

# Natural Resources Technical Report

## RICHMOND HIGHWAY (ROUTE 1) CORRIDOR IMPROVEMENTS PROJECT BETWEEN JEFF TODD WAY AND NAPPER ROAD, FAIRFAX COUNTY, VIRGINIA



Prepared in support of the Draft Environmental Assessment



VDOT Project #: 0001-029-205, C501, P101, R201

UPC#: 107187

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### List of Acronyms

BMP	Best Management Practice
BRT	Bus Rapid Transit
CBPA	Chesapeake Bay Preservation Act
CBP	Chesapeake Bay Program
CEDAR	Comprehensive Environmental Data and Reporting System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulation
CGP	Construction General Permit
CWA	Clean Water Act
CZMP	Coastal Zone Management Program
DRPT	Department of Rail and Public Transportation
EA	Environmental Assessment
EO	Executive Order
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
GIS	Geographic Information System
GWMA	Groundwater Management Areas
HUC	Hydrologic Unit Codes
LOD	Limits of Disturbance
MBTA	Migratory Bird Treaty Act
MEP	Maximum Extent Practical
MPH	Miles Per Hour
MPRSA	Marine Protection Research and Sanctuaries Act
MWCOG	Metropolitan Washington Council of Governments
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHD	National Hydrography Dataset
NMFS	National Marine Fisheries Service (NOAA Fisheries)
NOAA	National Oceanic and Atmospheric Administration
NWI	National Wetland Inventory
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
SE	State Endangered
SSA	Sole Source Aquifer
SSURGO	Soil Survey Geographic Database
ST	State Threatened
SWAP	Source Water Assessment Program
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
USACE	US Army Corps of Engineers
USCG	US Coast Guard
USDA	US Department of Agriculture
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
VDOF	Virginia Department of Forestry
VDGIF	Virginia Department of Game and Inland Fisheries
VDH	Virginia Department of Health
VDHR	Virginia Department of Historic Resources
VDMME	Virginia Department of Mines, Minerals, and Energy
VDOT	Virginia Department of Transportation
VESCH	Virginia Erosion and Sediment Control Handbook
VIMS	Virginia Institute of Marine Science
VMRC	Virginia Marine Resources Commission
VRRM	Virginia Runoff Reduction Method
VSMP	Virginia Stormwater Management Program
VWPP	Virginia Water Protection Permit
WIP	Watershed Implementation Plan
WLA	Waste Load Allocations
WOUS	Waters of the United States

## 1. INTRODUCTION

### 1.1 PROJECT DESCRIPTION

The Virginia Department of Transportation (VDOT), in cooperation with the Federal Highway Administration (FHWA), is preparing an Environmental Assessment (EA) for the Richmond Highway (Route 1) Corridor Improvements Project between Jeff Todd Way and Napper Road. Improvements are proposed for an approximate 2.9-mile section of Richmond Highway between Route 235 (Mount Vernon Memorial Highway – South) to 0.07 miles north of Route 235 (Mount Vernon Highway – North) at Napper Road. The environmental study area extends further north along the Richmond Highway to Sherwood Lane. The EA is being prepared in accordance with the National Environmental Policy Act (NEPA), FHWA NEPA regulations at 23 CFR 771 and Technical Advisory T 6640.8, and Council on Environmental Quality (CEQ) guidance at 40 Code of Federal Regulations (CFR) §1500 -1508.

Based on historical connections to the state capitol in Richmond, Route 1 is also known as the “Richmond Highway.” Richmond Highway is the principal north-south route for local traffic in eastern Fairfax County for shopping and other general-purpose trips, and serves as a major commuter route and an alternate route for nearby Interstate 95 (I-95). The section of Richmond Highway evaluated in this EA is in the southeast portion of Fairfax County between Hybla Valley to the north and Fort Belvoir to the south (**Figure 1-1**).

Richmond Highway on either side of the Study Area has six general purpose lanes (**Figure 1-2**). Beginning at the southwest end of the current Study Area at the Mount Vernon Memorial Highway (VA 235)/Jeff Todd Way intersection, a construction project is underway that widens Richmond Highway to six lanes extending 3.68 miles south through Fort Belvoir and ending at Telegraph Road. Richmond Highway has also been previously widened to six general purpose lanes from approximately the Ladson Lane intersection in the northern Study Area, north to I-95/I-495.

The purpose of this Technical Report is to identify existing natural resources in the Study Area and to analyze natural resources impacts that could result from implementation of the alternatives.

### 1.2 PURPOSE AND NEED

The Richmond Highway Corridor Improvements Project EA will address the following purpose and needs:

- Accommodate Travel Demand – better accommodate existing and future travel demand at peak travel hours, reducing congestion and increasing corridor accessibility and mobility.
- Accommodate Future Transit – set aside space for future transit services pursuant to Fairfax County’s Comprehensive Plan.
- Improve Safety – implement access control; provide adequately spaced signalized intersections; provide turn lanes where needed; improve structures at natural stream crossings; and enhance pedestrian and bicycle facilities.

Figure 1-1: Study Area



Figure 1-2: Richmond Highway Six-Lane Segments Adjacent to Study Area



## 1.3 ALTERNATIVES

### 1.3.1 No-Build Alternative

The No-Build Alternative includes continued road maintenance and repairs of existing transportation infrastructure within the Study Area. The Metropolitan Washington Council of Governments (MWCOG) Transportation Improvement Program does not have any major improvement projects listed for Richmond Highway within the Study Area. The MWCOG Constrained Long-Range Plan includes the current study for widening Richmond Highway, and the study of Bus Rapid Transit (BRT) in the current Study Area. For the purposes of this study, the No-Build Alternative does not include either proposed project. The No-Build Alternative serves as the baseline against which the potential environmental effects of the Build Alternative are compared.

### 1.3.2 Build Alternative

The Build Alternative is generated from the 2015 *US Route 1 Multimodal Alternatives Analysis* Locally Preferred Alternative (Alternative 4) selected by Fairfax County and the Department of Rail and Public Transportation (DRPT). The identified Build Alternative is to widen Richmond Highway from a four-lane undivided roadway to divided six-lane facility with bicycle and pedestrian accommodations, and a wide median to accommodate future BRT.

## 1.4 METHODOLOGY

The Study Area for detailed evaluation of direct effects is generally defined as 300 feet on either side of the existing Richmond Highway centerline, with additional areas extending as much as 1,000 feet for access management (**Figure 1-1**). 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 Summer/Fall 2016. More specific information regarding data gathering sources and approach are presented within the discussion of each resource in **Section 2**. The following federal, state, and local agencies 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 Game and Inland Fisheries (VDGIF)

## 2. NATURAL RESOURCES

The Study Area is highly urbanized, resulting in the loss of most of the natural ecosystems that were historically present (**Figure 2-1**). The remaining natural areas are now largely restricted to the major stream corridors.

### 2.1 WATER RESOURCES

#### 2.1.1 Methodology

##### 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:

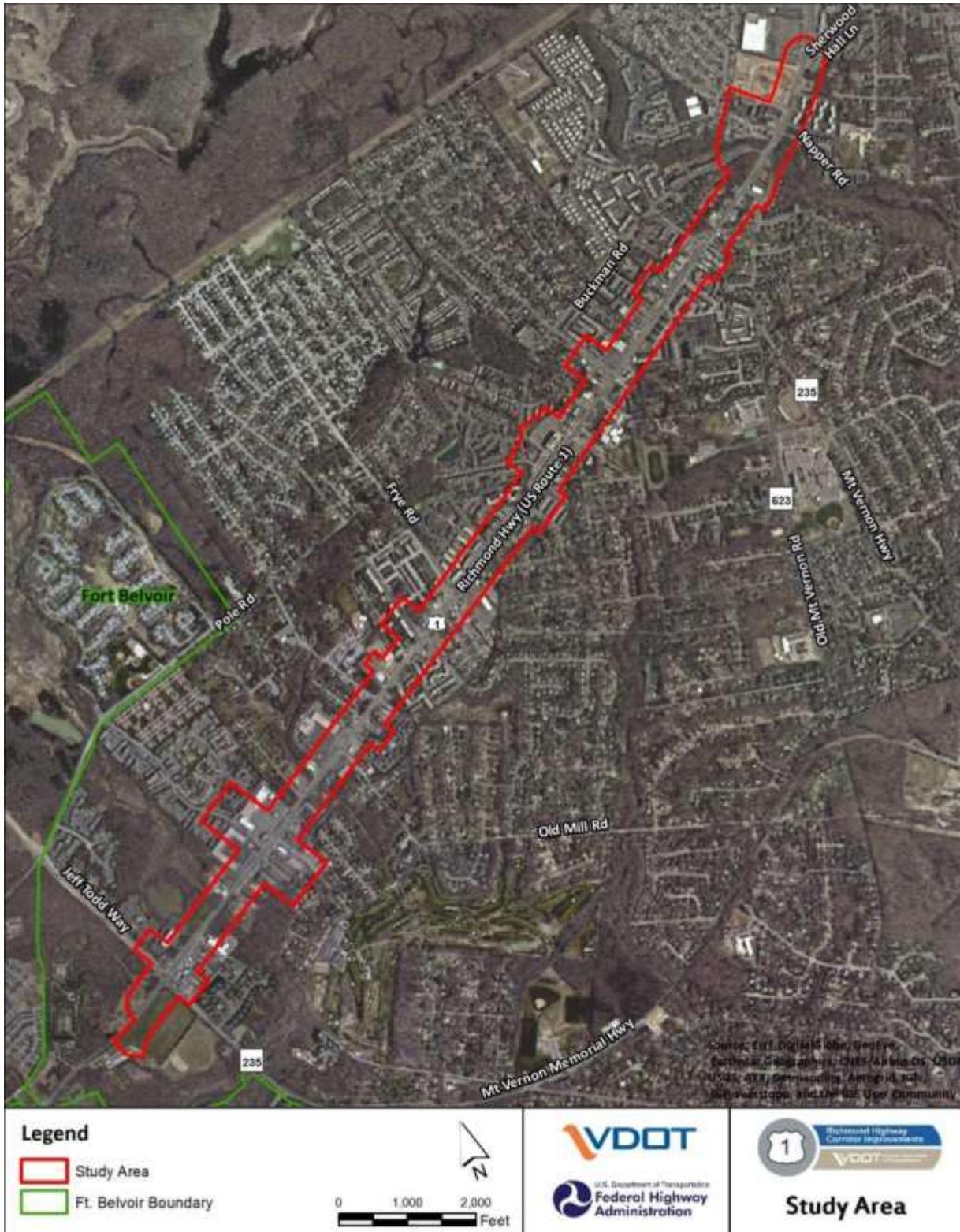
- Aquatic Life-supports the propagation, growth, and protection of a balanced indigenous population of aquatic life that may be expected to inhabit a waterbody
- Recreation-supports swimming, boating, and other recreational activities
- Fish Consumption-supports game and marketable fish species that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

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 (WLA), 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 Virginia Stormwater Management Program (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.

Figure 2-1: Study Area Aerial



## 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.

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 VWP permit be obtained before disturbing a stream or wetland by clearing, filling, excavating, draining, or ditching. The issuance of a state VWP permit does not depend on the issuance of a federal Section 404 permit.

Work in non-tidal streams with drainage areas greater than five square miles also require a permit from the VMRC, under the authority of Chapter 12 of Title 28.2 of the Code of Virginia. The USACE, the US Coast Guard (USCG), 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.

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 limits of disturbance (LOD), which is based on roadway engineering completed to date.

## Wetlands

Executive Order 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.”*

A field delineation of WOUS and wetlands was performed according to the methodology outlined in the Corps of Engineers 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).

### Aquifers/Water Supply

Congress enacted the Safe Drinking Water Act (SDWA) in 1974 and amended and reauthorized it in 1986 and 1996. It is the main 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 ground water 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 (SWAP) 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 Safe Drinking Water Act 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.

#### **2.1.2 Existing Conditions**

##### Water Quality

There are three perennial streams within the Study Area: Little Hunting Creek, North Fork Dogue Creek and Dogue Creek. Of these, Little Hunting Creek and Dogue Creek are designated "impaired waters" under Section 303(d) of the CWA (**Figure 2-2 and Table 2-1**) (VDEQ, 2014). Causes of impairment to these two streams include the presence of polychlorinated biphenyls (PCBs) in the water column (Little Huntington Creek) and *E. coli* (Dogue Creek). **Table 2-1** provides the source of impairment, impaired use, and stream length within the Study Area.

##### Streams

The project's Study Area is contained in two 12-digit Hydrologic Unit Code (HUC) subwatersheds (**Figure 2-3**) (VDCR, 2015). The eastern portion of the Study Area is in the Potomac River – Little Hunting Creek subwatershed (HUC 020700100307) and the western portion of the Study Area is in the Dogue Creek subwatershed (HUC 020700100306). **Appendix A** shows the stream locations in the Study Area, while **Table 2-2** summarizes the linear feet of streams in the Study Area by Cowardin classification (Cowardin et al., 1979). All waters ultimately flow to the Potomac River.

Figure 2-2: Impaired Waters



**Table 2-1: Study Area Impaired Waterbodies**

ID	Waters Name	Impairment Reach	Impairment Cause (Impaired Use)	Impairment Source	Impairment Length within Study Area (Feet)
VAN-A14R_LIF01A08	Little Hunting Creek	Segment begins at the confluence with an unnamed tributary, approximately 0.82 river miles upstream from the Route 1 bridge, and continues downstream until tidal waters	PCBs in Water Column (Fish Consumption)	Atmospheric Deposition – Toxics, Combined Sewer Overflows, Contaminated Sediments, Upstream Source	1,174.0
VAN-A14R_DOU01A04	Dogue Creek	Segment begins at the confluence with an unnamed tributary to Dogue Creek, approximately 0.3 river miles upstream from Rt. 622, and continues downstream until the end of the free-flowing waters of Dogue Creek	<i>E. coli</i> (Recreation)	Source Unknown	634.3

**Table 2-2: Streams within Study Area**

Cowardin Abbreviation	Waters Name	Cowardin Classification	Acreage <sup>1</sup> /Linear Feet within Study Area
R3	Little Hunting Creek, North Fork Dogue Creek and Dogue Creek	Upper Perennial	1.4 / 2,836.3
R6	Unnamed tributaries to Little Hunting Creek, North Fork Dogue Creek and Dogue Creek	Ephemeral	<0.01 / 132.2
<b>Total</b>			<b>1.4 / 2,968.5</b>

<sup>1</sup> Acreage of streams in Study Area calculated by using the width of Ordinary High Water (OHW) times the length of the stream in the Study Area divided by 43,560 square feet.

Figure 2-3: Study Area 12-Digit Hydrologic Units



Wetlands

Wetlands delineated within the WOUS survey area are depicted in **Appendix A**. A total of approximately 1.2 acres of wetlands are within the Study Area that **Table 2-3** presents by Cowardin et al. (1979) classification.

**Table 2-3: Wetlands within Study Area**

Cowardin Abbreviation	Cowardin Classification	Acreage within Study Area
PEM	Palustrine, Emergent	0.3
PFO	Palustrine, Forested	0.8
POW	Palustrine, Open Water	0.1
<b>Total</b>		<b>1.2</b>

Aquifers/Water Supply

The VDH reviews projects for their proximity to public drinking water sources. The USEPA’s National Sole Source Aquifer (SSA) GIS Layer was used to determine the boundaries of SSAs. Information on groundwater and underlying aquifers was obtained with assistance from VDEQ’s Ground Water Withdrawal Permitting Program, Office of Water Supply. Nearby reservoirs were identified using VDEQ’s What’s in my Backyard Online Mapper. **Table 2-4** summarizes the public water search results. As noted in the table, no public water resources were found in the Study Area, but the Study Area is within the Eastern Groundwater Management Area in Virginia. Under the Ground Water Management Act of 1992, Virginia manages groundwater through a program regulating the withdrawals of groundwater within designated Groundwater Management Areas (GWMA). Any person or entity located within a declared GWMA must obtain a permit to withdraw 300,000 gallons or more of groundwater in any one month.

**Table 2-4: Study Area Public Water Supplies Search Results**

Public Water Resource	Results
Public Ground Water Wells	None within the Study Area
Public Surface Water Intakes	None within the Study Area
Public Springs	None within the Study Area
Sole Source Aquifers	None designated within the Study Area
Reservoirs	None within the Study Area
Ground Water Management Areas	Eastern Groundwater Management Area in Virginia

**2.1.3 Environmental Consequences**

Water Quality

Under the **No-Build Alternative**, no project-related construction would occur; therefore, no change to water quality would result.

The **Build Alternative** would disturb up to 76.6 acres of land. Construction of the **Build Alternative** shall address compliance using the Virginia Runoff Reduction Method (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.

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 (SWCB), and regulated by the VDEQ. Other options for off-site compliance include A) participation in a local watershed comprehensive Stormwater Management Plan, B) participation in a locality pro rata share program, C) use of other VDOT properties within the same or upstream 12-digit HUC as the project, or D) other offsite options as approved by the VDEQ. Offsite options may only be used if on-site practices have been implemented to the maximum extent practical (MEP). The **Build Alternative** would construct stormwater management facilities in accordance with federal, state, and local criteria.

The Virginia Construction General Permit (CGP) outlines specific measures that development projects must address, including the development of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPPs outline how certain potential pollutant sources would be addressed including 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.

Executive Order (EO) 13508 on the Chesapeake Bay, issued May 12, 2009, included 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. Executive Order 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 **Build Alternative** would comply with these criteria.

Sections 107 and 303 of VDOT's specifications require the use of stormwater management practices to address issues such as post-development storm flows and downstream channel capacity. These standards require that stormwater management be designed to reduce stormwater flows to preconstruction conditions for up to a 10-year storm event. As part of these regulations, the capture and treatment of the first half inch of run-off in a storm event is required, and all stormwater management facilities must be maintained in perpetuity. These requirements would be met under the **Build Alternative** by implementing stormwater management practices and construction of appropriate stormwater management facilities.

Proper stormwater management under the **Build Alternative** in accordance with regulations and best management practices (BMP) as described above would minimize impacts to Little Hunting Creek and Dogue Creek water quality. The Build Alternative would be unlikely to cause further PCB, *E. coli* or other impairment to these two streams. See the *Indirect and Cumulative Effects Technical Report* for discussion of potential indirect downstream effects of the Build Alternative.

Streams

No improvements other than routine maintenance would be made to Richmond Highway in the Study Area under the **No-Build Alternative**, therefore, no changes to existing streams would occur.

**Table 2-5** shows that up to 0.6 acre or 963.2 linear feet of Upper Perennial (R3) stream impacts would occur under the **Build Alternative**. Appendix A contains the mapping showing the location of the stream impacts. In accordance with the USACE 2008 Compensatory Mitigation for Losses of Aquatic Resources, VDOT would first attempt to mitigate for stream impacts caused by the Build Alternative by purchasing stream credits from an approved stream mitigation bank within the 8-digit HUC watersheds encompassing the Build Alternative. If credits are not available for purchase in this watershed(s), VDOT would look to contribute to an approved in-lieu fee program.

**Table 2-5: Stream Impacts**

Cowardin Abbreviation	Cowardin Classification	Acreage/Linear Feet within LOD
R3	Upper Perennial	0.6/963.2
R6	Ephemeral	0/0
<b>Total</b>		<b>0.6/963.3</b>

Wetlands

The **No-Build Alternative** would not improve Richmond Highway in the Study Area, thus, no changes to wetlands would occur.

Under the **Build Alternative**, a total of 0.2 acre of wetland impacts would occur (**Table 2-6**). Appendix A mapping shows the location of the wetland impacts. In accordance with the USACE 2008 Compensatory Mitigation for Losses of Aquatic Resources, VDOT would first attempt to mitigate for stream impacts caused by the Build Alternative by purchasing wetland credits from an approved stream mitigation bank within the 8-digit HUC watershed encompassing the Build Alternative. If credits are not available for purchase in this watershed, VDOT would look to contribute to an approved in-lieu fee program.

**Table 2-6: Wetlands Impacts**

Cowardin Abbreviation	Cowardin Classification	Acreage within LOD
PEM	Palustrine, Emergent	0.1
PFO	Palustrine, Forested	0.1
POW	Palustrine, Open Water	0.0
<b>Total</b>		<b>0.2</b>

### Aquifers/Water Supply

The **No-Build Alternative** would not involve any construction or changes to the natural environment; therefore, no effects to aquifers or the public water supply would occur.

The **Build Alternative** would not involve any effects from construction because there are no public groundwater wells, surface water intakes, springs, SSA, or reservoirs in the LOD and roadway cuts are not anticipated to encounter the groundwater table.

## 2.2 WILDLIFE

### 2.2.1 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 (MBTA). The USFWS and VDGIF 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 (VDGIF, 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.

Information was collected from databases queries from the USFWS Information for Planning and Conservation (IPaC), the Virginia Department of Game and Inland Fisheries (VDGIF) Fish and Wildlife Information Service (VAFWIS), and the VDCR-DNH.

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.

#### Anadromous Fish

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 VDGIF, 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.

VDGIF 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 VDOT’s Comprehensive Environmental Data and Reporting System (CEDAR) GIS Database that contains VDGIF’s anadromous fish information from their VFWIS database (VDOT, 2016).

Threatened and Endangered Species

The information obtained from the agency database review is summarized below in **Table 2-7**. The table presents the species that are currently listed as threatened or endangered that are known to occur, or have the potential to occur, within the vicinity of the Study Area along with each species’ listed status and source of its listing. More specific information regarding data gathering sources and approach are presented within the discussion of each resource in a separate *Rare, Threatened, And Endangered Species Technical Report* for the project.

**Table 2-7: Rare, Threatened, and Endangered Species Mapped within the Vicinity of the Study Area**

Species	Status	Source of Listing
Atlantic Sturgeon ( <i>Acipenser oxyrinchus</i> )	Federally Endangered	VaFWIS
Northern Long-eared Bat ( <i>Myotis septentrionalis</i> )	Federally Threatened	IPaC
Little Brown Bat ( <i>Myotis lucifigus lucifigus</i> )	State Endangered	VaFWIS
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

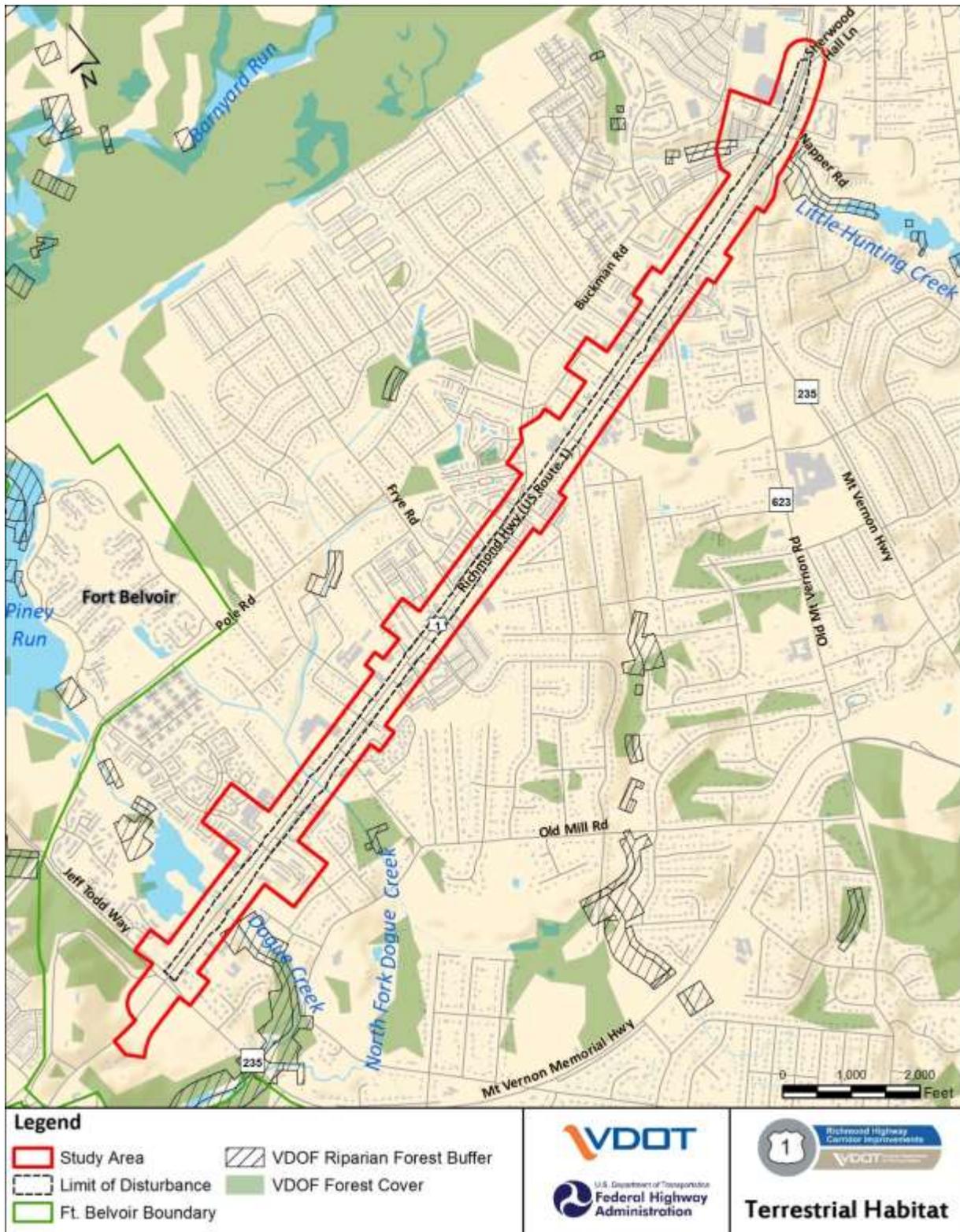
**2.2.2 Existing Conditions**

Terrestrial Wildlife / Habitat

Land use in the Study Area is primarily commercial followed by residential; recreation and open space; institutional, government, utilities; and industrial land uses. No agricultural land use is within the Study Area. Natural areas that remain are within the stream corridors and Fairfax County Parks, which have levels of protection through federal, state and county regulations. No wildlife refuges or wildlife management areas are located within the Study Area.

Expanses of terrestrial habitat are rare and fragmented as residential, commercial, industrial, government/military, and open water areas are common, resulting in low quality edge habitat (**Figure 2-4**). 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 (VDGIF, 2015). In addition,

Figure 2-4: Terrestrial Habitat



existing stream corridors and their floodplains within the Study Area are narrow corridors between fragmented habitat, leading to increased wildlife predation due to greater ease of locating prey species.

#### Anadromous Fish

Anadromous fish are born in fresh water, migrate to the ocean to grow into adults, and then return to fresh water to spawn. Anadromous Fish Use Areas are areas that are being used, or potentially could be used, by anadromous fish. Confirmed Anadromous Fish Use Areas are those areas where anadromous fish species have been observed. Dogue Creek and the Potomac River are confirmed Anadromous Fish use streams and Little Huntington Creek is a potential Anadromous Fish use stream (**Figure 2-5**). However, these anadromous fish confirmed use areas and potential use areas do not extend upstream into the Study Area.

### 2.2.3 Environmental Consequences

#### Terrestrial Wildlife / Habitat

The **No-Build Alternative** would not involve any project-related construction to Richmond Highway in the Study Area or changes to the natural environment other than those from continued maintenance of the roadway. As a result, project-related environmental effects to wildlife and terrestrial habitat from the No-Build Alternative are not anticipated.

Under the **Build Alternative**, Richmond Highway in the Study Area would continue to pose a barrier to wildlife movement. Incrementally increasing the width of the roadway would not likely substantially exacerbate existing conditions.. Potential for temporary impacts to wildlife exist with the removal of vegetated cover within the construction footprint and construction noise, likely causing animal migration away from the disturbance and a temporary reduction in habitat usage by mostly common edge-dwelling species.

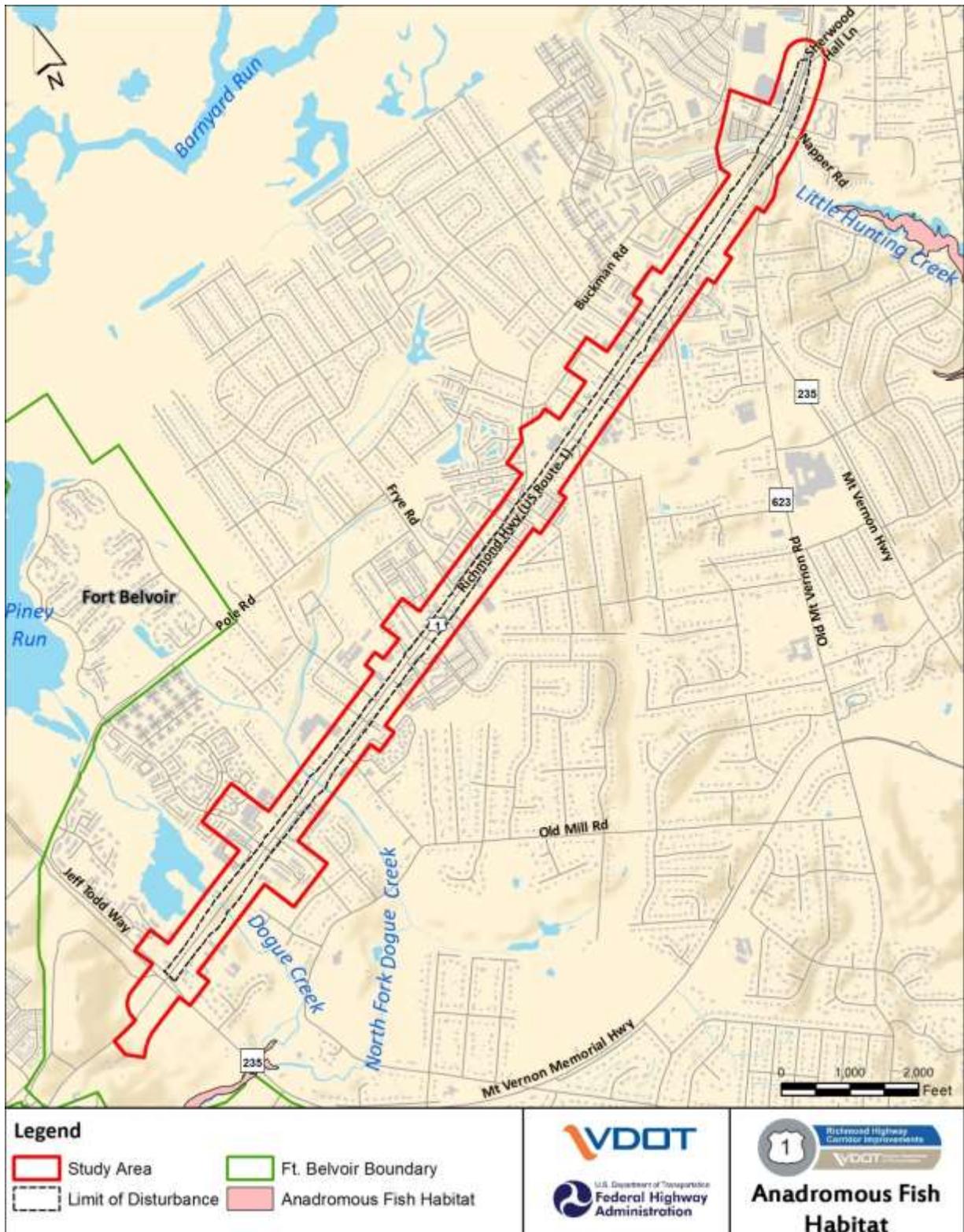
Measures to minimize impacts to habitat connectivity and wildlife passage would be evaluated in consultation with federal, state and local wildlife officials. To reduce potential impacts to terrestrial habitats, efforts to minimize the construction footprint would be made. Construction practices would 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 best management practices to reduce potential impacts to adjacent habitats and properties.

#### Anadromous Fish

Under the **No-Build Alternative**, no improvements would be made to Richmond Highway in the Study Area, thus, no direct impacts to Anadromous Fish Use Areas would occur. Potential downstream effects to anadromous fish are addressed in the *Indirect and Cumulative Effects Technical Report*.

No Anadromous Fish Use Areas are within the Study Area or the LOD, therefore, no direct impacts to these areas would occur under the **Build Alternative**. Potential indirect effects of the **Build Alternative** to Anadromous Fish Use Areas are evaluated in the *Indirect and Cumulative Effects Technical Report*.

Figure 2-5: Anadromous Fish Habitat



## 2.3 FLOODPLAINS

### 2.3.1 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, Executive Order 11988, and 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.

The VDCR floodplain management program and VDOT construction specifications for roadways also address roadway construction within floodplains. Sections 107 and 303 of VDOT’s specifications require the use of stormwater management practices to address issues such as post-development storm flows and downstream channel capacity. These standards require that stormwater management be designed to reduce stormwater flows to preconstruction conditions for up to a 10-year storm event. As part of these regulations, the capture and treatment of the first half inch of run-off in a storm event is required, and all stormwater management facilities must be maintained in perpetuity.

FEMA is required to identify and map the nation’s flood-prone areas through the development of Flood Insurance Rate Maps (FIRMs). 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, 2016). Floodplain areas were associated with the waterbody that controls hydrology affecting the floodplain elevation associated with the floodplain area.

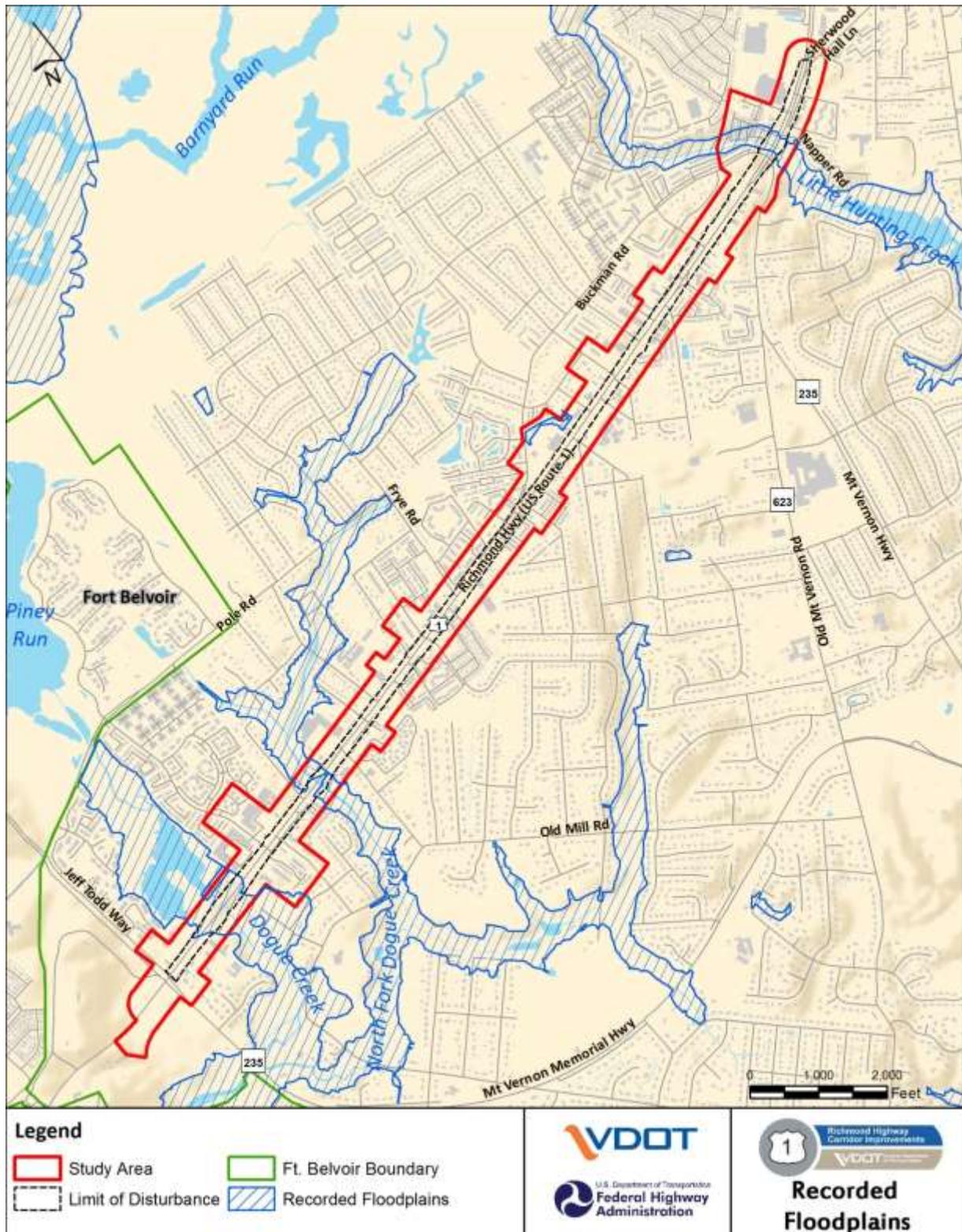
### 2.3.2 Existing Conditions

Approximately 26.7 acres of 100-year floodplains are within the Study Area. The 100-year floodplain includes those areas that statically have a one percent chance of being flooded in any given year. The 100-year floodplains occurring with the Study Area are associated with Dogue Creek, the North Fork Dogue Creek, and Little Hunting Creek (**Figure 2-6**).

### 2.3.3 Environmental Consequences

No project-related construction or changes to the natural environment other than those from continued maintenance of Richmond Highway would occur in the Study Area under the **No-Build Alternative**. Thus, project-related environmental effects to FEMA floodplains or their natural and beneficial floodplain values from the **No-Build Alternative** are not anticipated.

Figure 2-6: Study Area FEMA Recorded Floodplains



The **Build Alternative** would involve encroachment within approximately 8.6 acres of regulated floodplains (**Table 2-8**). Individual impacts to any one floodplain would be relatively small in size and severity. Most floodplain encroachments from the Build Alternative 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 Build Alternative would not substantially adversely impact natural and beneficial floodplain values. Efforts to minimize floodplain encroachment would be considered during advanced design to avoid or minimize impacts on natural and beneficial floodplain values.

**Table 2-8 : Impacts to FEMA 100-Year Floodplains (Acres)**

Waterway	Acre(s) within LOD
Dogue Creek	5.5
North Fork Dogue Creek	1.2
Little Hunting Creek	1.9
<b>Total</b>	<b>8.6</b>

The **Build Alternative** would not pose a flooding risk. The Build Alternative would design water crossings consistent with procedures for the location and hydraulic design of highway encroachments on floodplains contained in 23 CFR 650 Subpart A. Therefore, the Build Alternative is not expected to increase flood elevations, the probability of flooding, or the potential for property loss and hazard to life.

## 2.4 CHESAPEAKE BAY PRESERVATION ACT REQUIREMENTS

### 2.4.1 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 (RPAs) 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 (RMAs) 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 (IDAs) by the local government (9 VAC 25-830-100).

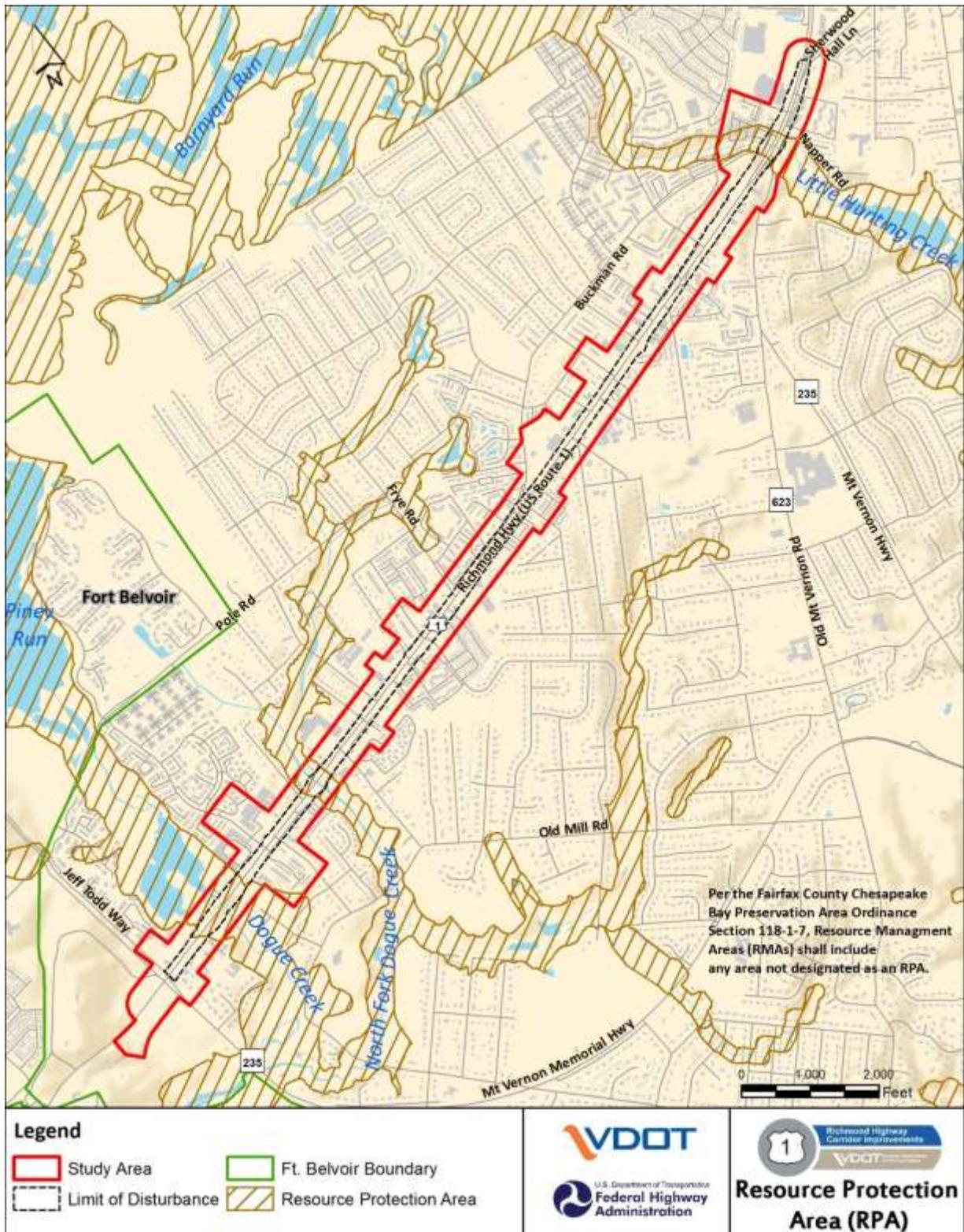
### 2.4.2 Existing Conditions

The Study Area is within the Chesapeake Bay watershed. **Figure 2-7** shows RPA's are concentrated adjacent to the Dogue Creek, North Fork Dogue Creek, and Little Hunting Creek stream corridors in the Study Area.

### 2.4.3 Environmental Consequences

Although RPAs and RMAs occur throughout the Study Area, public roads and their appurtenant structures are conditionally exempt from regulation under 8VAC25-830-150. Public roads are defined as publicly owned roads designed and constructed in accordance with water quality protection criteria at least as stringent as requirements applicable to VDOT, and in accordance with the Erosion and Sediment Control Law (§62.1-44.15:51 et seq. of the Code of Virginia) and the Stormwater Management Act (§62.1-44.15 et seq. of the Code of Virginia). This includes those roads where VDOT exercises direct supervision over the design or construction activities, or both, and cases where secondary roads are constructed or maintained, or both, by a local government in accordance with the standards of that local government. The exemption of public roads is further conditioned on the optimization of the road alignment and design, consistent with other applicable requirements, to prevent or otherwise minimize encroachment in the RPA and adverse effects on water quality. Since all public roads in the Study Area would meet the exemption conditions, they would not be under the CBPA purview under either the **No-Build Alternative** or the **Build Alternative**. Therefore, if the above conditions are met, no additional avoidance or minimization for CBPA areas would be necessary under the **Build Alternative**.

Figure 2-7: Resource Protection Areas



## 2.5 VIRGINIA COASTAL ZONE MANAGEMENT PROGRAM (VCP)

### 2.5.1 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, VDGIF, VDH, Virginia Department of Agriculture and Consumer Services (VDACS), Virginia Department of Forestry (VDOF), Virginia Department of Historic Resources (VDHR), Virginia Department of Mines, Minerals, and Energy (VDMME), 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.

### 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 require federal approval, the project must be consistent with the applicable Enforceable Regulatory Programs that comprise Virginia’s CZMP (VDEQ, 2016b) presented in **Table 2-9**. 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 2-9: 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 VDGIF	-
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 <sup>1</sup>	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	

<sup>1</sup> 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
  - wetlands
  - aquatic spawning, nursery, and feeding grounds
  - coastal primary sand dunes
  - barrier islands
  - significant wildlife habitat areas
  - public recreation areas
  - sand and gravel resources
  - underwater historic sites
- Coastal Natural Hazard Areas
  - highly erodible areas
  - coastal high hazard areas, including floodplains
- Waterfront Development Areas
  - commercial ports
  - commercial fishing piers
  - 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 Environmental Consequences

Under the **No-Build Alternative**, no improvements to Richmond Highway in the Study Area would occur other than routine maintenance. Thus, no project-related impacts to coastal resources would occur.

The **Build Alternative** would disturb additional land within Virginia’s coastal zone. The **Build Alternative** construction would be consistent with the applicable Enforceable Regulatory Programs that comprise Virginia’s CZMP. VDOT and VDEQ have established a procedure in which VDOT submits a “Request for Coastal Resources Management Consistency Certification”. This request includes relevant project information and data necessary to evaluate Coastal Zone Management. In this submittal, VDOT seeks VDEQ’s comment whether more information is needed, if certification is not required, and/or if the proposal has been found to be consistent with the “goals and objectives of the Virginia Coastal Resources Management Program.” This process is completed during the design and permitting phase of a project.

## 2.6 TOPOGRAPHY AND SOILS

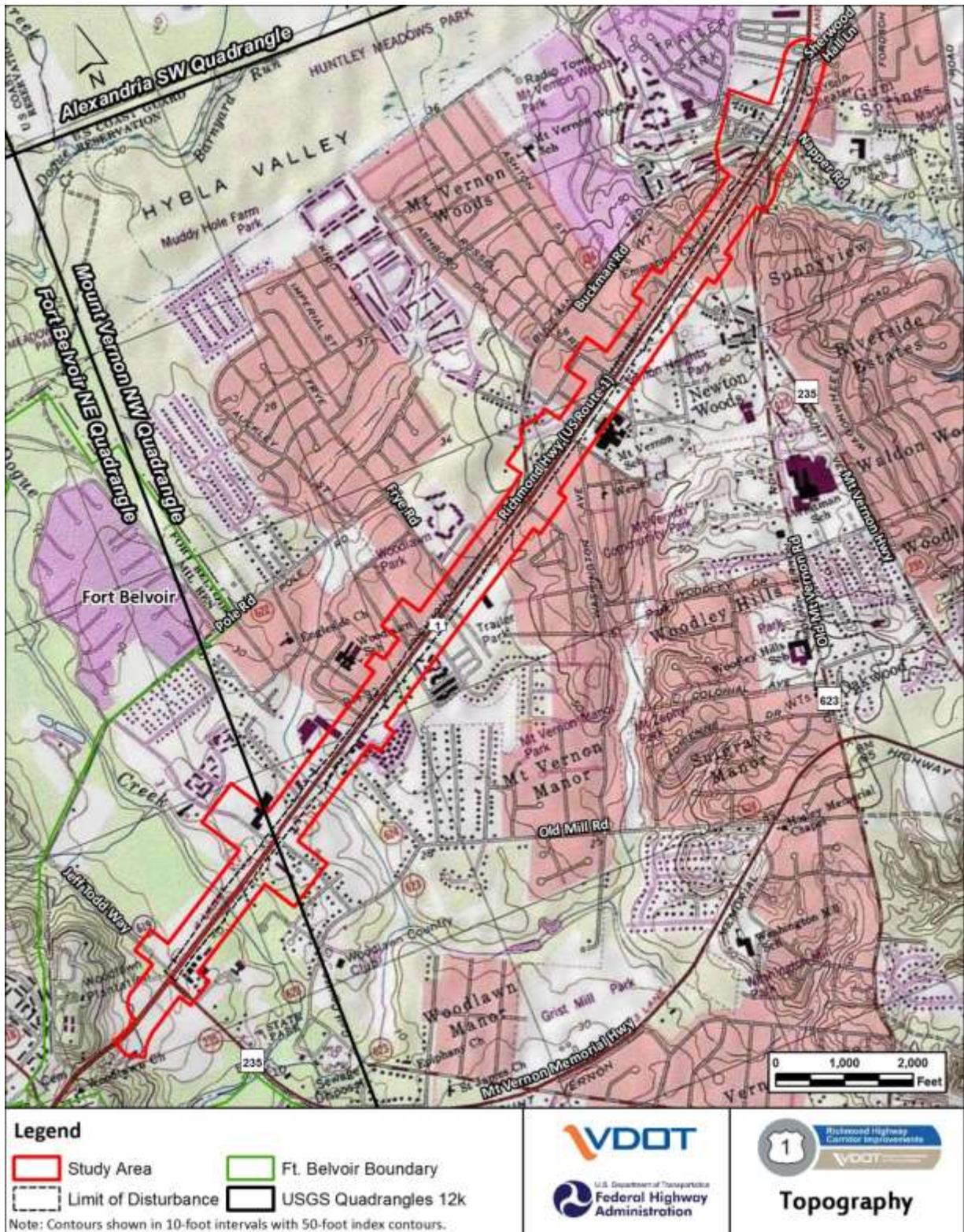
### 2.6.1 Methodology

The boundary of the project Study Area was established as the Area of Interest (AOI) 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. The Coastal Plain occupies approximately 26 percent of Fairfax County. The province consists of unconsolidated sand, silt and 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 2-8**).

Figure 2-8: Topography



**Table 2-10** shows the soil types in the Study Area and their erosion potential keyed to map unit symbols shown in **Figure 2-9**. Highly erodible soils within the Study Area include the Kingstowne-Sassafras-Marumsko complex and Sassafras-Marumsko complex. Hydric soils in the Study Area are shown in **Figure 2-10**.

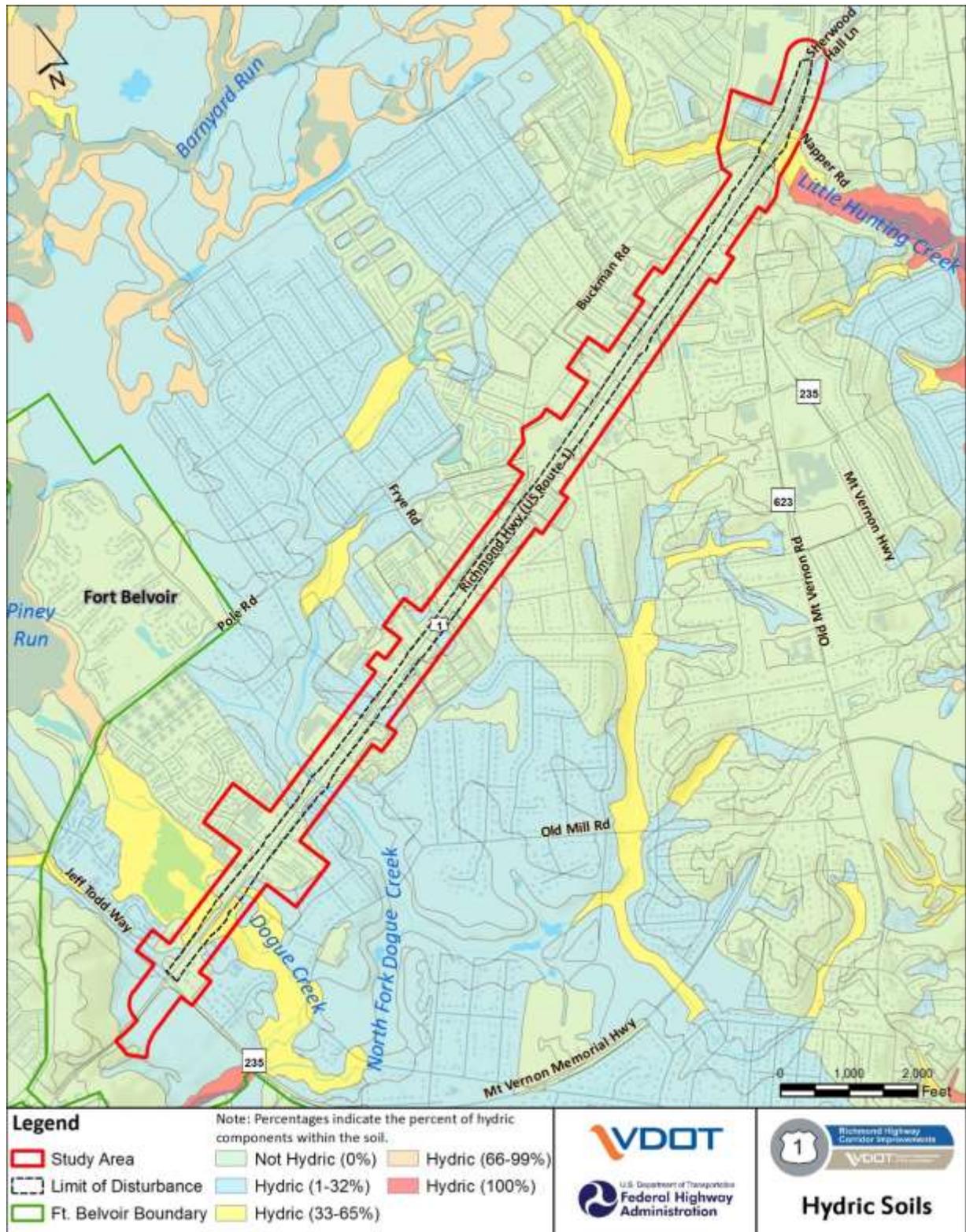
**Table 2-10: Study Area Soil Types**

Fairfax County, VA (VA059)				
Map Unit Symbol	Map Unit Name	Acre(s) in Study Area	Percent of Study Area	Erosion Potential
40	Grist Mill sandy loam, 0 to 25 percent slopes	0.6	0.2%	Moderate
95	Urban land	178.4	58.8%	N/A
98	Urban land-Grist Mill	34.8	11.5%	Moderate
100	Urban land-Kingstowne complex	9.7	3.2%	Moderate
103A	Wheaton-Codorus complex, 0 to 2 percent slopes	2.8	0.9%	Low
30A	Codorus and Hatboro soils, 0 to 2 percent slopes, occasionally flooded	14.1	4.7%	Low
43A	Grist Mill-Gunston complex, 0 to 2 percent slopes	4.1	1.3%	Low
46B	Grist Mill-Mattapex complex, 2 to 7 percent slopes	13.0	4.3%	Low
67B	Kingstowne-Beltsville complex, 2 to 7 percent slopes	22.8	7.5%	Low
70C	Kingstowne-Sassfras complex, 7 to 15 percent slopes	1.5	0.5%	Moderate
71C	Kingstowne-Sassafras-Marumsko complex, 7 to 15 percent slopes	1.0	0.3%	High
77B	Mattapex loam, 2 to 7 percent slopes	20.6	6.8%	Moderate
91C	Sassafras-Marumsko complex, 7 to 15 percent slopes	0.2	0.1%	High
<b>Total</b>		<b>303.5</b>	<b>100.0%</b>	<b>N/A</b>

Figure 2-9: Study Area Soils Mapping



Figure 2-10: Hydric Soils Mapping



### 2.6.3 Environmental Consequences

The **No-Build Alternative** would not involve any project-related construction or changes to the natural environment. Thus, no environmental effects to soils in the area are anticipated.

The **Build Alternative** could encounter two highly erodible soil types (**Table 2-11**); however over 70 percent of the soils in the Study Area are urban soils and present a low to moderate erosion potential. The topography is nearly level, thus deep cuts or fills are not anticipated under the Build Alternative. The project would be designed in accordance with the Virginia Erosion and Sediment Control Handbook and a Virginia Stormwater Water Management permit would be required for the project, thus, the SWPPP would provide methods to effectively manage the highly erodible soil types. Therefore, construction of the Build Alternative would not substantially adversely impact soils that would be managed in accordance with Virginia regulatory programs.

## 2.7 VEGETATION

### 2.7.1 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 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 (JPA) 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*).

#### *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, however, none of these species were directly 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 2010 to 2014 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 Environmental Consequences

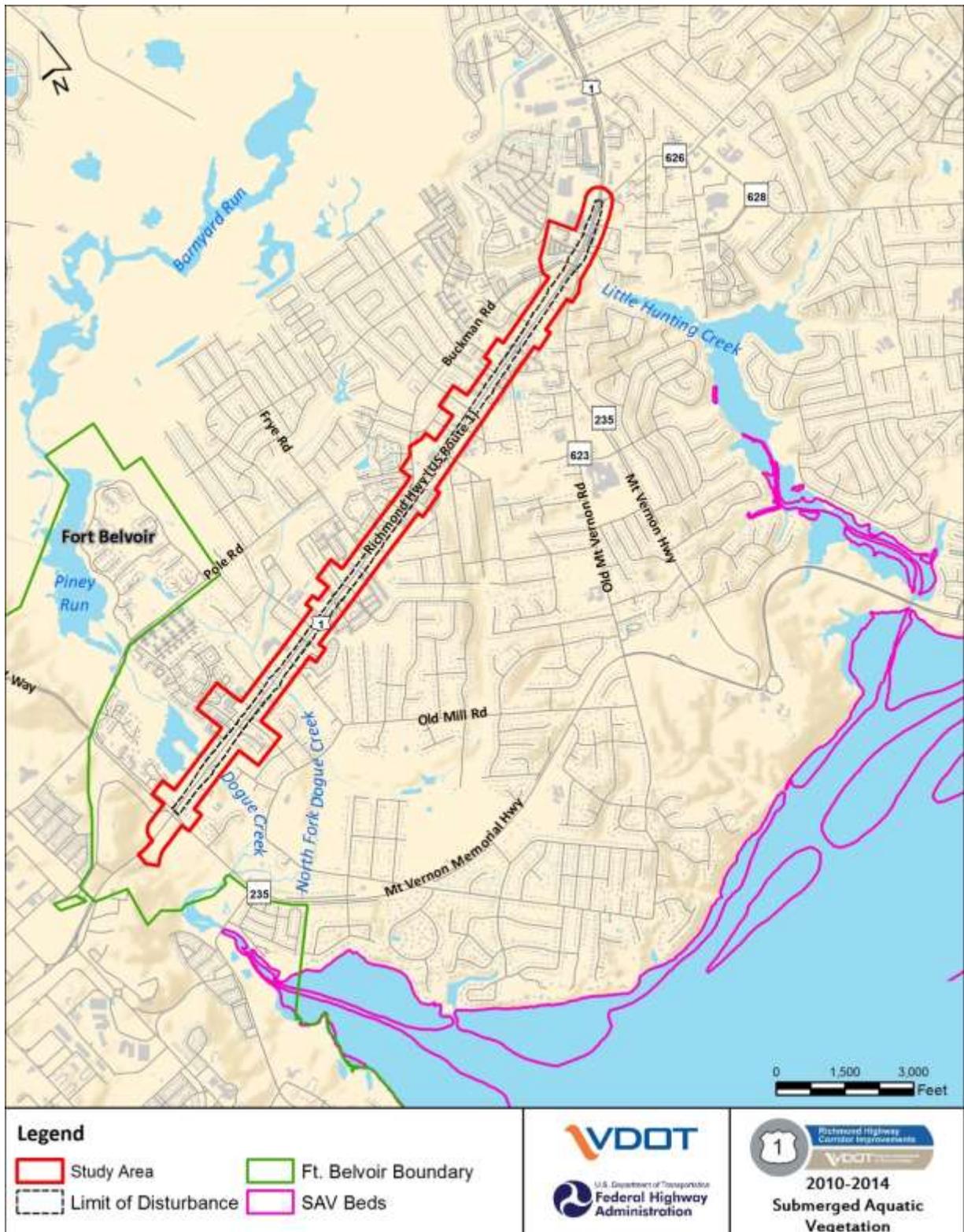
The **No-Build Alternative** would not involve any construction on Richmond Highway within the Study Area other than routine maintenance, or changes to the natural environment; therefore, no project-related changes regarding invasive species or SAV conditions would occur.

The **Build Alternative** 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 would be minimized by following provisions in VDOT's Road and Bridge Specifications. These provisions require prompt seeding of disturbed areas with mixes that are tested in accordance with the Virginia Seed Law and VDOT's standards and specifications. Specific seed mixes that are free of noxious or invasive species may be required for environmentally sensitive areas and would be determined during the design and permitting process. Because much of the construction under the **Build Alternative** would be along existing disturbed corridors, the addition of invasive animal species is expected to be minimal.

No SAV are within the Study Area or LOD, therefore no direct effects to SAV would occur under the **Build Alternative**. See the *Indirect and Cumulative Effects Technical Report* that describes the potential downstream effects of construction to SAV and best management practices to minimize adverse indirect effects.

Figure 2-11: Submerged Aquatic Vegetation



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## **APPENDIX A: WETLAND AND STREAM LOCATION MAPS**



