

Richmond Highway Bus Rapid Transit Project

NATURAL RESOURCES TECHNICAL REPORT

for

Fairfax County Department of Transportation



**Federal Transit
Administration**

NOVEMBER 2021

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LIST OF ABBREVIATION AND ACRONYMS

| | |
|-------|--|
| BMP | Best Management Practice |
| BRT | Bus Rapid Transit |
| CBPA | Chesapeake Bay Preservation Act |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulation |
| CWA | Clean Water Act |
| CZMP | Coastal Zone Management Program |
| EO | Executive Order |
| FEMA | Federal Emergency Management Agency |
| FFRMS | Federal Flood Risk Management Standard |
| GIS | Geographic Information System |
| GWMA | Groundwater Management Areas |
| JPA | Joint Permit Application |
| LOD | Limits of Disturbance |
| NEPA | National Environmental Policy Act |
| NFIP | National Flood Insurance Program |
| NHD | National Hydrography Dataset |
| NOAA | National Oceanic and Atmospheric Administration |
| PCB | Polychlorinated Biphenyl |
| PEM | Palustrine, Emergent |
| PFO | Palustrine, Forested |
| POW | Palustrine, Open Water |
| RMA | Resource Management Area |
| RPA | Resource Protection Area |
| SDWA | Safe Drinking Water Act of 1974, amended and reauthorized in 1986 and 1996 |
| SSA | Sole Source Aquifer |
| SWPPP | Stormwater Pollution Prevention Plan |
| TMDL | Total Maximum Daily Load |
| TOYR | Time of Year Restriction |
| USACE | US Army Corps of Engineers |
| USC | US Code |
| USDOT | US Department of Transportation |
| USEPA | US Environmental Protection Agency |
| USFWS | US Fish & Wildlife Service |
| USGS | US Geological Survey |
| VAC | Virginia Administrative Code |

| | |
|----------|---|
| VaFWIS | Virginia Fish and Wildlife Information Service |
| VDACS | Virginia Department of Agriculture and Consumer Services |
| VDCR | Virginia Department of Conservation and Recreation |
| VDCR-DNH | Virginia Department of Conservation and Recreation – Division of Natural Heritage |
| VDEQ | Virginia Department of Environmental Quality |
| VDH | Virginia Department of Health |
| VDWR | Virginia Department of Wildlife Resources |
| VIMS | Virginia Institute of Marine Science |
| VMRC | Virginia Marine Resources Commission |
| VPDES | Virginia Pollutant Discharge Elimination System |
| VRRM | Virginia Runoff Reduction Method |
| VSMP | Virginia Stormwater Management Program |
| VWPP | Virginia Water Protection Permit |
| WIP | Watershed Implementation Plan |
| WOUS | Waters of the United States |

1. INTRODUCTION

The Fairfax County Department of Transportation (FCDOT), in coordination with the Federal Transit Administration (FTA), is proposing to implement bus rapid transit (BRT) service extending along VA 241/ North Kings Highway and Richmond Highway/US Route 1 from the Washington Metropolitan Area Transit Authority (WMATA) Metrorail station at Huntington in the north to US Army Garrison Fort Belvoir in the south (**Figure 1-1**). The project includes the construction of new BRT-dedicated median lanes; nine BRT stations; roadway widening; and streetscape improvements. The project would operate in both dedicated and mixed traffic lanes within the project limits.

The purpose of this technical report is to identify existing natural resources in the study area and to analyze impact to the natural resources within and adjacent to the project limits of disturbance (LOD). Information in this report, described below, will support discussions presented in the Richmond Highway BRT documented CE.

- Section 1 provides an overview of the study and outlines the applicable regulations and methods used to assess the natural resources.
- Section 2 provides an overview of existing conditions, discusses the context of each Natural Resource, and describes potential impacts to the identified natural resources associated with the project.

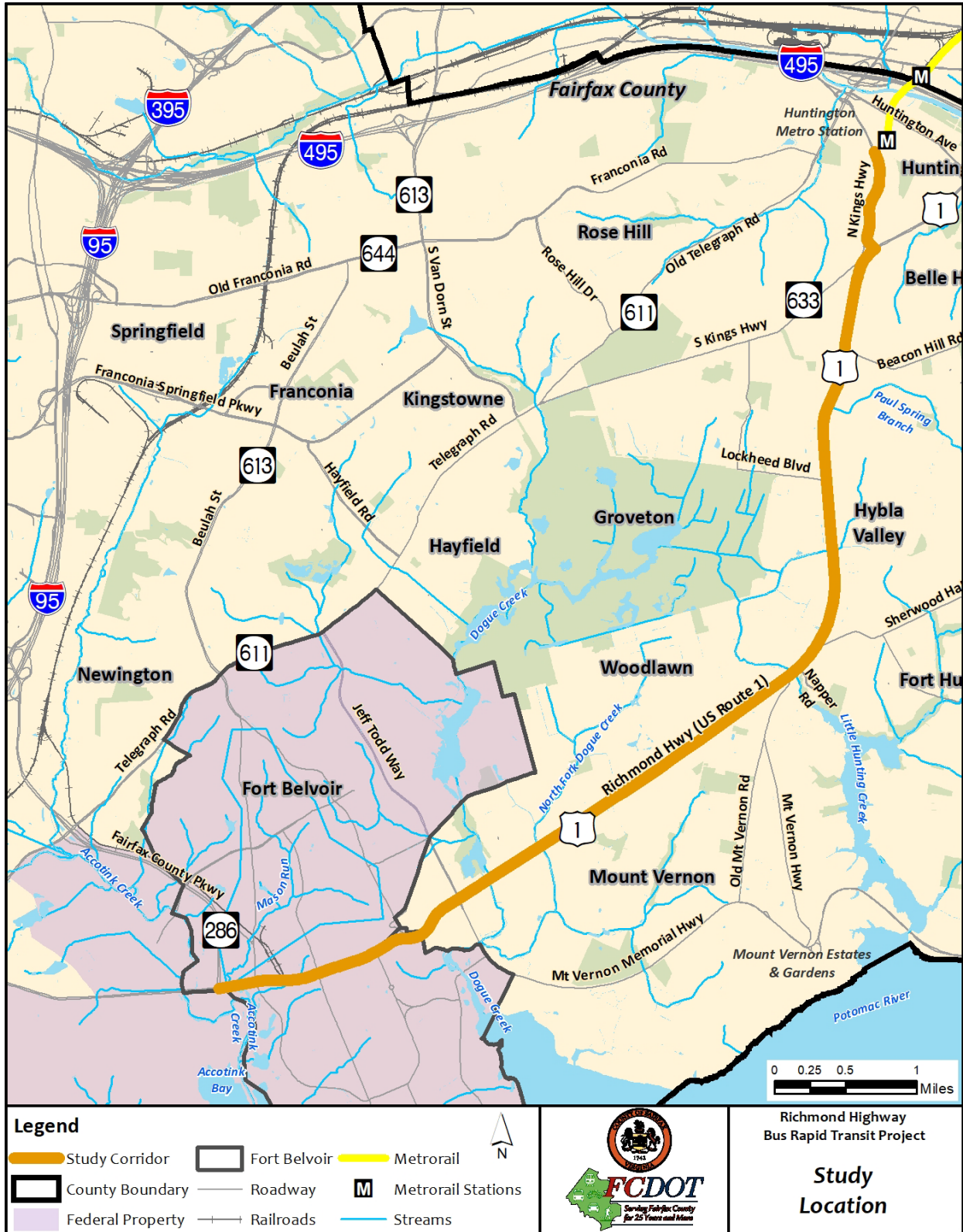
1.1 Project Description

The proposed BRT system would operate in both dedicated or mixed traffic lanes within the project limits. The BRT-dedicated lanes would range in width from 32 feet to 58 feet. Beginning at the Huntington Metrorail Station at the northern end of the corridor, the project would operate in mixed traffic operations along North Kings Highway to Shields Avenue and Richmond Highway/US Route 1. From Shields Avenue south to Sherwood Hall Lane, Richmond Highway would be widened and reconstructed to accommodate dedicated transit lanes for the BRT within the road median. From Sherwood Hall Lane south to the intersection with Jeff Todd Way/Mount Vernon Memorial Highway, the BRT-dedicated lanes would be built within a future reserved median to be constructed as part of a separate Virginia Department of Transportation multi-modal project. South from Jeff Todd Way / Mount Vernon Memorial Highway to Fairfax County Parkway at Fort Belvoir, new BRT-dedicated lanes would be constructed within the existing road median.

1.2 Methodology

The study area for detailed evaluation of existing conditions is generally defined as approximately 300 feet from edge of pavement of the existing Richmond Highway, from Fairfax County Parkway to Huntington Metrorail Station. For the purposes of this analysis, natural resources were identified based on agency input through the scoping process, review of existing available scientific literature, Geographic Information System (GIS) databases and mapping, and field reconnaissance of the study area conducted in Fall/Winter 2018. More specific information regarding data gathering sources and approach are presented within the discussion of each resource in Section 2.

Figure 1-1: Study Location



The following federal, state, and local agency datasets and databases were consulted for information regarding sensitive natural resources within the study area:

- United States Army Corps of Engineers (USACE), Norfolk District
- United States Environmental Protection Agency (USEPA), Region III, Environmental Programs
- United States Fish and Wildlife Service (USFWS)
- Virginia Department of Conservation and Recreation (VDCR)
- Virginia Department of Environmental Quality (VDEQ)
- Virginia Department of Wildlife Resources (VDWR)

The limits of disturbance (LOD) for evaluation of potential impacts varies along the length of the study corridor but is generally defined as extending from Belvoir Road to Huntington Metrorail Station and is generally 200 feet wide with additional areas extending from the Richmond Highway centerline for access and stormwater management.

The Virginia Department of Transportation (VDOT) is concurrently undertaking a study reviewing the impacts of widening a portion of Richmond Highway located within the limits of the project. The VDOT project, known as the Richmond Highway Corridor Improvements Project, which extends from Jeff Todd Way to Sherwood Hall Lane, is expected to be constructed prior to the construction of the Richmond Highway BRT. The approach taken with this Natural Resources Technical Report for the FCDOT BRT project was to evaluate conditions and resources along Richmond Highway, and to calculate impacts to those resources based on the project LOD. The ROW impacts assume that the VDOT Richmond Highway Corridor Improvements Project has been completed; therefore, the ROW impacts are for the Richmond Highway BRT project only.

2. NATURAL RESOURCES

The study area is highly urbanized resulting in the loss of, or disconnection of, natural ecosystems that were historically present (**Figure 2-1**). The remaining natural areas are now largely restricted to major stream corridors and small forested areas between commercial and residential developments.

2.1 Water Resources

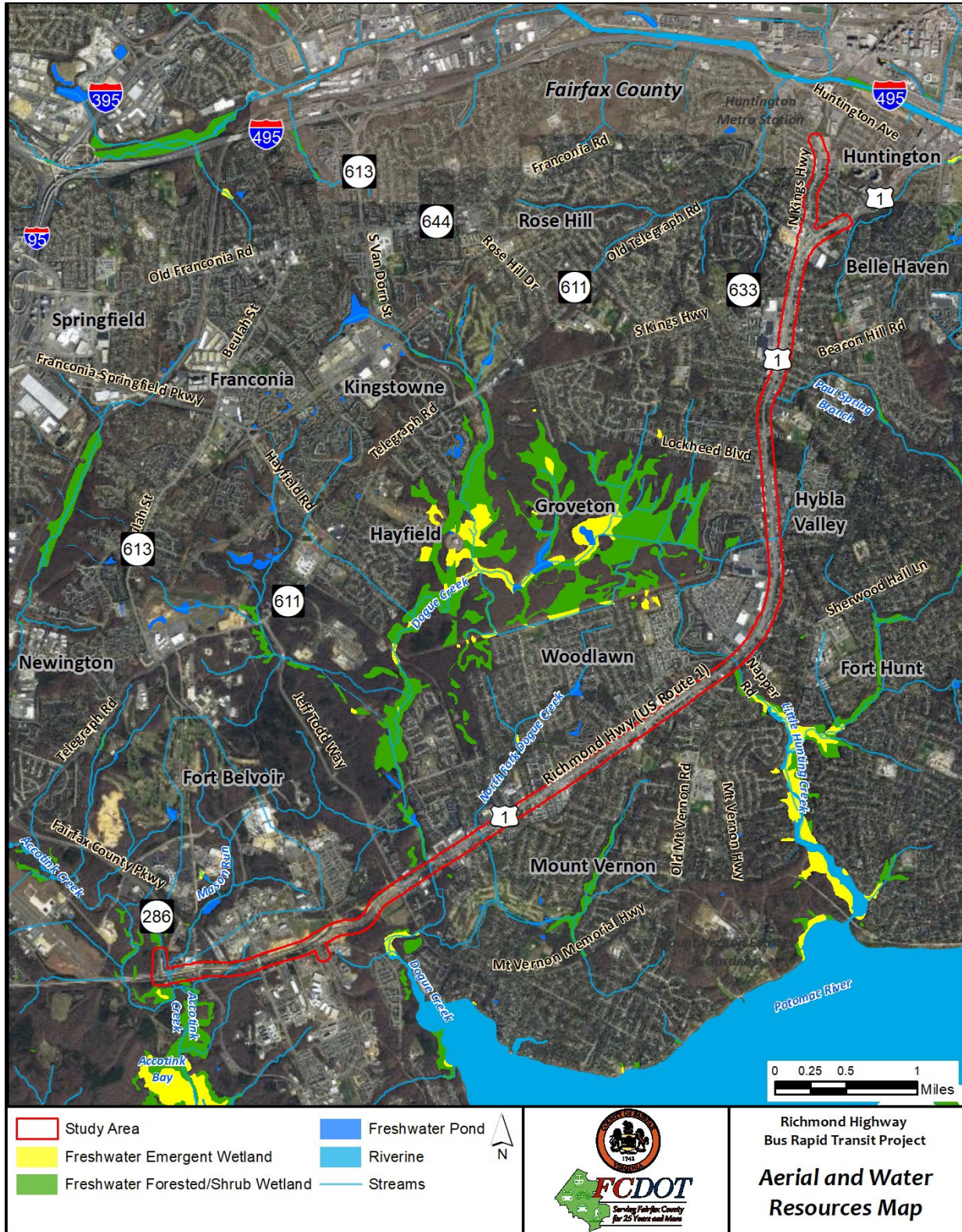
2.1.1 Background and Methodology

Streams

Water resources are federally regulated by the USEPA and the USACE under the CWA. The USEPA and USACE share responsibility for implementing Section 404 of the CWA. Section 404 of the CWA specifically regulates dredge and fill activities affecting Waters of the United States (WOUS), which can be defined as all navigable waters and waters that have been used for interstate or foreign commerce, their tributaries and associated wetlands, and any waters that if impacted could affect the former.

In April 2020, the USEPA and USACE published the Navigable Waters Protection Rule: Definition of “Waters of the United States” (Rule) finalizing a revised definition of WOUS under the CWA. The Rule defines four categories of jurisdictional waters including: territorial seas and traditional navigable waters; perennial and intermittent tributaries that contribute surface water flow to such waters; certain lakes, ponds, and impoundments of jurisdictional waters; and wetlands adjacent to other jurisdictional waters.

Figure 2-1: Aerial and Water Resources Map



The Rule also identifies excluded features that traditionally have not been regulated and provides definitions for previously-undefined terms occurring in prior regulatory text. This final rule became effective on June 22, 2020.

With the changes to the definition of WOUS resulting from the Navigable Waters Protection Rule, the VDEQ may now need to issue an independent state surface waters determination for certain wetlands, streams, and/or open waters if they were determined to be not federally jurisdictional by the USACE but remain jurisdictional as state surface waters. In cases where the USACE eliminated features as federally jurisdictional, but which remain jurisdictional to the VDEQ, requests for VDEQ's concurrence should be submitted to VDEQ concurrently or after the USACE determination process but before a Joint Permit Application (JPA) is submitted for unavoidable impacts.

Additionally, before the USACE issues a permit to impact WOUS under Section 404, the state must certify that state water quality standards would not be violated by the proposed work (Section 401 of CWA). In Virginia, the VDEQ is the authority that provides the Section 401 certification through its Virginia Water Protection Permit (VWPP) Program (9 VAC 25-210), which gets its statutory authority from 62.1-44.15 of the Code of Virginia. State law requires that a VWPP be obtained before clearing, filling, excavating, draining, or ditching a stream or wetland. The issuance of a state VWPP does not depend on the issuance of a federal Section 404 permit.

The VMRC, in conjunction with local wetlands boards, where established, has jurisdiction over tidal wetlands through Chapter 13 of Title 28.2 of the Code of Virginia. Permits to impact wetlands under VMRC jurisdiction are administered by localities that have adopted a wetlands zoning ordinance, such as Fairfax County. However, governmental activity in tidal wetlands does not require a Fairfax County Wetlands Board permit if the wetlands are owned or leased by the Commonwealth, or a political subdivision thereof (Fairfax County Code of Ordinances Chapter 116 § 116-1-3). The USACE, the US Coast Guard, the VDEQ, and the VMRC all issue permits for various activities in, under, and over WOUS.

Non-tidal streams were identified within the study area using the National Hydrography Dataset (NHD) from the US Geological Survey (USGS, 2016a) and field reconnaissance of the study area completed during the wetlands and waters delineations conducted for this project.

The quantity of streams within the study area was determined by performing GIS overlays onto the survey information from field reconnaissance. Potential impacts were calculated by performing GIS overlays of the LOD, which is based on roadway engineering completed to date.

Water Quality

In compliance with Sections 303(d), 305(b), and 314 of the Federal Water Pollution Control Act (i.e., 1972 Clean Water Act amended in 1977, or CWA) and the Safe Drinking Water Act, VDEQ has developed a prioritized list of waterbodies that currently do not meet State water quality standards. VDEQ monitors streams and waterbodies for a variety of water quality parameters, including temperature; dissolved oxygen levels; pH; the presence of fecal coliform, *Escherichia coli* (*E. coli*), and enterococci bacteria; total phosphorus and chlorophyll a levels; benthic invertebrates; and metals and toxics in the water column, sediments, and fish tissues. By monitoring these parameters, the VDEQ determines which waterbodies

have impaired water quality and how the type or extent of impairment affects the primary uses of the waterbody. The primary uses include:

- Aquatic Life – supports the propagation, growth, and protection of a balanced indigenous population of aquatic life that may be expected to inhabit a waterbody
- Recreation – supports swimming, boating, and other recreational activities
- Fish Consumption – supports game and marketable fish species that are safe for human health
- Shellfishing – supports the propagation and marketability of shellfish (clams, oysters, and mussels)
- Public Water Supply – supports safe drinking water

Virginia's Water Quality Standards (9 VAC 25.260) define the water quality needed to support each of these uses by establishing numeric physical and chemical criteria. If a waterbody fails to meet the Water Quality Standards, it would not support one or more of its designated uses as described above. These waters are considered to be impaired and placed on the 303(d) list as required by the CWA.

Once a waterbody has been identified as impaired due to human activities and placed on the 303(d) list, VDEQ is required to develop a Total Maximum Daily Load (TMDL) for the parameters that do not meet State water quality standards. The TMDL is a reduction plan that defines the limit of a pollutant(s) that a waterbody can receive and still meet water quality standards. A TMDL implementation plan, including Waste Load Allocations, is developed by VDEQ once the TMDL is approved by the USEPA. The ultimate goal of the TMDL Implementation Plan is to restore the impaired waterbody and maintain its water quality for its designated uses.

The water quality of some estuarine waterbodies contained in the study area was evaluated in the recent 303(d) and 305(b) integrated report released by Virginia. The *Final 2020 305(b)/303(d) Water Quality Assessment Integrated Report* was released by VDEQ on November 10, 2020. The report summarizes water quality conditions in Virginia from January 1, 2013 through December 31, 2018 (VDEQ, 2020a). Data from this report is available as GIS shapefiles (VDEQ, 2020b; 2020c; and 2020d) and this data was used to determine the location and extent of impaired waters in the study area. Potential impacts to impaired waters were calculated by performing GIS overlays of the LOD, which is based on roadway engineering completed to date.

Aquifers/Water Supply

Congress enacted the Safe Drinking Water Act (SDWA) in 1974 and amended and reauthorized it in 1986 and 1996. It is this federal law that ensures the quality of Americans' drinking water and authorizes the USEPA to set national standards for drinking water to protect against health effects from exposure to naturally-occurring and man-made contaminants. These drinking water standards only apply to public water systems, and the USEPA works with states, localities, and water suppliers who maintain these standards.

VDEQ adopted a one-mile wellhead protection zone around all groundwater public sources (VDEQ, 2005). Code of Virginia §15.2-2223 and §15.2-2283 include groundwater protection provisions for local governments to consider when developing Comprehensive Plans and/or zoning ordinances. The selection of management methods to protect ground water is determined at the local level. The Virginia Department of Health (VDH) received USEPA approval for their Source Water Assessment Program and

completed assessments and susceptibility evaluations on all public water supply systems in the Commonwealth in 2003.

The USEPA's Sole Source Aquifer (SSA) program (authorized by Section 1424(e) of the SDWA of 1974 (Public Law 93-523, 42 U.S.C. 300 et. seq)) enables them to designate an aquifer as a sole source of drinking water and establish a review area (USEPA, 2015a, 2015b, 2016). USEPA defines a SSA as one where 1) the aquifer supplies at least 50 percent of the drinking water for its service area; and 2) there are no reasonably available alternative drinking water sources should the aquifer become contaminated. USEPA has the authority to review proposed projects that both receive federal funding and are located within the review area.

The VDEQ, under the Ground Water Management Act of 1992, manages groundwater withdrawals in certain areas called Groundwater Management Areas (GWMA) (VDEQ, 2016a). As defined in 9VAC25-600-10, a GWMA is a geographically defined groundwater area in which the State Water Control Board has deemed the levels, supply, or quality of groundwater to be adverse to public welfare, health, and safety. The study area is located within the Eastern Groundwater Management Area.

Aquifers/water supplies in the project vicinity, GWMA's, public water supply wells, and other known wells were identified using widely-available public data sets and through a study area review completed by the Virginia Department of Health in 2018.

Wetlands

Executive Order (EO) 11990, *Protection of Wetlands*, established a national policy and mandates that each federal agency acts to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural value. Wetlands are currently defined by the USACE (33CFR 328.3[b]) and the USEPA (40 CFR 230.3[t]) as:

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetlands were identified within the study area using mapping obtained from the USFWS' National Wetlands Inventory Mapper and field delineations completed in the study area. The delineation of WOUS, including wetlands, was performed according to the methodology outlined in the USACE's *Wetlands Delineation Manual* (USACE, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (Version 2.0) (USACE, 2010). Potential impacts to wetlands were calculated by performing GIS overlays of the LOD, which is based on roadway engineering completed to date.

2.1.2 Existing Conditions

Water Quality

There are three impaired perennial streams within the study area, Dogue Creek, Little Hunting Creek, and Paul Springs Branch, as designated under Section 303(d) of the CWA (**Figure 2-2**) (VDEQ, 2020a). **Table 2-1** provides the source of impairment, impaired use, and impaired stream length within the study area.

Figure 2-2: Impaired Waters Map

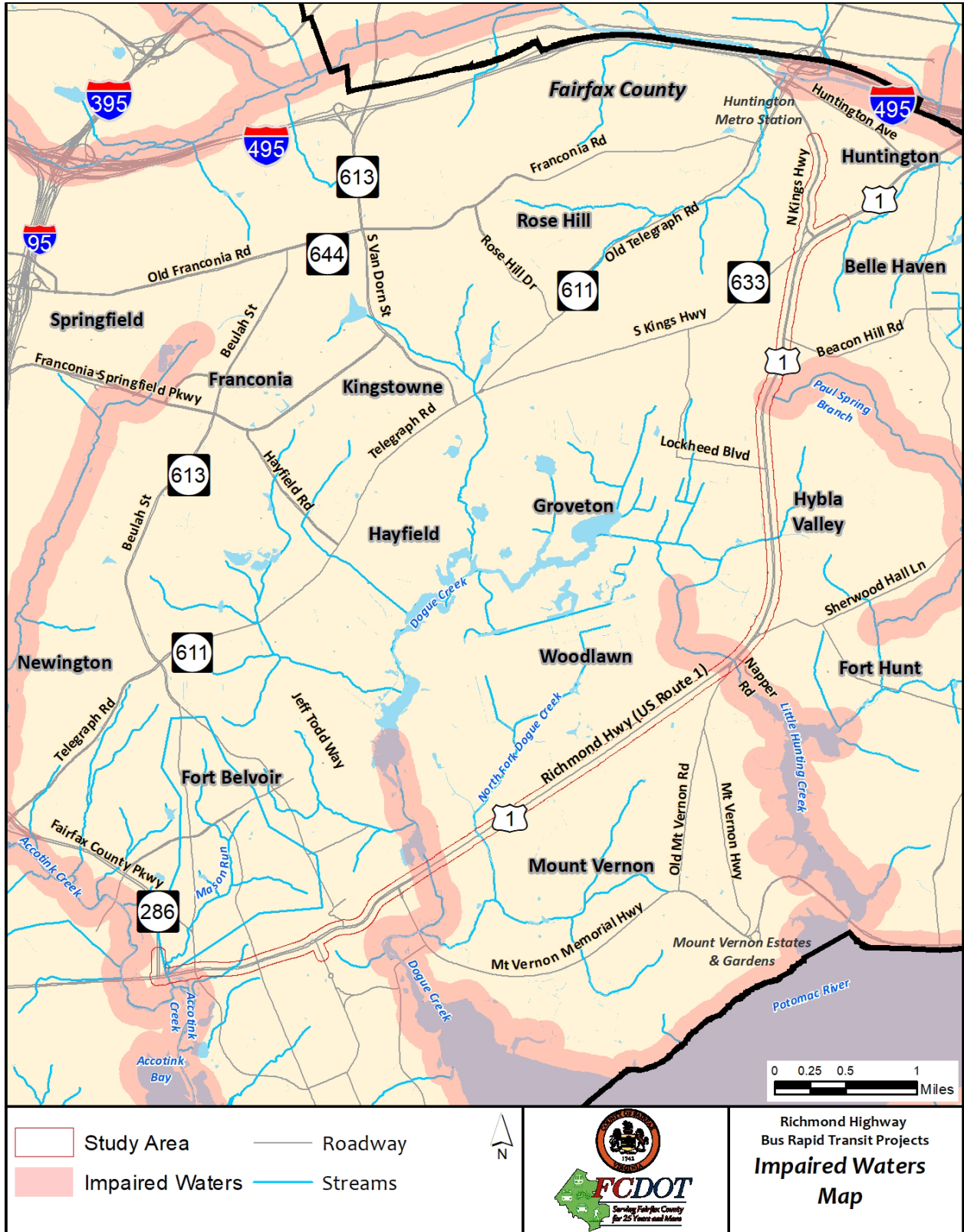


Table 2-1: Study Area Impaired Waterbodies

| Water Unit | Water Category | Impaired Use | Impairment Cause | Impairment Length within Study Area (Feet) |
|----------------------|----------------|-------------------------|---|--|
| Dogue Creek | 5A | Recreation | <i>Escherichia coli</i> | 485.7 |
| Little Hunting Creek | 4A | Fish Consumption | PCBs ¹ in water column | 529 |
| Paul Springs Branch | 5A | Aquatic Life Recreation | Benthic-macroinvertebrate Bioassessments, and <i>Escherichia coli</i> | 52.8 |

¹ Polychlorinated biphenyls

The recreation designated use supports swimming, boating, and other water-contact recreational activities. The fish consumption use supports game and marketable fish species that are safe for human health. Finally, the aquatic life designated use is assessed based on water quality standards to determine if the waterbody supports the propagation, growth, and protection of a balanced indigenous population of aquatic life which may be expected to inhabit a waterbody.

Total Maximum Daily Loads (TMDLs) have been established and approved by the USEPA for the Chesapeake Bay Basin (Total Nitrogen, Total Phosphorus, and Sediment) including the entire study area, the Potomac River, Tidal (Hooff Run and Hunting Creek) watershed (PCBs), and Hunting Creek watershed (E. coli). The Chesapeake Bay Basin TMDL has not yet been approved by the State Water Control Board (VDEQ, 2021a). The other TMDLs have been approved by the Board.

Aquifers/Water Supply

In a scoping response received from the Virginia Department of Health (VDH) on April 9, 2018, the VDH indicated that the Richmond Highway BRT project would have no impacts to public drinking water sources as there are:

- No public groundwater wells within a 1-mile radius of the study area
- No surface water intakes located within a 5-mile radius of the study area
- No public surface water intake watersheds within the study area.

Streams

The study area intersects with six streams within the Middle Potomac-Anacostia-Occoquan watershed. The streams, from south to north, include: two tributaries to Accotink Creek (Mason Run and an unnamed tributary); Dogue Creek and North Fork Dogue Creek; and Little Hunting Creek (which it crosses twice) and its tributary, Paul Springs Branch. These streams ultimately drain into the Potomac River, a tidally influenced system.

Table 2-2 contains the Cowardin Classification and corresponding linear feet of streams within the study area.

Table 2-2: Streams within Study Area

| Cowardin Abbreviation | Cowardin Classification | Linear Feet within Study Area |
|-----------------------|-------------------------|-------------------------------|
| R3 | Upper Perennial | 2,277.7 |
| R4 | Intermittent | 325.0 |
| R5 | Unknown Perennial | 903.5 |
| R6 | Ephemeral | 49.6 |
| Total | | 3,555.8 |

Figure 2-3 shows the four subwatersheds that contain the study area and are identified by their 12-digit Hydrologic Unit Code (HUC). The subwatersheds include Cameron Run, Little Hunting Creek-Potomac River, Dogue Creek, and Accotink Creek. Fairfax County has developed Watershed Management Plans for each of these watersheds.

Wetlands

Wetlands delineated within the WOUS survey area are depicted in mapping contained in **Appendix A**. A total of approximately 1.6 acre of wetlands were identified within the study area (**Table 2-3**).

Table 2-3: Wetlands within Study Area

| Cowardin Abbreviation | Cowardin Classification | Acreage within Study Area |
|-----------------------|-------------------------|---------------------------|
| PEM | Palustrine, Emergent | 0.2 |
| PFO | Palustrine, Forested | 1.0 |
| POW | Palustrine, Open Water | 0.4 |
| Total | | 1.6 |

2.1.3 Potential Impacts

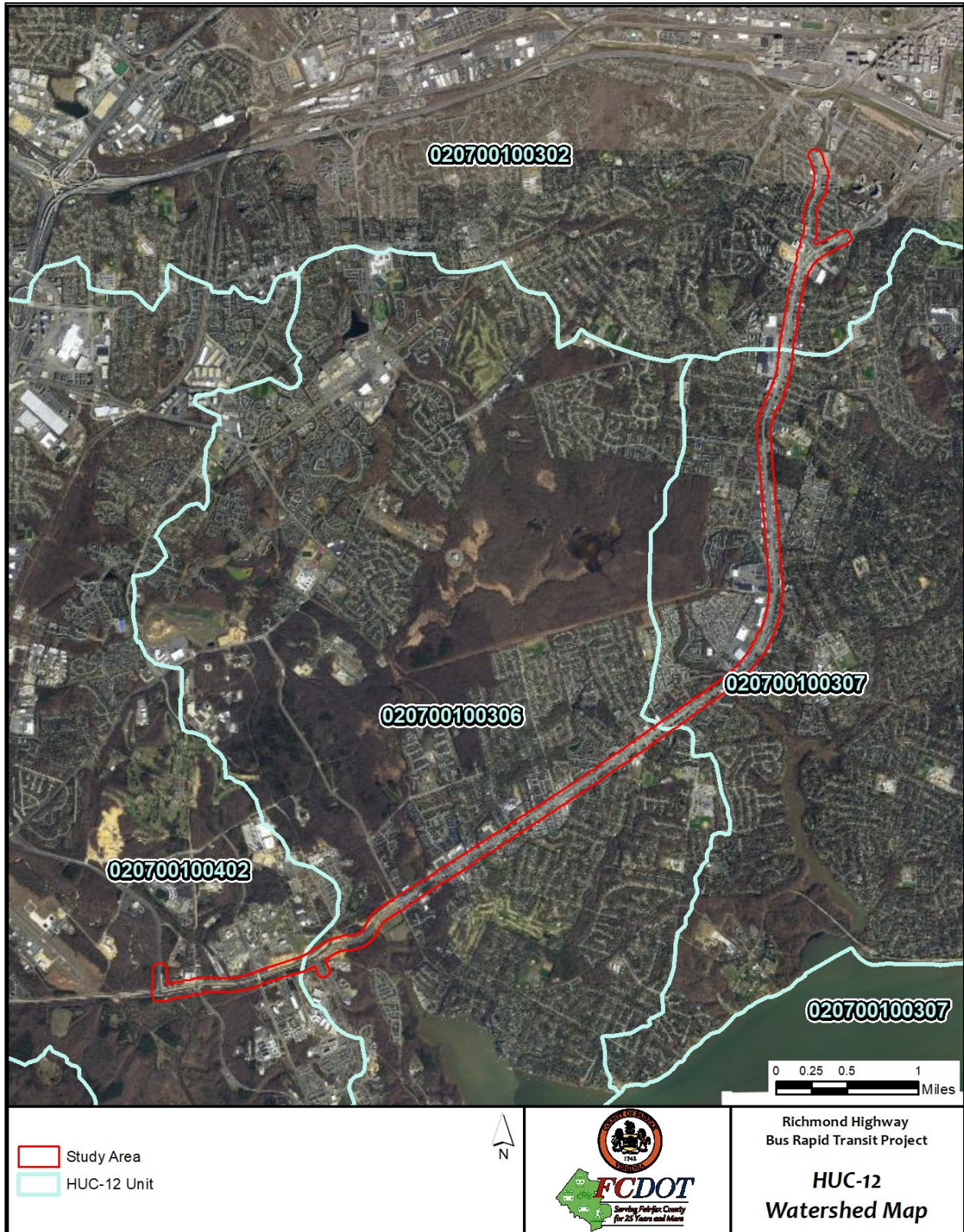
Streams

Table 2-4 shows that less than one tenth of an acre, or approximately 216 linear feet, of stream impacts would occur as a result of the project. The mapping in **Appendix A** shows the location and extent of the stream impacts. If the regulatory agency determines compensatory mitigation is required, the County will evaluate onsite compensation opportunities. If no onsite opportunities are available, the County will secure competitive bids from approved stream banks to purchase credits. If no credits are available, a trust fund payment will be secured. All this is in accordance with the 2008 *Compensatory Mitigation for Losses of Aquatic Resources (Final Rule)*. Mitigation measures would be discussed during the permit procurement process.

Table 2-4: Potential Stream Impacts

| Cowardin Abbreviation | Cowardin Classification | Acreage/Linear Feet within LOD |
|-----------------------|-------------------------|--------------------------------|
| R3 | Upper Perennial | 0.02 / 93.9 |
| R4 | Intermittent | <0.01 / 57.8 |
| R5 | Unknown Perennial | <0.01 / 14.7 |
| R6 | Ephemeral | <0.01 / 49.6 |
| Total | | 0.03 / 216.0 |

Figure 2-3: HUC-12 Watershed Map



Water Quality

The project would impact approximately 9.8 linear feet of impaired waters from Little Hunting Creek and approximately 4.2 linear feet of impaired waters from Dogue Creek.

Impacts to water quality by the project would be mitigated through adherence to prescribed methods and regulations. The project would follow the Virginia Stormwater Management Program (VSMP) and Stormwater Nonpoint Nutrient Offset legislation, Virginia Runoff Reduction Method (VRRM), the requirements of the Virginia Construction General Permit (including the development of a Stormwater Pollution Prevention Plan) and would comply with requirements associated with the Chesapeake Bay Watershed Improvement Plan (WIP).

The VSMP includes regulations (9 VAC 25-870) requiring water quality treatment, stream channel protection, and flood control standards for all new construction and redevelopment projects. The VSMP and the Stormwater Nonpoint Nutrient Offset legislation (Code§ 10.1-603.8:1) allow regulated land disturbance activities to utilize offsite options to achieve post-development water quality criteria. Nutrient credits are generated by Nutrient Banks under stringent state and federal criteria and certified by the State Water Control Board and regulated by the VDEQ. Offsite options may only be used if on-site practices have been implemented to the maximum extent practical and full compliance cannot be met onsite. The project would construct stormwater management facilities in accordance with federal, state, and local criteria.

The VRRM, a stormwater compliance framework focused not only on water quality treatment but also on reducing the overall runoff volume to better replicate pre-development hydrologic conditions, would be followed for construction of the project. VRRM is an iterative process of applying Environmental Site Design, Runoff Reduction, and Pollutant Removal practices such as but not limited to conservation, reforestation, runoff redirection, and wet swales in order to achieve the target load limit of the project.

The Virginia Construction General Permit outlines specific measures that development projects must address, including the development of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP outlines how certain potential pollutant sources would be addressed from nonpoint source pollution, construction activities, potential spills (e.g., petroleum, hydraulic fluids), etc. The SWPPP includes the Stormwater Management Plan, Erosion and Sediment Control Plan, and Pollution Prevention Plan that would provide specific measures to address TMDL requirements.

Aside from the development of a SWPPP, stormwater management for the portion of the project south of Jeff Todd Way and north of Sherwood Hall Lane must also comply with Fairfax County Regulations, specifically Article 4 of the Stormwater Management Ordinance (SWMO) and Chapter 6 of the Public Facilities Manual, based on Part IIB criteria of the Virginia Administrative Code 9VAC25-870-62 et seq. Fairfax County SWMO delineates the minimum technical criteria necessary of a project to ensure the protection of water quality and quantity from the potential harm of unmanaged stormwater runoff, particularly in the reduction of total phosphorous loads to levels below predevelopment levels and in meeting the requirements of all applicable TMDL action plans. These action plans are developed by Fairfax County in accordance with the County's MS4 permit.

EO 13508 on the Chesapeake Bay, issued May 12, 2009, includes goals for restoring clean water by reducing nitrogen, phosphorus, sediment, and other pollutants; recovering habitat by restoring a network of land and water habitats to support priority species and other public benefits; sustaining fish and wildlife; and conserving land and increasing public access. EO 13508 establishes additional responsibilities for federal agencies to ensure that their actions are not opposed to the goals of addressing water quality issues in the Chesapeake Bay watershed. After issuance of EO 13508, the USEPA promulgated the Chesapeake Bay TMDL requirements, which necessitates quantitative nutrient reductions by each contributing jurisdiction. The Commonwealth of Virginia developed a Watershed Implementation Plan (WIP) outlining how compliance with the Chesapeake Bay TMDL would be achieved. Included in the WIP were provisions for implementation of the above-referenced VSMP/VRRM criteria, which serve as the Commonwealth’s main vehicle for ensuring that nutrient and sediment loads for new development and redevelopment satisfy the requirements of the Chesapeake Bay TMDL. Measures implemented under the project would comply with these criteria.

Proper stormwater management under the project in accordance with regulations and best management practices (BMP) as described above would minimize impacts to streams near and downstream of the project. The project would be unlikely to cause further PCB, *E. coli*, or other impairment to these two streams.

Aquifers/Water Supply

No public groundwater wells, surface water intakes, nor public surface water intake watersheds were identified within the study area. As such, project activities are not anticipated to affect these resource types and no mitigation or avoidance measures are proposed.

Wetlands

Under the project, a total of approximately 0.02 acre of wetland impacts would occur (**Table 2-5**). Impacts would be minimized to the greatest extent practicable. The mapping in **Appendix A** shows the location and extent of the wetland impacts. If the regulatory agency determines compensatory mitigation is required, the County will evaluate onsite compensation opportunities. If no onsite opportunities are available, the County will secure competitive bids from approved wetland banks to purchase credits. If no credits are available, a trust fund payment will be secured. All this is in accordance with the 2008 *Compensatory Mitigation for Losses of Aquatic Resources (Final Rule)*. Mitigation measures would be discussed during the permit procurement process.

Table 2-5: Potential Wetlands Impacts

| Cowardin Abbreviation | Cowardin Classification | Acreage within LOD |
|-----------------------|-------------------------|--------------------|
| PEM | Palustrine, Emergent | <0.02 |
| PFO | Palustrine, Forested | <0.01 |
| POW | Palustrine, Open Water | 0.00 |
| Total | | 0.02 |

As the project advances beyond the NEPA review, additional design measures to avoid or minimize unavoidable impacts to wetlands may be identified in advance, or as part of the permitting process, therefore reducing the compensatory mitigation requirements. These measures may include use of the

smallest practicable roadway footprint to avoid and minimize the impact to wetlands by using the steepest practicable fill slopes and/or retaining walls.

2.2 Wildlife

2.2.1 Background and Methodology

Terrestrial Wildlife / Habitat

Federal and state agencies regulate and manage activities associated with terrestrial wildlife and their habitats on conserved lands and through the enforcement of laws related to hunting and fishing. The USFWS has statutory authority and responsibility for enforcing the Migratory Bird Treaty Act. The USFWS and VDWR act as consulting agencies under the US Fish and Wildlife Coordination Act. Their role in these procedures is to determine likely effects or impacts on fish and wildlife resources and habitats, and to recommend appropriate measures to avoid, reduce, or compensate for those impacts (VDWR, 2016a).

The Virginia Department of Conservation and Recreation, Natural Heritage Program (VDCR-DNH) conserves Virginia's natural resources through programs such as biological inventories, natural community inventory and classification, and the creation of Natural Area Preserves throughout the Commonwealth. In addition to Natural Area Preserves, VDCR-DNH identifies Conservation Sites, which represent key areas of the landscape worthy of protection and stewardship action because of the natural heritage resources and habitat they support (VDCR, 2016a). Conservation Sites are given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain; on a scale of B1-B5, with B1 being most significant (VDCR, 2016b).

The Fairfax County Park Authority maintains a list of wildlife found within this area of Fairfax County (Fairfax County, 2017) that is accessible to County residents on the County website. The County provides general information on the ecology and behavior of the most common species of wildlife within its borders. This information is intended to serve as a resource to educate and empower the residents of Fairfax County with knowledge about their wild neighbors.

State- and federally-listed species that are reported to occur, or potentially occur, within the vicinity of the study area were identified through use of the USFWS' Information for Planning and Conservation database (IPaC), VDWR's Fish and Wildlife Information Service (VaFWIS) database, and the VDCR-DNH Natural Heritage Data Explorer. Following the review of these data a list of potential federal and/or state-listed species was prepared for the study area. Readily available datasets such as those provided with the VDWR's Northern Long-Eared Bat Winter Habitat and Roost Trees Application and Little Brown Bat and Tri-colored Bat Winter Habitat and Roosts Application were utilized to inform this report. Information on land use was gathered from local comprehensive and land use plans, aerial photos, input from local and regional planning officials, and field reconnaissance. The database search results are compiled in **Appendix B**.

Threatened and Endangered Species

The information obtained from the agency database review is summarized below in **Table 2-6**. The table presents the species that are currently listed as threatened or endangered that are known to occur within the vicinity of the study area along with each species' listed status and source of its listing.

Table 2-6: Threatened and Endangered Species Mapped within the Vicinity of the Study Area

| Species | Status | Source of Listing |
|--|-----------------------------------|-------------------|
| Northern Long-eared Bat (<i>Myotis septentrionalis</i>) | Federally and State Threatened | IPaC |
| Tri-colored Bat (<i>Perimyotis subflavus</i>) | State Endangered | VaFWIS |
| Wood Turtle (<i>Glyptemys insculpta</i>) | State Threatened | VaFWIS |
| Peregrine Falcon (<i>Falco peregrinus</i>) | State Threatened | VaFWIS |

The following sections provide a brief summary of the natural history and distribution of the species listed in **Table 2-6**. This information was utilized as a general framework for the habitat evaluation to determine the presence of habitat, existing conditions, and potential impacts of the Richmond Highway BRT project within the study area. No threatened or endangered species presence/absence or habitat surveys were completed for this analysis. No critical habitat has been designated by the USFWS nor National Oceanic and Atmospheric Administration (NOAA) Fisheries within the study area.

Northern Long-Eared Bat – The Northern Long-Eared Bat (NLEB) is a federal- and state-threatened species. It is listed in Virginia’s Wildlife Action Plan as a Tier 1 species with a “Critical Conservation Need,” meaning the species is at high risk for extinction or extirpation (VDWR, 2015). The primary threat to NLEB was identified to be white-nose syndrome (WNS), although other threats do exist including impacts to hibernacula and summer habitat, and threats during migration (Indiana Department of Natural Resources, 2021). WNS is caused by the fungus *Pseudogymnoascus destructans* and is responsible for unprecedented mortality in some hibernating insectivorous bats in the northeastern U.S., including dramatic and rapid population declines in NLEB populations of up to 99 percent from pre-WNS levels (Indiana Department of Natural Resources, 2021).

The NLEB is a medium-sized bat in the genus *Myotis* that can be found throughout the eastern and midwestern U.S. and southern Canada. The NLEB uses a wide variety of forested habitats for roosting, foraging, and traveling, and may also utilize some adjacent and interspersed non-forested habitat such as emergent wetlands and edges of fields. This species has also been found roosting in structures like barns and sheds (particularly when suitable tree roosts are unavailable). The bats emerge at dusk to forage in upland and lowland woodlots and tree-lined corridors, feeding on insects, which they catch while in flight using echolocation. This species also feeds by gleaning insects from vegetation and water surfaces (VDWR, 2021a).

Roosting habitat includes forested areas with live trees and/or snags with a diameter at breast height (dbh) of at least 3 inches with exfoliating bark, cracks, crevices, and/or other cavities. Trees are considered suitable if they meet those requirements and are located within 1,000 feet of the nearest suitable roost tree, woodlot, or wooded fencerow. Maternity habitat is defined as suitable summer habitat that is used by juveniles and reproductive females. The summer maternity season in Virginia is April 1 through September 30. Winter habitat includes underground caves and cave-like structures such as abandoned or active mines and railroad tunnels. The NLEB migrate between their winter hibernacula and summer

habitat, typically between mid-March and mid-May, and mid-August and mid-October. They are considered a short-distance migrant (typically 40 - 50 miles), although their known migratory distances can vary greatly between five and 168 miles (USFWS, 2015). The USFWS uses 0.5-mile and 5.5-mile radius buffers of hibernacula, and 0.25-mile diameter buffers around roosts, to assess potential project impacts to the NLEB. According to the VDWR's NLEB Winter Habitat and Roost Trees Application, the nearest confirmed hibernacula occur approximately 92 miles to the west of the study area, in Rockingham County, and the nearest recorded roosts are located approximately 151 miles to the south in the City of Chesapeake (VDWR, 2021b).

Tri-colored Bat – The tri-colored bat, formerly known as the eastern pipistrelle, is a state-endangered species in Virginia. It is listed in the Virginia's Wildlife Action Plan as a Tier 1 species. This is one of the smallest eastern bats. There are typically two young born in sex-segregated maternity colonies from mid-June to early July. Mating occurs in autumn, in winter, and spring. They are active until late October and hibernate in caves/mines often too tiny for other species. They begin leaving caves in March to fly daily in the sun. They may roost in caves, rock crevices, trees/foilage, and seldom buildings. This species forages in the early evening in treetops and over water. They are never in deep woods or open fields unless large trees are nearby. The female is more specific than the male for roosting in the same site. They tolerate more light than other species. The hoary bat and the leopard frog are confirmed predators (VDWR, 2021a). According to the VDWR's Little Brown Bat and Tri-colored Bat Winter Habitat and Roosts Application, no confirmed hibernacula are located within the vicinity of the study area (VDWR, 2021c).

Wood Turtle – The wood turtle is listed as a state-threatened species and is also in Tier I of Virginia's Wildlife Action Plan. It is a medium-sized turtle, reaching lengths up to nine inches. Its skin is dark brown to black, and individuals often feature some orange or red pigment on their forelegs and neck. Wood turtle hatchlings are gray to brown and lack red or orange pigment on the head and legs. Known hatchling emergence dates in Virginia are from June to August. Clutches of 7-14 eggs are most common. The species is generally terrestrial during the warm part of the year and aquatic during cool spells and hibernation. Hibernation occurs within deep pools, under the mud or sand bottom of waterways, or under the overhanging roots of trees along the waterway bank. Although highly terrestrial, wood turtles must remain in moist habitats as they experience a greater evaporative water loss than the more terrestrial box turtles. Populations have declined due to degradation of aquatic habitats, loss of wetlands, fragmentation of habitats, urbanization, being killed by vehicular traffic, and from the collection of adults and juveniles for the pet trade (VDWR, 2021d). Wood turtle observations have previously occurred along Accotink Creek and Dogue Creek (VDWR, 2021a).

Peregrine Falcon – The peregrine falcon is listed as a state-threatened species and is also a Tier I species of Virginia's Wildlife Action Plan. Peregrine falcons are medium-sized raptors that feed chiefly on avian prey, including shorebirds, pigeons, blackbirds, jays, and other medium-sized birds. Peregrines have historically nested on the ledges of natural cliff faces in western Virginia. Although this mountain population is beginning to stage a comeback, the majority of peregrines currently nest in the Coastal Plain on artificial structures such as specially-constructed towers, nest boxes, bridges, and tall buildings. After the widespread use of dichloro-diphenyl-trichloroethane, in conjunction with human disturbance, it is believed that the peregrine falcon was totally extirpated from Virginia and the eastern U.S. by the mid-

1960s. Following the re-introduction to Virginia in the late 1970s, the coastal falcon population has continued to grow. The occurrence documented in the VaFWIS database within a two-mile radius of the study area is an observation made in Huntley Meadows Park from 1998, west of the study area. The population of peregrine falcons known to breed in Virginia is currently centered on the Coastal Plain. Currently, occupied territories are on nine peregrine towers and two fishing shacks on the Delmarva Peninsula; five bridges, one power plant stack, and one high-rise building in the Coastal Plain; and four natural cliff sites in the mountains (CCB, 2021). No resident occurrences are known for Fairfax County (VDWR, 2021a).

Anadromous Fish and T&E Waters

Virginia is a member of the Atlantic States Marine Fisheries Commission. A duty of the Commission is to prevent the depletion and physical waste of the marine, shell, and anadromous fisheries of the Atlantic seaboard. While this is not a regulatory mandate to protect anadromous fish, the VDWR and VMRC, in combination with NOAA Fisheries, oversees anadromous fish in Virginia. NOAA Fisheries has jurisdiction over anadromous fish listed under the Endangered Species Act through their Office of Protected Resources.

VDWR documents both confirmed and potential Anadromous Fish Use Areas and maintains a database with this information. The presence of both confirmed and potential Anadromous Fish Use Areas was obtained using the VDWR' VaFWIS database.

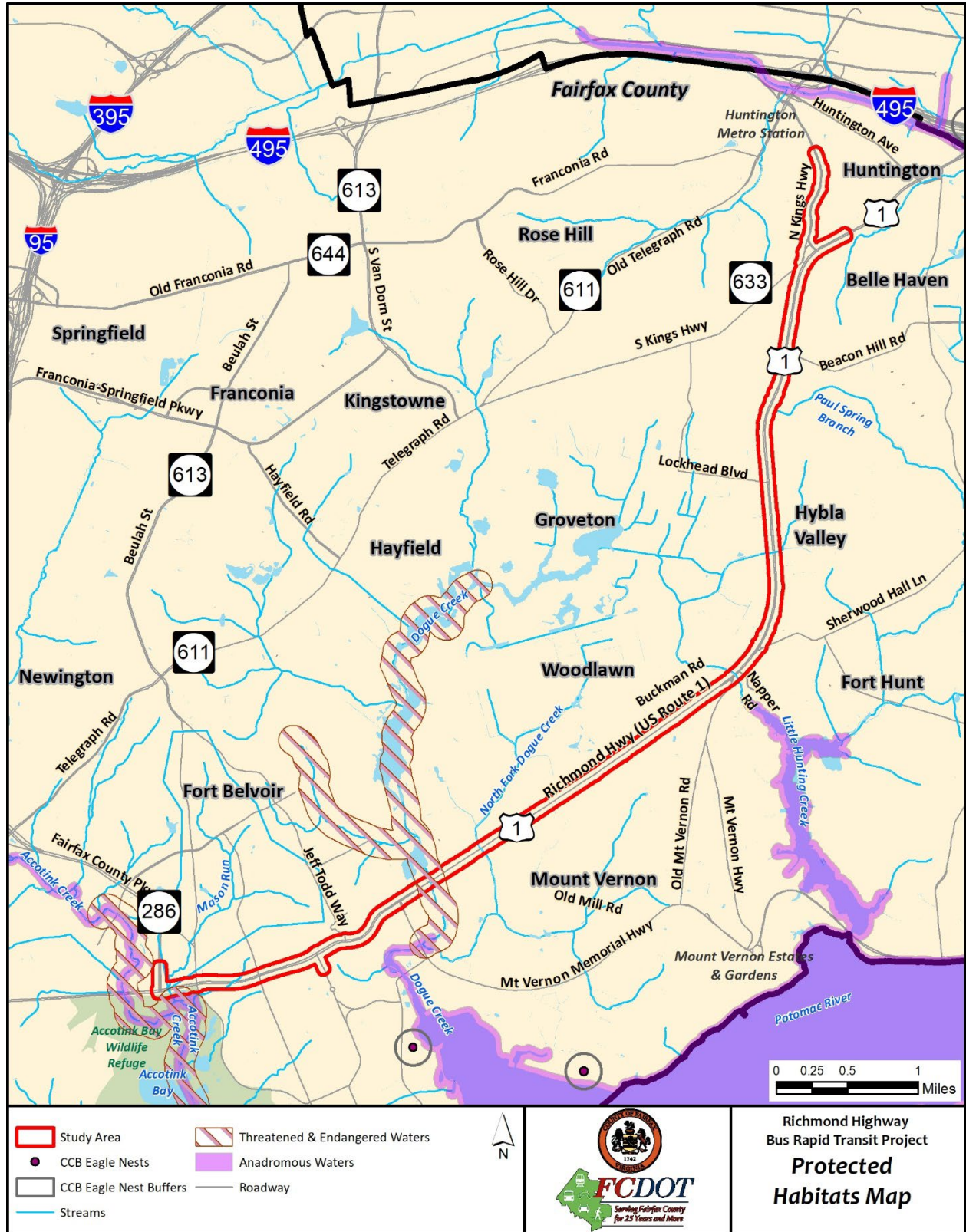
The VDWR has identified and mapped streams and rivers that contain documented occurrences of federal/state- or state-listed threatened or endangered species and their associated habitat. The VDWR institutes time-of-year restrictions to instream work in mapped T&E Waters. The time-of-year restriction is dependent upon the species known to inhabit the stream/river and the habitat's location. The presence T&E Waters in the study area was obtained using the VDWR' VaFWIS database.

2.2.2 Existing Conditions

Land use in the study area is primarily commercial, followed by residential; recreation and open space; institutional, government, utilities; and industrial land uses. There is no agricultural land use within the study area. Natural areas within the study area are limited to the stream corridors, Fairfax County Parks, and Accotink Bay Wildlife Refuge, all of which have levels of protection through federal, state, and/or county regulations (**Figure 2-4**). Accotink Bay Wildlife Refuge is a 1,200-acre Federal Wildlife Sanctuary that attracts spring and fall migrant birds, as well as shorebirds, waterfowl, and nesting ospreys. The Refuge is on the grounds of Fort Belvoir (VDWR, 2017).

The National Land Cover Dataset (2016) approximates 16.1 acres of forested land cover within the study area based on the presence of deciduous forest, mixed forest, and woody wetland areas (Dewitz, 2019). However, large expanses of terrestrial habitat are rare and fragmented, as residential, commercial, industrial, government/military, and open water areas are most common, which results in low-quality edge habitat. The wildlife species most capable of adapting to habitat fragmentation due to dense urban and suburban development include, but are not limited to, rabbits, whitetail deer, eastern gray squirrels, red fox, raccoon, striped skunk, and many common non-migratory bird species (VDWR, 2015). In addition, existing stream corridors and their floodplains within the study area are narrow corridors between

Figure 2-4: Protected Habitats Map



fragmented habitat, leading to increased wildlife predation due to greater ease of locating prey species. According to the VDWR' VaFWIS dataset, and as shown in **Figure 2-4**, no confirmed nor potential Anadromous Fish Use Areas occur in the study area (VDWR, 2021a). Dogue Creek was listed by VDWR as a potential T&E Water that could provide wood turtle habitat within the study area (VDWR, 2021a).

2.2.3 Potential Impacts

Terrestrial Habitat / Wildlife and T&E Species

The VDCR Natural Landscape Assessment (VDCR, 2017) is a landscape-scale GIS analysis that has identified, prioritized, and linked important lands to form natural land networks throughout Virginia. These unfragmented natural habitats are called Ecological Cores. Ecological Cores provide habitat for a wide range of species, from interior-dependent forest species to habitat generalists, as well as for species that utilize marsh and maritime habitats. The ecological cores layer represents ecological cores as polygons that are symbolized by Ecological Integrity scores. In general, larger, more biologically diverse areas are given higher scores. According to the VDCR Natural Landscape Assessment, the highly-developed LOD of the project does not intersect a designated ecological core area (VDCR, 2017).

The project would take place along an existing roadway facility, in a highly-developed area, which currently poses as a barrier to wildlife movement for non-listed species. Incrementally increasing the width of the right-of-way would not exacerbate the existing habitat fragmentation which occurs in the area. There is the potential for limited impacts to wildlife resulting from the removal of vegetation in areas along the existing roadway and would also temporarily result from construction noise.

The project would impact approximately 1.2 acre of forested land (Dewitz, 2019). The forest clearing would occur in low-quality edge habitat within highly-developed areas. These highly-developed areas and the existing roadway infrastructure limit the probability of travel corridors for NLEBs and tri-colored bats in the LOD. These areas are all unlikely to be utilized as roosts by NLEB, or the tri-colored bat, as roosts would not be expected in close proximity to the existing transportation corridor. In addition, as stated earlier, according to the VDWR' Northern Long-Eared Bat Winter Habitat and Roost Trees Application (VDWR, 2021b), no confirmed NLEB maternity roost trees or hibernacula are located within five miles of the study area and no tri-colored bat hibernaculum have been confirmed within five miles of the study area with use of the Little Brown Bat and Tri-colored Bat Winter Habitat and Roosts Application (VDWR, 2021c). Therefore, harm to roosting NLEB from tree removal would be unlikely in these areas, but as potential habitat exists, potential impacts have been considered further below. As stated above, the tri-colored bat could roost in trees/foilage, yet the VDWR has stated that they have not tracked and are not aware of any tri-colored bat roost trees in Virginia (VDWR, 2016b). As such, harm is anticipated to be unlikely to roosting tri-colored bat due to tree removal in the LOD.

The Federal Highway Administration, Federal Railroad Administration, FTA, and USFWS have been working together to streamline consultation and improve conservation for the Indiana bat (*Myotis sodalis*) and NLEB. As part of this effort, in 2016, they jointly developed a Range-wide Programmatic Biological Assessment (BA) for common types of transportation projects that State or local Departments of Transportation conduct with federal funding and/or approval. The BA defines the scope of, and criteria applicable to, projects that may rely upon the findings and streamlined processes for the Biological

Opinion (BO) prepared by USFWS. The USFWS signed the *Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat* in February 2018.

Potential project activities and impacts were evaluated using the assisted determination key from the USFWS IPaC service. Due to potential impact locations, and work around bridges within the LOD, the project is outside of the scope of the 2016 BA and 2018 BO for the NLEB.

Therefore, according to the BA, as the project is outside the scope of the BA, formal coordination of the project was completed and the NLEB 4(d) framework was used as formal coordination for the project. The 4(d) formal coordination was completed on May 6, 2021. The verification letter from the USFWS is included in **Appendix B**. Through this coordination it was determined that the project is consistent with activities analyzed in the BO on the Final 4(d) Rule. The project may affect the NLEB; however, any take that may occur as a result of the project is not prohibited under the ESA Section 4(d) rule adopted for the species at 50 CFR §17.40(o). The provided verification letter concludes the project's responsibilities under ESA Section 7(a)(2) with respect to the NLEB.

The state-threatened wood turtle was identified in the vicinity of the study area through use of VDWR's VaFWIS. As it has the potential to occur within a T&E Water, it is discussed further below in that section. As noted above, no resident occurrences of peregrine falcons are known for Fairfax County (VDWR, 2021a). Peregrine falcons are known to inhabit bridges within coastal Virginia; however, these bridges do not occur within the study area. There are two existing bridges in the LOD, and these occur above the bridged crossings of Dogue Creek and Little Hunting Creek. Both existing bridges are low-profiled, even with the road surface, and are in subordinate positions to the surrounding forested and built landscape. When nesting on bridges, peregrine falcons prefer to nest within open landscapes with access to foraging habitat (Watts and Watts, 2017). The bridges within the LOD would not serve these purposes and are unlikely to be utilized by nesting peregrine falcons. Therefore, no mitigation or avoidance measures are proposed for this species.

A field survey for tri-colored bat roost sites would be completed if required for CWA permitting of the project. If no roosts are identified with the survey, then VDWR may not institute a Time of Year Restriction (TOYR) for tree clearing activities in regard to the tri-colored bat. If a survey is not conducted, the VDWR may institute a TOYR extending from April 1 through October 31 for tree removal activities within suitable forested habitat. Use of these TOYR would offset potential direct impacts, would mitigate indirect effects outside of the area of direct impact, and should result in a "not likely to adversely affect" determination from the resource agencies.

Further, measures to minimize impacts to habitat connectivity and wildlife passage would be evaluated during the CWA permitting for the project. To reduce potential impacts to adjacent terrestrial habitats, construction practices would avoid the removal of existing vegetation to the greatest extent practicable and would include the implementation and maintenance of strict erosion and sediment control measures and stormwater management BMPs to reduce potential impacts to adjacent habitats.

Additionally, per coordination with US Army Garrison Fort Belvoir, cutting and removal of vegetation will be avoided on Fort Belvoir property from April 1 to July 15, with the understanding that if cutting and removal occurs during this time frame, a survey for birds and active bird nests is recommended. On Fort Belvoir property, guidance provided in the Migratory Bird Treaty Act will be followed.

Anadromous Fish and T&E Waters

There are no Anadromous Fish Use Areas within the study area; therefore, none are located within the LOD, and no avoidance or minimization measures are proposed for this resource. The section of Dogue Creek located within the LOD which is considered a T&E Water would contain low quality habitat for the wood turtle given its proximity to the existing road edge. Because of this low quality, there are no anticipated impacts to T&E Water species such as the wood turtle. Should VDWR determine that impacts to T&E Waters, and the wood turtle, could occur, the county may be required to adhere to the typical TOYR for the wood turtle, for in-water work, which is October 1 through March 15 of any given year (VDWR, 2020). In addition, the VDWR may institute, at the time of CWA permitting, a TOYR for work within 900 feet of a T&E Water extending between April 1 and September 30, of any given year. Use of these TOYR would offset potential direct impacts, would mitigate indirect effects outside of the area of direct impact, and should result in a “not likely to adversely affect” determination from the resource agencies.

2.3 Floodplains

2.3.1 Background and Methodology

Several federal directives regulate construction in floodplains to ensure that consideration is given to avoidance and mitigation of adverse effects to floodplains. These federal directives include the National Flood Insurance Act of 1968, EO 11988, and the US Department of Transportation (USDOT) Order 5650.2 entitled, *Floodplain Management and Protection*. The National Flood Insurance Act of 1968 established the National Flood Insurance Program (NFIP), which is administered by the Federal Emergency Management Agency (FEMA). In Virginia, the VDCR is responsible for coordination of all state floodplain programs. Development within floodplains is also regulated by local flood insurance programs administered by localities under the NFIP. As delineated in Section 104-1-8 of the Fairfax County Code of Ordinances, the current Virginia Erosion and Sediment Control Handbook and the Public Facilities Manual will be employed to ensure Erosion and Sediment control standards are met.

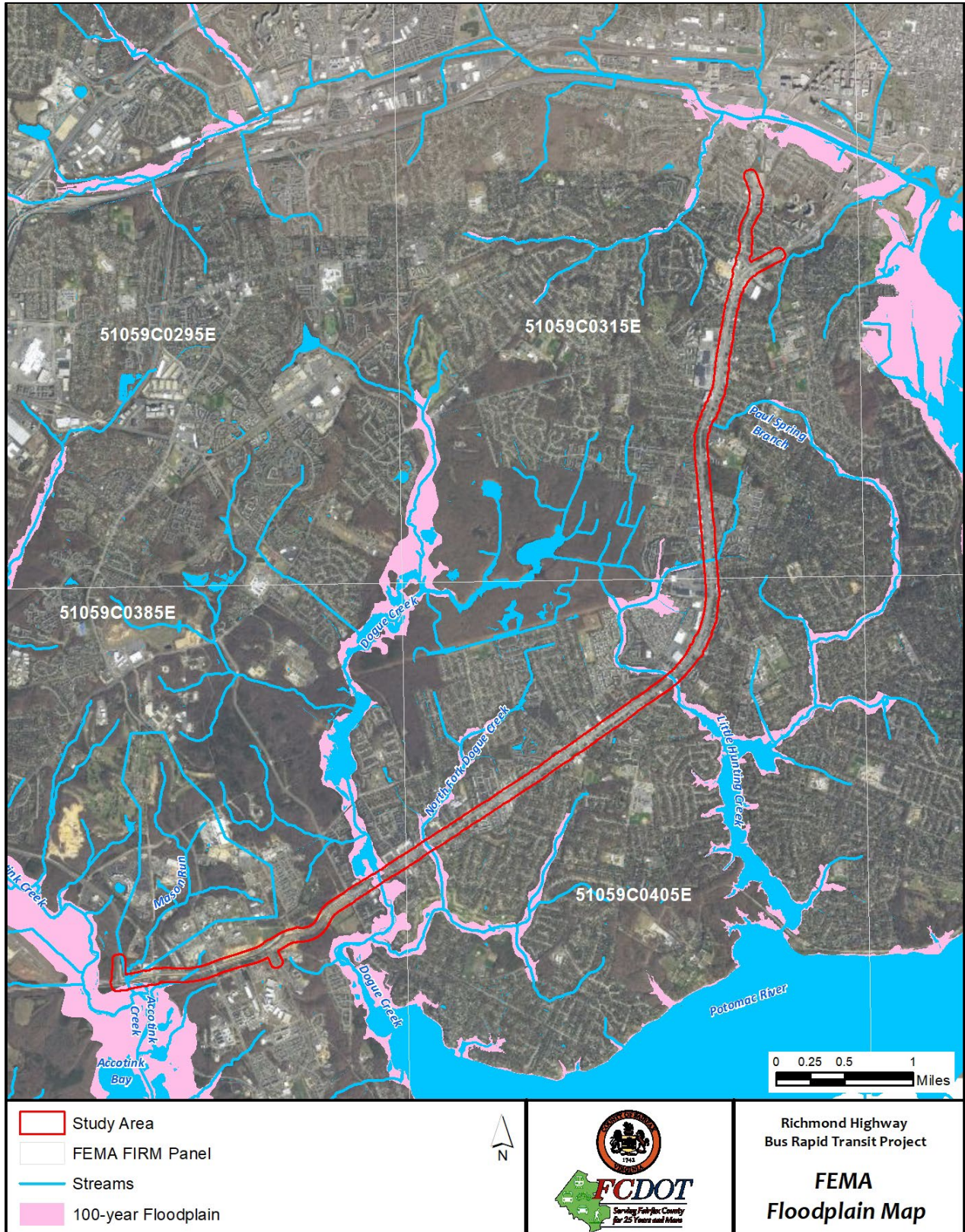
To reduce the risk of flood loss and to minimize the impact of floods on human safety, while preserving the natural beneficial values of floodplains, EO 11988, *Floodplain Management*, requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with construction within and modification of floodplains. The order also requires agencies to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. USDOT Order 5650.2 guides the implementation of EO 11988 and requires the detailed consideration of impacts to floodplains, as well as avoidance and minimization.

FEMA is required to identify and map the nation’s flood-prone areas through the development of Flood Insurance Rate Maps. Digital floodplain data was obtained from the FEMA Flood Map Service Center and plotted within the study area to determine the extent of floodplain areas (FEMA, 2018). Floodplain areas were associated with the waterbody that controls hydrology affecting the floodplain elevation associated with the floodplain area.

2.3.2 Existing Conditions

Approximately 15.2 acres of FEMA mapped 100-year floodplains occur within the study area (**Figure 2-5**). The 100-year floodplain includes those areas that statistically have a one percent chance of being flooded

Figure 2-5: FEMA Floodplain Map



in any given year. The 100-year floodplains occurring in the study area are associated with Accotink Creek, Dogue Creek, the North Fork Dogue Creek, and Little Hunting Creek.

2.3.3 Potential Impacts

The project would encroach upon roughly 0.2 acre of regulated floodplains. Individual impacts to any one floodplain would be relatively small in size and severity. Most floodplain encroachments from the project would be from the perpendicular crossing of floodplains, not from longitudinal encroachments. Perpendicular crossings would result in less floodplain fill, maximizing floodwater conveyance and storage compared to longitudinal encroachments. The actual encroachment may be different based upon the total extent of fill required for construction and the use of bridges at the major water crossings.

The project is consistent with local land use plans and is not projected to either encourage or accelerate growth or changes in land use within floodplains. Therefore, the project would not encourage, induce, allow, serve, support, or otherwise facilitate incompatible base floodplain development. Efforts to minimize floodplain encroachment, in the limited area of impact, would be considered during advanced design to avoid or minimize impacts on natural and beneficial floodplain values.

2.4 Chesapeake Bay Preservation Act

2.4.1 Background and Methodology

The Chesapeake Bay Preservation Act (CBPA) was enacted by the Virginia General Assembly in 1988 to protect and manage Virginia's "coastal zone". The CBPA balances state and local economic interests and water quality improvement by creating a unique cooperative partnership between state and Tidewater local governments to reduce and prevent nonpoint source pollution while still allowing for reasonable development to continue. The CBPA requires local governments in the coastal zone to include water quality protection measures in their zoning and subdivision ordinances and in their comprehensive plans (VDEQ, 2016c).

Within the Chesapeake Bay watershed of coastal counties, Resource Protection Areas (RPA) include tidal wetlands, tidal shores, waterbodies with perennial flow, and non-tidal wetlands connected by surface flow and contiguous to tidal wetlands or perennial water bodies, as well as a 100-foot vegetated buffer area located adjacent to and landward of these features. When preserved in their natural condition, RPAs protect water quality, filter and reduce the volume of runoff, prevent erosion, and perform other important biological and ecological functions (9 VAC 25-830-80). These areas are subject to local CBPA requirements to minimize land disturbance, preserve indigenous vegetation, minimize impervious surfaces, control stormwater runoff, and implement erosion and sediment control plans for land disturbances. Activities within RPAs are further restricted to water dependent or redevelopment related activities.

Resource Management Areas (RMA) include those lands contiguous to the inland boundary of the RPA, which if improperly used or developed, has the potential to degrade water quality, or diminish functions of the RPA. RMAs include floodplains, highly erodible soils (including steep slopes), highly permeable soils, non-tidal wetlands not included in RPAs, and any other sensitive lands considered by the local government to be necessary to protect the quality of water resources (9 VAC 25-830-90). Areas of existing development and infill sites where little of the natural environment remains within Chesapeake Bay

Preservation Areas may be designated as Intensely Developed Areas by the local government (9 VAC 25-830-100).

2.4.2 Existing Conditions

The study area is within the Chesapeake Bay watershed. **Figure 2-6** shows RPAs are concentrated adjacent to the Paul Spring Branch, Dogue Creek, North Fork Dogue Creek, Little Hunting Creek, and Accotink Creek stream corridors in the study area.

2.4.3 Potential Impacts

Although RPAs intersect with the LOD, public roads and their appurtenant structures are conditionally exempt from regulation under 9VAC25-830-150 and under Fairfax County Code Section 118-5-2. The roads would need to be constructed in accordance with water quality protection criteria, in accordance with the Erosion and Sediment Control Law, and Stormwater Management Regulations. If the above conditions are met, no additional avoidance or minimization of CBPA areas would be necessary for the project.

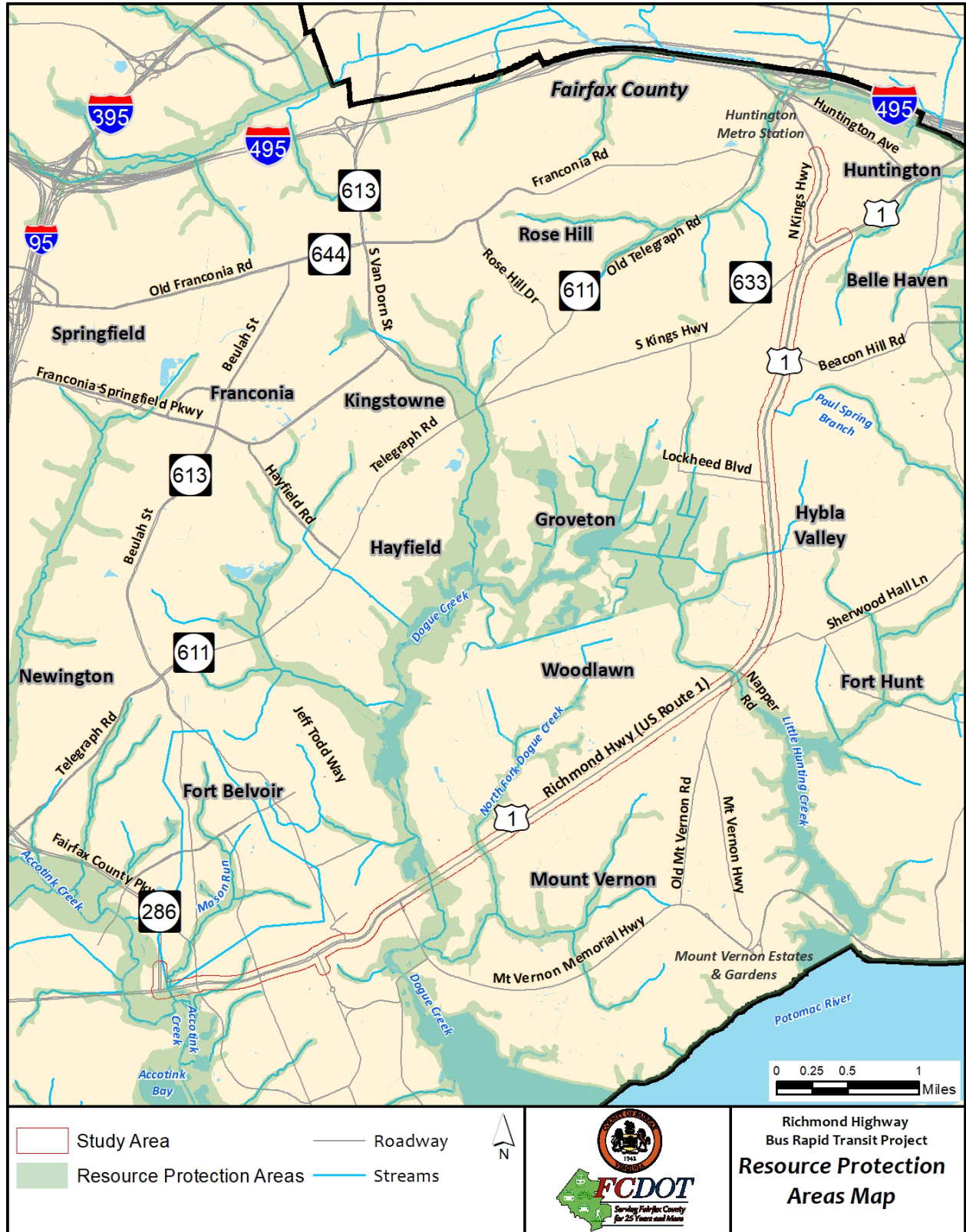
2.5 Virginia Coastal Zone Management Program

2.5.1 Background and Methodology

Federal projects occurring within any land or water use, or natural resource of a state's coastal zone, including cumulative and secondary impacts, must be consistent with the State's federally approved Coastal Zone Management Program (CZMP) per Section 307 of the Federal Coastal Zone Management Act of 1972, as amended, and NOAA regulations (15 CFR part 930). Such actions require a consistency determination that receives concurrence from the state. In Virginia, the VDEQ administers the CZMP and reviews consistency determinations.

The Virginia CZMP was established under EO in 1986 and its mission is to create more vital and sustainable coastal communities and ecosystems. The Virginia CZMP is known as a "networked program," which means to manage Virginia's coastal resources, the program relies on a network of state agencies and local governments to administer the enforceable laws and regulations that protect our wetlands, dunes, subaqueous lands, fisheries, and air and water quality within Virginia's coastal zone. The agencies involved in the CZMP include: VDEQ; VDCR; VMRC; VDWR; VDH; Virginia Department of Agriculture and Consumer Services (VDACS); Virginia Department of Forestry; Virginia Department of Historic Resources; Virginia Department of Mines, Minerals, and Energy; VDOT; Virginia Economic Development Partnership; and the Virginia Institute of Marine Science (VIMS). These agencies administer the enforceable laws, regulations, and advisory policies that protect our coastal resources and geographic areas of particular concern.

Figure 2-6: Resource Protection Areas Map



2.5.2 Existing Conditions

According to VDEQ, Virginia’s coastal zone “encompasses the 29 counties, 17 cities, and 42 incorporated towns in ‘Tidewater Virginia,’ as defined in the Code of Virginia 28.2-100” (VDEQ, 2016b). The study area is located within Virginia’s coastal zone. As such, since this project would receive federal funding for construction and therefore require federal approval, the project must be consistent with the applicable Enforceable Regulatory Programs that comprise Virginia’s CZMP (VDEQ, 2016b) presented in **Table 2-7**. When the USACE reviews a Joint Permit Application for impacts to WOUS, the USACE will require that the applicant demonstrate consistency with these enforceable programs of the CZMP.

Table 2-7: Virginia Coastal Zone Management Program Enforceable Regulatory Programs

| Regulatory Program | Resource | Virginia Code | Regulatory Agency | Notes |
|--------------------------------|---|--|---------------------------------|---|
| Fisheries Management | Conservation and enhancement of finfish and shellfish | 28.2-200 to 28.2-713 29.1-100 to 29.1-570 | VMRC VDWR | - |
| Subaqueous Lands Management | Establishes conditions for granting or denying permits to use State-owned bottomlands | 28.2-1200 to 28.2-1213 | VMRC | - |
| Wetlands Management | Preserve wetlands and prevent their despoliation | 62.1-44.15:5 28.2-1301 to 28.2-1320 | VDEQ VMRC Wetlands Boards | Non-tidal Tidal Tidal |
| Dunes Management | Prevent destruction or alteration of primary dunes | 28.2-1400 to 28.2-1420 | VMRC Wetlands Boards | |
| Non-point Source Pollution | Reduce soil erosion and decrease inputs of chemical nutrients and sediments | 62.1-44.15:51 <i>et seq.</i> | VDEQ Local Governments | |
| Point Source Pollution Control | Regulates discharges into State waters through VPDES and VPA permits | 62.1-44.15 | VDEQ | |
| Shoreline Sanitation | Septic tank placement | 32.1-164 to 32.1-165 | VDH | Contact may be required relocations and removal of existing systems |
| Air Pollution Control | Attainment and maintenance of NAAQS ² | 10.1-1300 to 10.1-1320 | VDEQ | |
| Coastal Lands Management | Regulates activities within RMAs and RPAs | 62.1-44.15:67 to 62.1-44.15:79 9 VAC 25-830-10 <i>et seq.</i> | VDEQ Local Governments | |

¹ Virginia Pollutant Discharge Elimination System

² National Ambient Air Quality Standards

In addition to the enforceable regulatory programs, the CZMP also includes advisory policies to protect coastal resources. When reviewing projects, the state agencies implementing these policies provide comments concerning the impacts to coastal resources. These resources include:

- Coastal Natural Resource Areas (including wetlands; aquatic spawning, nursery, and feeding grounds; coastal primary sand dunes; barrier islands; significant wildlife habitat areas; public recreation areas; sand and gravel resources; and underwater historic sites)
- Coastal Natural Hazard Areas (including highly erodible areas, coastal high hazard areas, including floodplains)
- Waterfront Development Areas (including commercial ports, commercial fishing piers, and community waterfronts)
- Virginia Public Beaches
- Virginia Outdoors Plan
- Parks, Natural Areas, and Wildlife Management Areas
- Waterfront Recreational Land Acquisition
- Waterfront Recreational Facilities
- Waterfront Historic Properties

2.5.3 Potential Impacts

The project would disturb additional land within Virginia's coastal zone. The project would be designed to be in compliance with the applicable Enforceable Regulatory Programs that comprise Virginia's CZMP. Should it be determined during the permit process that the project requires an individual permit, a Coastal Zone Management Consistency Certification will be pursued.

2.6 Topography and Soils

2.6.1 Methodology

The boundary of the study area was established as the Area of Interest using the Natural Resources Conservation Service Web Soil Survey. The study area's base soil data was taken from the resulting soil map and soil data explorer and referenced to the mapping in the *Description and Interpretive Guide to Soils in Fairfax County* prepared by Fairfax County Public Works and Northern Virginia Soil and Water Conservation District (Fairfax County, 2013).

2.6.2 Existing Conditions

Fairfax County can be divided into three major regions based on geology and physiography. The regions are Coastal Plain, Piedmont, and Triassic Basin (Fairfax County, 2013). The study area is in the Coastal Plain region, which occupies approximately 26 percent of Fairfax County. The province consists of unconsolidated sand, silt, clay, and gravel strata deposited by ancient oceans and rivers. The High Coastal Plain is found at elevations above 150 feet above sea level. The Low Coastal Plain occupies the low, flat, and wet portion of Hybla Valley, Mason Neck, and Gunston Cove. The overall drainage pattern in the study area is to the southeast and is a broad, nearly level area (**Figure 2-7**).

Table 2-8 shows the soil types in the study area. The erosion potential of the soil types is keyed to map unit symbols in **Figure 2-8**. Highly erodible soils within the study area include the Kingstowne-Sassafras-

Figure 2-7: Topography

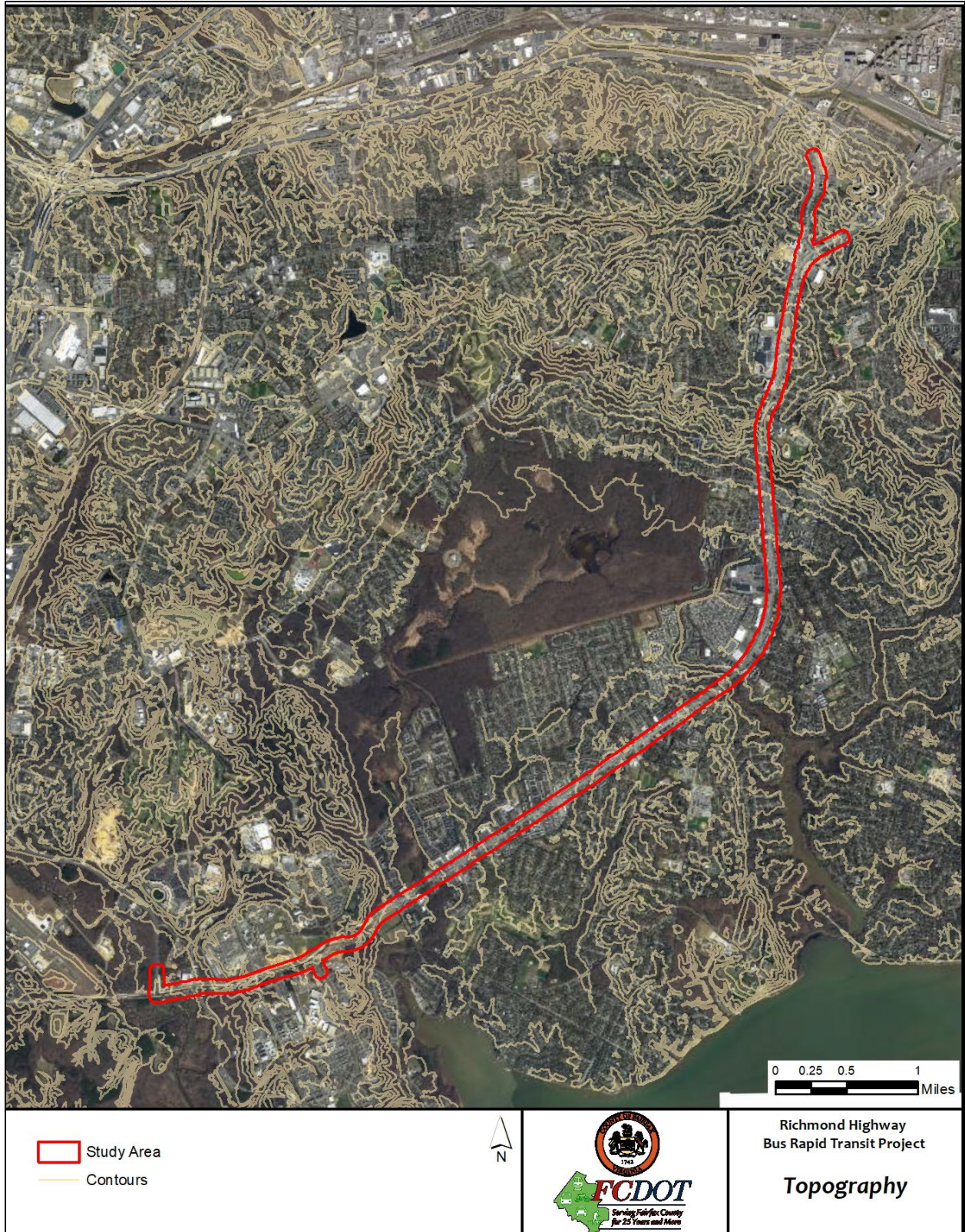
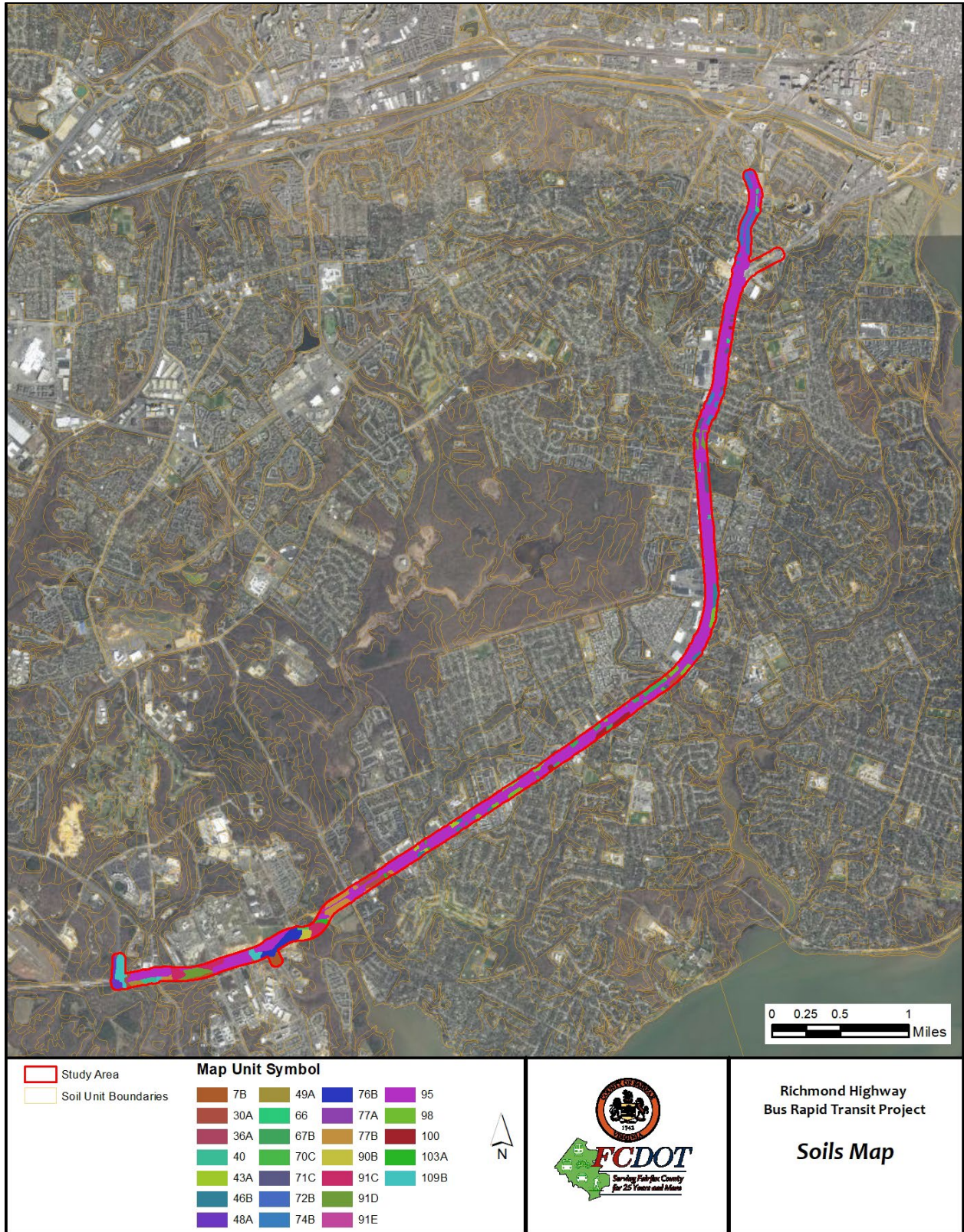


Table 2-8: Study Area Soil Types

| Map Unit Symbol | Map Unit Name | Acres in Study Area | Percent of Study Area | K factor | Hydric Rating |
|------------------------------|--|---------------------|-----------------------|----------|---------------|
| 7B | Beltsville silt loam, 2 to 7 percent slopes | 7.4 | 1.40% | 0.49 | 0 |
| 30A | Codorus and Hatboro soils, 0 to 2 percent slopes, occasionally flooded | 12.1 | 2.20% | 0.37 | 35 |
| 36A | Elkton silt loam, 0 to 2 percent slopes, occasionally ponded | 0.5 | 0.10% | 0.43 | 85 |
| 40 | Grist Mill sandy loam, 0 to 25 percent slopes | 4.1 | 0.70% | 0.24 | 0 |
| 43A | Grist Mill-Gunston complex, 0 to 2 percent slopes | 2.9 | 0.50% | 0.43 | 8 |
| 46B | Grist Mill-Mattapex complex, 2 to 7 percent slopes | 10.8 | 1.90% | 0.24 | 3 |
| 48A | Gunston silt loam, 0 to 2 percent slopes | 6.5 | 1.20% | 0.43 | 8 |
| 49A | Hatboro silt loam, 0 to 2 percent slopes, frequently flooded | 2.6 | 0.50% | 0.43 | 85 |
| 66 | Kingstowne sandy clay loam, 0 to 45 percent slopes | 4.3 | 0.80% | 0.2 | 0 |
| 67B | Kingstowne-Beltsville complex, 2 to 7 percent slopes | 12.9 | 2.30% | 0.2 | 0 |
| 70C | Kingstowne-Sassafras complex, 7 to 15 percent slopes | 0.7 | 0.10% | 0.2 | 0 |
| 71C | Kingstowne-Sassafras-Marumsco complex, 7 to 15 percent slopes | 17.5 | 3.10% | 0.2 | 0 |
| 72B | Kingstowne-Sassafras-Neabsco complex, 2 to 7 percent slopes | 21.1 | 3.70% | 0.2 | 0 |
| 74B | Lunt-Marumsco complex, 2 to 7 percent slopes | 8 | 1.40% | 0.2 | 2 |
| 76B | Matapeake silt loam, 2 to 7 percent slopes | 13.2 | 2.30% | 0.55 | 3 |
| 77A | Mattapex loam, 0 to 2 percent slopes | 0.5 | 0.10% | 0.49 | 3 |
| 77B | Mattapex loam, 2 to 7 percent slopes | 15.2 | 2.70% | 0.49 | 3 |
| 90B | Sassafras sandy loam, 2 to 7 percent slopes | 3.7 | 0.60% | 0.28 | 0 |
| 91C | Sassafras-Marumsco complex, 7 to 15 percent slopes | 18.2 | 3.20% | 0.28 | 0 |
| 91D | Sassafras-Marumsco complex, 15 to 25 percent slopes | 12.1 | 2.10% | 0.28 | 0 |
| 91E | Sassafras-Marumsco complex, 25 to 45 percent slopes | 0.3 | 0.10% | 0.28 | 0 |
| 95 | Urban land | 351 | 61.80% | | 0 |
| 98 | Urban land-Grist Mill | 16.9 | 3.10% | | 0 |
| 100 | Urban land-Kingstowne complex | 7.2 | 1.30% | | 0 |
| 103A | Wheaton-Codorus complex, 0 to 2 percent slopes | 3.7 | 0.70% | 0.37 | 5 |
| 109B | Woodstown sandy loam, 2 to 7 percent slopes | 14.5 | 2.60% | 0.2 | 0 |
| Totals for Study Area | | 567.9 | 100 | N/A | N/A |

Figure 2-8: Soils Map



Marumsc complex and Sassafras-Marumsc complex. Hydric soils in the study area are identified in **Table 2-8** and shown in **Figure 2-9**.

Marumsc soils are mapped in complexes with other soil types. The complexes are highly variable and consist of combinations of clays, silts, sands, and gravels. They may also be problematic. In steep areas that contain clays known as "marine clays" slope stability can be a problem. In addition, structures constructed on clays found in this complex could suffer foundation distress if adequate precautions are not taken during design and construction. There are approximately 44.0 acres of Marumsc soils mapped in the study area as shown in **Figure 2-10** (Fairfax County, 2021).

2.6.3 Potential Impacts

The project is unlikely to encounter highly erodible soil types (**Table 2-8**), as all of the soils in the LOD are urban soils and present low to moderate erosion potential. The topography is nearly level, thus deep cuts or fills are not anticipated under the project. Approximately 7.8 acres of Marumsc soils are located within the LOD, predominately near Spring Drive and North Hill Park in the northern portion of the study area.

The design of the project would ensure that Marumsc soils would be addressed prior to construction. In addition, the project would be designed in accordance with the Virginia Erosion and Sediment Control Handbook, as well as per Fairfax County regulations. A Virginia Stormwater Management permit would be required for the project including the preparation of a SWPPP. Construction of the project would not adversely impact sensitive soils and the project would be managed in accordance with Virginia regulatory programs.

2.7 Vegetation

2.7.1 Background and Methodology

Invasive Species

The VDCR-DNH defines invasive species as a non-native (alien, exotic, or non-indigenous) plant, animal, or disease that causes or is likely to cause ecological and/or economic harm to the natural system (VDCR, 2010).

In accordance with EO 13112, *Invasive Species*, as amended, no federal agency can authorize, fund, or carry out any action that it believes is likely to cause or promote the introduction or spread of invasive species. Other regulations in governing invasive species include the Non-Indigenous Aquatic Nuisance Prevention and Control Act of 1990 (as amended), Lacey Act of 1900 (as amended), Plant Protection Act of 2000, Federal Noxious Weed Act of 1974 (as amended), and the Endangered Species Act of 1973 (as amended). Likewise, the State of Virginia acted in 2003 to amend the Code of Virginia by adding the Nonindigenous Aquatic Nuisance Species Act, which, among other things, addresses the development of strategies to prevent the introduction of, to control, and to eradicate invasive species.

The VDCR-DNH, in association with the Virginia Native Plant Society, have identified and listed invasive plant species that are known to currently threaten Virginia's natural populations. To date, they have listed

Figure 2-9: Hydric Soils Map

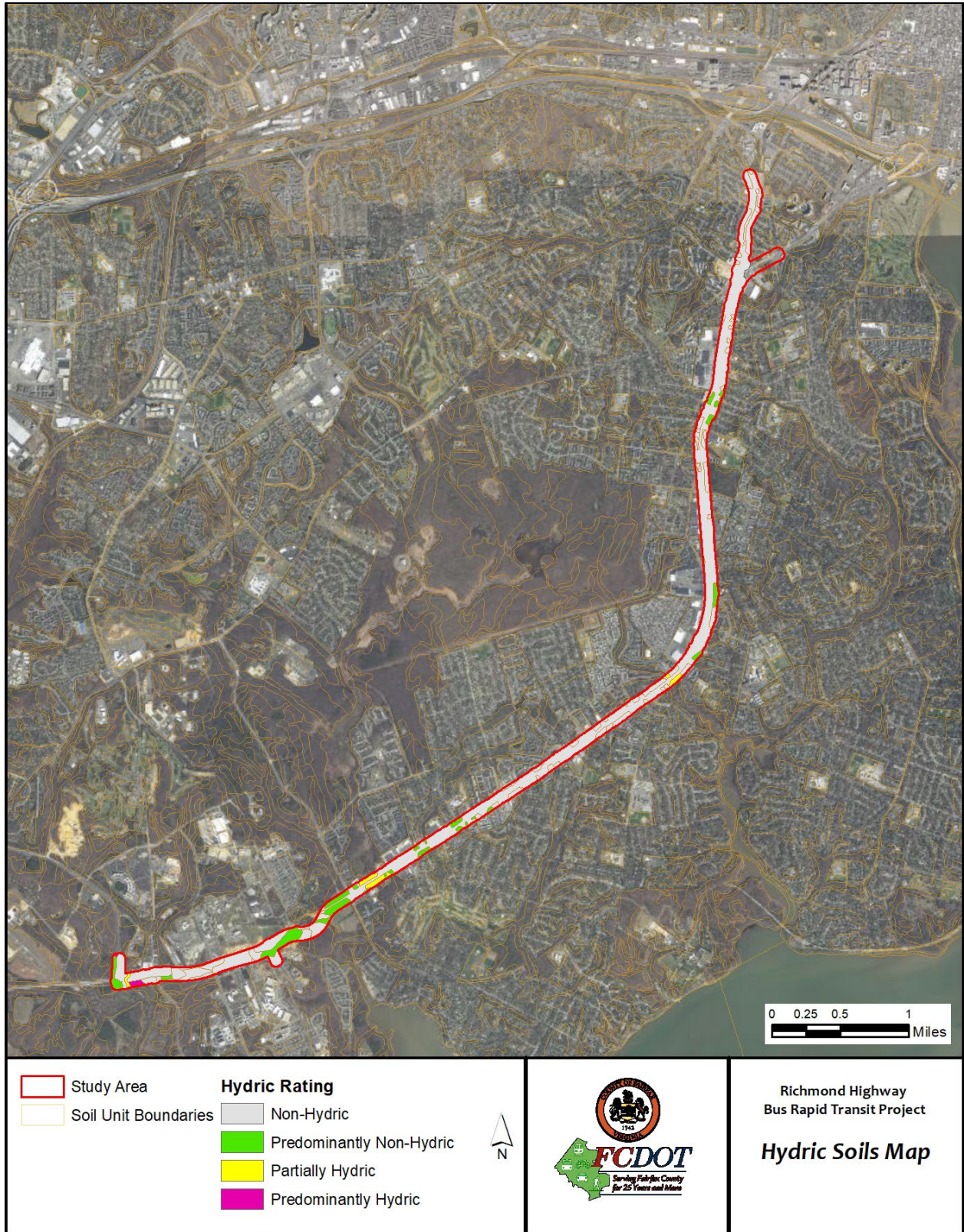
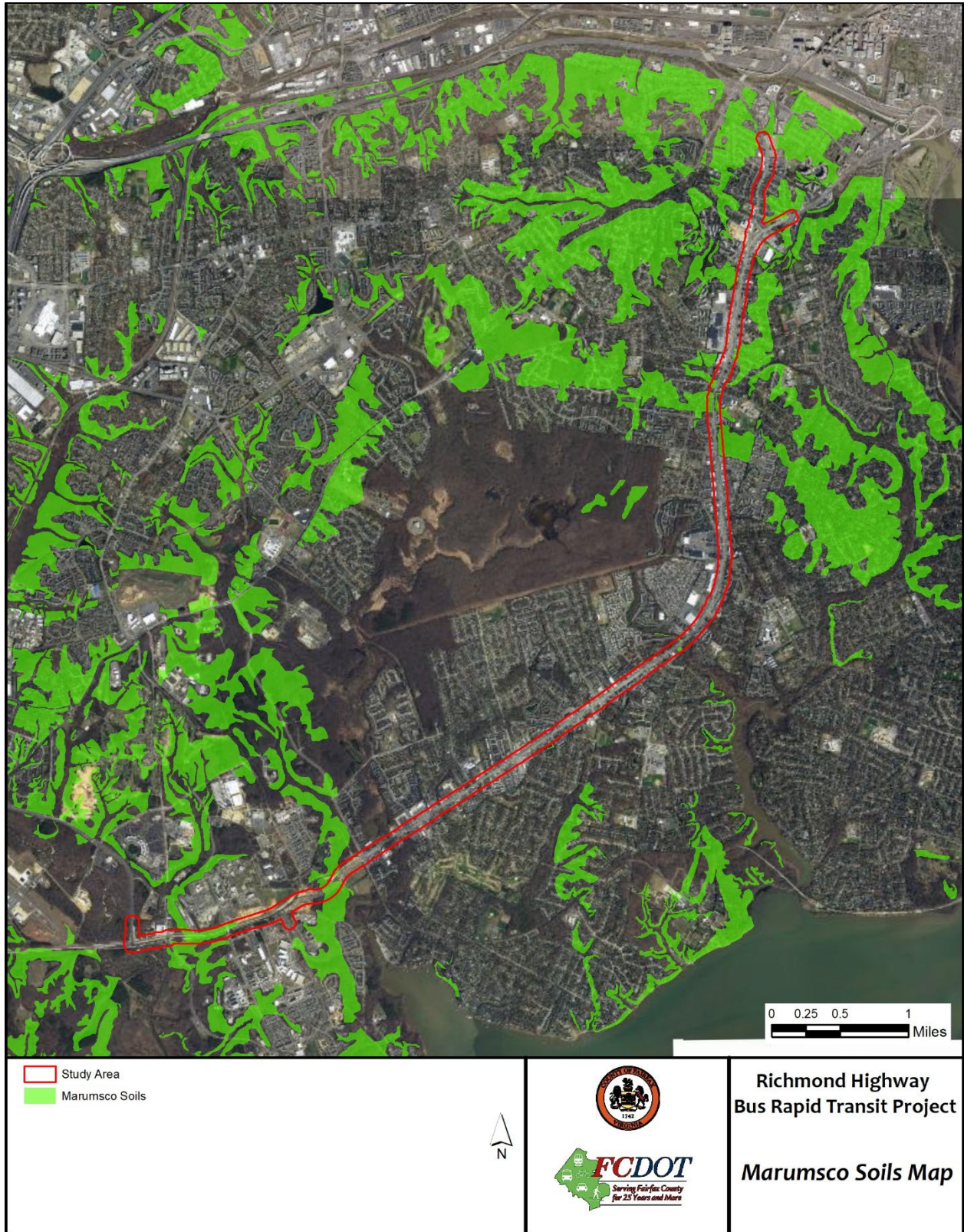


Figure 2-10: Marumsco Soils Map



approximately 90 invasive plant species on the Virginia Invasive Plant Species List. The list is divided into three regions: Coastal Plain, Piedmont, and Mountains. This list also classifies each species by level of invasiveness, including High, Medium, and Occasional. Highly invasive species generally disrupt ecosystem processes and cause major alterations in plant community and overall structure. They can easily establish themselves in undisturbed habitats and colonize disturbed areas rapidly under the appropriate conditions. While plants with medium and low invasiveness can become management problems, they tend to have less adverse effects on natural systems and are more easily managed.

Submerged Aquatic Vegetation

VMRC has jurisdiction over subaqueous bottoms or bottomlands through Subtitle III of Title 28.2 of the Code of Virginia and is directed to define existing beds of submerged aquatic vegetation (SAV) in consultation with VIMS (VA Code § 28.2-1204.1). SAV includes an assemblage of underwater plants found in shallow waters of the Chesapeake Bay and its river tributaries as well as coastal bays of Virginia.

According to the VAC, 4 VAC 20-337-30, any removal of SAV from State bottom or planting of nursery stock SAV for any purpose, other than pre-approved research or scientific investigation, would require prior approval by VMRC. Any request to remove SAV from or plant SAV upon State bottom shall be accompanied by a complete Joint Permit Application submitted to the VMRC (VMRC, 2000).

VIMS monitors and maintains a database for the presence and health of SAV in the Chesapeake Bay and its watershed (VIMS, 2014). As part of the Annual SAV Monitoring Program, since 2001 VIMS has been orthorectifying aerial images for documenting annually the extent of SAV beds. VIMS also maintains an on-line interactive mapper which depicts SAV beds in the Chesapeake Bay region dating back to 1971, and this database was used to obtain historic information on the presence of SAV within the study area.

2.7.2 Existing Conditions

Invasive Species

Plants

The study area is located within the Coastal Plain region. Some of the highly invasive plant species listed for this region likely to occur in the study area include tree-of-heaven (*Ailanthus altissima*), multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), mile-a-minute (*Persicaria perfoliata*), garlic mustard (*Alliaria petiolata*), Chinese Lespedeza (*Lespedeza cuneate*), and Chinese Privet (*Ligustrum sinense*). The highly invasive plant species identified at the WOUS field investigation data points include lesser celandine (*Ficaria verna*), multiflora rose (*Rosa multiflora*), Japanese stiltgrass (*Microstegium vimineum*), and Japanese honeysuckle (*Lonicera japonica*).

Animals

Many aquatic and terrestrial animal species threaten the native plant and animal communities in Virginia. The VAC (4VAC15-20-160) designates the following as nuisance species in Virginia, which are likely to occur within the study area. However, none of these species were documented as being observed during field investigations. These species include the house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), black rat (*Rattus rattus*), coyote (*Canis latrans*), nutria (*Myocastor coypus*), woodchuck (*Marmota monax*), European starling (*Sturnus vulgaris*), English sparrow (*Passer domesticus*), pigeon

(*Columba livia*), and other non-native species as defined in the Migratory Bird Treaty Reform Act of 2004 and regulated under 50 CFR 10.13. Likewise, the VDCR-DNH has identified invasive species which threaten Virginia's wildlife and plant systems such as the emerald ash borer (*Agrilus planipennis*), northern snakehead fish (*Channa argus*), rapa welk (*Rapana venosa*), and the imported fire ant (*Solenopsis invicta*). These species are listed as established in Virginia.

In addition, the VDCR-DNH has also identified the Zebra mussel (*Dreissena polymorpha*), Sirex woodwasp (*Sirex noctilio* F.), rusty crayfish (*Orconectes rusticus*), and the Chinese mitten crab (*Eriocheir sinensis*) as species that may threaten Virginia's wildlife and plant systems; however, they are not well established in the Commonwealth.

Submerged Aquatic Vegetation

Species of SAV most commonly found in the Chesapeake Bay and its tributaries within the vicinity of the study area include eelgrass (*Zostera marina*) and widgeon grass (*Ruppia maritima*). Other species, less likely to occur due to their association with freshwater and lower salinity levels, include wild celery (*Vallisneria americana*), hydrilla (*Hydrilla verticillata*), redhead grass (*Potamogeton perfoliatus*), sago pondweed (*Stuckenia pectinata*), and Eurasian watermilfoil (*Myriophyllum spicatum*) (Orth et al., 2015). An important component of the Chesapeake Bay ecosystem and barometer for water quality, SAV beds filter polluted runoff, provide essential habitat for all life stages of numerous aquatic species, and provide a valuable food source for waterfowl (VIMS, 2016).

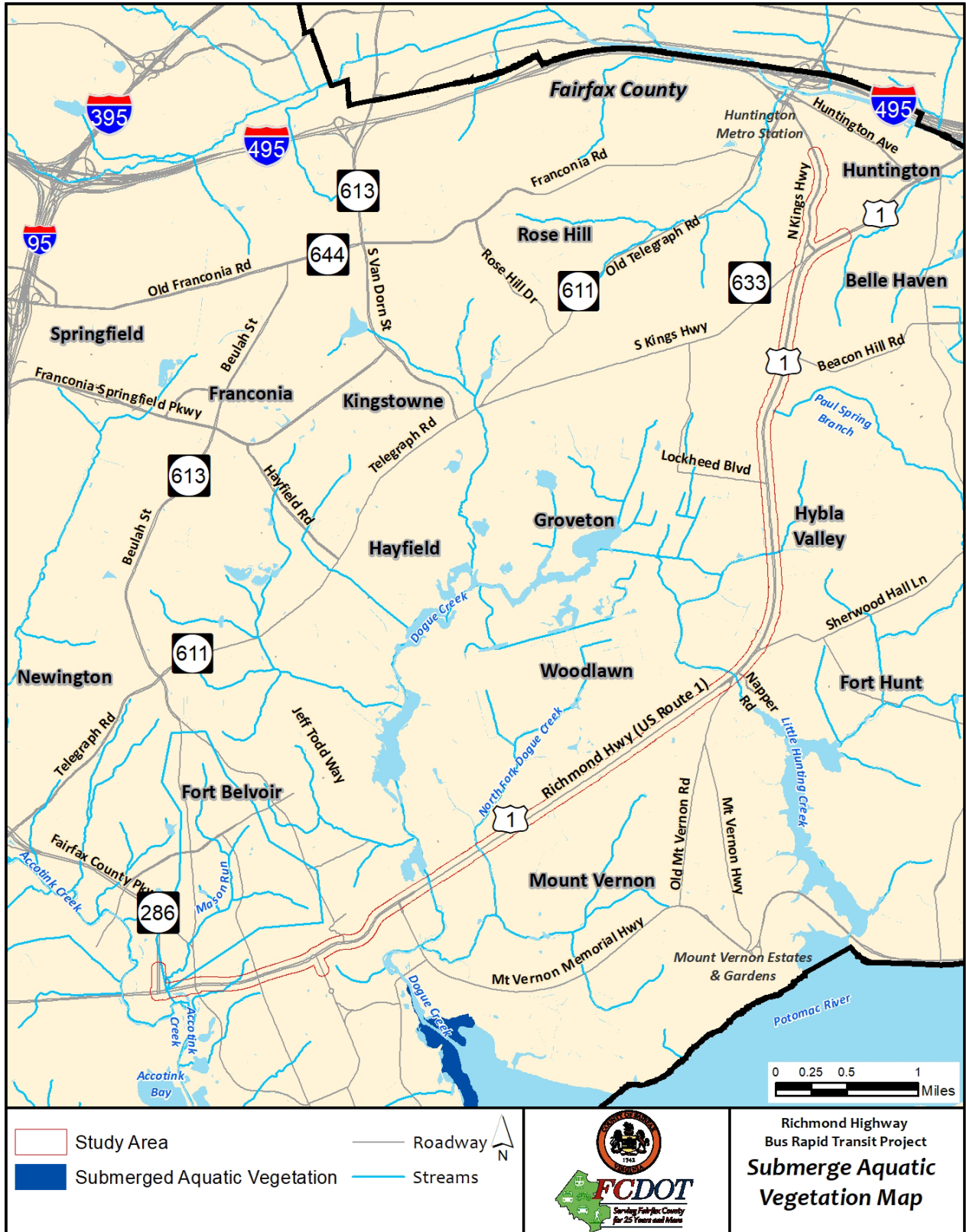
Since the presence of SAV can change from year to year based on environmental conditions, such as coastal storms and annual fluctuations in nutrient levels and water clarity, documentation of the presence of SAV in any year within a period of five consecutive years is sufficient to constitute viable SAV habitat. For the purpose of this document, mapped populations of SAV in any year from 2012 to 2016 constitute existing beds and are depicted in **Figure 2-11**. The mapping indicates that existing SAV beds occur downstream of the project within Dogue Creek and the Potomac River (Orth et al., 2011 and 2012; Orth et al., 2013 and 2014).

2.7.3 Potential Impacts

The project has the potential to introduce invasive species, particularly those species noted above. While most of the area within the LOD is previously disturbed by a myriad of development activities, the disturbance of natural areas as well as the removal and transfer of fill from borrow sites within the LOD or offsite locations could spread invasive species. The spread could be exacerbated if vegetation clearing takes place while the plants are dispersing seed. Likewise, the ground disturbance could encourage the spread of species that spread through rhizomes. Clearing native vegetation could also aid the spread or introduction of invasive/nuisance animal species. The introduction of plant and animal invasive/nuisance species could occur from vehicles transporting these species or their seed. Offsite borrow and disposal areas, staging areas, and access roads could contribute similarly to the spread or introduction of these species.

In accordance with EO 13112, *Invasive Species*, the spread of invasive species under the project would be minimized by requiring prompt seeding of disturbed areas with mixes that are tested in accordance with the Virginia Seed Law. Specific seed mixes that are free of noxious or invasive species

Figure 2-11: Submerged Aquatic Vegetation Map



may be required for environmentally sensitive areas and would be determined during the design and permitting process. Because much of the construction under the project would be along existing disturbed corridors, the addition of invasive animal species is expected to be minimal.

The invasive species are not anticipated to impact pollinators or pollinator habitat as the study area is in a densely populated urban area that has been previously disturbed; therefore, the area does not currently support much pollinator habitat. Pollinator species could include honeybees, native birds, bats, and butterflies. These pollinator species could be considered in the development of the seed mix for landscaping. The VDOT Pollinator Habitat Program is in development and currently focuses on rest areas and park and rides along state-maintained roadways.

No recorded SAV beds are within the study area (Orth et al., 2013) or LOD; therefore, no direct effects to SAV would occur under the project. See the *Indirect and Cumulative Effects Technical Report* for a description of the potential downstream effects of construction to SAV and BMPs to minimize adverse indirect effects.

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