inventory of Fort Belvoir's BMPs to the VADEQ for appropriate assignment of implemented BMPs and the POCs for assigning roles in the Warehouse. From the Warehouse, the BMP data is then loaded into the National Environmental Information Exchange Network (NEIEN). The NEIEN then processes the data that assigns nutrient and sediment reductions to DoD in the Phase 6 Model via Chesapeake Bay Assessment and Scenario Tool (CAST).

In addition to the BMP's being taken credit for currently, there are BMP's that are proposed within the Lower Accotink Creek Watershed that are currently under construction. Credits for these BMP's may be taken in later years upon completion of construction and approval within the Chesapeake Bay Data Call. BMP's currently under construction are summarized below in Table 17:

Table 17: Proposed BMP Inventory within Lower Accotink Creek Watershed

Proposed BMP Number	Project	BMP Type	Acres Treated	Impervious Acres Treated	Pervious Acres Treated
1	National Museum of the United States Army (NMUSA)	Infiltration Gallery (W1)	1.42	1.19	0.23
2	NMUSA	Infiltration Gallery (W2)	2.26	1.27	0.99
3	NMUSA	Infiltration Gallery (W3)	1.94	1.13	0.81
4	NMUSA	Infiltration Gallery (W4)	3.27	2.03	1.24
5	NMUSA	Infiltration Gallery (W5)	2.89	1.79	1.10
6	NMUSA	Infiltration Gallery (W6)	0.90	0.71	0.19
7	NMUSA	Infiltration Gallery (W7)	2.75	1.89	0.86
8	NMUSA	Infiltration Gallery (W8)	1.37	0.94	0.43
9	NMUSA	Permeable Grass Pavement (W9)	0.82	0.00	0.82
10	NMUSA	Infiltration Gallery (E1)	5.27	3.39	1.88
11	NMUSA	Permeable Pavers (E2)	0.65	0.65	0.00
12	NMUSA	Compost Soil Amendment (E3)	2.93	0.00	2.93
Total Number of Proposed BMP's Within Lower Accotink Creek Watershed:					***12***

The potential credits achieved from these proposed BMP's is then next calculated below in Table 18. The same methodology is used here as is above for the existing BMP's, determining which Chesapeake Bay Program BMP from Table 15 is most applicable/equivalent, and then calculating using the loading rate for Total Suspended Solids for the Potomac River Basin from Table 3b within 9VAC25-890-40 Part II.A.3 (regulated urban impervious area for TSS is 1,171.32 lbs./ac./yr., while regulated urban pervious area for TSS is 175.8 lbs./ac./yr).

Table 18: Total Suspended Solids Reduction per Proposed BMP

Proposed BMP #	Equivalent Ches. Bay Program BMP #	Load from Impervious Acres Treated (lbs./yr.)	Load from Pervious Acres Treated (lbs./yr.)	Combined Load (lbs./yr.)	Sediment Removal Efficiency	Reduction (lbs./yr.)
1	12	1,393.87	40.43	1,434.30	95%	1,362.59
2	12	1,487.58	174.04	1,661.62	95%	1,578.54
3	12	1,323.59	142.40	1,465.99	95%	1,392.69
4	12	2,377.78	217.99	2,595.77	95%	2,465.98
5	12	2,096.66	193.38	2,290.04	95%	2,175.54
6	12	831.64	33.40	865.04	95%	821.79
7	12	2,213.79	151.19	2,364.98	95%	2,246.73
8	12	1,101.04	75.59	1,176.63	95%	1,117.80
9	N/A	N/A	N/A	N/A	N/A	0.00
10	12	3,970.77	330.50	4,301.27	95%	4,086.21
11	N/A	N/A	N/A	N/A	N/A	0.00
12	N/A	N/A	N/A	N/A	N/A	0.00
Total Reduction Achieved From Proposed BMP's (to be applied once complete):						***17,247.87***

These credits can be applied at a later date to this Lower Accotink Creek Sediment TMDL Action Plan, once the BMP's are approved for Fiscal Year 2021 or 2022, the BMP Warehouse, and the National Environmental Information Exchange Network (NEIEN) List.

5.2. URBAN STREAM RESTORATION

Stream restoration is a carefully designed intervention to improve the hydrologic, hydraulic, geomorphic, water quality, and biological condition of degraded urban streams. According to Appendix V.J of the Guidance, urban stream restoration projects may receive credit using the following four (4) protocols:

1. Prevented Sediment During Storm Flow
2. In-Stream and Riparian Nutrient Processing During Base Flow
3. Floodplain Reconnection Volume
4. Dry Channel Regenerative Stormwater Conveyance (RSC) as an Upland Stormwater Retrofit

Each protocol has certain requirements that need to be met in order to qualify. As the completed stream restoration projects at Fort Belvoir are stream restoration practices that prevent channel or bank erosion that would otherwise be delivered downstream from an actively enlarging or incising urban stream, Protocol 1 is most applicable.

The first step is determining the stream restoration projects that can be used for credit. As of July 2020, two (2) stream restoration projects have been completed on Fort Belvoir within the Lower Accotink Creek Watershed between the years 2009 and 2020. All completed projects qualified for the conditions of Nationwide Permit 27, Aquatic Habitat Restoration, Establishment and Enhancement Activities (USACE, 2016). In addition, all completed projects were located completely within the regulated MS4 service area defined in Section 3 and consisted of over 100 linear feet of project area. The stream restoration projects considered for credits are summarized in Table 19 below, with all Stream Restorations on Fort Belvoir Property shown in Figure 7. Most projects considered were listed based on priority in the Real Property Master Plan Environmental Impact Statement (EIS). Some additional projects were completed and funded by either tenant organizations or privatized utility partners. Additionally, improvements of the water and wastewater systems done as part of a main post infrastructure upgrade has been using natural stream design and channel stabilization techniques to correct situations where instream erosion has been threatening existing utility crossings.

Table 19: Completed Stream Restoration Projects

Project Site	Type	Master Plan EIS Site #	Year Completed	Linear Feet (L.ft)
North Area	Natural Channel Design	9	2011	128.0
Stream at NMUSA	Natural Channel Design	25	2019	210.0
			Total Linear Feet	***338.0***

Table 20 below summarizes the Urban Stream Restoration Interim Approved Removal Rates for stream restoration projects. As Fort Belvoir is located entirely within the coastal plain area, and as the older North Area stream restoration project was not completed using more modern and up-to-date calculations, this following method was utilized as a conservative approach to determining removal rates.

Table 20: Urban Stream Restoration Interim Approved Removal Rates

Credits	TSS	
Mass Reduction/length (lbs/linear foot)	44.88 15.13	*non-coastal plain* *coastal plain*

Not all projects qualify for credits when it comes to sediment reductions. The Expert Panel report defining removal rates from individual restoration projects states that any sections that are tidally influenced or projects that are primarily designed to protect public infrastructure by bank armoring or rip rap do not qualify for a credit. The following conditions qualify a project for acceptable stream restoration credit:

- An entire urban stream reaches greater than 100 ft in length that is still actively enlarging or degrading in response to upstream development
- Comprehensive stream restoration design, involving the channel, banks, and floodplain using state approved design methods
- Special consideration is given to projects that area explicitly designed to reconnect the stream with its floodplain and/or create in stream habitat features known to promote nutrient uptake and/or de-nitrification
- Pre and post-project monitoring may be required to substantiate bank/channel erosion rates, using bank pins, cross-sectional surveys or other methods in order to be eligible for credits under protocols 2-5 above. (Schueler & Stack, 2014)

Fort Belvoir streams are periodically evaluated for stability and potential impacts to future development including stormwater management issues, contamination issues, and constructability. The evaluations are used to rank the streams systems for potential and priority restoration prior to being submitted for design funding and construction. Streams where rapid erosion is occurring and/or is potentially adversely impacting vital infrastructure (i.e. water and wastewater lines, roads, facilities and other utilities) are ranked higher than other streams. The evaluation includes photographic documentation of the stream systems, evaluation of watershed influences, and identification of potential impacts to vital infrastructure.

For streams that are candidates for restoration, the U.S. Environmental Protection Agency Rapid Bio Assessment Protocol is being used for further evaluation. Since 2013, Fort Belvoir has also used the Bank Assessment for Non-point source Consequences of Sediment (BANCS) method to quantitatively predict stream bank erosion rates for each stream evaluation. Natural stream design is being employed and takes into consideration the site conditions and any known proposed changes in flows. Although the protocol used may be different from project to project, Fort Belvoir has taken the conservative approach in calculating credits earned by using the approved removal rates as discussed above.

As shown in Table 19 above, a total of 338.0 linear feet of streams have been restored since 2009 within the Lower Accotink Creek Watershed. All permit closeout certifications are kept by DPW-Environmental. Appendix V.J of the Guidance (GM15-2005) was used to determine the achieved reductions from stream restorations to include the adjustments for unregulated lands. The Guidance states that permittees may receive the following credits from:

1. **Regulated Acres:** The full (100%) reduction credits for the portion of the project that receives drainage from regulated acres.
2. **Unregulated Acres:** Half (50%) reduction credits for the portion of the project that receives drainage from unregulated acres.

The next step is to calculate the POC reductions from the proposed stream restoration projects. Because Fort Belvoir is located within the Coastal Plain only, the removal rate for the coastal plain of 15.13 is used in the calculations. Additionally, as the restored stream channels are all within the full MS4 regulated area, no adjustments for unregulated portions of land were required. Since these projects are both being evaluated through the same protocol, the linear feet of restoration is combined and is summarized below in Table 21:

Table 21: Reductions Achieved from Stream Restoration Projects

POC	Linear Feet Restored (linear ft.)	Removal Rates (lbs/linear ft.)	Reduction Achieved (lbs./yr.)
Total Suspended Solids	338.0	15.13	***5,113.94***

Verification of the initial and long-term performance of stream restoration projects is critical to ensuring that the nutrient and sediment reduction is met. According to the Chesapeake Bay Program Stream Restoration Workgroup's BMP Verification Guidance the following should be maintained in order to keep the load reduction credits associated with each project above:

- Length of qualifying stream projects completed each year
- Post construction certification that the stream restoration practices were installed properly for each project reach and are working as designed
- Maintain project files for each site for the lifetime of the project
- Duration of the credit is 5 years, but can be renewed if field inspection indicates the stream restoration project is still meeting its design objectives. (CSN , 2011)

The length of each qualifying stream length for which Fort Belvoir is receiving credit is shown in Table 19 and post construction certifications are kept by DPW-Environmental. For any new Stream Restoration Projects, actual stream restoration linear footage will be reported within the MS4 Annual Report. The MS4 report will document the following for each individual stream restoration project installed:

- Type, length, and width of the project
- Location coordinates
- Year of installation and maximum duration of credits
- 12-digit watershed in which it is located
- Protocol(s) used
- Projected sediment, nitrogen, and phosphorus reductions

Inspections of stream restoration projects will occur 2 years after initial construction and once every 5 years afterwards. This inspection schedule shall occur for the lifetime of the project in order to ensure that individual projects are still capable of removing nutrients and sediment. If a field inspection indicates that the original design criteria has been diminished, Fort Belvoir will have one year to take corrective actions and restore the stream to its original design capacity. If corrective actions aren't taken within the required timeframe the BMP credits will be eliminated but can be credited once again after restoring to its original performance. (Workgroup, 2014)

Verification of the long-term performance of the stream restoration for the North Area was completed during the 2018-2019 permit cycle, and the Stream at NMUSA was completed during the 2019-2020 permit cycle. Fort Belvoir Stream Assessment Form 1 and Form 2 and the associated Habitat Assessment Field Data every 100 feet for stream restorations of less than 1,000 linear feet and every 200 linear feet for stream restoration sites that exceed 1,000 linear feet were used to assess the functionality of the stream restoration projects. The effort provided updated data on restored length and verified the long-term performance of the restorations in order to maintain any associated credits for the next five years. Below is a summary of the conclusions for the verified projects, the full reports are available upon request:

North Area: On January 17, 2019, a stream and habitat assessment were conducted of the North Area Stream Restoration Project. The North Area Stream Restoration restored 128 linear feet (LF) of stream restoration along an unnamed tributary to Accotink Creek completed in 2011. Field assessments indicate the stream restoration is preventing erosion within the restored area successfully. The restoration project is functioning as expected and should continue to generate credits for the next five (5) year cycle.

Stream at NMUSA: On December 30, 2019, a stream and habitat assessment were conducted of the Stream at NMUSA Project. The Stream at NMUSA Restoration project restored 210 linear feet (LF) of stream restoration along an unnamed tributary to Accotink Creek completed in 2019. Field assessments indicate the stream restoration has successfully prevented erosion within the restored area. The restoration project is functioning as expected and should continue to generate credits for the next five (5) year cycle.

5.3. STREET SWEEPING

In March 2020, Appendix V.G was revised for street sweeping to better reflect the most recent Bay Program guidance on this subject. This method was utilized to estimate the reduction achieved for street sweeping within the Lower Accotink Creek Watershed. The actual acres and reductions achieved annually will be reported in the MS4 Annual Report.

Street sweeping is an effective strategy of removing sediment loads prior to them being transported in stormwater runoff. Frequent sweeping of prioritized areas is an effective strategy to receive pollutant reduction credits to meet TMDL targets. There is one approved approach for calculating pollutant removal; the revised street cleaning module which uses the Windows Source Loading and Management Model (WinSLAMM) to determine allowable street cleaning credits. This method was used to calculate load reductions, according to Appendix V.G of the Chesapeake Bay TMDL Special Condition Guidance, which states:

1. Determine which street cleaning scenario your program falls under.
2. Calculate loading rate associated with the impervious area swept.
3. Calculate your load reductions.

Table 22 below summarizes the street sweeping practices available for credit, according to Appendix V.G of the Chesapeake Bay TMDL Special Condition Guidance:

Table 22: Street Cleaning Practices Available for Credit

	Practice #	Description	Passes/Year (approx.)	%TSS Removal
Advanced Sweeping Technology (vacuum or regenerative air sweeping technologies)	SCP-1	2 passes per week	100	21
	SCP-2	1 pass per week	50	16
	SCP-3	1 pass every 2 weeks	25	11
	SCP-4	1 pass every 4 weeks	10	6
	SCP-5	1 pass every 8 weeks	6	4
	SCP-6	1 pass every 12 weeks	4	2
	SCP-7	Seasonal scenario 1 or 2	15	7
	SCP-8	Seasonal scenario 3 or 4	20	10
Mechanical Broom Technology	SCP-9	2 passes per week	100	1.0
	SCP-10	1 pass per week	50	0.5
	SCP-11	1 pass every 4 weeks	10	0.1
Seasonal scenarios are defined as follows: S1: Spring – One pass every week from March to April. Monthly otherwise. S2: Spring – One pass every other week from March to April. Monthly otherwise. S3: Spring and Fall – One pass every week (March to April, October to November). Monthly otherwise. S4: Spring and Fall – One pass every other week during the season. Monthly otherwise.				

Fort Belvoir has an existing street sweeping program executed by a contractor already in place. The Operation and Maintenance Contractor uses a regenerative vacuum sweeper to conduct monthly sweeping on roads and parking lots. The contract specifies that approximately 13 million square yards of impervious surfaces will be swept monthly over the entire installation, with 6,168,127 square yards of roadways and 6,821,433 square yards of parking lots. Of this area, only 1,472,447 square yards are within

the Lower Accotink Creek Watershed. A breakdown is provided below in Table 23 of how this value was determined.

Table 23: Area Swept per Facility, Road, or Parking Lot within Lower Accotink Creek Watershed

Facility, Road, or Parking Lot Name	Area Swept (sq.yd.)
Defense Logistics Agency (DLA)	142,950
Davison Army Airfield (DAAF)	302,896
National Geospatial Agency (NGA)	99,593
Aerospace Data Facility – East (ADF-E)	129,305
Barta Road	17,118
Beulah Street	264,409
Farrar Road	54,861
John J. Kingman Road	110,170
McCutcheon Road	22,473
Wills Road	151,138
Mosby Reserve Center Parking Lot	131,913
Building 2901 Parking Lot	40,572
Barta Road Parking Lot	5,049
Total:	***1,472,447***

As street sweeping must be credited annually, Belvoir has taken a conservative approach. The following steps were taken to determine reductions from the street sweeping:

1. Determine which street cleaning scenario your program falls under: There is a total of 1,472,447 sq.yd. within the Lower Accotink Creek Watershed. Due to this, it is conservatively estimated that sweeping will occur on a basis of one pass every 4 weeks, meeting Practice SCP-4. This means a Total Suspended Solids removal efficiency of 6%. As these values are given in square yards, this needs to be converted to acres using the conversion factor of 4,840 sq. yd. in an acre:

$$\left(1{,}472{,}447\ sq.yd.\left(\frac{1\ acre}{4{,}840\ sq.yd.}\right)\right) = 304.22\ acres$$

   Acreage can then be converted to curb-lane miles swept using the conversion factor of one acre = one curb lane mile rule of thumb, making 304.22 curb lane miles swept.

2. Calculate loading rate associated with the impervious area swept: Multiplying the curb lane miles swept by the sediment loading rates for urban impervious cover within the Potomac River Basin is the next step. The 2009 EOS Loading Rate was acquired from the MS4 Permit Part II.A.3, Table 3b. This calculation is shown below in Table 24.

Table 24: Calculate Street Sweeping Loading Rate for the Potomac River Basin

POC	Acres Swept (monthly)	2009 EOS Loading Rate (lbs/acre/yr)	Estimated Total POC Load (lbs/yr)
TSS	304.22	1,171.32	356,338.97

3. Calculate your load reductions: Determine reductions from street sweeping by multiplying the loading rate by the removal rate for SCP-4 shown in Step 1. This calculation is shown below in Table 25.

Table 25: Reductions Achieved Through Street Sweeping

POC	Pre-Sweep Baseline Load (lbs. /yr.)	Removal Rate Percentage (lbs./acre/yr.)	Reduction Achieved (lbs. /yr.)
TSS	356,338.97	0.06	***21,380.34***

Street sweeping is considered an operational BMP and verification is usually done by insuring that it is being conducted appropriately. This verification process involves the submittal of monthly reports by the contractor performing the work as well as inspections and approval from the Contract Performance Specialist (CPS) prior to payment for services. In addition, windshield inspections are conducted by the stormwater program to identify issues or areas of concern.

5.4. STORM DRAIN CLEANING

Storm Drain Cleaning is another effective method at removing sediment from stormwater systems prior to being transported to water bodies. Sediment reduction credits are provided for solids that are directly removed from catch basins, within storm drain pipes, or captured at the storm drain outfalls. Credits also apply to sediment removal from concrete-lined conveyance channels, but does not apply to sediment removal during ditch maintenance along open section roads. Sediments are removed from these systems on Fort Belvoir Property and are taken to two (2) dumpsters located at Tactical Washrack on Meade Road. Sediments are collected in dumpsters until full, at which point they are allowed to dry out, are sampled to determine the proper disposal procedures required, and are then disposed of by a contractor. At the disposal time, the dry weight is recorded in a waste disposal manifest.

According to Appendix V.G.2, the first step is to determine the pounds of solids and organic matter that is collected or removed from catch basins, storm drain pipes, at the storm drain outfall, or from within concrete-line conveyance channels. This credit is conducted on an annual basis and all solids collected are combined for a single-year value. From there, the initial wet mass may be converted to dry weight. As the dry weight is the weight that is recorded on the waste disposal manifests obtained at Fort Belvoir, this weight is already known and no conversion needs to occur.

From there, to determine the reductions achieved from Storm Drain Cleaning the dry weight mass is then multiplied by a Nutrient Enrichment Factor for Total Suspended Solids. Dry weight reported here is the actual values reported in 2018 of 137,680 pounds or 68.84 tons of dry weight material for the entirety of Fort Belvoir. This will need to be evaluated yearly to determine how much weight was disposed in the previous year for reporting purposes.

As the value of 137,680 pounds or 68.84 tons of dry weight material is for the entirety of Fort Belvoir, this needs to be applied to just the area within the Lower Accotink Creek Watershed. From Table 6, the total MS4 Service Area is 3,202 acres, while from Table 9, the Lower Accotink Creek Watershed has a total of 1,429.5 acres within the MS4 Service Area, making up for 44.64% of the total MS4 Service Area. This can be simply applied to the total dry weight, and the total reductions achieved are summarized in Table 26 below:

Table 26: Storm Drain Cleaning Reductions Achieved off Nutrient Enrichment Factor

Dry Weight (lbs./yr.) Fort Belvoir MS4 Service Area	Dry Weight (lbs./yr.) Lower Accotink Creek MS4 Service Area	TSS Nutrient Enrichment Factor	Reductions Achieved (lbs./yr.)
137,680	61,460.35	0.3	18,438.11

The following three qualifying conditions should be observed in order to achieve credits for the storm drain cleaning as follows:

1) To maximize reduction, efforts should target catch basins that trap the greatest organic matter loads, streets with the greatest overhead tree canopy and/or outfalls with high sediment or debris loads.
2) The loads must be tracked and verified using a field protocol to measure the mass or volume of solids collected within the storm drain system. The locality must demonstrate that they have instituted a standard operating procedure (SOP) to keep track of the mass of the sediments and/or organic matter that are removed.

3) The material collected and measured for the credit must be properly disposed so that it cannot migrate back into the watershed.

As described above, a procedure is in place to address the qualifying conditions in order to receive credits for storm drain cleaning. Material collected from storm drain cleaning is taken to two (2) dumpsters located at the Tactical Washrack on Meade Road, where they are allowed to drain into a sedimentation basin before entering an Oil Water Separator, which discharges into the sanitary sewer system. The contractor responsible for operations coordinates this discharge with Noman Cole Pollution Control Plant. When dry, the soil is sampled to determine proper disposal procedures required, and are then disposed of by the contractor. At the disposal time, the dry weight is recorded in a waste disposal manifest.

5.5. LAND USE CHANGE

As part of the "all of the above" approach, Fort Belvoir looks for opportunities to receive credit for land use change conversions and apply the appropriate credit as per Appendix V.H of the Guidance. This may include converting impervious to forest, impervious to mixed open, impervious to turf, turf to forest, turf to mixed open, or mixed open to forest. Upon completion of a land use change BMP, Table V.H.1 Land Use Change Conversion Efficiency table found in the Guidance can be used to calculate the reductions. The guidance puts some restrictions on the accounting for land use changes to both forest and mixed open. To qualify a conversion to 'mixed open,' the area is defined as herbaceous cover that is minimally disturbed, and must remain unmanaged with no nutrients applied. To qualify for the 'forest' credits, the acres converted must meet the density requirements described in the Virginia Department of Forestry Land Use Tax Assessment Standards. The conversion efficiencies for the Potomac River Basin are presented in Table 27, below.

Table 27: Land Use Change Efficiencies for the Potomac River Basin

Original Land Use	Post Conversion Land Use	Edge of Stream Reductions TSS (lbs/ac/yr)
Impervious	Forest	1,797.0
Impervious	Mixed Open	877.0
Impervious	Turf	1,240.0
Turf	Forest	557.0
Turf	Mixed Open	0.0
Mixed Open	Forest	920.0

Multiple sites across Fort Belvoir were considered for the land use change credits to include sites at Belvoir North Area and on the Main Post within the Accotink Creek Watershed. Each site was reviewed to see which category of conversion each falls in. The sites considered, the acreage converted, and the conversion status are presented in Table 28 below.

Table 28: Sites Considered for Land Use Changes

Site	Acres	Notes	Original Land Use	Post Conversion Land Use
Belvoir North – West	23.71	500 seedlings/acre	Turf	Forest
Belvoir North – East	2.88	300 seedlings/acre	Impervious	Mixed Open

The projects above were all considered as land use changes with the potential for credits. Table 29 below summarizes the total reductions achieved through changes in land cover.

Table 29: Reductions Achieved Through Land Use Changes

Original Land Use	Post Conversion Land Use	Total Acres Converted	Reduction TSS (lbs/yr)
Impervious	Forest	0	-
Impervious	Mixed Open	2.88	2,525.76
Impervious	Turf	0	-
Turf	Forest	23.71	13,206.47
Turf	Mixed Open	0	-
Mixed Open	Forest	0	-
Total Reductions Achieved			***15,742.23***

On site monitoring during the first three years after a land use conversion should be conducted to ensure stabilization of the change. Land use change projects are designed to minimize long-term maintenance and can be assumed to be maintained in perpetuity. Documentation of these areas is covered within the Fort Belvoir Integrated Natural Resources Management Plan dated August 2018.

6. IMPLEMENTATION SCHEDULE AND COSTS

VA TMDL Guidance provides an overall timeline for when all pollutant load reductions must be implemented by to include long term maintenance. Fort Belvoir has been able to exceed all required TMDL reductions for the Lower Accotink Creek Sediment TMDL. Table 30 below summarizes the cumulative required reductions in comparison to already implemented practices.

Table 30: Cumulative Reductions Achieved and Progress towards Goals

POC	BMP	Required Reduction (lbs. /yr.)	Reductions Achieved (lbs. /yr.)	Cumulative Load Reduced vs. Required
Total Suspended Solids	Urban Structural BMPs	***161,960***	110,359.56	68.14%
	Stream Restoration		5,113.94	3.16%
	Street Sweeping		21,380.34	13.20%
	Storm Drain Cleaning		18,438.11	11.38%
	Land Use Change		15,742.23	9.72%
Total Suspended Solids Reduction Achieved			***171,034.18***	***105.60%***

As the projects needed to satisfy all required reductions are already complete, an implementation schedule and planning level costs are not necessary and are not included in this report. Although additional projects are still planned, no additional BMPs are required to be implemented to meet pollutant reduction goals for the Lower Accotink Creek Sediment TMDL in regards to Fort Belvoir. The completed/implemented projects far exceed the reduction requirements for Total Suspended Solids. Therefore, the focus of this Action Plan has been to describe the efforts needed in order to maintain the credit already earned. This includes requirements for reporting and verification of all BMPs as described in Section 5.

7. 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 Sediment TMDL Action Plan was completed as per Part II.B of the 2018-2023 General Permit. This Lower Accotink Creek Sediment TMDL Action Plan allowed for a public comment period by being posted on the Fort Belvoir Home Page under Environmental Documents for Stormwater in 8 January 2021. A Notice of Availability for the document was:

- Posted on the Fort Belvoir Environmental Facebook page on 8 January 2021
- Posted on the Fort Belvoir Home Page on 8 January 2021
- Published in the Fort Belvoir newspaper, *The Belvoir Eagle* on 14 January 2021

Fort Belvoir provided for the public comment period to be open until February 15, 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 Sediment TMDL Action Plan to VADEQ due on May 29, 2021.

Comment	Response

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APPENDIX A

FIGURES

A-1 - JURISDICTIONAL BOUNDARY
A-2 - OTHER VPDES PERMITTED AREAS ON MAIN POST
A-3 - OTHER VPDES PERMITTED AREAS AT NORTH AREA
A-4 - 2000 VS. 2010 URBANIZED CENSUS AREAS
A-5 - ADDITIONAL AREAS CONSIDERED URBAN
A-6 - STRUCTURAL BMP LOCATIONS AT FORT BELVOIR
A-7 - STREAM RESTORATION PROJECT LOCATIONS AT FORT BELVOIR

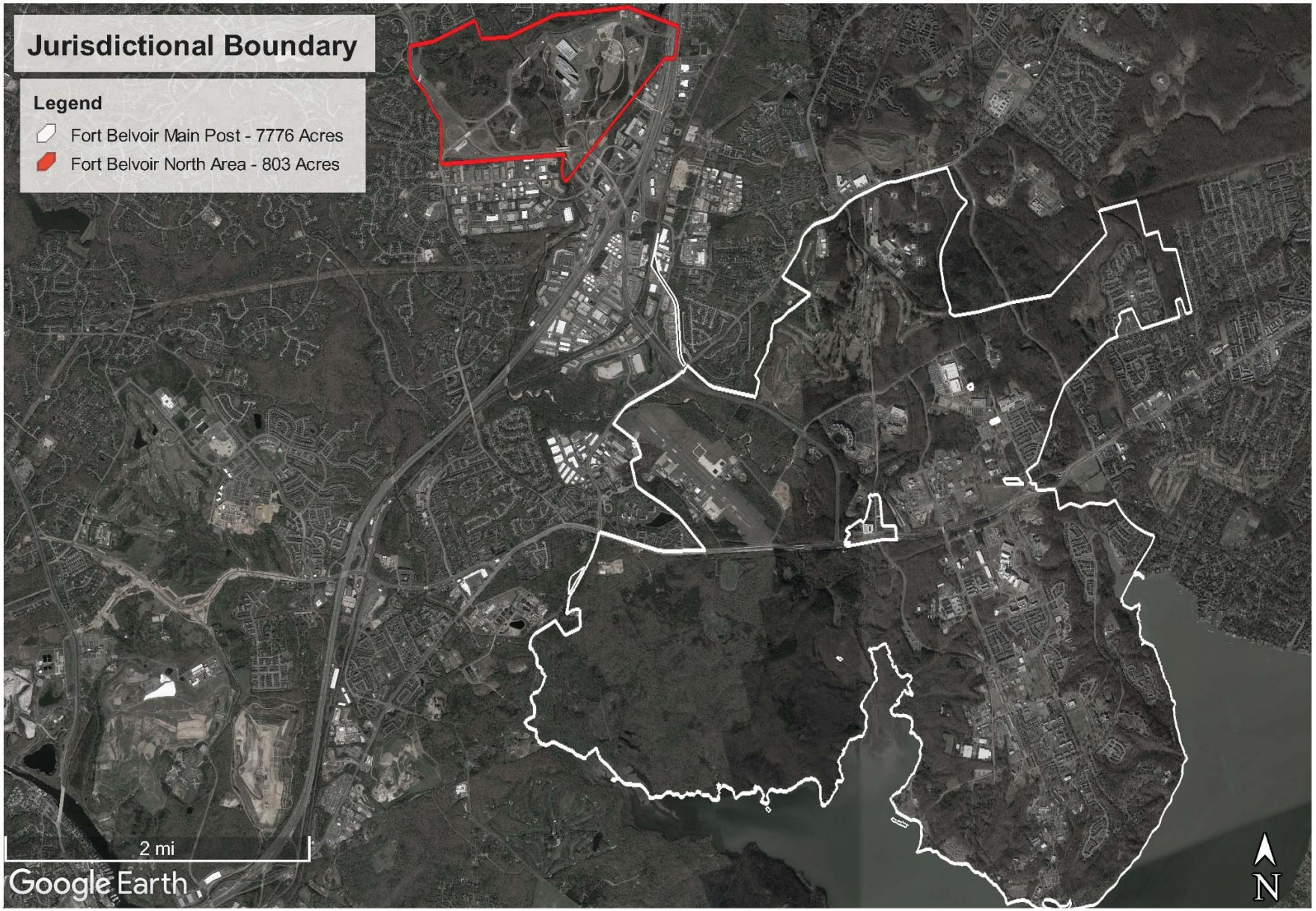

Figure 1: Total Fort Belvoir Jurisdictional Boundary

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Fort Belvoir

Prepared by:
SCF LLC

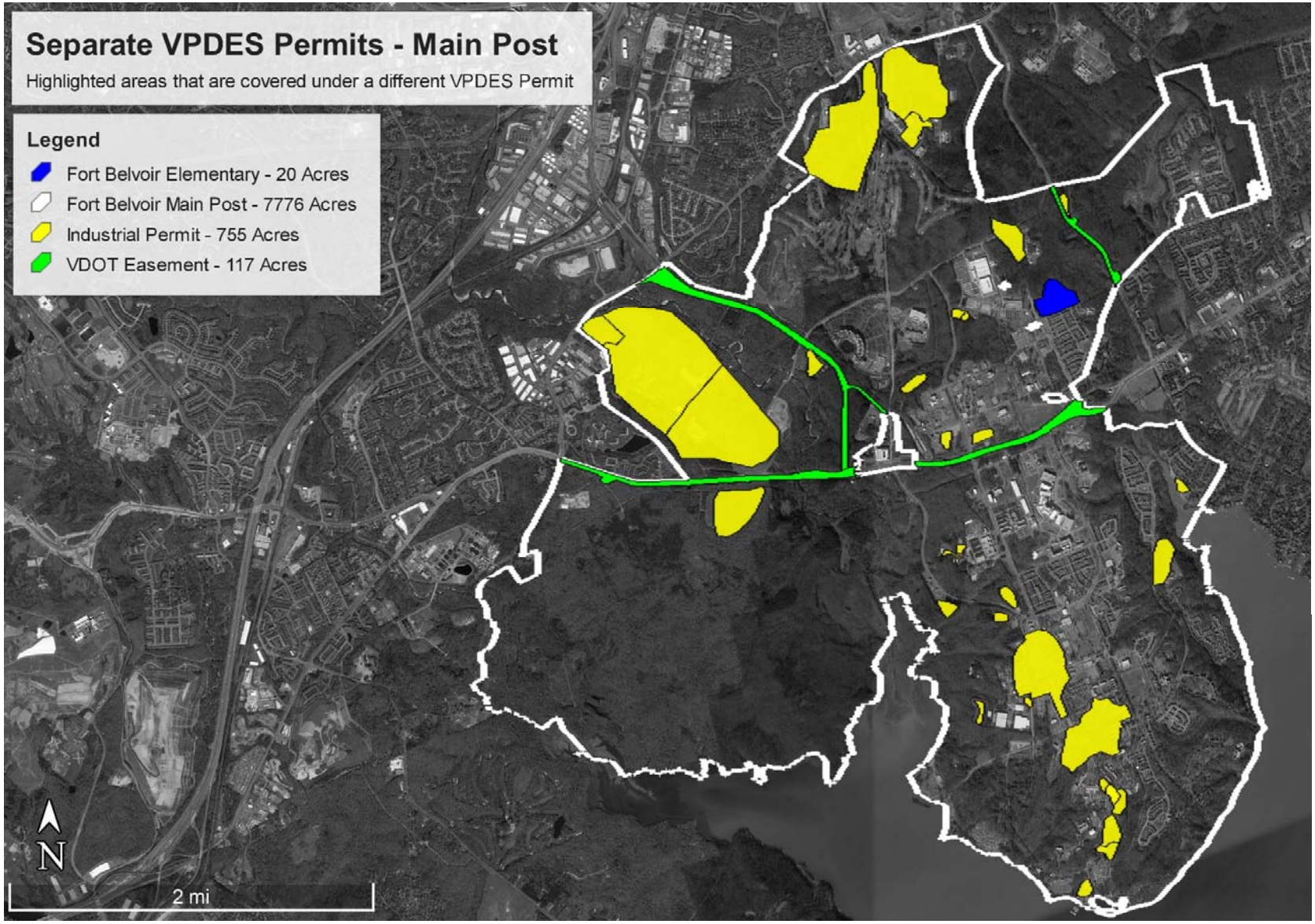

Figure 2: Areas Covered Under a Separate VPDES Permit on the Main Post

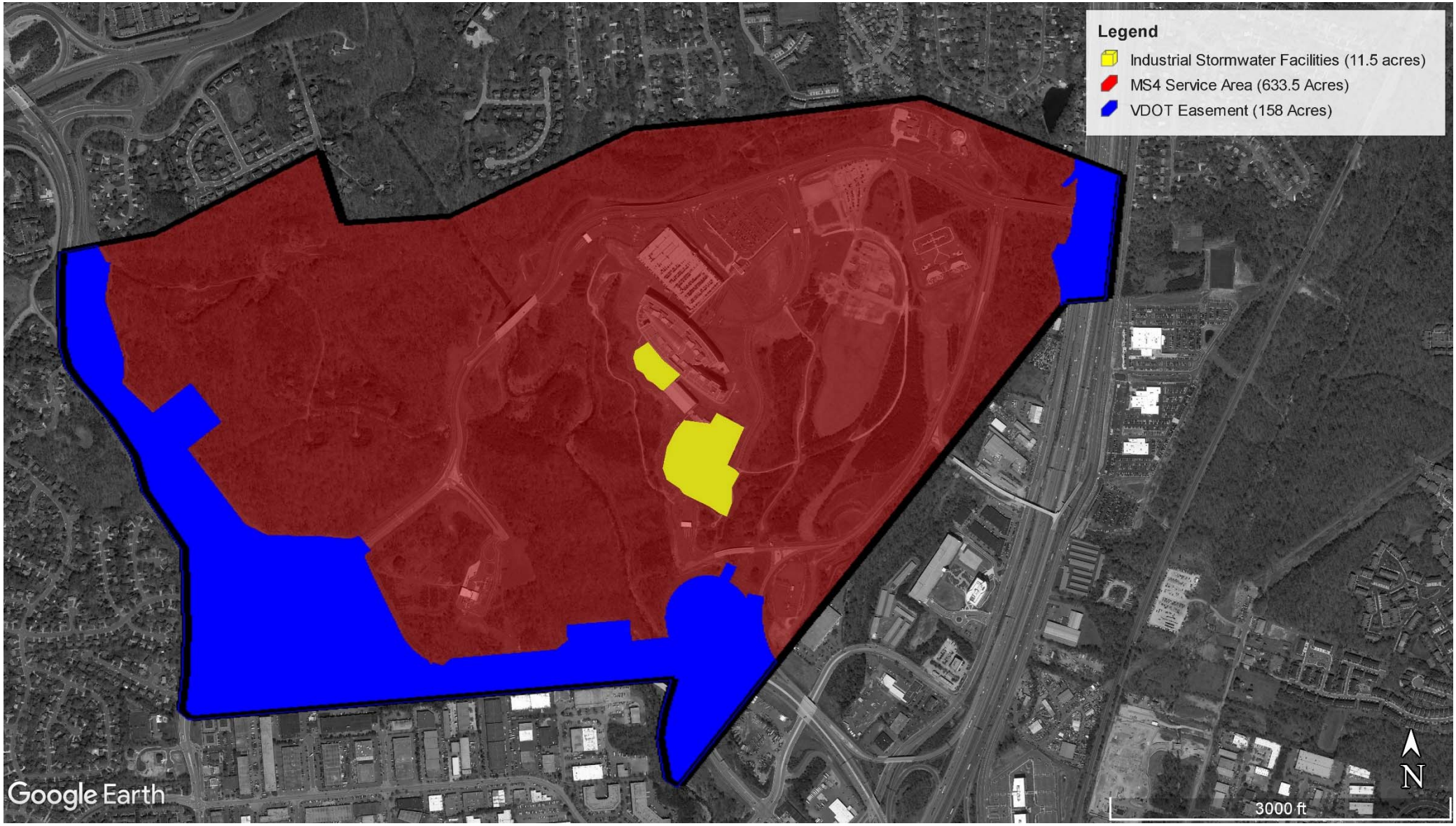

Figure 3: Areas Covered Under a Separate VPDES Permit at Fort Belvoir North Area

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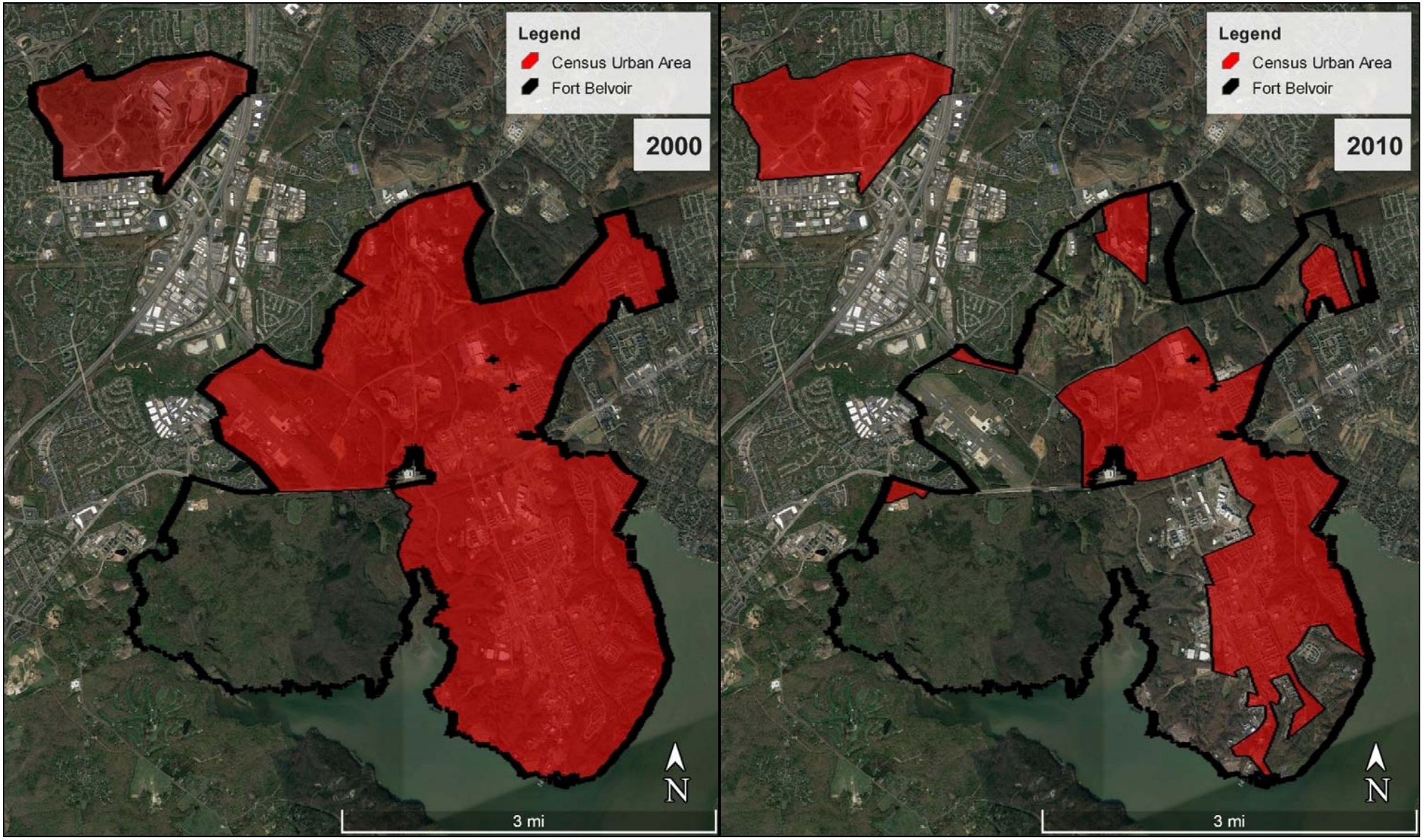

Figure 4: Fort Belvoir's Urbanized Areas Based on 2000 and 2010 Census Data

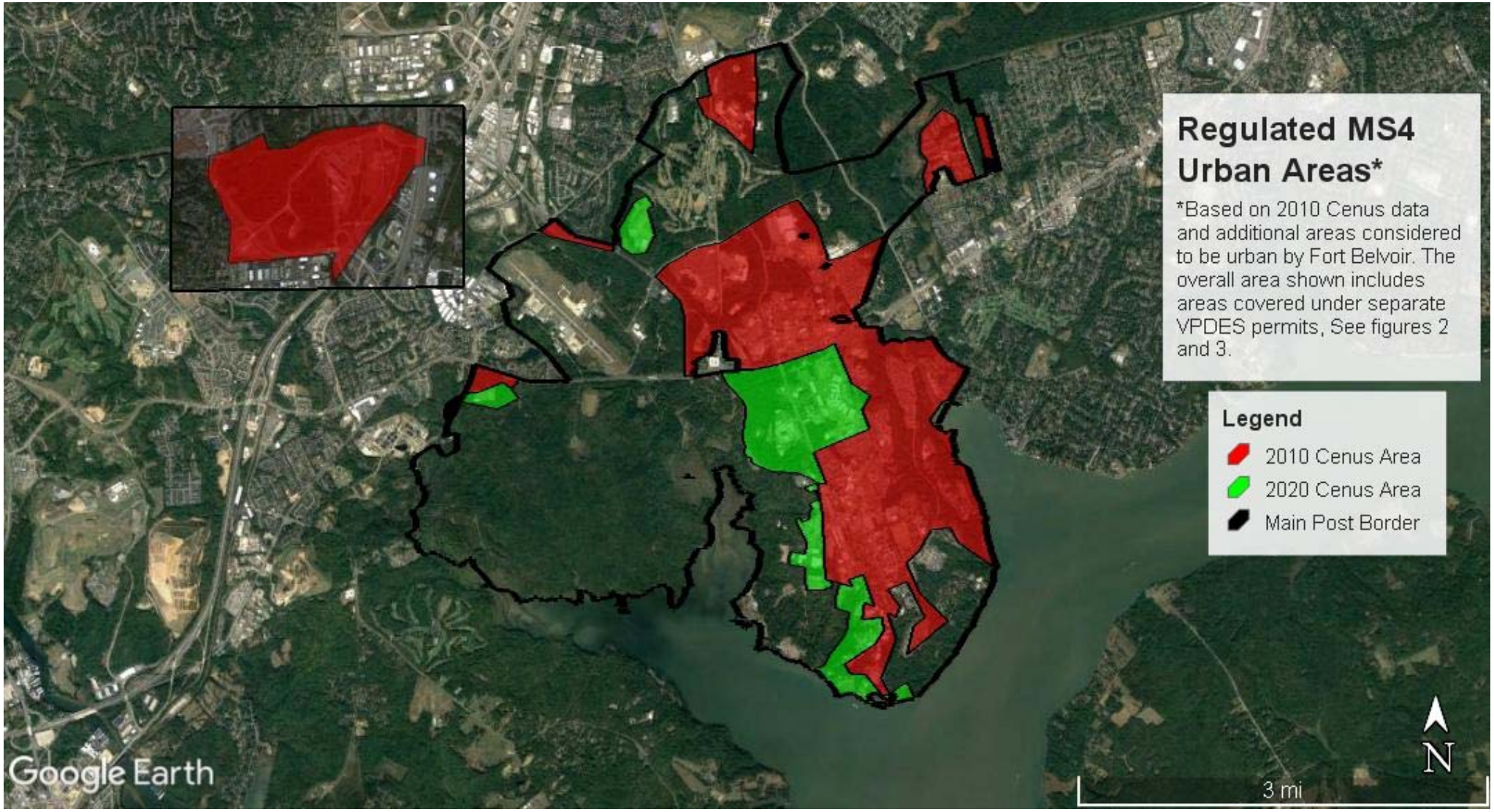

Figure 5: Additional Areas Considered to be Urban Based on Current and Projected Land Use

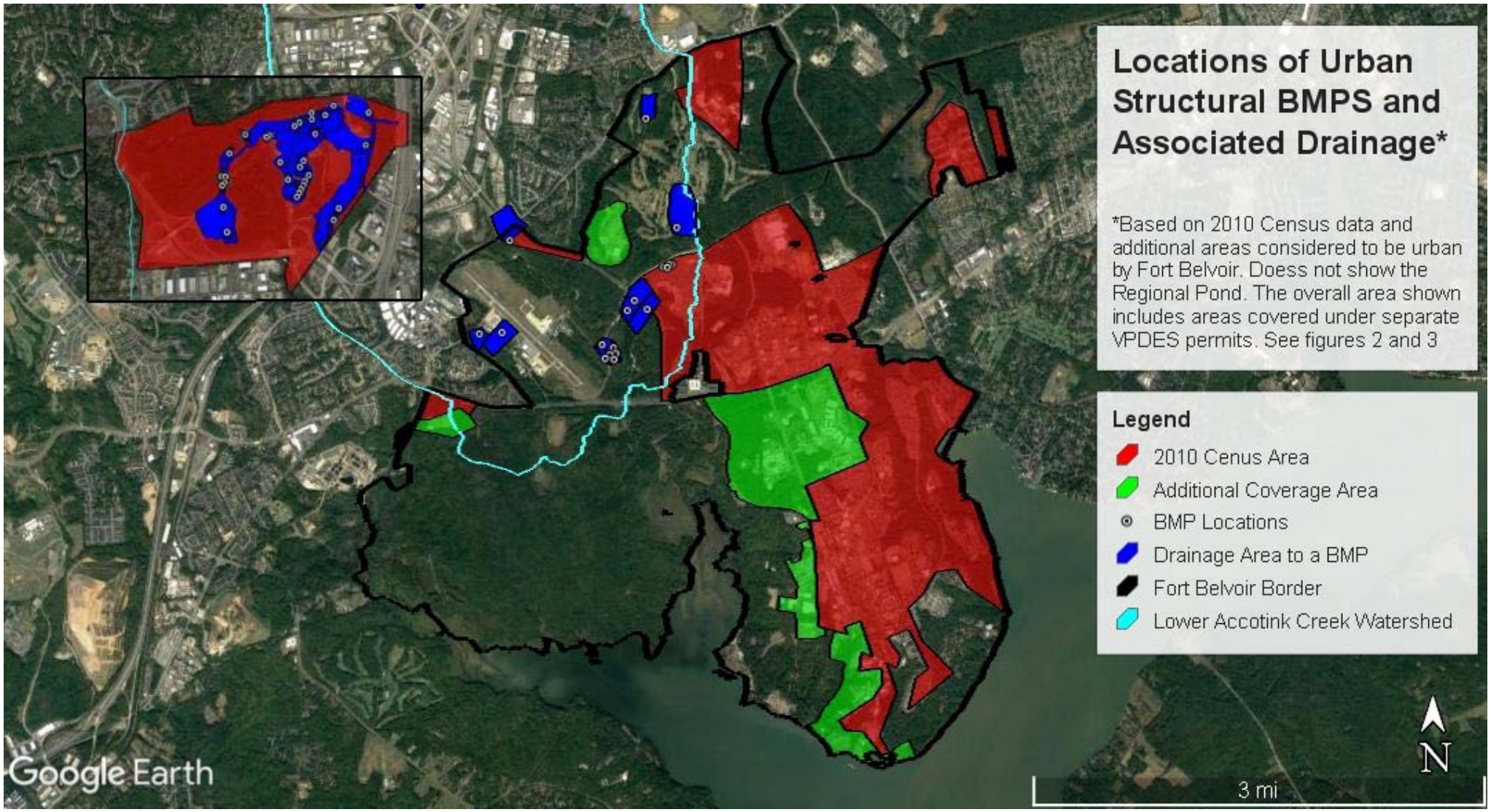

Figure 6: Locations of Structural BMPs on Fort Belvoir

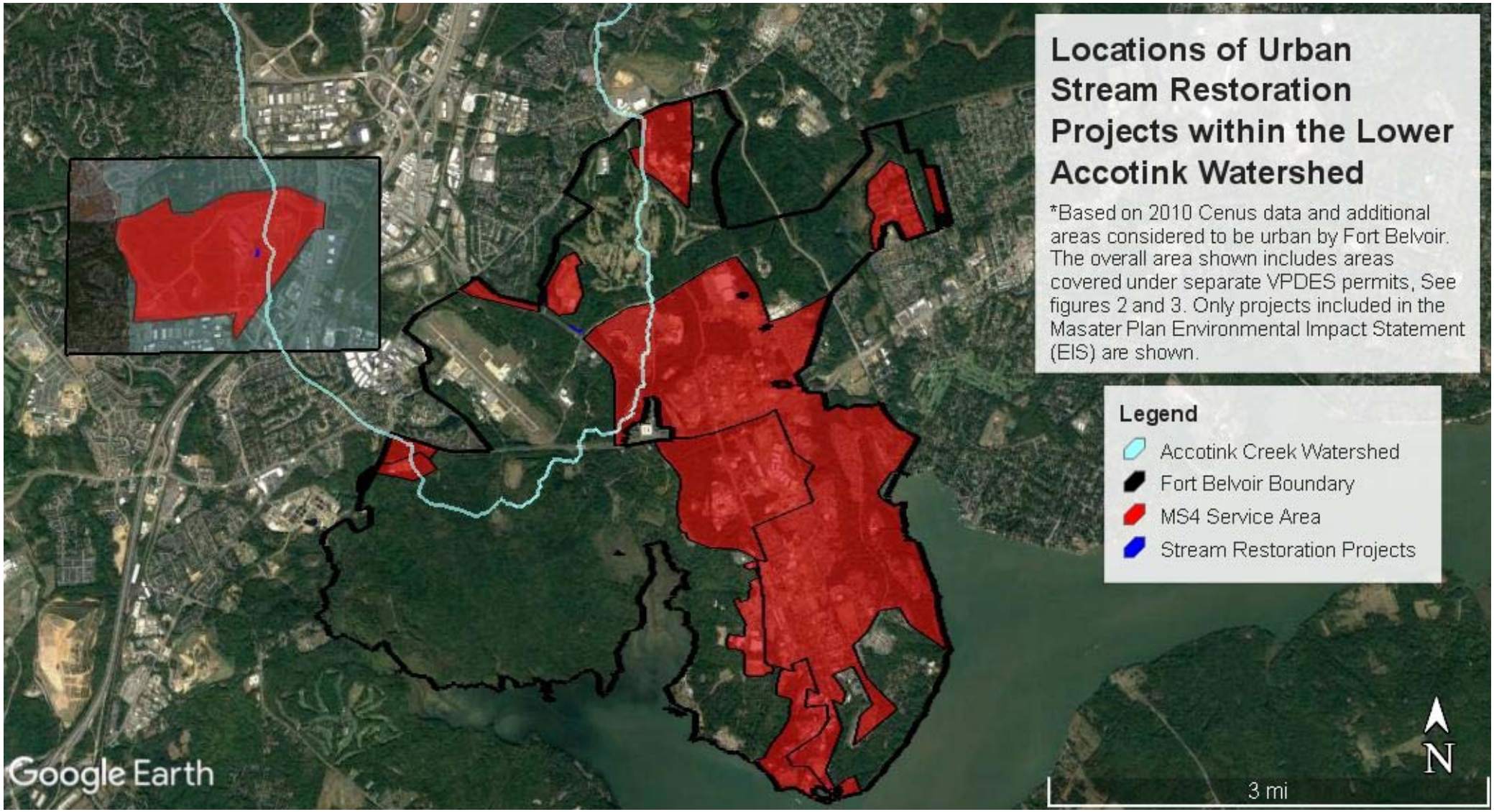

Figure 7: Locations of Stream Restoration Projects on Fort Belvoir

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APPENDIX B

OPEN SPACE STUDY SUMMARY FROM REAL PROPERTY MASTER PLAN

FORT BELVOIR ACCOTINK CREEK SEDIMENT TMDL ACTION PLAN

that appears higher than the actual energy consumption per square foot. A growth of data center and cybersecurity operations from 2004 through 2007 without a sizable increase in building square footage likely contributed to the reported increase in energy consumption.

Despite the uncertainties of relating energy use and building square footage, the overall energy trends projected in Table 5.2 are assumed to be valid for planning purposes.

Implementing Energy Reduction Goals

The Sustainable Design and Development Policy Update on Environmental and Energy Performance (U.S. Army, 2010h) provide guidance for how aspects of the EPAct05, EISA07, EO 13423, and EO 13514 apply to Army facility construction. Achieving these federal mandates and the energy reduction vision described in the CEWMP are carried out on two main levels. These are:

Planning Level

At a large scale, implementing renewable energy projects such as geothermal energy for direct use or electricity generation is largely dependent on subsurface geological conditions of hot water and steam reservoirs. These projects are generally not feasible. Fort Belvoir's region is not well-suited to the continuously high wind speeds required for significant wind power potential; in addition, wind turbines would impact migratory bird routes. Solar photovoltaic technology for converting sunlight into electricity has been too costly to pursue without access to the federal and state tax incentives available for the commercial and residential sector.

However, smaller scale renewable energy systems (i.e., building rooftop solar panels and geothermal systems) may be possible in certain select areas. Additionally, clustered buildings, particularly those with offsetting peak energy demands, could share common heating/cooling systems. This approach would be cost effective and increase energy efficiency throughout the life cycle. Mixed-use buildings and/or new development clustered around common open spaces areas as shown in **Section 4: Framework Plan** and in the regulating plans presented in the IPS support the notion of shared uses in a campus style setting.

Project and Building Level

Energy reduction and sustainability goals to meet federal mandates are achieved largely measured and incorporated at the project or building level. It is during the site development phase when planning and engineering studies begin to incorporate sustainable design and development principles to minimize water consumption and optimize energy efficiency. The Army will incorporate the high performance building requirements of EO 13514 into any facility design. Starting with the FY 2013 military construction program, new buildings and structures, and major renovations shall be built to achieve a minimum silver level through the Leadership in Energy and Environmental Design (LEED) green building rating system, one performance level above LEED-certified and two levels below LEED platinum. Several excellent examples of this energy-efficient building can are found, such as the new Fort Belvoir Community Hospital on the Main Post.

Additional information regarding the Army energy policy, including energy reduction goals, can be found in **Appendix B4 Army Directive 2014-02 Net Zero Installation Policy** (issued 28 January 2014).

Regulating Plans in the Fort Belvoir IPS align with and support energy reduction goals. They include open space areas that could incorporate low impact design features that enhance protection of the streams and watersheds.

FBNA Short-Term (2017) Utility Systems Requirements

Sanitary Sewers

As part of BRAC 2005, a network of new sanitary sewer lines was installed at FBNA that connects to the Fairfax County trunk sewer that runs along Accotink Creek. These lines have been located and sized to serve potential additional development on FBNA. The Fairfax County trunk sewer varies in diameter from 42 to 54 inches. Fairfax County DPWES-WMD staff indicate that this existing trunk sewer and the existing County wastewater treatment plant both have adequate capacity to serve the potential additional development at FBNA. Sewer service to FBNA was previously metered, but (according to Installation staff) these meters were pulled prior to construction of the NGA complex. The Installation is negotiating a new contract with the Fairfax County DPWES-WMD for sewer service to FBNA.

Water Distribution

As part of BRAC 2005, a water distribution network was installed that connects to the existing Fairfax Water system on Backlick Road. Fairfax Water indicates that the existing County water system has adequate capacity to serve both existing and anticipated future development at FBNA. Water infrastructure at FBNA includes a distribution system and a new water tank sized for future development at FBNA.

A new water storage tank is proposed at FBNA to provide emergency storage; the tank site will allow construction of two additional tanks if required. Water service to FBNA is metered at the connection to the Fairfax Water system at Backlick Road.

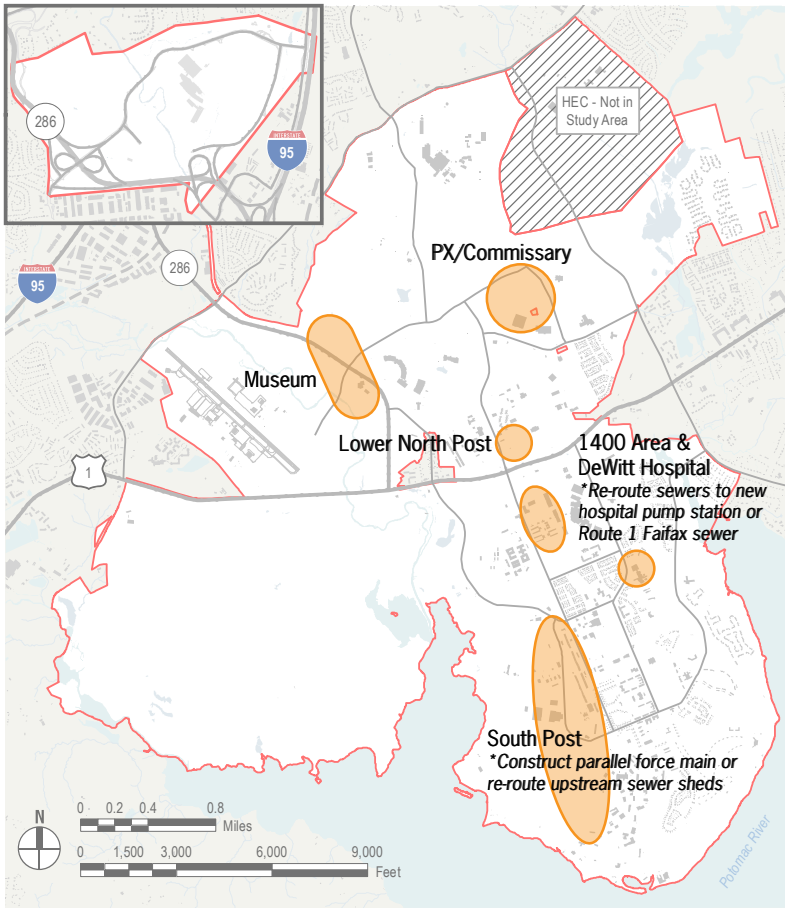
Electric and Natural Gas

Both electric and natural gas service at FBNA are privatized. Dominion Virginia Power (DVP) and Washington Gas provide electric and natural gas service, respectively, to the Installation boundary, as well as distribution and service lines within the Installation. DVP has constructed off-site transmission lines and a new substation to provide permanent electric service. These facilities have capacity for some additional development; however, the anticipated trend for more intensive electrical/energy service demands as described in the CEWMP, are expected to increase with the number of secure campuses that require large data processing facilities to operate. The Installation and DVP shall remain engaged in the planning process for any significant new construction at FBNA. Washington Gas has extended service to FBNA and does not foresee any difficulty in providing service for future development. In summary, utility service providers will be able to support new development at the levels proposed. Depending on the size and location of the project, advance planning is recommended to identify the specific load requirements in order to allow time to construct any new facilities that may be needed.

Stormwater Management

The development at FBNA includes extensive drainage conveyance and stormwater management facilities, providing both quality and quantity control. These facilities convey runoff to the existing on-site channels that eventually drain into Accotink Creek. In general, the types of stormwater management quality and quantity control facilities, including LID measures that were constructed with the NGA project, represent an improved post-development condition from previous uses on the site. Future development on FBNA would deploy similar SWM design measures. For further information on SWM design strategies that apply to all new projects, see the section on Stormwater Management.

Figure 5.2 - Sanitary Sewer Improvements - Short Term (2017)



Main Post Short-Term (2017) Utility Systems Requirements

Sanitary Sewers

The sewer system was privatized to American Water Military Systems in 2010. American Water (AW) is preparing a Capital Improvement Plan that includes repair and replacement to existing pump stations, and repairs and upgrades to existing sanitary lines. Based on existing conditions and projected sewer demands created by the near-term project, AW has identified several areas of concern (See Figure 5.2):

- American Water has prepared a hydraulic study of the sewer system using limited survey and metering data. From observation, no significant capacity problems exist on Post. Pump Stations 00097 and 00687, serving the southern part of Main Post, sometimes overflow into holding tanks during wet weather events. American Water plans pump replacements at these two facilities and also plans pipe lining which shall reduce infiltration. American Water does not see any major infrastructure problems in the system to support near-term growth. Some pipe surcharging occurs during wet weather events, but there are no overflows.
- Construction of the new Fort Belvoir Community Hospital complex included a rerouting of sanitary lines in the area around the Hospital. This area previously flowed to a trunk line east of Belvoir Road and south to Pump Station 687. It now ties to a new

pump station near the Hospital and then flows north to the Fairfax County sewer line along Route 1. This diversion has relieved capacity issues on the trunk line east of Belvoir Road as well as at Pump Station 687. The Hospital pump station has capacity to serve the Hospital complex. It may also have capacity for additional development in the 1400 Area.

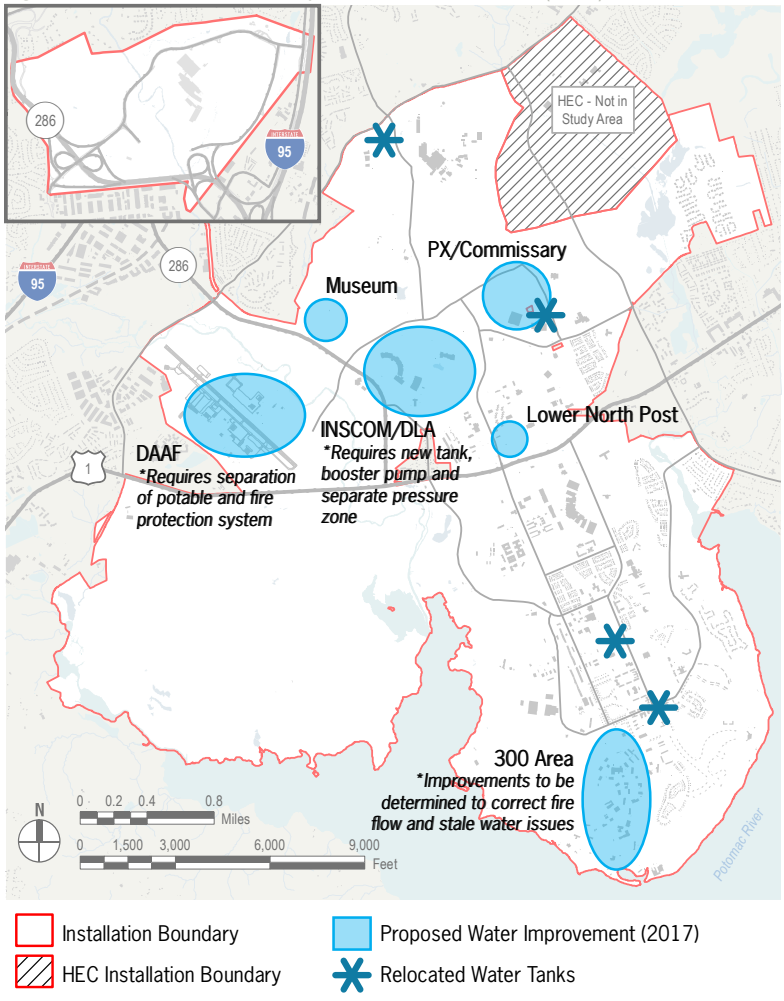
- Future development of the NMUSA and at the DLA complex will need to evaluate the capacity of the 15 inch sewer which runs from DLA southwest toward Davison Field. Based on preliminary studies, this line is at or near capacity.
- The proposed INSCOM expansion shall evaluate the capacity of the existing pump station east of the site and the gravity sewers downstream to insure that adequate capacity exists for the additional population.
- Anticipated development at the PX/Commissary, on Lower North Post, and on South Post will require extension of the sanitary sewer collection system to serve these areas. No capacity problems are expected.

Water Distribution

A water capacity study at Main Post conducted in 2007 analyzed existing conditions and considered requirements to serve growth to the year 2015. The study identified several areas of concern and suggested improvements to the water system. The BRAC infrastructure program and Fort Belvoir Community Hospital included several of the projects required to alleviate these problems. See Figure 5.3.

- The water system was privatized to American Water Military Systems in 2010. American Water is preparing a Capital Improvement Plan that includes repair, replacement, and upgrades of pipes, pumps and tanks.
- American Water has prepared a hydraulic study of the water system. The study indicates that there are no significant capacity or pressure problems on Post. Nearly all areas have pressure of 38 psi or more under peak (non fire flow) conditions. No location on post has pressure below 30 psi. In some areas, buildings higher than three or four floors will require fire pumps to insure adequate fire flows. (Providing system pressures adequate to meet fire flow requirements will typically require pressure reducing valves on domestic services at each building.) There are concerns with inadequate circulation in the 300 Area.
- The infrastructure projects completed in 2011 as a result of BRAC provided upgrades to the existing water system and shall provide adequate pipe capacity for anticipated growth to 2017.
- American Water is evaluating the replacement of several of the existing water tanks and relocating to new locations with higher elevations as shown in Figure 5.3. Placing a new tank near DLA will provide additional storage and pressure near an area of high demand and high fire flow requirements; however, Davison Army Airfield's proximity to DLA will limit the tank height. Providing elevated tanks at new locations or at slightly higher elevations can improve water pressure at DLA.
- The system includes several pressure reducing valves (PRVs) to regulate water pressure between the higher areas on Upper North Post and lower areas farther south. Relocating some of these PRVs can provide improved pressure to several areas.
- Anticipated development at INSCOM, DLA, the Museum, and the Lower North Post will require extension of the water distribution system to serve new facilities and may require the tank and pressure improvements noted above to accommodate the additional demand.
- Development at the PX/Commissary, Lower North Post, and South Post will require extension and/or replacement of the water distribution systems in these areas.

Figure 5.3 - Water Distribution Improvements - Short Term (2017)



Electric

Dominion Virginia Power (DVP) has an extensive network of distribution lines throughout the Post. New projects must provide a load letter to DVP, and DVP determines the extent of improvements to provide service. Each project must fund any required improvements. For most small projects, the costs for service extensions will not be significant. Projects with high loads may require significant infrastructure improvements depending on site location and program requirements.

Natural Gas

Washington Gas has an extensive network of distribution lines covering large parts of the Post. New projects must provide a load letter to Washington Gas to determine the extent of improvements required to provide service. Each project must fund any required improvements. For small projects adjacent to existing gas mains, service can be provided at low or no costs. Projects that require extension of gas mains for a significant distance may incur substantial costs to provide service.

Steam

In 2007, the existing steam plants and distribution system were analyzed to determine their adequacy for current and future needs. The steam system is old, inefficient, and leaky. The Installation is phasing out the steam system and replacing it with gas boilers in individual buildings. There are no plans to expand the steam system. It will be several years before the entire steam system is abandoned. The existing steam lines will be abandoned in place and will not be removed.

Storm Sewer System

The existing Main Post storm sewer system includes 280,241 linear feet (LF) of storm drainage pipe and 597 culvert crossings (representing an additional 32,181 LF of pipe). Pipe diameters range from 6 inches to 54 inches, and vary in material: reinforced concrete, asbestos cement, cast iron, brick, corrugated metal, ductile iron, and polyvinyl chloride (PVC). There are about 501 manholes and 2,140 inlets. In addition, 43 storm basins, primarily dry ponds, exist on Main Post. The storm system drains via a series of piping that discharges to various streams and tributaries, and ultimately, to the Potomac River and its tributaries. Installation staff maintains the system.

Prior to BRAC, the previous development at Main Post occurred without the provision of stormwater management. The increased runoff exceeds the capacity of receiving water courses, resulting in serious erosion of natural channels.

Installation staff have indicated that existing stream erosion is their primary concern associated with the drainage system. A study called “Stormwater Management Guidance” (dated March 2007) was developed to summarize design criteria, provide guidelines for meeting the Fairfax County and VDEQ design criteria, and suggest methods of providing quality and quantity control. While stormwater management regulations have changed since the study was completed, elements of this document continue to be carried forward to guide decision making.

The BRAC projects completed in 2011 (both new buildings and the Infrastructure projects) included extensive drainage conveyance and stormwater management facilities upgrades, providing both quality and quantity control. The infrastructure projects also included several stream restoration projects to remediate stream erosion.

Areas of the Installation with well developed storm drainage systems, adequate inlets, an extensive network of storm sewers, and stormwater management (SWM) facilities, include:

- Tracy Loop and Theote Road-16th Street areas
- New RCI housing areas, such as Vernondale and Herryford Village
- DLA and DTRA complex

Several areas on the Installation have limited inlet and pipe networks and no storm water management facilities:

- The block between 16th and 18th Streets and Gunston and Belvoir Roads. (The 6-8 inch pipes in this area appear to be undersized for the drainage area. Paved areas are relatively flat, but there are very few inlets.)
- The block between 12th and 16th Streets and Gunston and Middleton Roads, in the vicinity of Buildings 1150, 1155, and 1190. (Very little storm drainage exists.)
- East of Gunston Road, between U.S. Route 1 and 9th Street, within the 3rd, 4th, 5th, and 6th Streets vicinity (the 1400 Area). Pipes within this area appear to be undersized for the amount of impervious area associated with full build-out conditions.

Since funding to improve the existing inadequate drainage systems is unlikely, all new development shall include: an adequate storm drainage system (including upgrades to the existing system where runoff is directed from new development), stormwater quality/quantity control, and an analysis of the existing downstream storm system to ensure adequate outfall is available.

Design of all new drainage facilities shall consider the ultimate anticipated development in the surrounding area, including the entire upstream sanitary or storm drainage-shed. New infrastructure shall be designed to serve the ultimate anticipated flow from the upstream area, based on the potential of achieving full build-out as reflected in the district regulating plans.

Drainage facilities at Fort Belvoir are regulated by DoD design criteria and by the Installation's MS-4 stormwater discharge permit, which is issued by the Commonwealth of Virginia's Department of Environmental Quality (VDEQ). The MS-4 permit requires that stormwater management and erosion control be provided in accordance with Fairfax County standards. Note that Fairfax County has no jurisdictional authority over Fort Belvoir; enforcement of the regulations is the responsibility of the Installation staff.

Stormwater Management

Stormwater management strategies for individual projects shall emphasize decentralized infiltration techniques to the maximum extent possible. This will achieve Low Impact Development goals and the requirements of the Energy Independence and Security Act 2007 Section 438. Low impact design techniques are especially appropriate when redeveloping on smaller infill parcels where land may not be able to support a traditional SWM facility and/or the site would not have access to a larger, centralized underground SWM facility that will be designed to serve existing and future projects.

The Installation has proposed one centralized stormwater management facility near Theote Road and 16th Street to serve existing and future development in the area. This proposed regional facility is located within the Accotink Bay sub-watershed (listed as Short-term Project #14, ST 14, in the EIS) and is currently on hold pending environmental remediation. There are no other centralized SWM facilities planned.

There are no other centralized SWM facilities planned. The Installation shall pursue additional funding for SWM facilities which may also include stream restoration, riparian buffer revegetation, and culvert crossing improvements to improve stream stability and in places where there is an inadequate outfall condition, consistent with the goals of the INRMP. In accordance with the MS-4 permit, all new development at Fort Belvoir must meet three specific stormwater management criteria:

- Runoff volume control: To reduce peak runoff of the developed Post to the same level as the pre-developed Post, for both the two-year and ten-year frequency storms.
- Quality control: To reduce pollutants in runoff caused by paved, roofed, and other impervious areas. (This is usually met by detaining the first half-inch of runoff from a site for 48 to 72 hours, which allows solids and other pollutants to settle before runoff is released).
- Adequate outfall: To ensure any new development discharges storm and other surface waters into a natural watercourse or man-made drainage facility, with sufficient capacity to preclude any adverse impacts to the land (over which waters are conveyed) or natural watercourse/facility (into which waters are discharged).

The Fairfax County Public Facilities Manual (Section 6-0203) defines the following requirements for an adequate outfall analysis. The extent of the review of the downstream drainage system shall be:

- To a point that is at least 150 feet (46 m) downstream to a point where the receiving pipe or channel is joined by another that has a drainage area that is at least 90 percent of the size of the first drainage area at the point of confluence; or
- To a point at which the total drainage area is at least 100 times greater than the contributing drainage area of the development site; or
- To a point that is at least 150 feet (45 m) downstream of a point where the drainage area is 360 acres (1.46 km2) or greater.

Additionally, there have been several culvert crossing improvements to install a base flow culvert and a second high flow culvert for storm events to provide stability to the stream system and allow self-maintenance.

Figure 5.4 - Open Space Analysis, 2017 (Short Term)

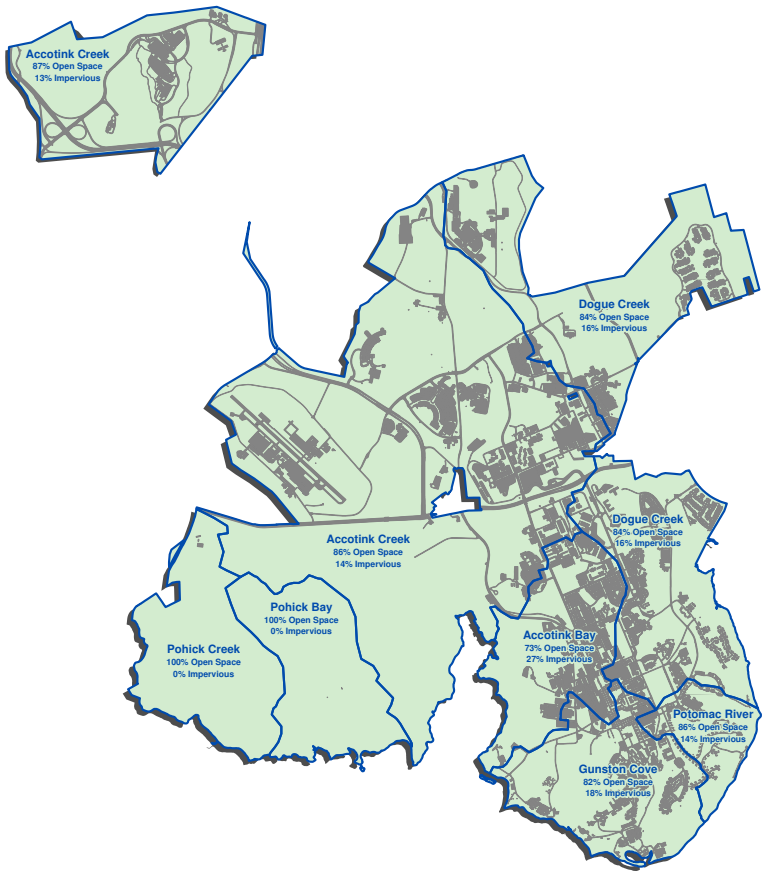


Table 5.3 - Open Space Analysis - Short Term (2017)

	2011 (Post-BRAC)				2017 (Near Term)			
Watersheds	**Open Space (Acres)**		**Impervious (Acres)[2]**		**Open Space (Acres)**		**Impervious (Acres)[2]**	
Accotink Bay	452	74%	156	26%	442	73%	166	27%
Accotink Creek	2,859	88%	392	12%	2,802	86%	449	14%
Accotink Creek - FBNA	702	87%	102	13%	700	87%	104	13%
Dogue Creek	1,507	85%	258	15%	1,489	84%	276	16%
Gunston Cove	559	83%	117	17%	557	82%	119	18%
Pohick Bay	566	100%	0	0%	566	100%	0	0%
Pohick Creek	635	100%	1	0%	635	100%	1	0%
Potomac River	203	88%	34	14%	203	86%	34	14%
Total	**7,484**	**88%**	**1,059**	**12%**	**7,394**	**87%**	**1,149**	**13%**

Notes: 1. Percentages shown in tables reflect estimates of future project footprints; therefore, impervious areas may vary by approximately 3%.
2. Impervious area does not include paved trails and sidewalks.

Impervious = Airfield Surfaces, Buildings, Parking Lots, Bridges, Driveways and Roads
Open Space = Everything Else

Locations for stormwater management facilities on Fort Belvoir are limited. The following factors will be considered in the design and siting of new SWM facilities:

- No interference with known locations for major facilities and roads
- No incursion into wetlands, waters of the U.S., or Chesapeake Bay Resource Protection Areas, or riparian buffers
- Avoids wetland, stream restoration, and revegetated mitigation areas
- Minimization of removal of forest cover
- No interference with known Threatened and Endangered Species sites
- Minimization of excavation requirements
- Conformance to local topography to the greatest extent possible
- Access from existing or planned roads
- Distribution of sites over all watersheds within the project area.
- Accessibility of facility for maintenance and inspection

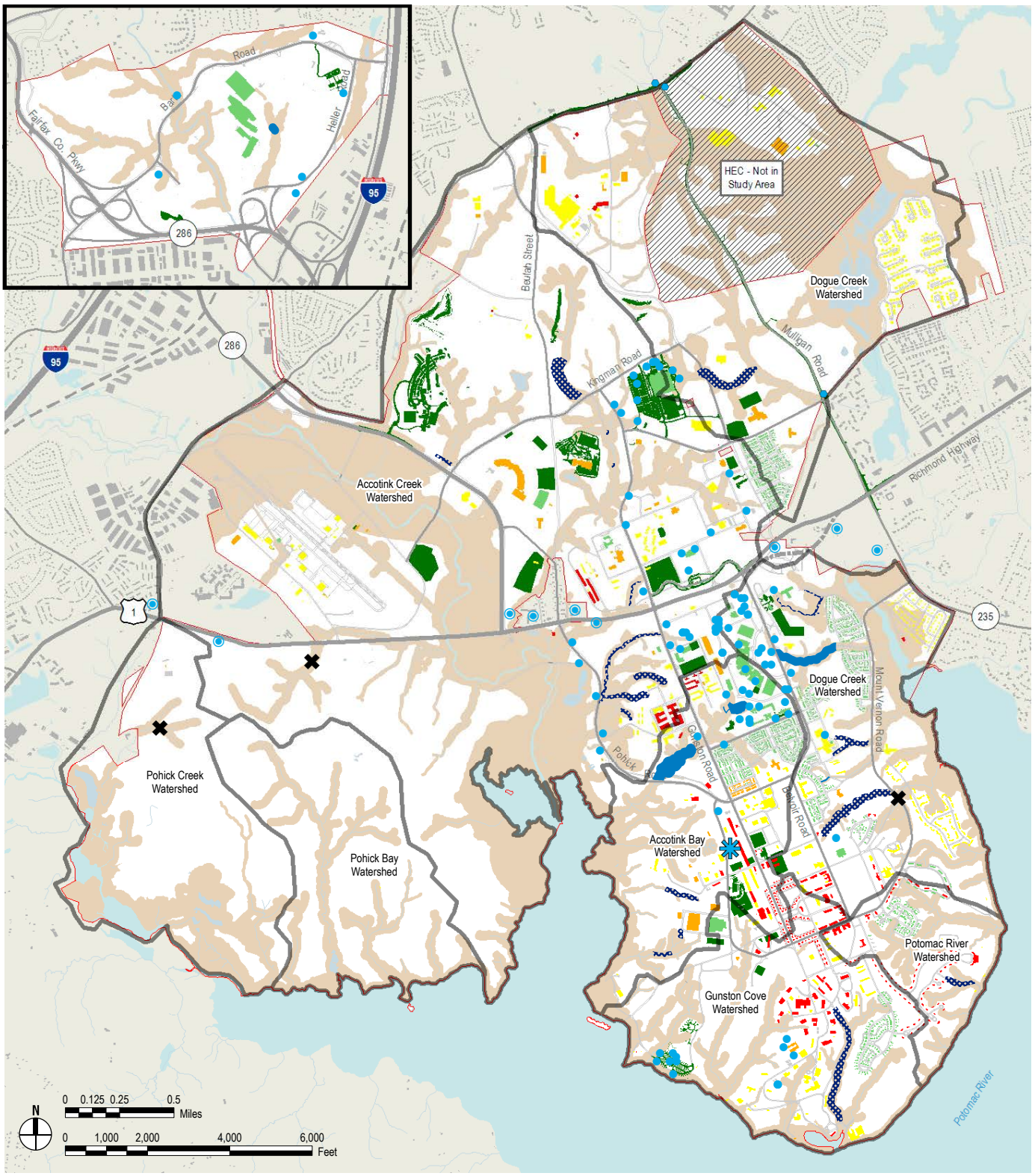
Stormwater management efforts should be designed as a comprehensive and integrated solution that addresses the existing watershed conditions as described in Section 2.

The following is a summary of the types of SWM facilities that will be required to support individual projects. The exact facility locations will be determined with the design of the project.

- Underground SWM facilities will generally be located in low areas within the open space areas as shown in the Regulating Plans Chapter 2 of the IPS or in surface parking lots and/or paved areas. One recent example is the underground facility in the parking lot within the WT campus.
- The expansion of existing and/or future aboveground SWM facilities (dry or wet ponds) where facilities have been sized to support additional runoff.
- Use of innovative low impact design solutions and facilities such as rain gardens, bioswales and porous pavement. Opportunities for stormwater reuse should also be considered.
- Outfall improvements, if required, will be determined by the condition of the drainage shed in accordance with regulations.

An Open Space Analysis prepared in 2011 showed that Fort Belvoir will retain more than 87 percent (over 7,000 acres) of open space upon completion of anticipated 2017 development. New development will fall largely within Accotink Creek and Dogue Creek watersheds. As shown in Figure 5.4 and Table 5.3, Accotink Creek watershed is anticipated to lose 57 acres of open space, and Dogue Creek will lose 18 acres of open space.

Figure 5.5 - Watershed Improvements



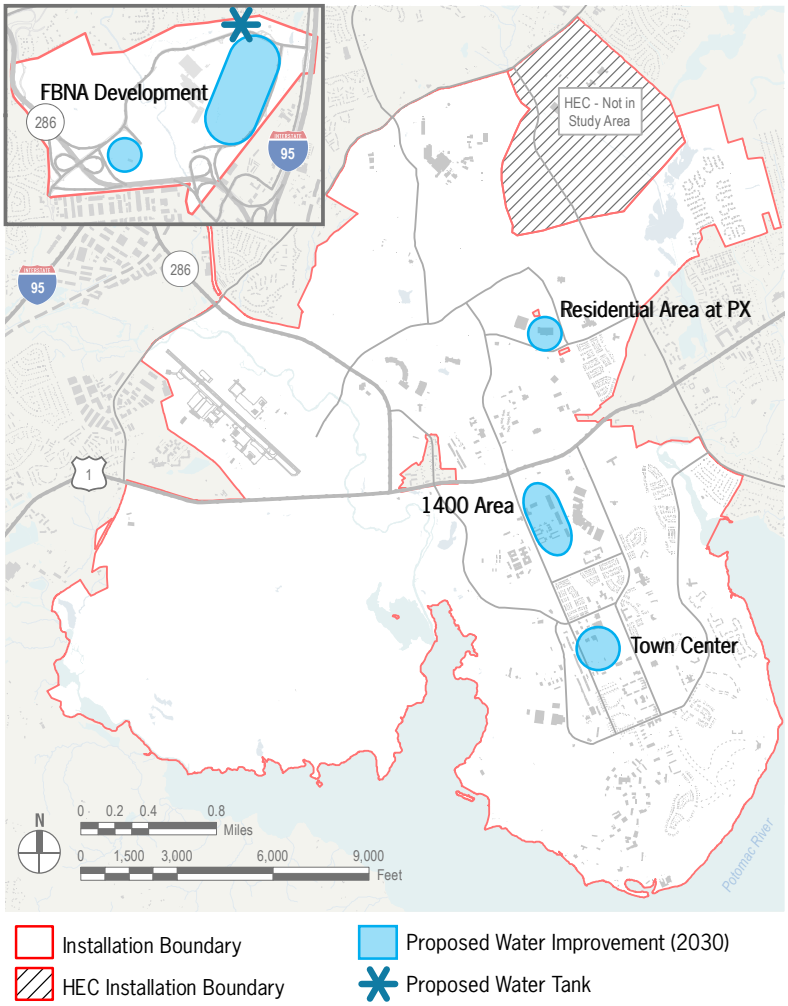
- Culvert Crossing Stream Improvement
- Existing Stormwater Management Area
- Proposed Stormwater Management Area
- Proposed Regional Stormwater Management Facility
- Watershed Boundary
- RPA Boundary & Riparian Buffer
- Completed Stream Restoration
- Proposed Stream Restoration
- Short Range Project with new SWM/LID design measures as required

Facility Stormwater Treatment Based on Age

- No SWM Treatment
- Minimal SWM, Limited to Quantity Control, Areas with No SWM
- SWM Generally Both Quantity and Quality Control
- Enhanced SWM Extended Detention, LID, Etc.

Typical locations for new, SWM facilities on smaller redevelopment sites will be determined in the short term (2017) on a project-by-project basis. Ideally, areas include the open lawn areas created by AT/FP building setbacks and in places where surface parking lots may be proposed that minimize their impact on the land. When possible, new SWM facilities should provide expansion for future projects within the sub-watershed. Lastly, SWM strategies must consider downstream conditions that may require enhanced SWM measures such as extended detention, water conservation, LID measures and/or stream restoration. See Figure 5.5 for location of proposed stream restoration areas and 2017 projects.

Figure 5.6 - Water Distribution Improvements - Long Term (2030)



Long-Term (2030) Utility Systems Improvements

Water

The FBNA water distribution network will need to be extended for anticipated new development at FBNA. The existing system shall have adequate capacity to serve anticipated development. If additional storage is required, a second tank can be constructed at FBNA.

At Main Post, construction of the residential area adjacent to the PX and redevelopment of the Town Center area will require extension of the water distribution system to these areas, and replacement of existing lines which conflict with proposed development redevelopment of the 1400 Area that requires a new pipe network, as most of the existing lines in the area west of the new hospital will need to be abandoned; (proposed buildings are in conflict with most existing water lines here). The new USALSA building has constructed the first portion of this new pipe network. The proposed 16-inch water line spanning from the Fairfax County Water System in the north to just south of U.S. Route 1 will provide adequate service for proposed 2030 development.

Some infrastructure upgrades will be required if all the projects anticipated are built; however, the exact scope of these depends on what will actually be built. See Figure 5.6.

Stormwater Management

The densest projected development in the 2030 plan is in the 1400 Area and redevelopment of the old DeWitt Hospital. Significant development is also proposed in the Lower North Post area. Stormwater conveyance and management facilities in these areas will be funded and constructed with individual projects, but facility design must consider the ultimate anticipated development in each area.

Site selection for each new building shall consider utility, drainage and stormwater requirements for future development and reserve utility corridors and adequate areas for future stormwater facilities. Preliminary design for each new building shall include preliminary infrastructure design for future buildings in the vicinity to demonstrate: 1) they can be efficiently served by expansion or extension of existing and proposed facilities, and 2) the new development infrastructure (e.g., will not be in conflict with future development) and projected building/parking facilities. All utilities (water, sanitary, storm, gas, electric) shall be designed with capacity for the ultimate anticipated development. Where feasible, design stormwater management facilities with capacity for future development in the area. The Installation must ensure that the siting of each building and its required infrastructure will not preclude the cost efficient provision of access, drainage or utilities for future planned development.

Due to site limitations, most stormwater management (quality and quantity control) facilities in the 1400 Area are likely to be underground storage systems, designed to serve only one or two new buildings. (The Gunston Road infrastructure project has constructed several small underground facilities; the USALSA building is served by an underground facility that is sized only for the USALSA site.) It may be possible to construct larger surface or underground facilities on the perimeter of the 1400 Area that can initially serve one building but be expanded with additional development.

The Lower North Post area drains toward a stream that runs to the southwest and eventually becomes Mason Run. Development here shall consider the use of shared surface or underground stormwater management facilities. OCAR has built a surface facility which can be expanded to serve additional development.

Drainage design in both the 1400 Area and Lower North Post areas shall consider adequate outfall in the downstream receiving waters.

The 2011 Open Space Analysis also evaluated the long range (to 2030) impacts of development by watershed. From 2017 to 2030, most development will again fall largely within Accotink, Dogue Creek, and Gunston Cove watersheds. Accotink Creek watershed loses 12 acres of open space on Main Post and 26 acres on FBNA. Dogue Creek and Gunston Cove both lose 9 acres of open space. See Figure 5.7 and Table 5.4.

Typical locations for new, SWM facilities on smaller redevelopment sites in the long range (2030) will be the same as noted for 2017 and will be determined on a project-by-project basis. In addition, several 2030 projects, such as the future campus at FBNA and the redevelopment of the 1400 Area, offer the opportunity to provide a more centralized SWM approach given a larger land area to support the facilities.

Figure 5.7 - Open Space Analysis, 2030 (Long Range)

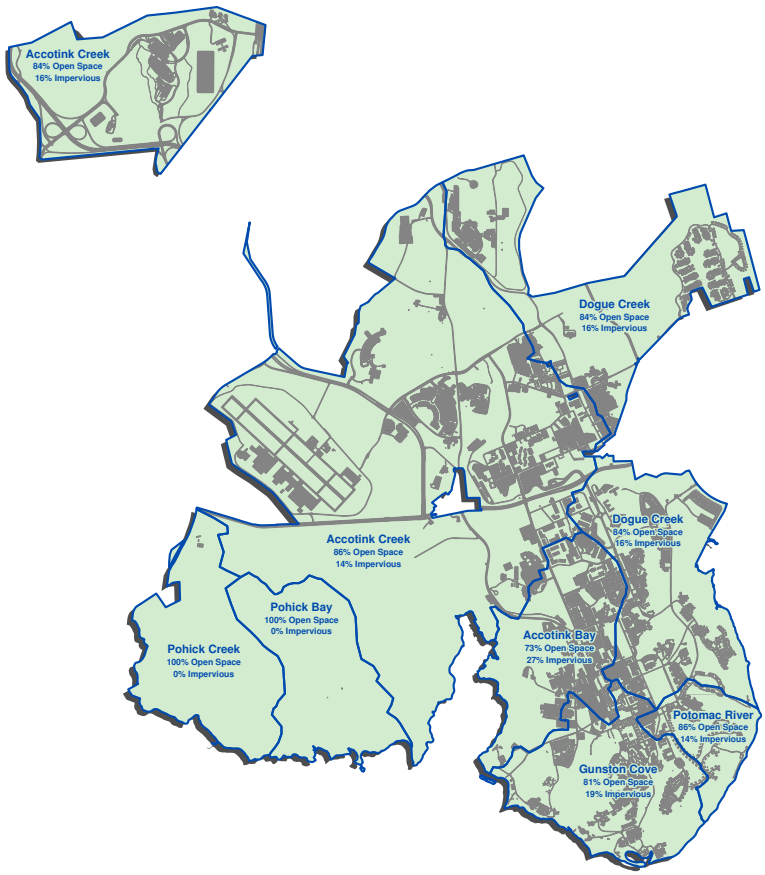


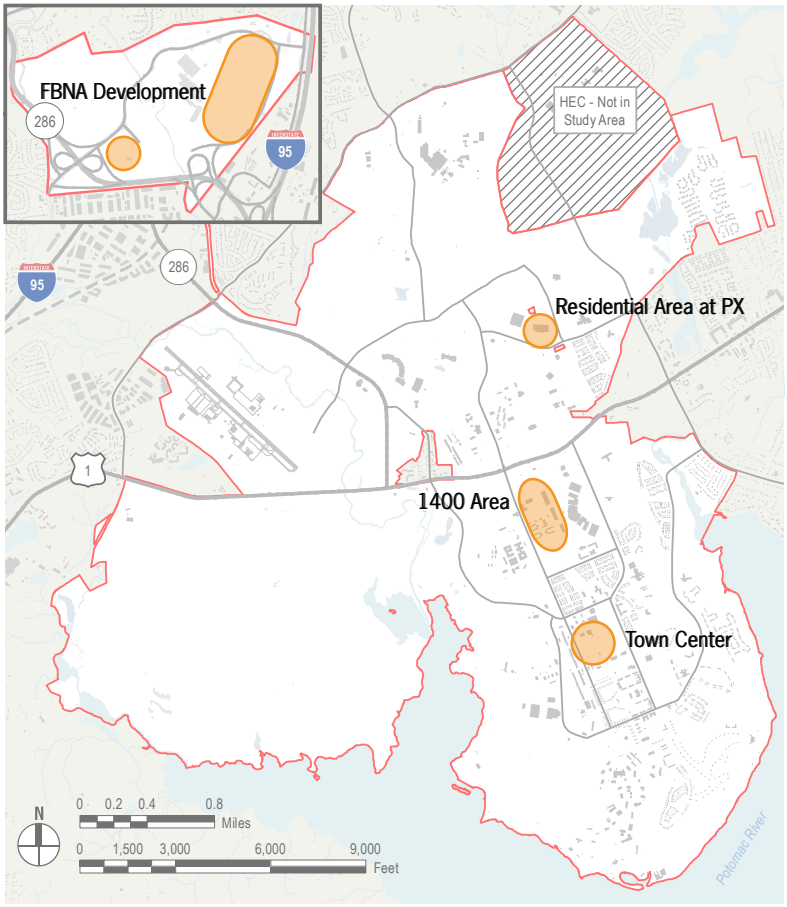
Table 5.4 - Open Space Analysis - Long Range (2030)

	2017 (Short Term)				2030 (Long Range)			
Watersheds	**Open (Acres)**		**Impervious (Acres)[2]**		**Open (Acres)**		**Impervious (Acres)[2]**	
Accotink Bay	442	73%	166	27%	442	73%	166	27%
Accotink Creek	2,802	86%	449	14%	2,790	86%	462	14%
Accotink Creek - FBNA	700	87%	104	13%	674	84%	130	16%
Dogue Creek	1,489	84%	276	16%	1,480	84%	285	16%
Gunston Cove	557	82%	119	18%	548	81%	127	19%
Pohick Bay	566	100%	0	0%	566	100%	0	0%
Pohick Creek	635	100%	1	0%	635	100%	1	0%
Potomac River	203	86%	34	14%	203	86%	34	14%
Total	7,394	87%	1,149	13%	7,339	86%	1,204	14%

Notes: 1. Percentages shown in tables reflect estimates of future project footprints; therefore, impervious areas may vary by approximately 3%.
2. Impervious area does not include paved trails and sidewalks.

Impervious = Airfield Surfaces, Buildings, Parking Lots, Bridges, Driveways and Roads
Open Space = Everything Else

Figure 5.8 - Sanitary Sewer Improvements - Long Term (2030)



Installation Boundary

HEC Installation Boundary

Proposed Sanitary Improvement (2030)

Sanitary Sewer

Potential development at FBNA will require extension of the sanitary sewer system to serve these areas. No capacity problems in serving these areas is anticipated.

At Main Post, construction of the residential area adjacent to the PX and redevelopment of the Town Center area will require extension of the sanitary collection system to these areas, and replacement of existing lines which conflict with proposed development. No capacity issues are anticipated. The densest projected development in the 2030 plan is the new construction in the 1400 Area. This development has the potential to overload the downstream gravity sewers and pump stations. Part or all of this area can be diverted to the new hospital pump station; if there is not adequate capacity for this flow in the pump station, a second pump station can be constructed adjacent to it. Redevelopment of the 1400 Area will require a new pipe network, as most of the existing lines in the area west of the new hospital will need to be abandoned; (proposed buildings are in conflict with most existing water lines here). The new USALSA building has constructed the first portion of this new pipe network.

Summary Utility Assessment

The utility construction work associated with BRAC 2005 and the ongoing replacement of aging water and sewer lines by American Water should be able to support the near-term projects. Any additional water and sewer line extensions that will be needed for these new projects should be sized to support future development. The ability of utility service providers to meet these future demands is expected to continue and should not hinder the Installation's ability to expand. The current demands for enhanced electric service associated with more energy intensive uses needed to meet the existing population as well as future growth levels are expected to continue. This trend will require advance planning with the service providers and the continuation of innovative project design solutions. Innovative examples include the recent LEED built projects such as the Fort Belvoir Community Hospital and the secure campus at FBNA that can offset these increased energy demands. See Figure 5.8.

2021

APPENDIX C

PUBLIC COMMENT PERIOD

FORT BELVOIR ACCOTINK CREEK SEDIMENT TMDL ACTION PLAN

MENU

U.S.ARMY

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 Sediment Total Maximum Daily Load (TMDL) Action Plan for the Lower Accotink Creek until 15 February 2021. Submit comments via EMAIL

2021 Sediment TMDL Action Plan

Fort Belvoir Environmental Division
January 8 ·

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 Sediment Total Maximum Daily Load (TMDL) Action Plan for the Lower Accotink Creek until 15 February 2021. The documents are located at https://home.army.mil/…/directorate-…/environmental-division.

Submit comments via email to Yari Chiro at yarelis.chiro.civ@mail.mil or at usarmy.belvoir.id-sustainment.mbx.dpw-enrd-stormwater@mail.mil
For more information contact the Stormwater Program directly at 703-806-3406 or Mr. Anthony Gartrell at 703-806-3437.

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

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Like Comment Share

Belvoir Community Briefs

The Army Maintenance App is coming Jan. 19!

The app, which is for those who live in the barracks or overseas family housing, allows users to report routine maintenance problems, quickly and easily. You can sign up for access by using the QR code to sign up today!

VA Education Briefing

Learn about the comparison between Montgomery GI BILL, Post 911 (Forever bill) and the Yellow Ribbon Program. Learn how to apply for the GIBILL, TBD and many more VA resources. Join the briefing today at 10 a.m. via MS Teams. RSVP to the event at: https://www.surveymonkey.com/r/QQKQ6MH

Credentialing Assistance Briefing

Interested in learning more about Credentialing Assistance? Now is your chance to learn more about the program from our Credentialing Counselor. The briefing is Feb. 3 at 10 a.m. MS Teams. RSVP to the event at: https://www.surveymonkey.com/r/2HGL9QH

FAFSA Briefing

Need money for college? Join Barden Education Center for step by step instructions on how to complete the Free Application for Federal Student Aid (FAFSA), Feb. 2 at noon via ZOOM at https://vccs.zoom.us/j/88234710761; Meeting ID: 882 3471 0761; Passcode: 427099; Dial by location: 1-301-715-8592

Fort Belvoir Family Step Challenge

Challenge yourself and your family to a vigorous walk now - Jan. 31. Choose your own course or opt to use our traditional route options on Fort Belvoir. Each participant tracks their daily steps and prizes will be awarded. Rules and eligibility restrictions apply. For more, go to belvoir.armymwr.com or call 703-806-4430.

Martin Luther King, Jr. Day Creative Contest

Celebrate the life and achievements of American civil rights leader, Dr. Martin Luther King, Jr., through the MWR Martin Luther King, Jr. Day Creative Contest, now through Jan.22. Share, in your creative writing or visual art, how you will honor his legacy. Rules and restrictions apply. For entry and more information, go to belvoir.armymwr.com or call 703-805-4244.

Play Morning

Play Mornings, hosted by Army Community Service, allows families to connect virtually and have a playgroup experience through crafts, story time and other activities. Classes are biweekly, 10 a.m., Fridays. The next session is Jan. 22. Additional classes will be Feb. 5 and 19. Participants will be notified of any changes in the schedule. Registration is required by calling 571-231-7028.

Winter Reading Program

The MWR Library encourages children, teens and adults to support a love of reading by participating in the Winter Reading Program, Jan. 15 - Feb. 15. Readers can win prizes for reaching their reading goals based on grade level categories. For entry details and more information, go to belvoir.armymwr.com or call 703-805-4244.

Dads 101

Let the Army Community Service New Parent Support team show you how to overcome your fears and get comfortable in your paternal role. This virtual class teaches dads and dads-to-be the needed tips and tools to help them become more successful. Classes are from 3 to 4 p.m., Jan. 27, Feb. 10 and 24, March 10 and 24, with additional classes throughout the year. For more information and to register, call 571-231-7028.

COMMENTS

"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 Sediment Total Maximum Daily Load (TMDL) Action Plan for the Lower Accotink Creek until Feb. 15.

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

For more information:
Stormwater Program
703-806-3406
or
Mr. Anthony Gartrell
703-806-3437