

ENVIRONMENTAL ASSESSMENT

# Indirect and Cumulative Effects Technical Report

February 2020



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## 1.0 INTRODUCTION

The Virginia Department of Transportation (VDOT), in coordination with the Federal Highway Administration (FHWA) as the lead federal agency, is evaluating an extension of the Interstate 495 (I-495) Express Lanes along approximately three miles of I-495, also referred to as the Capital Beltway, from their current northern terminus in the vicinity of the Old Dominion Drive overpass to the George Washington Memorial Parkway (GWMP) in the McLean area of Fairfax County, Virginia. Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, and in accordance with FHWA regulations<sup>1</sup>, an Environmental Assessment (EA) is being prepared to analyze the potential social, economic, and environmental effects associated with the improvements being evaluated.

The purpose of this Indirect and Cumulative Effects Technical Report is to identify indirect and cumulative effects that could result from implementation of the Build Alternative. Information in this report provides an overview of the regulatory context, methods used to identify existing resources, potentially affected resources identified within the study area, and potential indirect and cumulative effects associated with the implementation of the Build Alternative. The findings of this technical report support discussions presented in the EA.

### 1.1 PROJECT TERMINI

The project includes an extension of the existing Express Lanes from their current northern terminus south of the Old Dominion Drive Overpass to the GWMP. Although the GWMP provides a logical northern terminus for this study, additional improvements are anticipated to extend approximately 0.3 miles north of the GWMP to provide a tie-in to the existing road network in the vicinity of the American Legion Memorial Bridge (ALMB). The project also includes access ramp improvements and lane reconfigurations along portions of the Dulles Toll Road and the Dulles International Airport Access Highway, on either side of the Capital Beltway, from the Spring Hill Road Interchange to the Route 123 interchange. The proposed improvements entail new and reconfigured express lane ramps and general purpose lane ramps at the Dulles Interchange and Route 123/I-495 interchange ramp connections.

### 1.2 STUDY AREA

In order to assess and document relevant resources that may be affected by the proposed project, the study area for this EA extends beyond the immediate area of the proposed improvements described above. The study area for the EA includes approximately four miles along I-495 between the Route 123 interchange and the ALMB up to the Maryland state line. The study area also extends approximately 2,500 feet east along the GWMP. Intersecting roadways and interchanges are also included in the study area, as well as adjacent areas within 600 feet of the existing edge of pavement.

The study area boundary is a buffer around the road corridor that includes all natural, cultural, and physical resources that must be analyzed in the EA. It does not represent the limits of disturbance (LOD) of the project nor imply right-of-way take or construction impact, but rather extends beyond the project footprint

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<sup>1</sup> NEPA and FHWA's regulations for Environmental Impact and Related Procedures can be found at 42 USC § 4332(c), as amended, and 23 CFR § 771, respectively.

to tie into the surrounding network, including tying into future network improvements. **Figure 1-1** depicts the project termini, study area, and LOD.

### **1.3 LIMIT OF DISTURBANCE**

Potential direct impacts to resources have been calculated using a conceptual level of design of the Build Alternative. The footprint for this conceptual level of design is referred to as the LOD. The LOD accommodates roadway improvements, drainage, stormwater management facilities, utilities, erosion and sediment control, noise control measures, construction methods, and temporary construction easements.

Impact values presented for the evaluated resources represent the worst-case scenarios and assume complete direct impact to the resource occurring in the LOD. As design progresses, measures may be taken to avoid and minimize impacts to environmental resources to the maximum extent practicable. Recommendations for potential minimization and mitigation measures for unavoidable adverse impacts are provided under the Build Alternative sections of each resource that is discussed in this report. At this time, it is not possible to anticipate the exact locations of each proposed activity; impacts outside of the existing study area will be reviewed and documented through future NEPA re-evaluations.

### **1.4 PURPOSE AND NEED**

The purpose and need for the extension of Express Lanes on I-495 between Route 267 and the GWMP is to:

- Reduce congestion;
- Provide additional travel choices; and
- Improve travel reliability.

A detailed description of the purpose and need for the proposed project can be found in Chapter 1 of the EA.

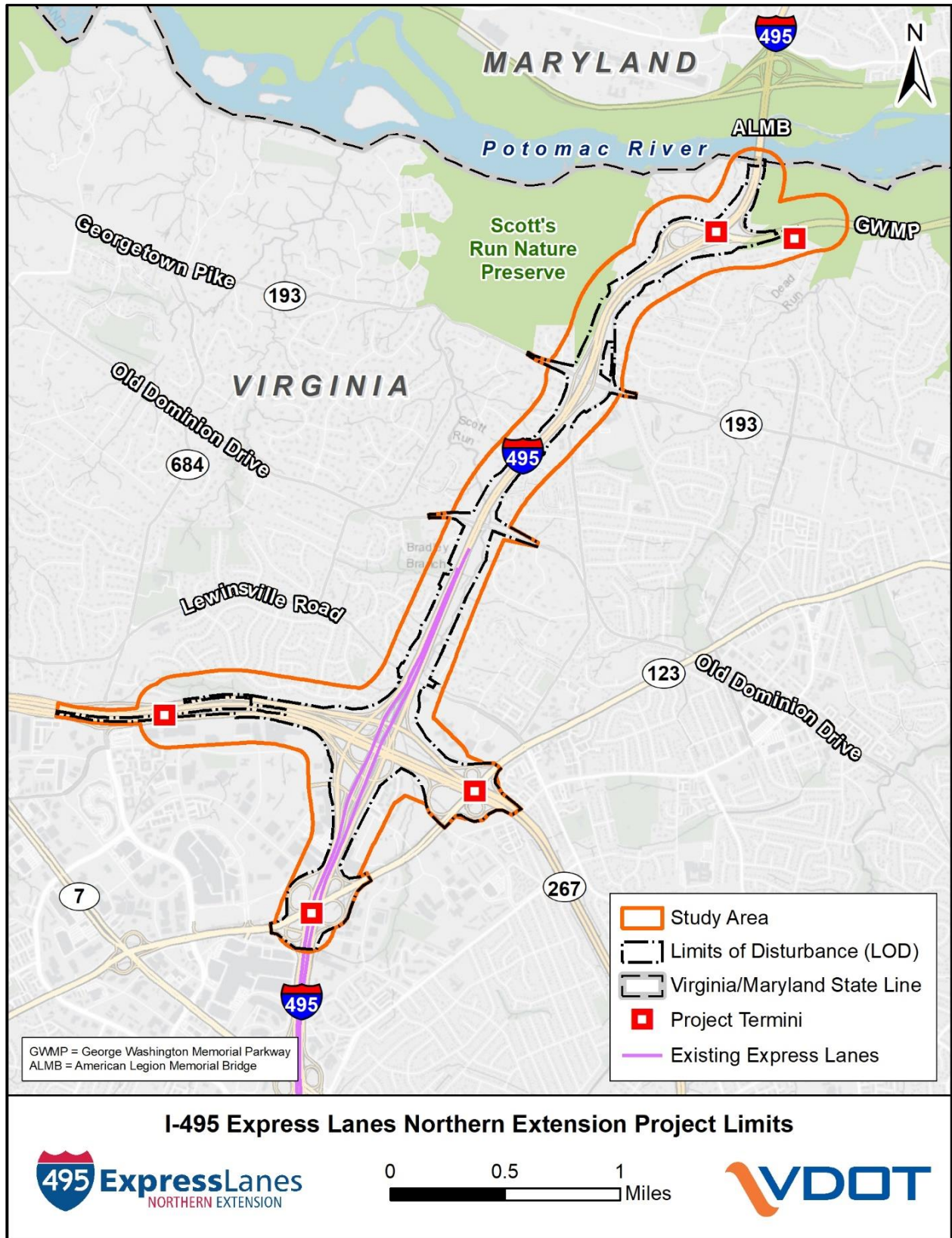


Figure 1-1. I-495 Express Lanes Northern Extension Project Limits

## 2.0 ALTERNATIVES

Two alternatives are being considered in the EA: the No Build Alternative<sup>2</sup> and the Build Alternative, described below. Additional information on the Build Alternative is included in the *I-495 Alternatives Technical Memorandum* (VDOT, 2020a).

### 2.1 NO BUILD ALTERNATIVE

Under the No Build Alternative, the Express Lanes would not be extended beyond the current northern terminus at Old Dominion Drive. There would be no change to existing access points, and I-495 would remain in its present configuration. VDOT would continue maintenance and repairs of the existing roadway, as needed, with no substantial changes to current capacity or management activities.

### 2.2 BUILD ALTERNATIVE

The Build Alternative would extend the existing four I-495 Express Lanes from their current terminus between the I-495/Route 267 interchange and the Old Dominion Drive Overpass north approximately 2.3 miles to the GWMP.

Additional improvements are anticipated to extend approximately 0.3 miles north of the GWMP to tie into the existing road network in the vicinity of the ALMB. The Build Alternative would retain the existing number of general purpose (GP) lanes within the study area.

Direct access ramps would be provided from the I-495 Express Lanes to the Dulles Toll Road and the GWMP. Access would also be provided between the I-495 GP and Express Lanes at the Route 267 interchange: from northbound GP lanes to northbound Express Lanes, and from southbound Express Lanes to southbound GP lanes, located within the current interchange footprint. These connections have been accounted for in the LOD and are described in more detail in the *I-495 Alternatives Technical Memorandum* (VDOT, 2020a) and the *I-495 Traffic and Transportation Technical Report* (VDOT, 2020f).

The Build Alternative includes an approximately 3.1-mile 10-foot-wide shared-use path, consistent with the Fairfax County Countywide Trails Plan Map (FCDPZ, 2018) that is not provided under the existing condition.

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<sup>2</sup> According to FHWA guidelines, the consideration of a No Build Alternative is a requirement under NEPA. The Build Alternative must be reasonable and practicable enough to dismiss the No Build Alternative (FHWA, 1990).



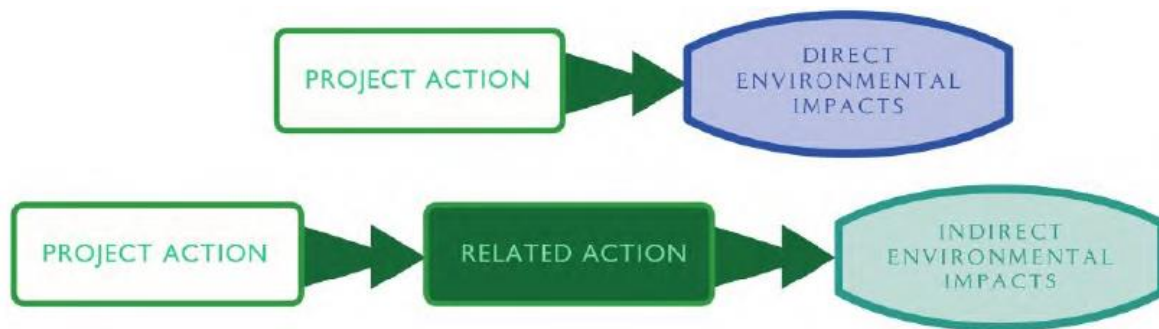
### 3.0 METHODOLOGY

#### 3.1 REGULATORY CONTEXT

The NEPA legislation does not mention indirect effects or cumulative impacts; however, the Council on Environmental Quality (CEQ) regulations for implementing NEPA address federal agency responsibilities applicable to indirect and cumulative considerations, analysis, and documentation (40 CFR 1508.25) in the content requirements for the environmental consequences section of an Environmental Impact Statement (EIS) (40 CFR 1502.16) (FHWA, 2003). In addition to CEQ's regulations, indirect and cumulative effects must be evaluated in accordance with the requirements and processes outlined in the following regulations and guidance documents:

- FHWA regulations for Environmental Impact and Related Procedures (23 CFR Part 771)
- Position Paper on Secondary and Cumulative Impact Assessment (FHWA, 1992)
- Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process (FHWA, 2003)
- National Cooperative Highway Research Program (NCHRP) Report 466: Desk Reference for Estimating the Indirect Effect of Proposed Transportation Projects (Transportation Research Board [TRB], 2002)
- NCHRP Project 25-25 Task 22: Land Use Forecasting for Indirect Impacts Analysis (TRB, 2007)
- NCHRP Project 25-25 Task 11: Secondary/Indirect and Cumulative Effects Analysis (TRB, 2006)
- Considering Cumulative Effects under the National Environmental Policy Act (CEQ, 1997a)
- Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (CEQ, 2005)

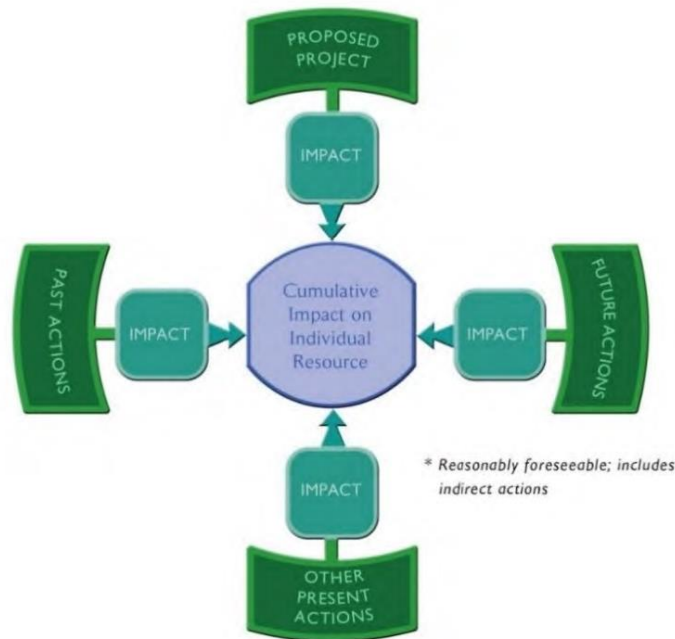
CEQ defines indirect effects as "...effects which are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR 1508.8(b)). These induced actions are those that may or may not occur without the implementation of the proposed project, as illustrated in **Figure 3-1**.



**Figure 3-1. Direct vs. Indirect Environmental Impact**

Source: *Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process* (FHWA, 2003)

CEQ defines cumulative effects as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). Cumulative effects include the total of all impacts, direct and indirect, experienced by a particular resource that have occurred, are occurring, or would likely occur as a result of any action or influence, including effects of a federal activity (EPA, 1999), as shown in **Figure 3-2**.



**Figure 3-2. Cumulative Impacts**

Source: *Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process* (FHWA, 2003)

Because indirect and cumulative effects may be influenced by actions including those taken by others outside of the immediate study area, assumptions must be made to estimate the result of these actions. The CEQ regulation, cited above, states that the analysis must include all the indirect effects that are known, and make a good faith effort to explain the impacts that are not known but which are “reasonably foreseeable.” NEPA does not define what constitutes “reasonably foreseeable actions;” however, CEQ has provided guidance on how to define reasonably foreseeable actions based upon court opinions. Court decisions on this topic indicate that indirect impact analyses should consider impacts that are sufficiently “likely” to occur (FHWA, 2003). CEQ is clear that actions that are probable should be considered while actions that are merely possible, conceptual, or speculative in nature are not reasonably foreseeable and need not be considered in the context of cumulative effects (CEQ, 1997a; FHWA, 2003).

Therefore, while reasonably foreseeable events may be uncertain, they must still be probable. As such, those events that are considered possible, but not probable, may be excluded from NEPA analysis. There is an expectation in the CEQ guidance that judgments concerning the probability of future impacts will be informed, rather than based on speculation (FHWA, 2003). This direction on identifying reasonably

foreseeable actions is taken into account in both indirect and cumulative effects analyses described in the following sections. Specific methodologies on how these analyses were conducted are presented below.

The means by which these regulations are applied to this Technical Report are explained in the sections below.

### 3.2 INDIRECT EFFECTS

This section presents an analysis of the potential indirect impacts to the alternatives described in Section 2.0. For the purposes of this Technical Report and the associated EA, the methodology followed for analyzing indirect effects are those described in the NCHRP Report 466, *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (TRB, 2002).

In the NCHRP Report 466, TRB states that indirect effects can occur in three broad categories:

1. **Encroachment-Alteration Impacts**—Alteration of the behavior and functioning of the affected environment caused by study encroachment (physical, biological, socioeconomics) on the environment
2. **Induced Growth Impacts**—Project-influenced development effects (land use)
3. **Impacts Related to Induced Growth**—Effects related to project-influenced development effects (impacts of the change of land use on the human and natural environment)

For the purposes of this analysis, the term “indirect effects” refers to all three of these categories. Transportation improvements often reduce time and cost of travel, as well as provide new access to properties, enhancing the attractiveness of surrounding land to developers and consumers (NCDOT, 2001). Development of vacant land, or conversion of the built environment to more intensive uses, is often a consequence of highway projects. Important characteristics for induced growth are described in North Carolina’s Department of Transportation’s (NCDOT) *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, Vol. II: Practitioners Handbook* (NCDOT, 2001). These characteristics include existing land uses conditions in the project area, increased accessibility that may result from new transportation improvements, local political and economic conditions, the availability of other infrastructure, and the rate of urbanization in the region (NCDOT, 2001). The study area is in an advanced land use progression; and is therefore likely to experience more infill development than urban and suburban sprawl.

Based on these principles, the indirect effects analysis focuses on the potential for ecological and socioeconomic impacts that could occur as a result of the proposed alternatives outside of the area of direct impact. The stepwise process TRB recommends in NCHRP Report 466 for assessing indirect effects has been used as the structure for the analysis, and considers the following steps:

- Step 1. Scoping
- Step 2. Identify Study Area Directions and Goals
- Step 3. Inventory Notable Features in the Study Area
- Step 4. Identify Impact-Causing Activities of the Proposed Action and Alternatives
- Step 5. Identify Indirect Effects for Analysis
- Step 6. Analyze Indirect Effects and Evaluate Analysis Results
- Step 7. Assess Consequences and Develop Mitigation

To complete these steps, the required analysis relies on planning judgement. The NCHRP 25-25 Program, Task 22, Forecasting Indirect Land Use Effects on Transportation Projects, documents means of applying planning judgement to indirect and cumulative effects analysis (TRB, 2007). The direction provided in the TRB document is the basis for the indirect effects analysis presented in this Technical Report.

Each of these steps in the indirect effects evaluation process is discussed in **Section 4.0, Indirect Effect Analysis** of this Technical Report.

### 3.3 CUMULATIVE IMPACTS

To document cumulative effects for this study, the analysis followed the five-part evaluation process outlined in *Fritiofson v. Alexander*, 772 F.2d 1225 (5th Cir. 1985), as described in FHWA's Guidance: Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process (FHWA, 2003):

1. What is the geographic area affected by the study?
2. What are the resources affected by the study?
3. What are the other past, present, and reasonably foreseeable actions that have impacted these resources?
4. What were those impacts?
5. What is the overall impact on these various resources from the accumulation of the actions?

Each of these parts of the evaluation process is discussed in **Section 5.0, Cumulative Impacts** of this Technical Report.

## 4.0 INDIRECT EFFECT ANALYSIS

### 4.1 STEP 1: SCOPING

The first step in the indirect effects analysis includes scoping activities and the identification of the study area to set the stage for the remaining steps of the analysis. As part of the scoping effort for the EA, a number of planning documents prepared by the localities were reviewed, including the *Fairfax County Comprehensive Plan* (Fairfax County, 2018b), *Fairfax County Transportation Plan* (Fairfax County, 2017b), *Dulles Toll and Access Roads/I-495 Long Range Plan – Option 7* (GEC, 2008), and sections from the *Montgomery County Comprehensive Plan* (Montgomery County, 1990 and 2002). These documents illustrate that the proposed project has been considered in the local and regional planning processes for some time. **Section 4.2.2, Directions and Goals**, provides a summary of how each plan refers to the I-495 Express Lanes Northern Extension Project. The proposed project is consistent with the existing plans, though the *Fairfax County Transportation Plan* anticipated a transit connection to Maryland would be necessary in the future which is not accommodated by this project.

In addition to a review of local and regional planning documents, VDOT engaged in agency outreach as part of the scoping efforts for the proposed project. Scoping letters were customized to ask questions regarding indirect and cumulative effects to each agency or organization with an interested or purview related to indirect and cumulative effects. The following agencies provided the following information on indirect and cumulative effects:

- County of Fairfax Board of Supervisors
  - Potential impacts to parallel and neighborhood roads.
  - Existing neighborhoods and James Cooper Middle school may be affected.
  - Potential for disruption to community or planned development.
  - Some areas planned for residential use, mixed use, or parks are located within the study area and may be affected by project. Proposal should be consistent with Comprehensive Plan and Environmental Policies and address Heritage Resource goals.
  - The GWMP, Beaufort Park, and Shiloh Baptist Church are historic sites which may be impacted by the project.
  - Increased impervious surface from the proposed project can increase runoff volume and velocity, exacerbating adverse environmental impacts and threats to safety, property and infrastructure of the Scotts Run and Dead Run watershed which currently have very poor ecological health.
  - 17 active or recently constructed stormwater improvements projects are in the vicinity of the proposed project.
- County of Fairfax Park Authority
  - Scott's Run Nature Preserve, McLean Hamlet Park, Timberly Park, and Falstaff Park are in the vicinity of the project and may be affected.
- Virginia Department of Environmental Quality
  - Fairfax County currently does not meet the National Ambient Air Quality Standards for ozone and is considered by the state to be a volatile organic compounds and oxides of nitrogen emission control area.
- United States Army Corps of Engineers (USACE)
  - An area of sufficient size to include any indirect and cumulative downstream effects is recommended to establish an ICE study area.
  - Cumulative effects should be considered up to the construction of the original interstate and any adjacent highways.
  - VDOT district offices, the Virginia Marine Resources Commission, and USACE should be contacted to gather information regarding past projects requiring a permit in the area and the identification of any mitigation or preservation sites.
  - We recommend VDOT refer to Virginia's record of identified impaired waters as one indicator of cumulative effects to surface waters. USACE and other federal agencies should be coordinated with regarding methodologies VDOT proposes to use for identifying resources for both direct and indirect impact analyses.
- Washington Metropolitan Area Transit Authority
  - It is unlikely that the Express Lane extension would induce more Metrorail ridership.
  - The Authority hopes that the proposed project is designed to accommodate buses in the managed lanes for potential future transit service.
  - We hope that the Express Lane extension may provide the opportunity to address barriers to pedestrian traffic that remain, such as the lack of pedestrian access through the VA-123/I-495 interchange.

The information obtained through these efforts provided additional context for the direction and goals of the region, as well as the resources included in the study area. Chapter 4 of the EA contains a review of all

comments received from agencies during the scoping process, including those not specifically related to indirect or cumulative effects.

## 4.2 STEP 2: IDENTIFY STUDY AREA DIRECTION AND GOALS

The second step in the indirect effects analysis focuses on assembling information about general trends and goals within the study area. This included identifying the study areas in which resources were identified and analyzed as part of the analysis.

### 4.2.1 Study Areas

The study areas for this analysis, along with input from the scoping process outlined above, were used to inform the identification of resource-specific study areas for this indirect effects analysis. Specific ICE study areas were developed to evaluate indirect effects for each of the following resources:

- **Induced Growth:** The Induced Growth Study Area (**Figure 4-1**) incorporates a 1-mile buffer around existing interchanges, plus a 1,000-foot buffer for a distance of two miles along major feeder roads that lead to the interchanges, in accordance with the *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, Vol. II: Practitioners Handbook* (NCDOT, 2001), which VDOT has adopted and has used as guidance in other recent studies. This 2-mile distance was selected because of the limited anticipated induced growth further from the corridor due to the heavily built-out nature of the land use and the nature of the project, which would include limited access points to the new Express Lanes.
- **Socioeconomic Resources:** The Socioeconomic Resources ICE Study Area (**Figure 4-1**) was established to analyze indirect effects to socioeconomics, land use, community facilities, recreational resources, and Environmental Justice (EJ) populations. The Socioeconomic Resources ICE Study Area encompasses a larger area than that of the direct impact study area established for the EA and includes those census block groups that lie directly within or partially within the Induced Growth Study Area (**Figure 4-1**).
- **Natural Resources:** The Natural Resources ICE Study Area (**Figure 4-1**) was established to analyze indirect effects to water resources, floodplains, wildlife habitat, and threatened and endangered status species. The Natural Resources ICE Study Area uses the U.S. Geological Survey (USGS) Subwatershed 12-digit Hydrologic Unit Codes (HUC) that encompass the Induced Growth Study Area. This includes the Scotts Run and Dead Run watersheds, which represent a 5,774-acre portion of the Nichols Run-Potomac River watershed (HUC 020700081005). This area is sufficient to include any indirect downstream effects, such as potential water quality effects from roadway runoff, in response to the scoping comment provided by the USACE.
- **Historic Resources:** The Historic Resources Area of Potential Effects (APE) (**Figure 4-1**) as defined in the *I-495 Cultural Resources Survey Report* (VDOT, 2020b) in consultation with the State Historic Preservation Office (SHPO) was also used in the ICE to evaluate indirect effects such as altering the setting, feeling, and association of archaeological and architectural historic properties, considered under Section 106 of the National Historic Preservation Act (NHPA). The types of indirect effects that were assessed for this ICE analysis include changes to accessibility or visitation during or after construction and impacts related to induced growth.

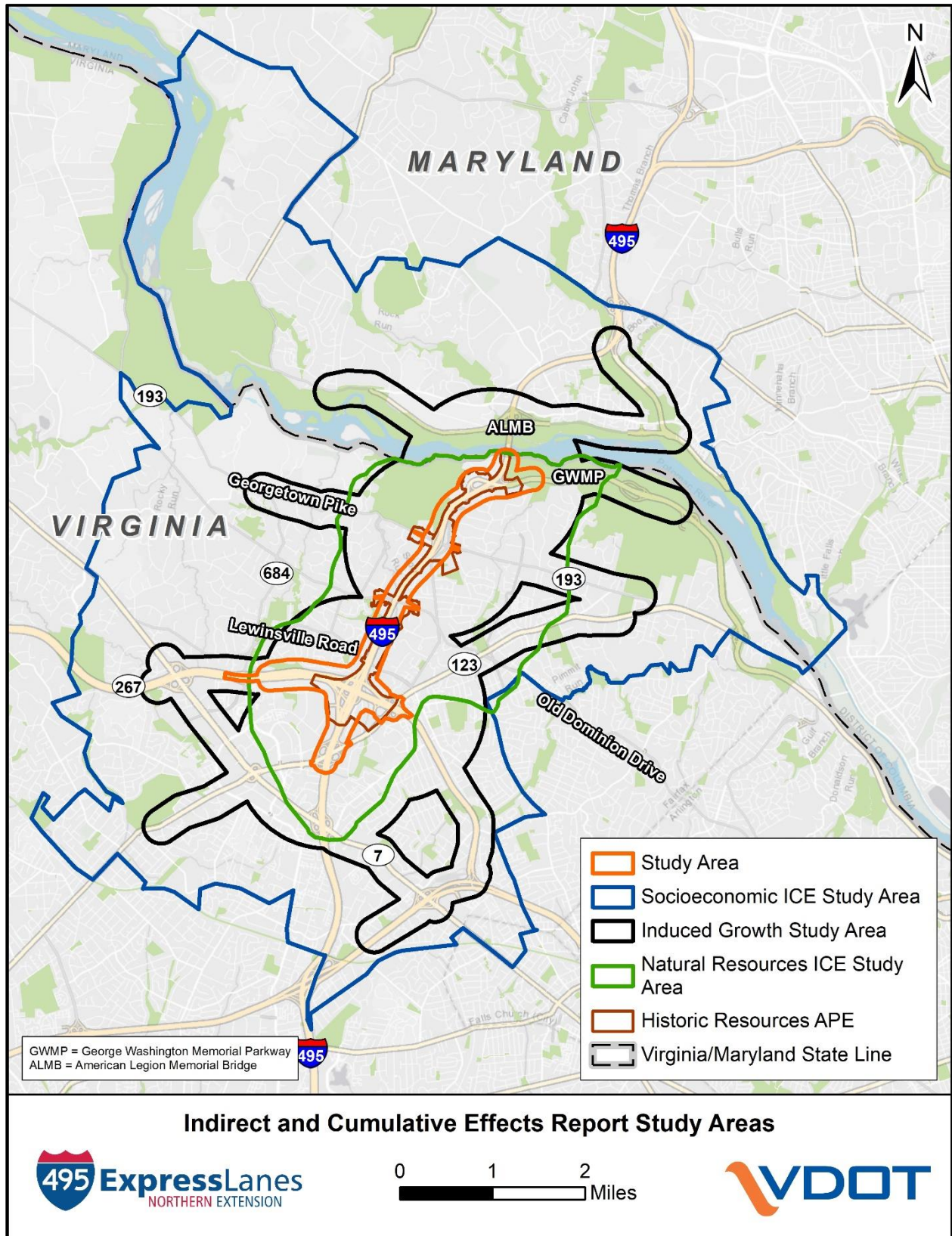


Figure 4-1. Indirect and Cumulative Effects Report Study Areas

## 4.2.2 Directions and Goals

The direction and goals considered for the analysis are independent of the transportation improvements evaluated in the EA and include social, economic, growth-related, natural, and historic resources-related issues. Evidence indicates that transportation investments result in land use changes only in the presence of other factors. These factors include supportive local land use policies, local development incentives, availability of developable land, and a favorable investment climate (TRB, 2002). An understanding of local goals combined with a thorough knowledge of demographic, economic, and social trends is essential in understanding the potential for project-influenced changes.

Understanding the regional goals is also important for consideration of potential indirect effects to the natural environment and whether potential effects are in line with local goals as a determinant of impact significance and an indicator of effects that merit further analysis. The following sections describe the existing and planned land use and population and employment trends in the corresponding ICE study areas described above in **Section 4.2.1** to provide insight to the direction and goals for the study areas.

### *Historic Land Use*

The ICE study areas mainly lie within the McLean Planning District and a portion of the southern terminus of the study areas lie within Tysons Urban Center (formerly Tysons Corner). Both McLean and Tysons are unincorporated communities of Fairfax County, Virginia. McLean was founded in 1910, when the nearby communities of Lewinsville and Langley merged, and was well established at the time I-495 was constructed in the early 1960s. Tysons was previously a rural area that developed into a commercial urban center around the time the Route 7 and Route 123 interchanges were built in the 1950s and 1960s. Tysons has seen much more rapid growth compared to other locations near the I-495 corridor and now serves as a "downtown" of Fairfax County, with one quarter of all office space and one eighth of all retail in the county.

Since the completion of I-495 in 1964, growth in the Washington metropolitan area and changes in land use and travel patterns have made the Beltway an integral part of the regional and local transportation system in Northern Virginia. Since the opening, incremental improvements have been made over time, including the addition of lanes, construction of noise barriers, construction or modification of interchanges, and minor safety improvements.

One of the more recent transportation improvements includes the opening of the I-495 Express Lanes in 2012. The Express Lanes were built with the goal to mitigate the growing congestion and provide more mobility options for those in the region. However, the current Express Lanes terminate before the ALMB and the surrounding local roads have seen an increase in congestion as a result.

### Review of Historic Aerials

Knowledge of the historic effects of transportation improvements on land use can provide insight into potential future changes to land use related to transportation investments. The following review of historic aerials utilizes mapping from Fairfax County's Historical Imagery Viewer and Google Earth imagery.

Fairfax County mapping from 1953 show mostly large tracts of rural land with the early stages of residential development occurring south of the project termini, north of Leesburg Pike, in the Pimmit Hills Census Designated Place (CDP) area, and the land where downtown McLean and Tysons are located today. The area that is now Scott's Run Nature Preserve and the GWMP have remained undeveloped since this time. In 1953, the majority of land that is within the ICE study areas was agricultural or undeveloped.



On the 1960 Fairfax County mapping, most of the arterial roads that connect to I-495 were built by this time including Route 123, Lewinsville Road, and Georgetown Pike. Commercial areas are visible along Route 7 within the Tysons area. Scattered residential neighborhoods were established along I-495; however, the majority of land within the study area remained agricultural or undeveloped land. By this time, the clearing and construction for I-495 and the GWMP was underway which was the first addition of a major divide for habitat and wildlife corridors, as well as the addition of more side streets and residential neighborhoods which increased the impervious area.

In 1976, the Fairfax County mapping shows that I-495 within the study area is complete. The beginnings of the Tysons downtown area are visible north of Route 123, with a number of commercial buildings. The majority of the agricultural lots along the corridor have been converted to single-family residential and the GWMP has been built by this time. The completion of I-495 in the study area solidified a divide in habitat and wildlife corridors. The continued residential development as well as new commercial and industrial developments in the Tysons and McLean area ushered in more impervious area at a much higher rate than was previously observed.

Between 1976 and 1990, some additional infill development has occurred along the I-495 corridor, but conditions are generally similar to what is shown in 1976. This time period also marks the beginning of development encroaching the Potomac River which could have the potential to directly affect that aquatic resource.

Starting in 1990, aerial imagery shows denser residential development scattered along the ICE study areas with higher-density development in downtown McLean and Tysons. Residential construction and infill development continued through the 2000s. The residential and commercial growth from 2010 to present day have continued to be in the form of infill. The rate at which impervious area increased and impacted undisturbed natural features was observed to decline as development activity became more focused on infill rather than new clearing and development as was the case in the 1970s. Much of the protected land from the 1950s still exists in the ICE study areas and a majority of the development seen from 2000 to present day has been adjacent to already developed areas.

#### Historic Population Increases

**Figure 4-1** shows the population increase between 1940 and 2018 for the localities encompassing or intersecting the ICE study areas including the McLean and Tysons CDP; Fairfax County, Virginia; and Montgomery County, Maryland. Data for the McLean and Tysons CDPs was only available beginning in 1970 and 1980, respectively. Fairfax County and Montgomery County both experienced their largest growth between 1950 and 1960, consistent with the completion of the Route 7 and Route 123 interchanges and ongoing development of I-495. Since 1960 growth has continued at a slower rate with growth over the past 20 years ranging between 10% and 20% for Fairfax and Montgomery Counties. The McLean CDP experienced its largest increase in population from 1970 to 1980 followed by the largest increase in population in the Tysons CDP two decades later, from 1990 to 2000. While the Tysons CDP is estimated to have continue increasing in population, the McLean CDP is currently estimated to have lost population since 2010.

**Table 4-1. Historic Populations**

Locality	1940	1950	1960	1970	1980	1990	2000	2010	2017/ 2018
McLean CDP, VA	--	--	--	19,494	35,664	38,168	38,929	48,115	47,305
<i>Growth</i>	--	--	--	--	83%	7%	2%	24%	-2%
Tysons CDP, VA					10,065	13,124	18,540	19,627	23,236
<i>Growth</i>	--	--	--	--	--	30%	41%	6%	18%
Fairfax County, VA	40,929	98,557	275,002	454,275	596,901	818,623	969,749	1,081,726	1,150,795
<i>Growth</i>	--	141%	179%	65%	31%	37%	18%	12%	6%
Montgomery County, MD	83,912	164,401	340,928	522,809	579,053	757,027	873,341	971,777	1,052,567
<i>Growth</i>	--	96%	107%	53%	11%	31%	15%	11%	8%

Source: Census 2010, 1990a, 1990b, 2010a, 2010b, 2017, 2018

Note: The 2017/2018 population values shown are the most recent estimated population

### ***Land Use Patterns and Local Plans***

The following section describes the local plans that guide the land use patterns and other development in Fairfax County, Virginia and Montgomery County, Maryland, which both lie within the Socioeconomic Resources ICE Study Area. Additional information is available in the *I-495 Socioeconomic and Land Use Technical Report* (VDOT, 2020e). Each locality has a general, overarching plan guiding community development and has selective neighborhood-specific plans that focus on issues pertinent to that neighborhood. Transportation elements of the below plans that overlap with the Socioeconomic Resources ICE Study Area are also described below.

#### **Fairfax County Comprehensive Plan, McLean Planning District (2018)**

The I-495 project study area is contained completely within the McLean Planning District (**Figure 4-2**) which also encompasses the majority of the Socioeconomic Resources ICE Study Area. The district as a whole is located in the northeast portion of Fairfax County, bounded on the north by the Potomac River, on the southeast by Arlington County and the City of Falls Church, and on the southwest by Leesburg Pike and the Dulles Airport Access Road (DAAR) and Dulles Toll Road. According to the *Fairfax County Comprehensive Plan* (Fairfax County, 2018b), the McLean Planning District is predominantly composed of stable, low-density residential neighborhoods outside of the Community Business Center (CBC). Commercial uses are limited, with only a few neighborhood-oriented commercial areas throughout the planning district (Fairfax County, 2018b).

Immediately to the south is a regionally important concentration of transit-oriented development and retail around the four Tysons and McLean Metrorail Stations. Large tracts of federally-owned parkland and institutional uses are also present in the planning district. The majority of the McLean Planning District has been recommended as Suburban Neighborhoods and Low-Density Residential Areas for future land use. Much of the District that is within the ICE study areas has already been built out with Suburban Neighborhoods and Low-Density Residential Areas; therefore, there are no major objectives in the plan targeted at developing or redeveloping this area. The District also contains the McLean CBC which is on

the east side of the ICE study areas; the CBC is intended to encourage community-serving retail use with office, retail, and residential uses that are pedestrian-oriented. Developing the CBC as described above is included in the major objectives of the plan. The plan also recommends public transit facilities such as bus shelters at transit stops. The proposed project's conversion of land to a transportation use is consistent with the recommendations of the *Fairfax County Comprehensive Plan* for the McLean Planning District.

#### Fairfax County Comprehensive Plan, Tysons Urban Center (2018)

The Tysons Urban Center, located mainly within the McLean Planning District, encompasses the southern portion of the Socioeconomic Resources ICE Study Area (**Figure 4-2**). Tysons contains a regionally important concentration of transit-oriented development and retail surrounding four Silver Line Metrorail stations (McLean, Tysons Corner, Greensboro, and Spring Hill). Tysons is located at the confluence of I-495, Route 267, Leesburg Pike, and Chain Bridge Road/Dolley Madison Boulevard. According to the *Fairfax County Comprehensive Plan*, Tysons is comprised of a large concentration of office and retail development that is supported by the adjacent high-density residential communities (Fairfax County, 2018b).

The *Fairfax County Comprehensive Plan* includes recommendations for future redevelopment scenarios in each district of Tysons. These scenarios are dependent on the degree to which necessary public infrastructure can be provided and the way in which plan objectives and development conditions as set forth in the areawide and subdistrict guidance can be satisfied by development proposals (Fairfax County, 2018b). The vision for Tysons includes calls for 75% of all development to be located within a 0.5-mile walk of a Metrorail station, an urban center that could include 200,000 jobs and 100,000 residents, and a redesigned transportation system with circulator routes, community shuttles, feeder bus service, and vastly improved pedestrian and bicycle routes and connections. The proposed project's conversion of land to a transportation use is consistent with the recommendations of the *Fairfax County Comprehensive Plan* for the Tysons area as it would provide additional capacity and relief of congestion to allow more individuals to access the Tysons Urban Center for employment opportunities without negatively impacting the planned land uses or creating additional fragmentation in the existing transportation network. The plan anticipates that a high-quality transit connection in Tysons to Maryland will be necessary in the future.

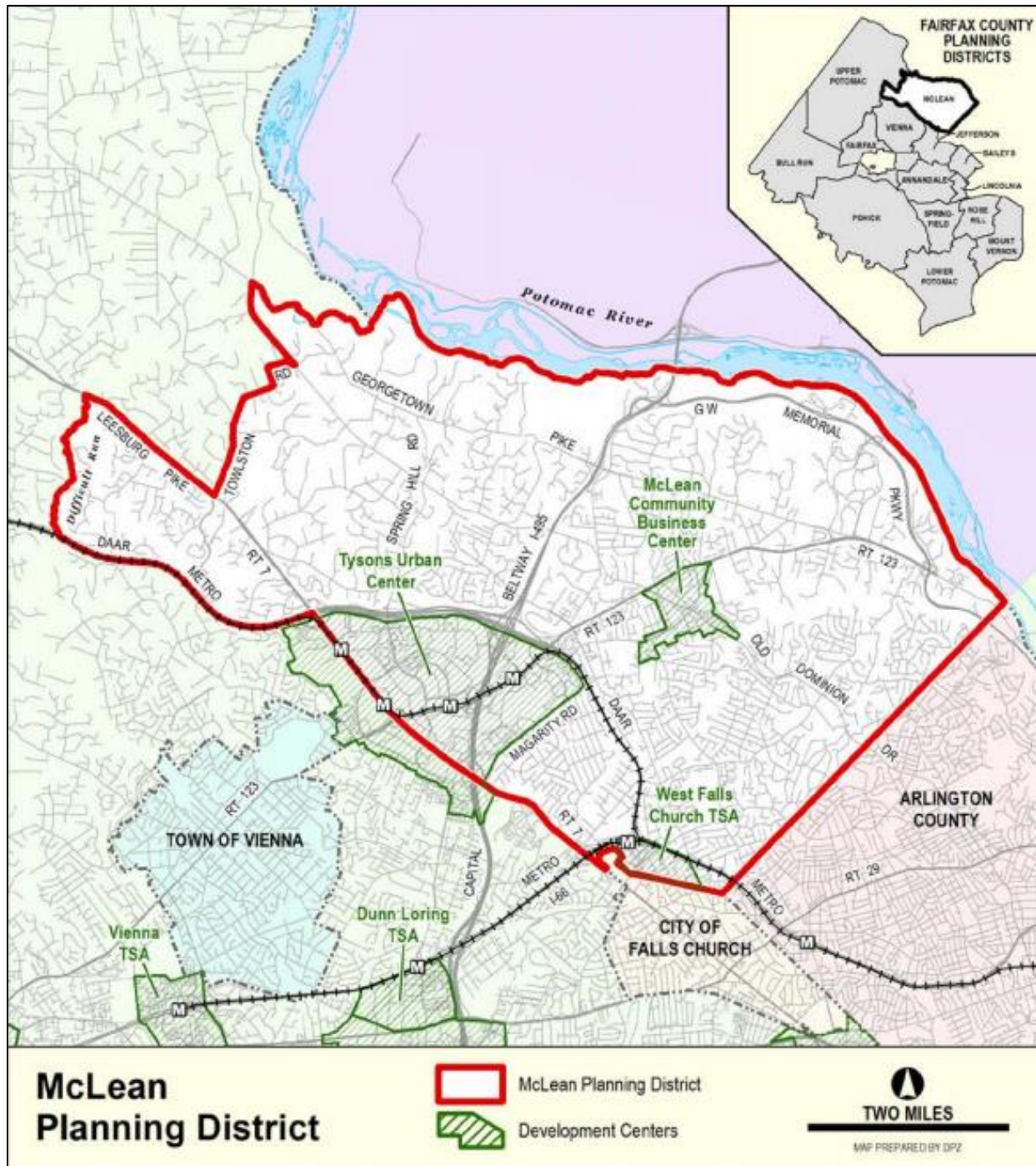


Figure 4-2. McLean Planning District and Tysons Urban Center Boundary (Fairfax County, 2018b)

Montgomery County Master Plan of Highways and Transitways (MNCPPC, 2018)

High occupancy vehicle lanes were officially adopted in the Master Plan for the I-495 corridor from the ALMB to the I-270 West Spur in Montgomery County in 2004. Though this plan is not directly consistent with VDOT’s subject I-495 Express Lanes Northern Extension project, FHWA in cooperation with the MDOT State Highway Administration (SHA) has issued a Notice of Intent (2018) to prepare an EIS for

constructing managed lanes on the I-495 corridor in Maryland. The Final EIS and ROD for this project is currently anticipated to be completed in Fall 2020 (MDOT SHA, 2019).

This proposal is consistent with the plan for VDOT's I-495 project and the two agencies continue to coordinate the connection of the two projects at the ALMB.

#### Fairfax County Transportation Plan (2017)

The proposed project is consistent with the *Fairfax County Transportation Plan*, which calls for Express Lanes on the road segments of I-495 through the study area (Fairfax County, 2017b). The proposed project falls within the plan's guidelines to meet the environmental policies aimed to reduce disturbances within environmentally sensitive areas, such as the Resource Protection Areas (RPA) and Environmental Quality Corridors.

The *Fairfax County Comprehensive Plan* designates the study area for "Enhanced Public Transportation." No studies have been conducted yet to determine what type of transit may be most appropriate for the study area.

#### Dulles Toll Road and Dulles Airport Access Road/I-495 Long Range Plan – (2008)

The National Capital Region's CLRP (MWCOC, 2018b) includes future phased access improvements to the Dulles Toll Road (DTR)-DAAR/I-495 interchange that were proposed in VDOT's original I-495 Express Lanes project, as documented in the *Dulles Interchange Justification Report* (VDOT, 2009b) and *Environmental Studies Memorandum* (VDOT, 2009a), and constructed through Phase 1 in 2012. That proposed project, and the I-495 NEXT project, were developed to be consistent with the CLRP, recognizing that future access improvements would be constructed in addition to what is proposed with these projects. The CLRP envisions full connectivity between the DTR, DAAR, and the existing I-495 GP Lanes and the 495 Express Lanes. The subject project proposes to modify existing ramps and construct additional ramps between I-495 and the DTR and DAAR in order to provide for additional connectivity between the Dulles corridor, the I-495 Express Lanes, and the I-495 GP Lanes.

The CLRP also includes a proposal by the Metropolitan Washington Airports Authority (MWAA) to widen the DAAR to six lanes between the airport and I-495. The original Dulles Interchange Long Range Plan was developed to account for this improvement, and the proposed widening has been incorporated as a future baseline project during the analysis and planning of the subject I-495 NEXT project.

#### Montgomery County Comprehensive Plan, Bethesda Chevy Chase Master Plan (1990)

The Master Plan for the Bethesda-Chevy Chase planning area encompasses north and east of the Socioeconomic Resources ICE Study Area in Montgomery County, Maryland. When the plan was adopted in 1990, the area was characterized as a mature suburban community comprised of predominantly single-family residential areas with a limited number of high-density employment and neighborhood retail areas. The current land use in the study area remains mostly single-family residential (shown on **Figure 4.3**). The Master plan shows concentrated growth centers and corridor cities expanding from I-495 north from the Potomac River. The plan recommends that additional transportation services in Bethesda-Chevy Chase be based primarily on an expanded transit and mobility services program. Although transit is the primary focus of the transportation recommendations, improvements to highway systems to improve safety, reduce through traffic on residential streets, and previously programmed projects while minimizing the addition of new highways are also recommended. The proposed project which proposes additional capacity on an

existing facility to directly alleviate congestion on I-495 and indirectly improve adjacent transportation networks complies with the existing and anticipated plans outlined in the *Bethesda-Chevy Chase Master Plan*.

#### Montgomery County Comprehensive Plan, Potomac Subregion Master Plan (2002)

The Master Plan for the Potomac Subregion is located on the north and west side of the Socioeconomic Resources ICE study area in Montgomery County, Maryland. The plan describes the area as being defined by natural resources with a desire to maintain the current low-density residential development. Future development is encouraged to grow in an ecologically sensitive and energy-efficient development pattern, with an emphasis on conservation. In 2002 when the plan was adopted, the existing land use within Montgomery County was identified as being 93% developed with additional growth anticipated to grow. The plan recommends that a two-lane road policy and rustic roads program be followed for the roadways within the Potomac Subregion with an understanding the Subregion is bordered to the east by regional highways, I-495 and I-270. Transit improvements are not a priority to the rural nature of the community which affords itself more for a network of off-road bike routes. The proposed project is consistent with the existing and anticipated plans for the Potomac Subregion since it does not conflict with the two-lane road policy for roadways within the subregion and would provide improved mobility to access the subregion.

#### Maryland Department of Transportation State Highway Authority I-495 and I-270 P3 Program

The MDOT SHA, in cooperation with FHWA, has begun the planning and necessary environmental review as part of the NEPA process for a Public Private Partnership (P3) Program which proposes to improve the I-495 and I-270 corridors in Maryland (MDOT SHA, 2019). Through this process, MDOT SHA has evaluated 15 different alternatives for implementation along the corridor and has narrowed the preferred option down to five alternatives which all include aspects of HOV or HOT capacity improvements. The western terminus of the proposed study area is just west of the GWMP. In November 2019 an agreement was reached between Governor Ralph Northam of Virginia and Governor Larry Hogan of Maryland to share the cost of replacing the ALMB and constructing Express Lanes between the GWMP in Virginia and River Road (MD-190) in Maryland (VOG, 2019). This bi-state agreement also dictated the responsibility of the operation and tolling of the express lanes by each state within this segment. The I-495 NEXT project proposes to link the existing Express Lanes on I-495 in Virginia with the proposed Express Lanes included in Maryland's I-495/I-270 P3 Program as well as this bi-state agreement.

#### ***Future Population Projections***

The Weldon Cooper Center for Public Service Demographics Research Group and the Maryland Department of Planning State Data Center produce population projections for their respective localities out to 2040 or 2045 utilizing past available U.S. Census Bureau data. Population projections for the McLean and Tysons CDPs were not available. Based on these projections, Fairfax and Montgomery Counties are anticipated to continue to grow in population at a steady pace of between 5% and 8% each decade over the next approximately 20 years. The increase in population for both counties between 2010 and 2040 is projected to be just over 20%.

**Table 4-2. Future Population Projections**

Locality	2010	2020	2030	2040	Change from 2010 to 2040
Fairfax County, VA	1,081,726	1,162,504	1,244,025	1,308,224	
<i>Growth</i>	--	7%	7%	5%	21%
Montgomery County, MD	971,777	1,052,050	1,128,800	1,197,150	
<i>Growth</i>	--	8%	7%	6%	23%
Virginia	8,517,685	8,655,021	9,331,666	9,876,728	
<i>Growth</i>	--	2%	8%	6%	16%

Source: Weldon, 2019; MDPSDC, 2017

The Metropolitan Washington Council of Governments (MWCOC) is a regional organization of the Washington area local governments that projects population growth on a smaller scale by Transportation Analysis Zones (TAZ)<sup>3</sup> from the period of 2010 to 2045. Since the Socioeconomic Resources ICE Study Area was defined using census block group boundaries, the TAZs do not share the same boundary with the Socioeconomic Resources Study Area and may extend beyond the study area. The current MWCOC Round 9.1 projections<sup>4</sup> indicate that by 2045, the resident population of the TAZ areas that are within or intersect the Socioeconomic Resources ICE Study Area will increase from 157,348 to 246,618 persons, a 57% increase (see **Figure 4-4**). This is comparatively two and a half times higher of an increase in population as compared to Fairfax and Montgomery Counties as a whole, indicating that the Socioeconomic Resources ICE Study Area is anticipated to continue to be a center of development and redevelopment in the region.

### ***Economic Development and Employment***

Within the Socioeconomic Resources ICE Study Area, most of the business activity is concentrated in the Tysons Urban Center and McLean CBC as described in **Section 4.2.2**. In a relatively small geographic area Tysons includes multiple major shopping centers such as Tysons Corner Shopping Center and Tysons Galleria Shopping Center as well as multiple urban office spaces for large international companies such as Capital One, Ernst & Young, and Hilton. Tysons alone contained approximately a quarter of all office space in Fairfax County in 2010 (Fairfax County, 2016) and is currently the largest concentration of transit-oriented development and retail in the region, anchored by four Metrorail stations.

### ***Natural Resource Protection and Ecosystems***

The Natural Resources ICE Study Area is a built-up area comprised mostly of residential development in addition to the Tysons Urban Center and McClean CBC, which are high-density business areas. Though some development was present prior to 1950, the construction of the Route 7 and Route 123 interchanges as well as the I-495 corridor in the 1950s and 60s spurred an increase in development, resulting in the loss of the majority of the natural ecosystems that were historically present; the exception to these losses were

<sup>3</sup> Transportation Analysis Zone (TAZ) is the unit of geography most commonly used in conventional transportation planning models. The size of a zone varies, but for a typical metropolitan planning software, a zone of under 3000 people is common (TRB).

<sup>4</sup> MWCOC Cooperative Forecasting Program provides regularly updated population, household, and employment forecasts for use in planning and modeling activities at COG, the Transportation Planning Board, and other state, regional, and local agencies (MWCOC).

the Scott's Run Nature Preserve managed by the Fairfax County Park Authority (FCPA) and the GWMP managed by the National Park Service. The remaining natural areas are now largely restricted to the major stream corridors, which have received higher levels of protection with passage of the Clean Water Act of 1972 (CWA); formation of the joint Maryland-Virginia Chesapeake Bay Legislative Advisory Commission in 1978; formation of the Chesapeake Bay Commission in 1980; and enactment in Virginia of the Chesapeake Bay Preservation Act (CBPA) in 1988. Additional laws and regulations that protect major stream corridors include the Virginia Erosion and Sediment Control Law, the Virginia Stormwater Management Act, the Virginia Water Resources and Wetlands Protection Program, floodplain management regulations, and local land disturbance regulations.

The CWA provides water quality, wetland, and stream protections, which are administered and enforced by the United States Environmental Protection Agency (USEPA), USACE, and Virginia Department of Environmental Quality (VDEQ). The CBPA provides protections for riparian habitats that buffer wetlands and streams through the designation of RPAs and Resource Management Areas (RMAs). In Virginia, administration and enforcement of the CBPA is carried out by the individual localities subject to the CBPA. In the Natural Resources ICE Study Area, the CBPA is enforced by Fairfax County and Montgomery County. RPAs within Fairfax County include tidal wetlands, tidal shores, water bodies with perennial flow, non-tidal wetlands connected by surface flow and contiguous to a tidal wetland or water body with perennial flow, any land within a major floodplain, and any land within 100 feet of one of the features described above.

Generally, development within the RPA is limited to water dependent activities (e.g., stormwater management facilities, sanitary sewer gravity lines), redevelopment of existing developed areas (e.g., development within the footprint of an existing structure or impervious surface), and linear transportation and utility projects. Fairfax County currently enforces their respective Chesapeake Bay Preservation Ordinances and generally does not allow residential or commercial development within the RPAs. RMAs usually include any area not designated as an RPA. Development within the RMA is generally less restrictive; however, coordination with the County is still required prior to development. Some past development may have been subject to different regulations as the County's requirements have evolved.

Wildlife habitats within the Natural Resources ICE Study Area occur mostly along stream corridors within RPAs and within protected parks and natural areas such as Scott's Run Nature Preserve, Scotts Run Stream Valley Park, Cooper Intermediate School Site, local parks, and lands along the GWMP. Therefore, wildlife and wildlife habitat within the RPAs also receive protection through the CWA and the CBPA. Threatened, endangered, and special status species, if present, receive direct protection through federal or state endangered species laws. The natural areas within the Natural Resources ICE Study Area that are not RPAs receive conservation management guidance by local plans such as the *Fairfax County Natural Resources Management Plan* (FCPA, 2019).

Habitats within the Natural Resources ICE Study Area are highly fragmented, as areas adjacent to existing roadways have already been developed for residential, commercial, or industrial purposes. No plans to modify development regulations are known, although any changes would have only a nominal effect since most of the study area is built out, and future growth would likely be through redevelopment. Common invasive species observed in the study area include Japanese stiltgrass (*Microstegium vimineum*), Japanese honeysuckle (*Lonicera japonica*), Chinese privet (*Ligustrum sinense*), mile-a-minute (*Persicaria perfoliata*), and multiflora rose (*Rosa multiflora*).



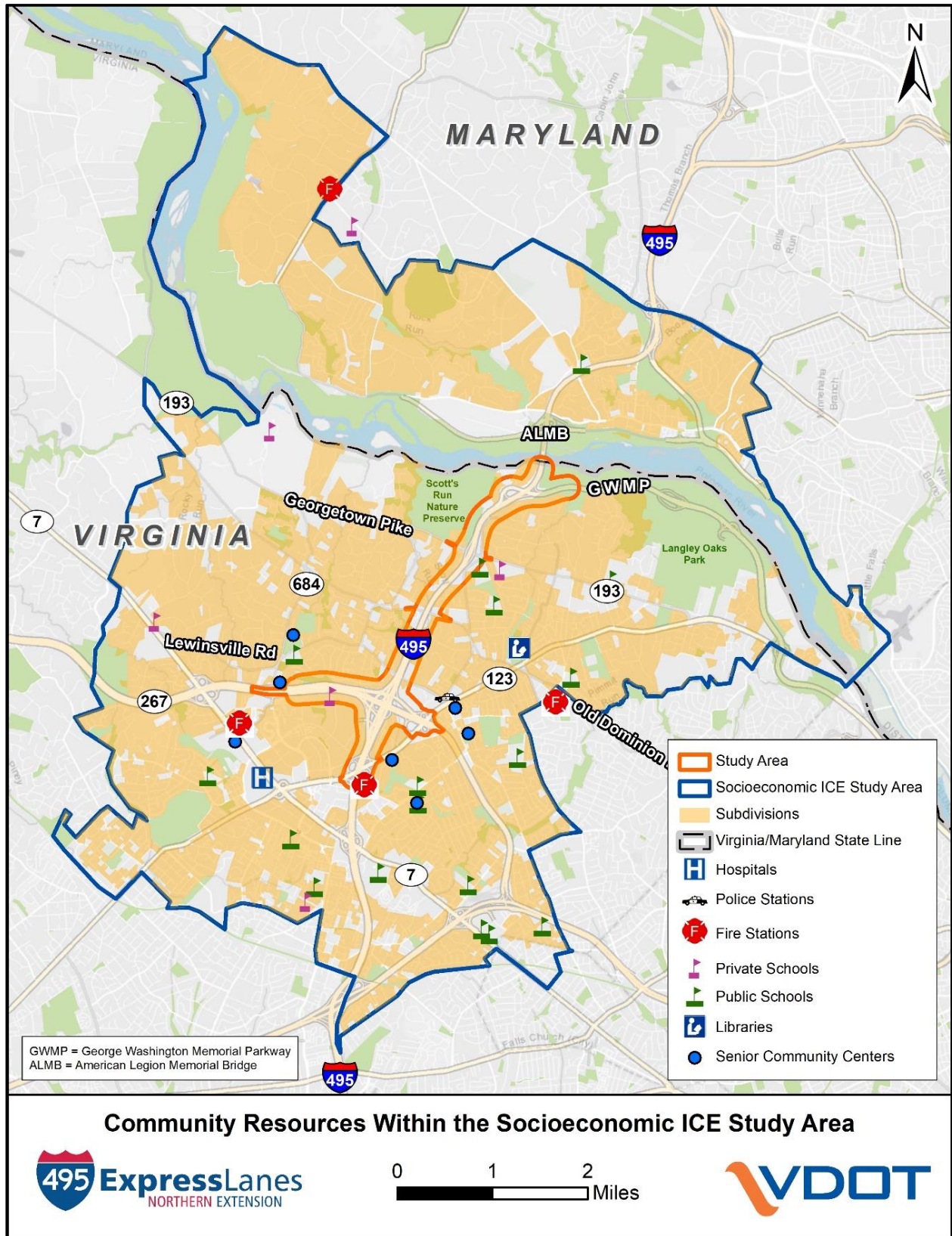


Figure 4-3. Community Resources Within the Socioeconomic ICE Study Area

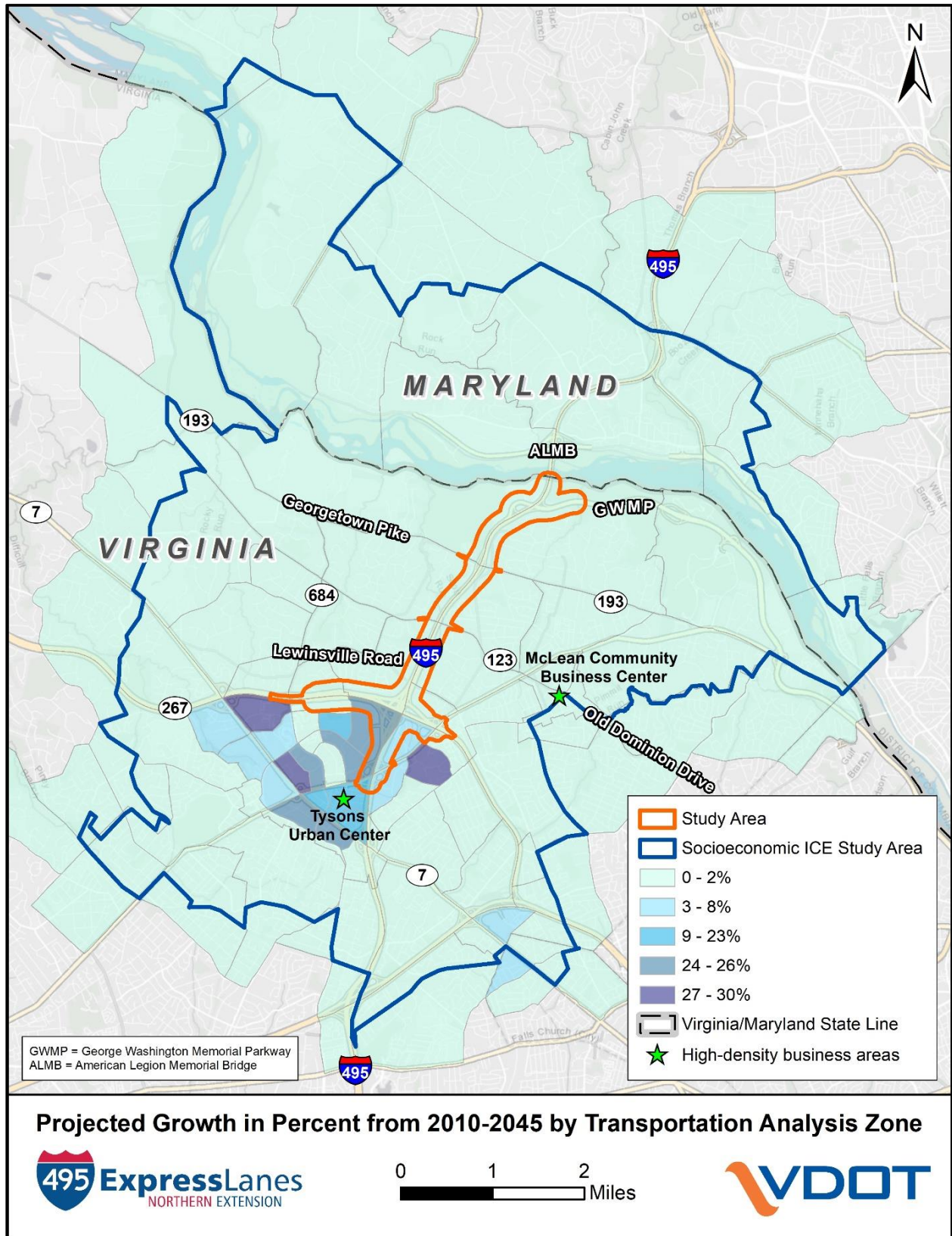


Figure 4-4. Projected Growth in Number from 2010 - 2045 by Transportation Analysis Zone

### 4.3 STEP 3: INVENTORY OF SENSITIVE RESOURCES IN THE STUDY AREA

Sensitive resources for this study that were considered to be particularly relevant for the analysis of impacts from a transportation project include socioeconomic resources, natural resources, and historic resources.

#### 4.3.1 Socioeconomic Resources

##### *Land Use*

The Socioeconomic Resources ICE Study Area includes those census block groups that lie directly within or partially within the Induced Growth Study Area and therefore encompasses a larger area which crosses over the Potomac River into Maryland and extends further east, south, and west to include more of unincorporated Fairfax County. Land use and zoning data from both Fairfax County, Virginia and Montgomery County, Maryland were reviewed for this analysis.

The land within the Socioeconomic Resources ICE Study Area is mostly comprised of well-established residential communities, institutional facilities (in Virginia), and public land, as shown in **Table 4-3** and **Figure 4-3**. Neither Fairfax nor Montgomery Counties categorize transportation right-of-way in their land use system; therefore, the right-of-way area is not included in **Table 4-3**. Land uses in the Socioeconomic Resources ICE Study Area are guided by multiple plans as described in **Section 4.2.2**.

**Table 4-3. Socioeconomic Resources ICE Study Area Land Use**

County Land Use Class*	Amount in Study Area (acres)	Percent of Study Area
<i>Fairfax County, Virginia</i>		
Low-density Residential	9,269.40	50%
Recreation	2,602.06	14%
Open land, not forested or developed	1,861.94	10%
Institutional	1,570.19	8%
Commercial	1,220.32	7%
Public	1,116.36	6%
High-density Residential	489.86	3%
Medium-density Residential	360.42	2%
Utilities	113.11	1%
Industrial, light and heavy	106.21	1%
<b>Total in Virginia</b>	<b>18,709.88</b>	<b>-</b>
<i>Montgomery County, Maryland</i>		
Residential	9,005.37	99%
Commercial and Retail	13.93	> 1%
Other	84.96	> 1%
<b>Total in Maryland</b>	<b>9,104.25</b>	<b>-</b>
<b>Total in Study Area</b>	<b>27,814.13</b>	<b>-</b>

Sources: Fairfax County, Virginia and Montgomery County, Maryland Land Use Parcels

\* Residential–Detached and Residential–Estate land uses were combined for the purpose of this study.

### ***Community Facilities, Parks, and Recreational Facilities***

Community facilities in the Socioeconomic Resources ICE Study Area were identified through a review of data from local governments and aerial reviews. Community facilities within the Socioeconomic Resources ICE Study Area include:

- In Fairfax County, Virginia:
  - Schools (13)
  - Community Facilities (libraries, cemetery, recreation center, etc.) (6)
  - Post Office (3)
  - Fire Stations (3)
  - Parks (67)
  - Trails (18)
- In Montgomery County, Maryland:
  - Schools (7)
  - Community Facilities (libraries, cemetery, recreation center, etc.) (1)
  - Post Office (2)
  - Fire Stations (1)
  - Parks (21)
  - Trails (2)

Additional information about community and recreational facilities adjacent to the corridor, as well as potential impacts from the proposed project, is discussed in the *I-495 Socioeconomic and Land Use Technical Report* (VDOT, 2020e).

### ***Economic Characteristics***

**Table 4-4** shows the reported (2015) and projected (2020-2040) employment for Fairfax County and Montgomery County. In the time period from 2015 to 2040, the number of employed persons is anticipated to increase by 31% in Fairfax County and 26% in Montgomery County. The decade over decade percent employment growth in both counties is projected to increase at a higher rate as compared to the total population growth in those same decades.

**Table 4-4. Future Employment Projections**

Locality	2015	2020	2030	2040	Change from 2015 to 2040
Fairfax County, VA	654,100	701,651	787,246	857,728	
<i>Growth</i>	--	7%	12%	9%	31%
Montgomery County, MD	520,160	543,467	604,516	653,865	
<i>Growth</i>	--	4%	11%	8%	26%

Source: MWCOG, 2018a

As of September 2019, the three largest industry group employers for the Washington Metropolitan Statistical Area (MSA) were Professional and Business Services, Government, and Education and Health Services. Manufacturing, Information, and Financial Activities were the smallest industry group employers (MWCOG, 2019). The unemployment rate in August of 2019 for the MSA was at 3.2% and on a decreasing trend over the past two years.

### ***Environmental Justice***

The *I-495 Socioeconomic and Land Use Technical Report* (VDOT, 2020e) provides a detailed description of the regulatory basis and methodology used for the EJ impact analysis for this project.

#### Minority Populations

A minority population is present when: (a) the minority population of the affected area exceeds 50% of total population or (b) the minority population percentage in the affected area is “meaningfully greater” than the minority population percentage in the general population or other appropriate unit of geographical analysis (CEQ, 1997b). For the purposes of this study, the minority population for a census block group within the study area will be found to be “meaningfully greater” than that of the general population if its minority population percentage is greater than the value of the average minority population percentage of the county. The average minority population percentage of Fairfax County is 45.4% and 50.7% for Montgomery County. Therefore, study area block groups within Fairfax County with an average minority population percentage greater than 45.4% are considered minority populations. Because the minority population percentage of Montgomery County exceeds the CEQ-defined threshold of 50%, study area block groups with a minority population percentage of 50% or greater are considered minority populations within Montgomery County.

**Figure 4-5** depicts the census block groups containing minority populations within the Socioeconomic Resources ICE Study Area. Based on this definition, 11 out of 50 census block groups in Fairfax County and zero block groups in Montgomery County have a minority population.

#### Low-Income Populations

The low-income populations are identified where the median household income for a study census block group is at or below the Health and Human Services (HHS) poverty threshold. The Census Bureau’s 2014-2018 ACS Median Household Income in the Past 12 Months (in 2016 Inflation-adjusted Dollars), was used to generate median household income data at the census block group level.

An area is identified as containing a low-income population when the median household income for the census block group is below the HHS poverty threshold, which was \$160,020 for a family of two, \$20,160 for a family of three, and \$25,100 for a family of four in 2016. No census block groups with a resident population in the Socioeconomic Resources ICE Study Area for Fairfax or Montgomery Counties have a median household income below the HHS poverty threshold.

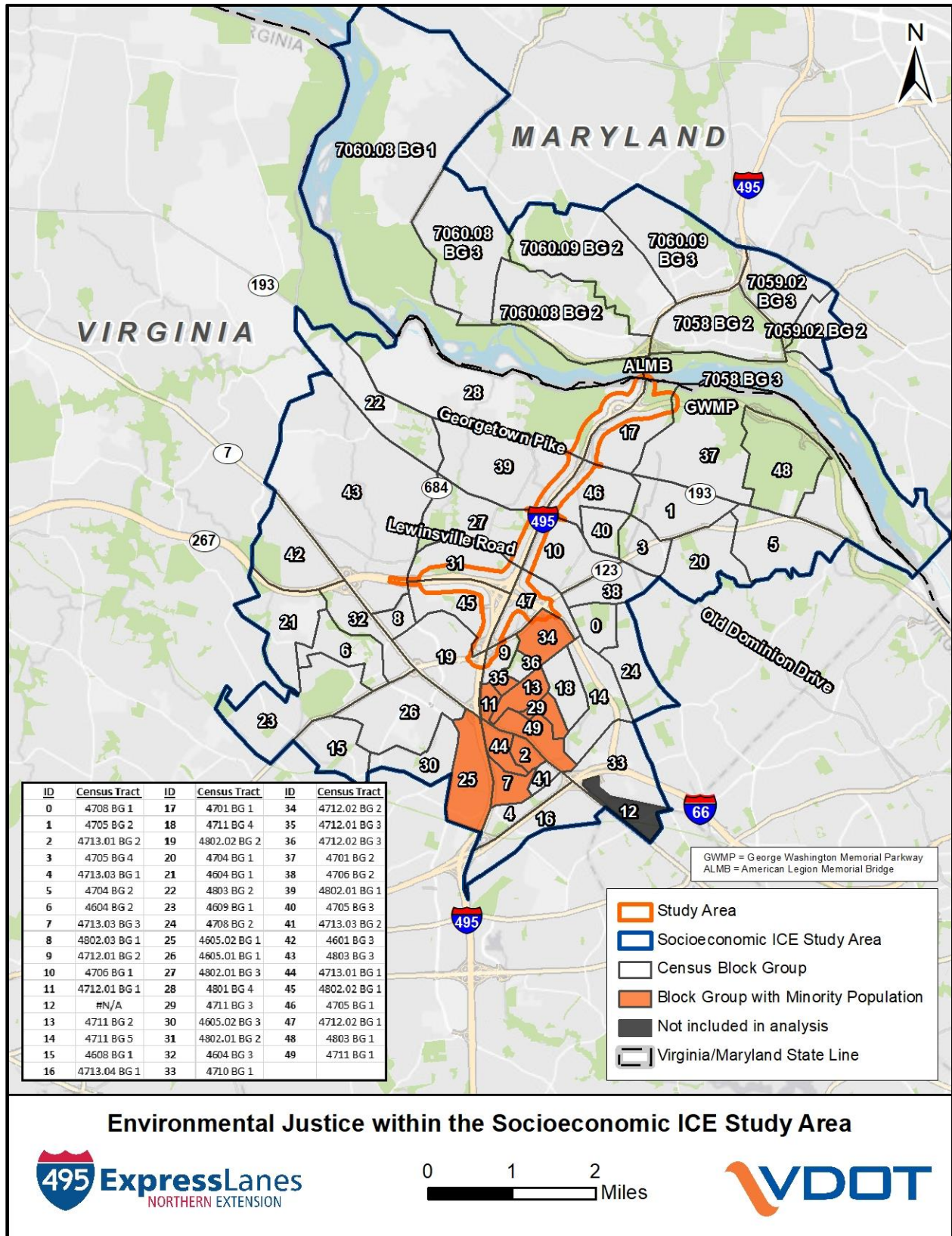


Figure 4-5. Environmental Justice Populations within the Socioeconomic ICE Study Area

### 4.3.2 Natural Resources

Natural resources, including water resources; floodplains; wildlife habitat; and threatened, endangered, and special status species, are considered valuable and unique and may be less able to bear impacts from the proposed transportation improvements. Vulnerable natural resources within the Natural Resources ICE Study Area are discussed below.

#### *Streams and Wetlands*

The Natural Resources ICE Study Area contains a large number of named and unnamed perennial and intermittent streams and wetlands (see **Figure 4-6** and **Figure 4-7**). The National Hydrography Dataset (NHD) and the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI), combined with field reconnaissance data collected within the EA study area in 2018 and 2019, was used to approximate the extent of streams and wetlands within the Natural Resources ICE Study Area. Approximately 48 miles of streams were identified (combined NHD and 2018/2019 wetland investigation data) within the Natural Resources ICE Study Area, including the Potomac River. The most prominent stream corridors are Scott Run and Dead Run. All streams in the study area ultimately flow to the Potomac River.

Approximately 92 acres of wetlands were identified within the Natural Resources ICE Study Area (combined NWI and 2018/2019 wetland investigation data). Of these, approximately 8 acres are Palustrine Emergent wetlands (PEM), 45 acres are Palustrine Forested (PFO) wetlands, 3 acres are Palustrine Open-water wetlands (POW), 4 acres are Palustrine Unconsolidated Bottom wetlands (PUB), 27 acres are riverine, and 7 acres are lacustrine (see **Figure 4-7**). The majority of PFO and PEM wetlands are located along streams and floodplains, whereas POW wetlands within the study area generally consist of stormwater management ponds in developed areas. According to VDEQ's Wetland Condition Assessment Tool (WetCAT), wetland habitat stress levels and water quality stress levels within the Natural Resources ICE Study Area range from slightly stressed to severely stressed (VDEQ, 2019a).

One body of water in the Natural Resources ICE Study Area fails to meet state water quality standards and is designated as an "impaired waters" under Section 303(d) of the CWA. According to the Final 2018 VDEQ 305(b)/303(d) Integrated Report, three miles of Dead Run is designated as an impaired water due to an impaired microbenthic invertebrate community (VDEQ, 2018a), as discussed in the *I-495 Natural Resources Technical Report* (VDOT, 2020c). Additionally, the Potomac River is impaired due to sediments, Polychlorinated biphenyls (PCB), nutrients, metals, ions, and bacteria (MDE, 2019). No impaired reservoirs or estuaries were identified within the Natural Resources ICE Study Area. Common causes of impairment include copper, mercury in fish tissue, PCB in fish tissue, dissolved oxygen, aquatic plants (macrophytes), chlorophyll-a, E. coli, estuarine bioassessments, and fecal coliform.

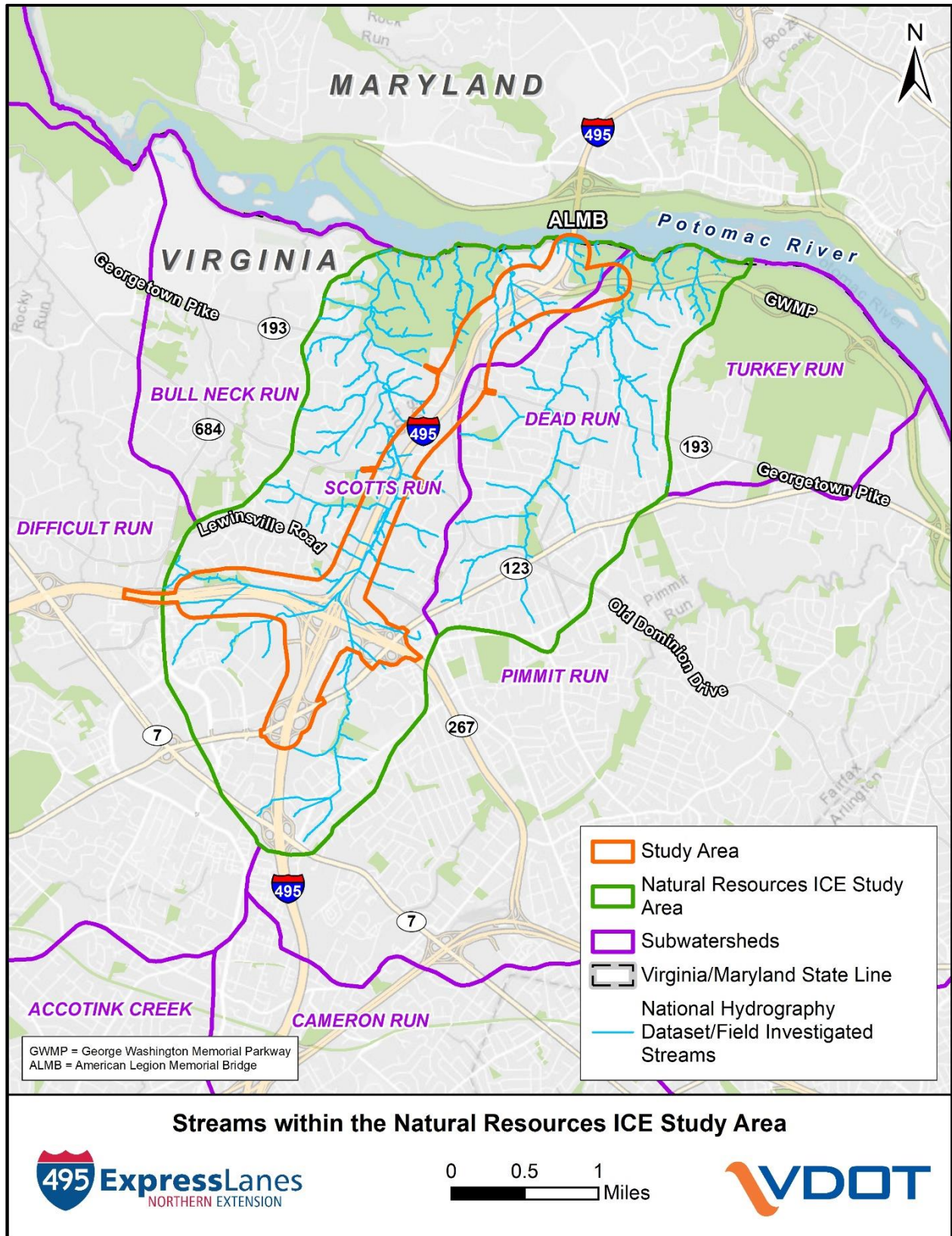


Figure 4-6. Streams within the Natural Resources ICE Study Area



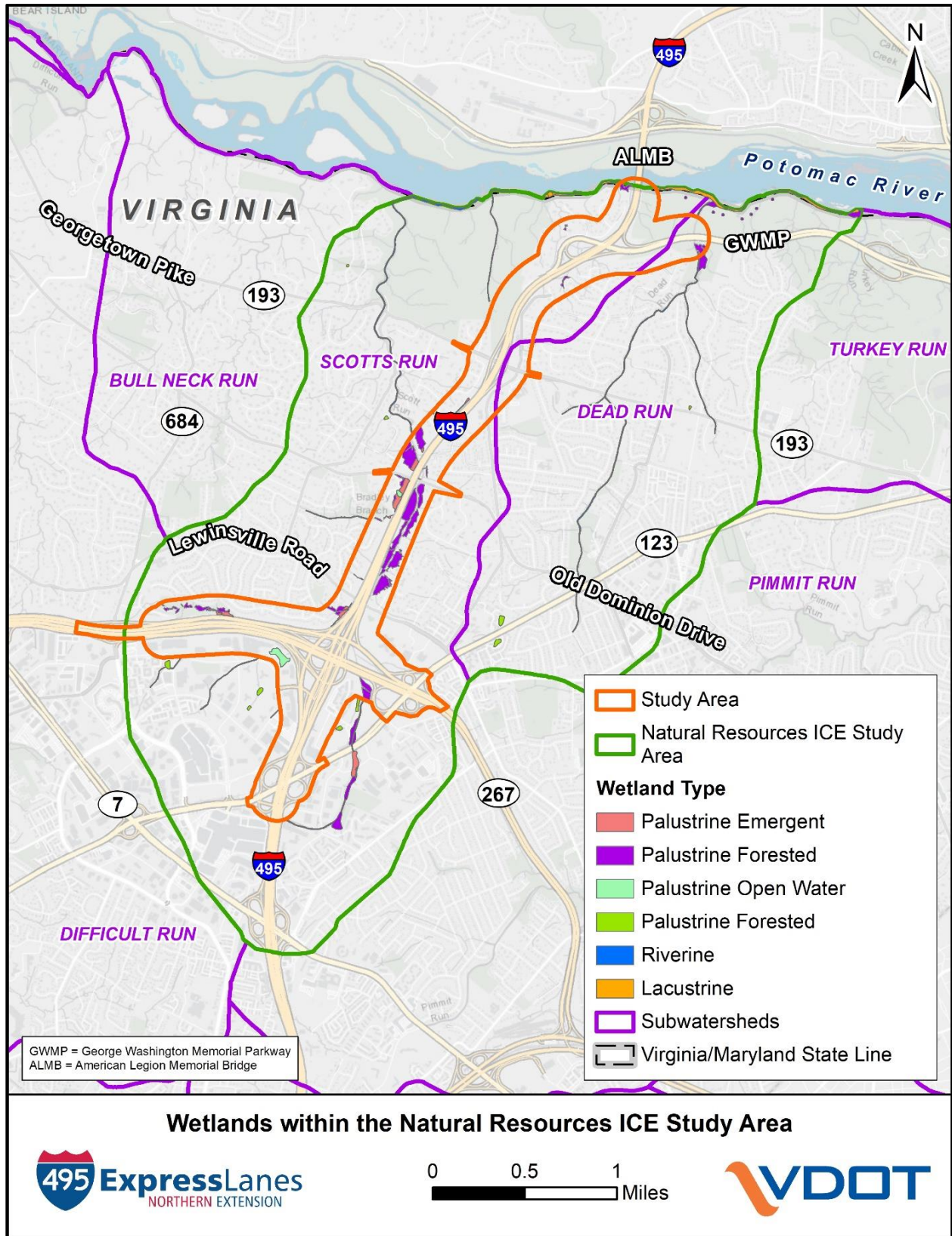


Figure 4-7. Wetlands within the Natural Resources ICE Study Area

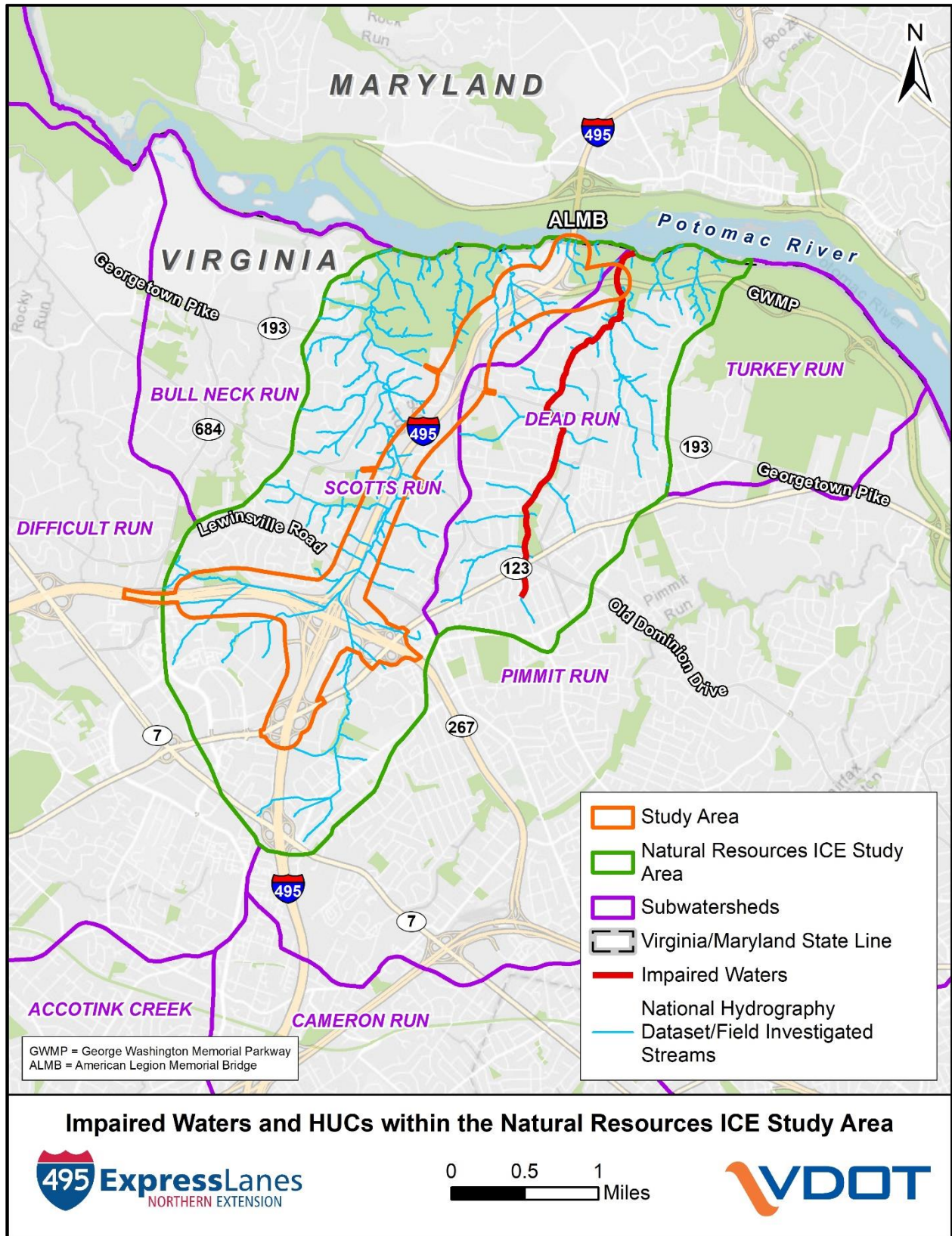


Figure 4-8. Impaired Water Resources within the Natural Resources ICE Study Area

***Resource Protection Areas***

All perennial streams, including the Potomac River, Scott Run, and Dead Run, and any wetlands and floodplains associated with these streams are within areas designated as RPAs. Lands contained in designated RPAs are afforded protections restricting their development. A total of approximately 668 acres of RPAs were identified within the Natural Resources ICE Study Area, and according to perennial stream data available from Fairfax County GIS, all 688 acres are associated with perennial streams. All of the RPAs in the Natural Resources ICE Study Area are part of the Middle Potomac Watersheds (Dead Run and Scotts Run) and are guided by the *Middle Potomac Watershed Management Plan* (2008).

***Floodplains***

The Federal Emergency Management Agency (FEMA)-regulated floodplains within the Natural Resources ICE Study Area occur along Scott Run, Dead Run, and the Potomac River. These floodplains experienced a relatively high level of development encroachment historically but are now generally well-protected. An estimated 264 acres of 100-year floodplains occur within the Natural Resources ICE Study Area. The remaining 5,510 acres are classified as Zone X (areas of minimal flood hazard, outside of the 500-year floodplain) (refer to **Figure 4-9**). There are no designated floodways within the Natural Resources ICE Study Area. All floodplain areas within the Natural Resources ICE Study Area are within areas protected by RPAs. For more information on floodplains, see the *I-495 Natural Resources Technical Report* (VDOT, 2020c).

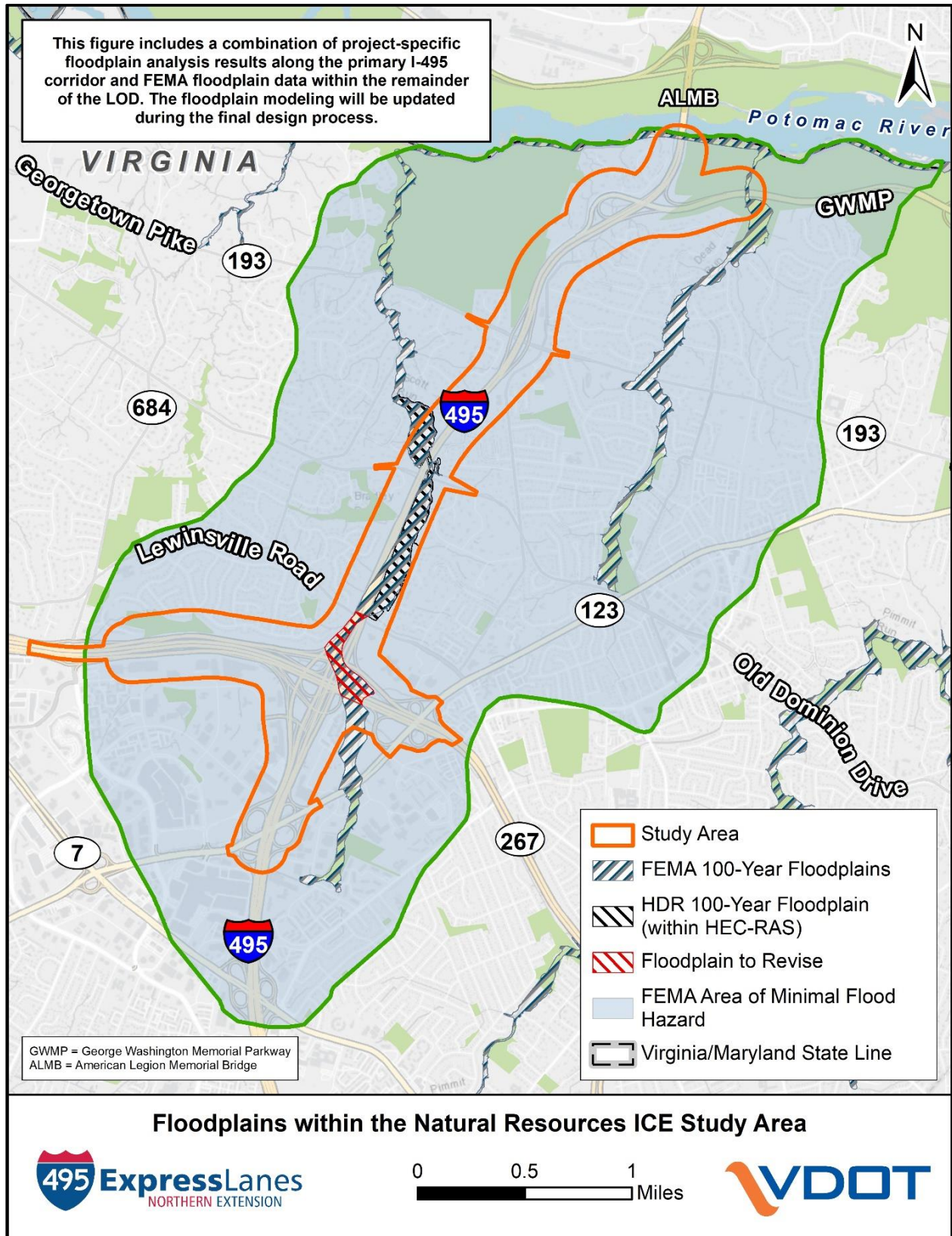


Figure 4-9. Floodplains within the Natural Resources ICE Study Area

### Wildlife Habitat

The Natural Resources ICE Study Area contains a number of different kinds of available wildlife habitat as classified by VGIN: forest, tree, hydro, NWI/other, turfgrass, pasture, and scrub/shrub (VGIN, 2016) (see **Figure 4-10**). The composition of available wildlife habitat directly affects the natural communities, wildlife, and biodiversity found within a given environment. Approximately 65% of the Natural Resources ICE Study Area is covered by available wildlife habitat. The remaining cover is composed of developed land. **Table 4-5** shows the acreage and percentage of each wildlife habitat type within the Natural Resources ICE Study Area.

**Table 4-5. Wildlife Habitat within the Natural Resources ICE Study Area**

Wildlife Habitat Type	Acres Within Natural Resources ICE Study Area	Percent of Natural Resource Study Area
Forest/Tree	2,446	42%
Hydro/NWI/Other	21	<1%
Turfgrass/Pasture	1,243	22%
Scrub/Shrub	25	<1%
<b>Total</b>	<b>3,735</b>	<b>65%</b>

Source: VGIN, 2016

Note: Where appropriate, some terrestrial habitat types have been combined to reflect similar types in total.

Wildlife habitats within the Natural Resources ICE Study Area occur mostly along stream corridors within RPAs and within protected parks and natural areas such as Scott's Run Nature Preserve, Scotts Run Stream Valley Park, Cooper Intermediate School Site, local parks, and lands along the GWMP. Forestlands within the Natural Resources ICE Study Area are typical of Oak-Hickory forest and provide habitat for many of the typical terrestrial urban wildlife species inhabiting this region.

Mammal species confirmed within a 3-mile radius of the study area include the little brown bat (*Myotis lucifugus*), tri-colored bat (*Perimyotis subflavus*), and northern long-eared bat (*Myotis septentrionalis*) (VDGIF, 2019c; USFWS, 2019e). Habitats and wildlife corridors within the Natural Resources ICE Study Area are highly fragmented, as areas adjacent to existing roadways have already been developed for residential, commercial, or industrial purposes. Fragmentation in the developed areas has resulted in low-quality edge habitat. Existing roadways pose virtually impenetrable barriers to crossings by terrestrial species due to vehicle strikes and fencing. Edge habitats along highways in the right-of-way, interchange loops, and medians are poor habitats for wildlife due to access restrictions posed by the travel lanes. The terrestrial wildlife species most capable of adapting to habitat fragmentation outside of the fence line of the existing roadway are primarily species that are adapted to urban environments. Additional information regarding the wildlife commonly found within the project study area is provided in **Section 3.3.1** of the *I-495 Natural Resources Technical Report* (VDOT, 2020c).

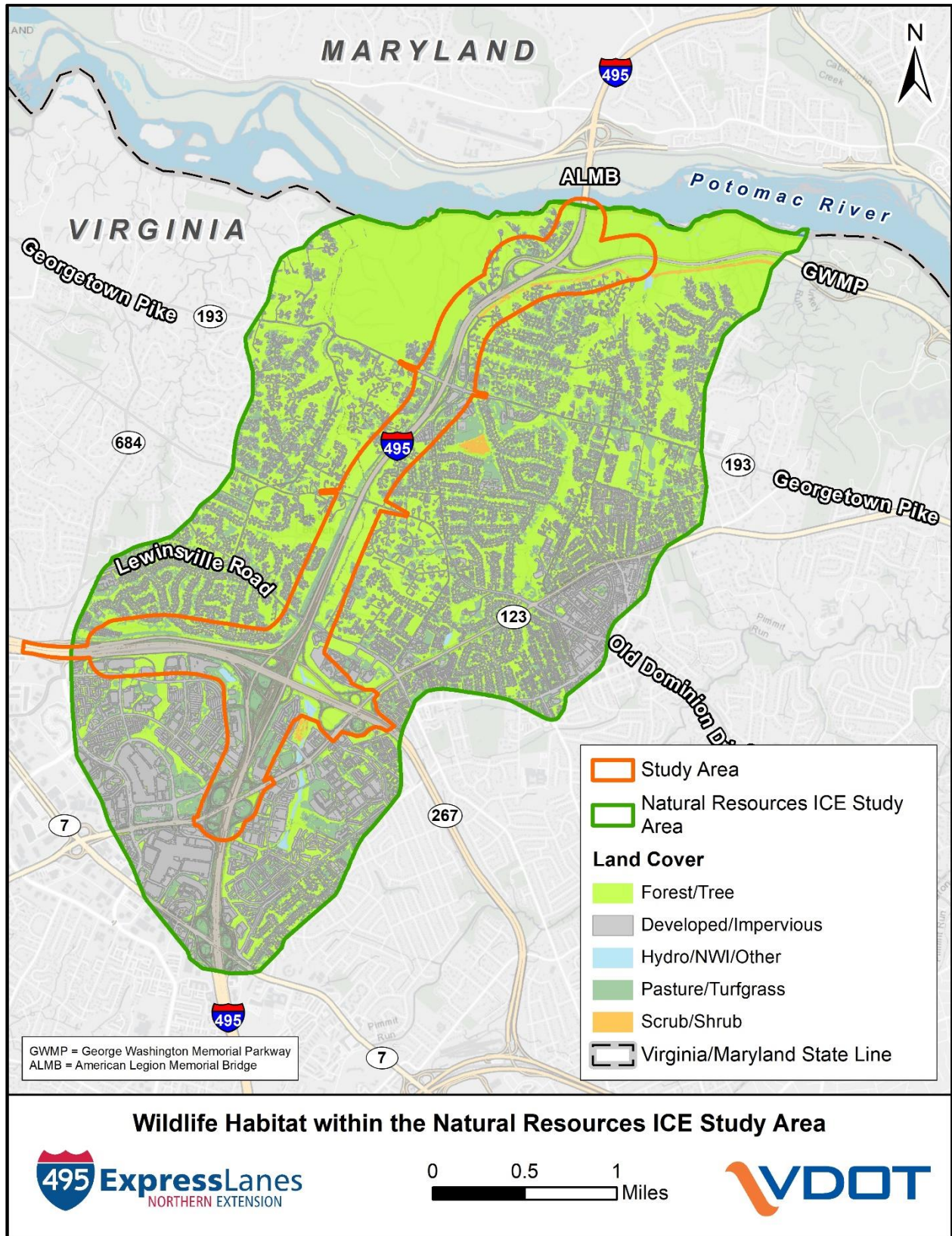


Figure 4-10. Terrestrial Habitat within the Natural Resources ICE Study Area

### Threatened and Endangered Species

As detailed in the *I-495 Natural Resources Technical Report* (VDOT, 2020c), the USFWS Information for Planning and Consultation (IPaC), Virginia Fish and Wildlife Information Service, and Virginia Department of Conservation and Recreation (VDCR) Division of Natural Heritage databases were consulted to identify confirmed occurrences of federally-listed and state-listed threatened and endangered species within the study area. The results of these database consultations are summarized in **Table 4-6**. The table presents the species with confirmed occurrences within a 3-mile radius of the project study area, along with each species' listed status and the source(s) of its listing. More specific information regarding data gathering sources and approaches used is provided in the *I-495 Natural Resources Technical Report* (VDOT, 2020c).

**Table 4-6. Threatened and Endangered Species within the Natural Resources ICE Study Area**

Species	Status	Source of Listing
Northern Long-Eared ( <i>Myotis septentrionalis</i> )	FT, ST	VaFWIS, IPaC
Rusty Patched Bumble Bee ( <i>Bombus affinis</i> ) (historic)	FE	VDCR-DNH
Little Brown Bat ( <i>Myotis lucifugus</i> )	SE	VaFWIS
Tri-Colored Bat ( <i>Perimyotis subflavus</i> )	SE	VaFWIS
Wood Turtle ( <i>Glyptemys insculpta</i> )	ST	VaFWIS, VDCR-DNH

Source: VDGIF, 2019c; USFWS, 2019e; VDCR, 2019

FE = Federally Endangered; SE = State Endangered; FT = Federally Threatened; ST = State Threatened; VaFWIS = Virginia Fish and Wildlife Information Service; IPaC = US Fish and Wildlife Service Information for Planning and Consultation; VDCR-DNH = Virginia Department of Conservation and Recreation Division of Natural Heritage

#### Northern Long-Eared Bat

While no documented occurrences of NLEB were identified in the Virginia Department of Game and Inland Fisheries (VDGIF) VaFWIS report, the study area is within the range of the federally threatened NLEB. The study area is not within the vicinity of any known hibernacula or maternity roosts, with the nearest hibernaculum located 86.5 miles away. However, suitable summer habitat for the NLEB is present throughout the study area.

#### Rusty Patched Bumble Bee

VDCR-DNH identified the federally-listed endangered RPBB as historically occurring within the study area (VDCR, 2019), and the USFWS RPBB Map did not identify the study area as being an area where the RPBB may be present. Fairfax County is considered to be part of the RPBB historic range, although no observations of RPBB have been documented since before 2000. USFWS expressed no concerns regarding this species during coordination with them in December 2018 or December 2019.

#### Little Brown Bat and Tri-Colored Bat

The VaFWIS report identified documented occurrences of the little brown bat and the tri-colored bat, both state-listed as endangered, within a 2-mile radius of the study area (VDGIF, 2019c). The study area is not within the vicinity of any known hibernacula or maternity roosts (VDGIF, 2019d).

### Wood Turtle

According to the VDGIF VaFWIS the wood turtle has been documented within several streams within a 3-mile radius of the study area, including Turkey Run, Difficult Run, and Pimmit Run. Suitable habitat for this species within the study area includes riparian areas along the Potomac River, Dead Run, Turkey Run, and Scott Run.

No streams within the Natural Resources ICE Study Area were identified as Threatened and Endangered Waters. The Potomac River is a confirmed Anadromous Fish Use Area that supports species such as the Atlantic Sturgeon (*Acipenser oxyrinchus*), Striped Bass (*Morone saxatilis*), Yellow Perch (*Perca flavescens*), and several shad and herring species (*Alosa* spp.).

Review of USFWS Virginia Field Office mapping (USFWS, 2019d) and the Center for Conservation and Biology Virginia Eagle Nest Locator database (CCB, 2019) indicate that the Natural Resources ICE Study Area is not within or adjacent to any Bald Eagle concentration areas or Bald Eagle nest locations. The closest known Bald Eagle nest to the study area is located approximately 1.5 miles east of the Natural Resources ICE Study Area.

### **4.3.3 Historic Resources**

Historic properties are considered notable features for their value to the area's historical and cultural foundations, and the state and nation's heritage. The NHPA (16 USC § 470) defines a historic property as any "prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP), including artifacts, records, and material remains related to such a property or resource." For the purposes of this analysis, historic properties are archaeological site and historic architectural resources eligible for listing or listed in the NRHP. Historic architectural resources within the Historic Resources APE are shown on **Figure 4-11**, including the following:

- **George Washington Memorial Parkway**—Listed in the NRHP in June 1995
- **George Washington Memorial Parkway, intersection with Capital Beltway/I-495**—A non-contributing structure to the George Washington Memorial Parkway
- **Potomac Heritage Scenic Trail**—Within the boundary of the George-Washington Memorial Parkway; contributing/non-contributing status unevaluated
- **Georgetown Pike (Route 193)**—Listed in the NRHP in 2012; the 0.53-long section of divided lanes within the APE that provides access ramps to I-495 is a non-contributing structure to the Georgetown Pike

Archaeological resources within the study area include the following:

- **44FX0379**—Late Archaic to Early Woodland camp. The portion of the site that extends within the study area does not contribute to the NRHP eligibility of the site. No further work needed;
- **44FX3892**—Pre-contact camp of undetermined age. Not eligible for the NRHP. No further work needed.

Additional details are in the *I-495 Cultural Resources Survey Report* (VDOT, 2020b).



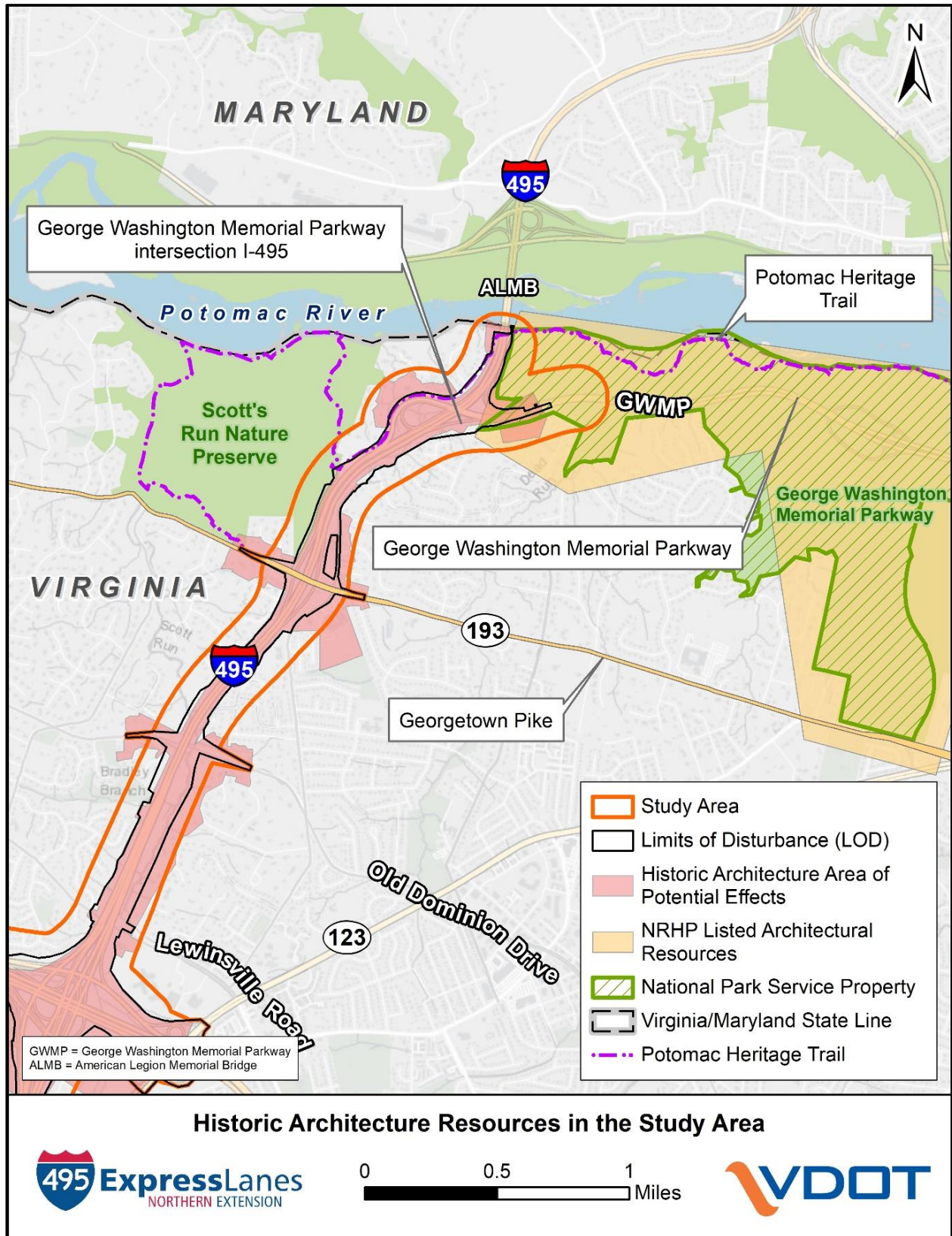


Figure 4-11. Historic Resources within the Historic Resources APE

#### 4.4 STEP 4: IDENTIFY IMPACT-CAUSING ACTIVITIES OF THE BUILD ALTERNATIVE

The objective of this step is to identify direct impacts that could have indirect effects that conflict with the regional direction and goals discussed in **Section 4.2, Step 2: Identify Study Area Direction And Goals** or impact the resources identified in **Section 4.3, Step 3: Inventory of Sensitive Resources in the Study Area**. The NCHRP Report 466 includes groups of actions associated with transportation projects that are known to trigger indirect effects. NCHRP and project-specific examples of these impact-causing activities include alteration of drainage, channelization, noise and vibration, excavation and fill for roadways, barriers, erosion and sediment control (ESC), landscaping, and alteration of travel time or cost. These activities potentially result in the estimated impacts documented in **Table 4-7**. Comparing these actions to regional directions and goals and the resources in the study areas enables the identification of resources that could be indirectly affected. The findings of this identification process are presented in **Section 4.5, Identify Indirect Effects for Analysis**.

**Table 4-7. Direct Impacts of the Build Alternative**

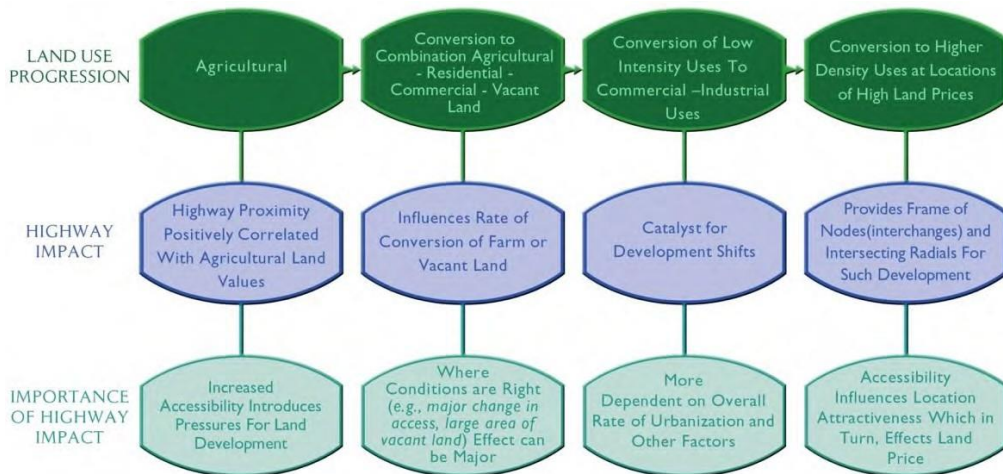
Notable Feature	Build Alternative Estimated Direct Impact
<i>Land Use</i>	
Permanent Right-of-Way Acquisition	29 acres located on 74 individual parcels
Potential Relocations (No.)	0
<i>Community Facilities</i>	
Recreational Trails (No.)	9
Parks (No.)	2
Other Community Facilities (No.)	3
<i>Water Resources</i>	
Streams (Linear Feet)	12,821
Wetlands (Acres)	19.8
100-Year Floodplains (Acres)	60
RPA's (Acres)	75.5
<i>Wildlife</i>	
Forest/Tree Habitat (Acres)	117.8
Hydro/NWI/Other Habitat (Acres)	1.6
Turfgrass/Pasture Habitat (Acres)	110.5
Scrub/Shrub Habitat (Acres)	3.5
<i>Threatened, Endangered, and Special Status Species</i>	
Threatened, Endangered, and Special Status Species or potential habitat (No.)	5
<i>Cultural Resources</i>	
Historic Resources Properties (No.)	2
Archaeological Sites	0

### 4.5 STEP 5: IDENTIFY INDIRECT EFFECTS FOR ANALYSIS

The objective of this step is to assess whether direct impacts identified above would cause indirect effects. The indirect effects analysis focuses on the potential for socioeconomic and ecological impacts that could occur outside of the area of direct impact as a result of the alternatives. As previously discussed in **Section 3.2**, TRB states that indirect effects can occur in three broad categories:

- **Encroachment-Alteration Impacts**—Alteration of the behavior and functioning of the affected environment caused by project encroachment (physical, biological, socioeconomics) on the environment
- **Induced Growth Impacts**—Project-influenced development effects (land use)
- **Impacts Related to Induced Growth**—Effects related to project-influenced development effects (impacts of the change of land use on the human and natural environment)

Development of vacant land or conversion of the built environment to more intensive uses are often consequences of highway projects. For purposes of this study, the NCDOT *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Project in North Carolina, Vol II: Practitioners Handbook* has been used to evaluate induced growth; VDOT has adopted this methodology and has used it on other recent studies. The Handbook provides characteristics for induced growth as well as illustrates the different stages of development (see **Figure 4-12**) (NCDOT, 2001). These characteristics include existing land use conditions in the project area, increased accessibility that may result from new transportation improvements, local political and economic conditions, the availability of other infrastructure and the rate of urbanization in the region.



**Figure 4-12. Highway Investment on Typical Progress of Urbanization**

Source: NCDOT, 2001

“Induced growth effects” in this document is referring to potential growth within a 1-mile buffer around existing interchanges, plus a 1,000-foot buffer for a distance of two miles along major feeder roads that lead to the interchanges (see **Figure 4-1**).

In general, transportation improvements often reduce time and travel cost, and provide new or improved access to properties, enhancing the attractiveness of surrounding land to developers and consumers. Using these limits to identify the location of potential induced development and associated indirect effects is an attempt to identify where those indirect effects are most probable and could occur because of the project. It does not mean that indirect effects from the project would not occur elsewhere; rather, it means that those effects are less reasonably foreseeable.

Additionally, much of the land within the Induced Growth Study Area is already developed, protected by environmental regulations (e.g., RPAs and associated buffers, FEMA 100-year floodplains), or located in parks (e.g., Scott’s Run Nature Preserve, GWMP) (see **Table 4-8**). While development is still possible, these protected resources and limited vacant land restrict the amount of private development that may occur. Therefore, the potential for induced growth as a result of this project is extremely limited and would be in the form of infill or redevelopment where the natural environment has already been degraded.

Fairfax County has identified several designated growth areas including Tysons Urban Center, Transit Station Areas, and Revitalization Districts. Growth is encouraged in these areas, and the County is intentional about including recreation as part of mixed-use development (Fairfax County, 2018b). However, 94% (9,680 acres) of the Induced Growth Study Area is already developed or limited for growth by environmental regulations, parklands, or military installations. The remaining area (624 acres) within the Induced Growth Study Area is designated by Fairfax or Montgomery County as open land which, in addition to vacant developable properties, may include buffer areas between neighborhoods, along right-of-way, or along streams; therefore, these areas may also be limited as for potential development.

The discussion below provides a summary of potential indirect effects meriting analysis, identifying the indirect effect type, the impact-causing activities (direct effects), indirect effects from direct effects, and a description of the potential change.

#### **4.5.1 Socioeconomic Resources**

The Build Alternative has limited potential to directly impact land use within and immediately adjacent to the corridor, including permanent and temporary right-of-way acquisition. The indirect impacts to communities, community facilities, and EJ populations due to these direct impacts are closely related and are described together throughout the rest of the indirect effects analysis.

The Build Alternative could indirectly impact communities, community facilities, and EJ populations within the Socioeconomic Resources ICE Study Area. Indirect impacts may include altering access to communities and associated community facilities or services. Because indirect effects are possible, socioeconomic resources has been advanced to **Step 6: Analyze Indirect Effects and Evaluate Analysis Results (Section 4.6)**.

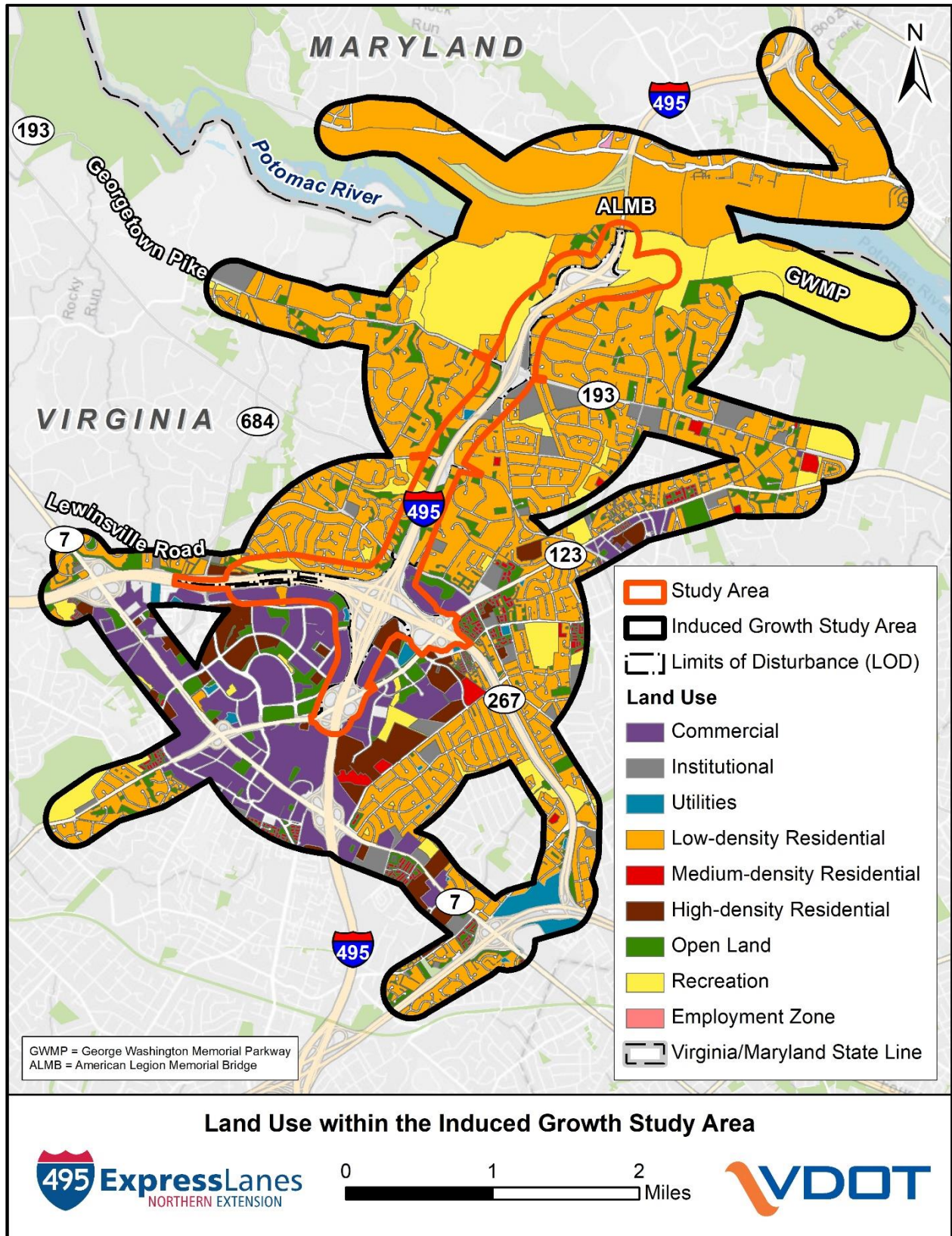


Figure 4-13. Land Use within the Induced Growth Study Area

## 4.5.2 Natural Resources

### *Streams and Wetlands*

Construction of the Build Alternative would result in direct impacts to water resources through the placement of fill into Waters of the U.S. Potential indirect effects resulting from construction could include increased runoff from the addition of impervious surface and the consequent increase in pollutant discharge and changes to hydrologic regime. Additional indirect effects could include changes in wetland hydrology, changes in drainage patterns within floodplains.

Development within the Natural Resources ICE Study Area could impact water resources. The Natural Resources ICE Study Area has approximately 48 miles of streams, as approximated with NHD mapping and 2018/2019 field reconnaissance data. The mainstem of Dead Run, totaling approximately three miles, is impaired due to an impaired microbenthic invertebrate community (See **Section 4.3.2**). The Natural Resources ICE Study Area does not contain any public ground water wells, surface water intakes, springs, reservoirs, or sole source aquifers. The Washington Aqueduct's Little Falls intake which pulls water from the Potomac River, is located approximately three miles downstream of the study area. Wetlands within the Natural Resources ICE Study Area total approximately 92 acres, as determined with NWI mapping and 2018/2019 field reconnaissance data. Because indirect effects are anticipated, water resources have been advanced to **Step 6: Analyze Indirect Effects and Evaluate Analysis Results (Section 4.6)**.

### *Floodplains*

Construction of the Build Alternative would result in direct impacts to floodplains. The Build Alternative could also cause indirect impacts to floodplains by altering drainage patterns and flood flows. The Natural Resources ICE Study Area contains approximately 270 acres of 100-year floodplains and 5,503 acres of Zone X, areas of minimal flood hazard. Because indirect effects on floodplains are possible, this resource has been advanced to **Step 6: Analyze Indirect Effects and Evaluate Analysis Results (Section 4.6)**.

### *Wildlife and Habitat*

The Build Alternative has the potential to directly impact terrestrial habitat. Forest clearing along the edge of the existing right-of-way would result in reduction in forested cover and quality of forested habitat.

Development within the Natural Resources ICE Study Area could impact wildlife habitat. The Natural Resources ICE Study Area contains approximately 2,446 acres of forested land (tree/forest), 1,243 acres of turfgrass/pasture, and 25 acres of shrub/scrub/grasslands. Because indirect effects are anticipated, wildlife habitat has been advanced to **Step 6: Analyze Indirect Effects and Evaluate Analysis Results (Section 4.6)**.

### *Threatened, Endangered and Specials Status Species*

The Build Alternative is not anticipated to directly impact threatened, endangered, or special status species. However, construction of the Build Alternative may indirectly affect threatened and endangered species by altering landscape habitat. Such alterations include increased road noise, increased pollution, and alteration of animal foraging behavior. Additionally, development within the Natural Resources ICE Study Area could impact threatened, endangered, and special status species and their habitat. Two federally listed species (NLEB and RPBB) and four state listed species (NLEB, little brown bat, tri-colored bat, and wood turtle) have been known to occur or have potential habitat within the Natural Resources ICE Study Area.

Given the likelihood of land use changes within the Natural Resources ICE Study Area, threatened, endangered, and special status species have been advanced to **Step 6: Analyze Indirect Effects and Evaluate Analysis Results (Section 4.6)**.

### 4.5.3 Historic Resources

The Build Alternative has the potential to directly and indirectly affect historic resources, as described in detail in the *I-495 Section 4(f) and Section 6(f) Technical Memorandum* (VDOT, 2020d). There is potential for direct effects to the historic resources identified, therefore, these resources could be indirectly impacted during construction. Because indirect effects are possible, historic resources has been advanced to **Step 6: Analyze Indirect Effects and Evaluate Analysis Results (Section 4.6)**.

## 4.6 STEP 6: ANALYZE INDIRECT EFFECTS AND EVALUATE ANALYSIS RESULTS

Using planning judgement, this step analyzes indirect and induced growth effects potentially resulting from each alternative. Potential indirect effects that may occur by the year 2045 (the design year) are considered for the No Build and Build Alternatives. The specific minimization and mitigation measures that would reduce adverse indirect effects to socioeconomic, natural, and historic resources are presented in **Section 4.7**.

### 4.6.1 No Build Alternative

#### *Effects to Socioeconomic Resources*

The original I-495 Express Lanes (Springfield Interchange/I-395 to just north of the Dulles Toll Road) were built in 2012 with the goal to mitigate congestion and provide more mobility options for those in the Northern Virginia region. However, congestion at the current northern terminus of the I-495 Express Lanes encourages detouring and cut-through traffic on adjacent facilities. The adjacent local roads have seen an increase in congestion and a decrease in community mobility as a result, especially during peak traffic hours (6:45–9:45 a.m. and 2:45–5:45 p.m.). Variability in travel speeds and travel time are also expected to worsen. The No Build Alternative would not address these issues. Additional information regarding cut-through traffic and congestion is provided in the *I-495 Traffic and Transportation Technical Report* (VDOT, 2020f).

Given the importance of the I-495 corridor in connecting the communities between Virginia and Maryland, increasing congestion and travel unreliability would likely continue to delay the delivery of goods and services, restrict access to commercial activities, and result in lost economic productivity due to workers and the local community being delayed in traffic. Increased congestion would also result in more visual, noise, and air impacts that would be borne by all users of the corridor.

No induced growth would be expected as a result of the No Build Alternative. The Socioeconomic Resources ICE Study Area and surrounding localities are already developing and are planning the area for continued development, as identified in locality future land use plans as well as projects currently underway or planned projects for which construction funding has been identified in CLRP. Land near existing interchanges may also become less desirable due to continued traffic congestion and diminishing travel reliability. Since no induced growth would be expected as a result of the No-Build Alternative, there would likely be no effects related to the lack of induced growth.

### ***Effects to Natural Resources***

Existing development within the watersheds would continue to contribute to surface water impairments. Under the No Build Alternative there would continue to be a lack of stormwater management facilities along the corridor. No induced growth would be expected as a result of the No Build Alternative; therefore, there would likely be no effects related to the lack of induced growth.

### ***Effects to Historic Resources***

No induced growth would be expected as a result of the No Build Alternative. Increasing traffic congestion under the No Build Alternative could make access to historic properties more difficult for public visitation.

## **4.6.2 Build Alternative**

### ***Effects to Socioeconomic Resources***

#### Encroachment Effects

The Build Alternative would add capacity to I-495 by extending the existing Express Lanes within the interstate for approximately three miles. The temporary and permanent right-of-way requirements would be limited primarily to narrow strips adjacent to I-495 in the study area. Proposed right-of-way acquisition would not change overall land use in the area; therefore, the Build Alternative would have minimal indirect effects on land use.

As discussed in **Section 4.6.1**, existing congestion results in traffic diverting onto local roads, and has led to variability in travel speeds and travel time on I-495 within the study area. Improvements to I-495 under the Build Alternative would result in greater transportation mobility and improved congestion relief along the I-495 corridor, including local arterials, as discussed in the *I-495 Traffic and Transportation Technical Report* (VDOT, 2020f). The Build Alternative is anticipated to reduce congestion by optimizing traffic volumes and travel demand, improving traffic operations, and increasing the number of persons moved. Generally, reduced congestion makes facilities more attractive for travelers. Local roadways that parallel the improved I-495 study area could see traffic volume reductions, as drivers divert from existing surface streets to the improved corridor where they would find better travel conditions. This would result in an indirect benefit to communities from the proposed project.

The original I-495 Express Lanes (Springfield Interchange/I-395 to just north of the Dulles Toll Road) were built in 2012 with the goal to mitigate congestion and provide more mobility options for those in the Northern Virginia region. However, congestion at the current northern terminus of the I-495 Express Lanes encourages detouring and cut-through traffic on adjacent facilities. The adjacent local roads have seen an increase in congestion and a decrease in community mobility as a result, especially during peak traffic hours (6:45 – 9:45 a.m. and 2:45 – 5:45 p.m.). Additional information regarding cut-through traffic and congestion is provided in the *I-495 Traffic and Transportation Technical Report* (VDOT, 2020f).

As a result of congestion relief, transit services that use I-495 in the Socioeconomic Resources ICE Study Area could also be improved. This would benefit people and businesses by reducing lost productivity from sitting in congested traffic.

Additionally, increases in job opportunities could be expected due to short-term construction hiring and long-term operation and maintenance of the new improvements. Employment opportunities near the study area would become more attractive to qualified workers in a greater geographic area who were previously



deterred by long travel times, boosting employment growth and productivity within the study area and the region as a whole.

The Build Alternative would extend Express Lanes, requiring single-occupancy vehicles and other vehicles not meeting HOV occupancy requirements to pay a variable toll to use the Express Lanes. The existing GP lanes would remain free for travelers using the facility. This provides a choice to travelers whom, based on individual needs, may or may not choose to pay a toll. In addition, the extension of the managed lanes system may encourage carpooling in the area, allowing HOV users to take advantage of the Express Lanes for free.

The additional capacity on I-495 proposed by the Build Alternative would positively impact all communities, including the census block groups which contain EJ populations. Since the tolled lanes are being added and not converted from existing general-purpose use, the existing GP lanes would remain free for travelers using I-495 through the study area. The reduction in congestion and the improvement in travel time reliability resulting from the Build Alternative are anticipated to benefit users of both the Express Lanes and GP lanes. Transit users along the corridor would receive additional benefits since these busses would travel toll free along the express lanes. Any potential adverse indirect impacts as a result of this project are anticipated to affect all communities equally. Therefore, a disproportionately high or adverse indirect impact is not anticipated on EJ communities.

This reduction in travel time may also result in air quality impacts which would positively impact all communities. The project is not anticipated to have an adverse effect on community cohesion due to the lack of additional fragmentation or isolation proposed as a direct effect of this project.

The proposed shared-use path would provide a new multimodal travel option for local trips that is not currently provided under the existing condition and would not be provided by an extension of the Express Lanes alone. The proposed shared-use path would improve travel choice in the study area by providing a bicycle and pedestrian option for local travelers.

#### Induced Growth Impacts

The Build Alternative is not projected to result in indirect effects due to induced development. No new access points to undeveloped land are planned as part of this proposed project, and increased traffic speeds and travel time reliability through the study area would reduce the likelihood that drivers would choose to use local roads as a detour around I-495.

Furthermore, the potential for induced growth is limited by the restricted availability of undeveloped land in the Induced Growth Study Area (**Figure 4-13** and **Table 4-8**). The study area is virtually built-out, with only approximately 6% of the area undeveloped or underdeveloped (scattered undeveloped individual residential parcels within existing neighborhoods, undeveloped buffers along water resources between neighborhoods, and a few undeveloped commercial parcels within Tysons Urban Center). Approximately 8% of the study area is protected parkland or under the protection of the US Government (including GWMP and Scott's Run Nature Preserve), and 86% is developed (commercial, retail, low-, medium-, and high-intensity developed lands, and right of way). Growth in the developed areas would likely be in the form of infill or redevelopment.

**Table 4-8. Developable Land within Induced Growth Study Area**

Land Use	Total (Acres)	Total (%)
Parks and Protected Area	815	8%
Developed Land	8,864	86%
Open Land	625	6%
<b>Total</b>	<b>10,304</b>	<b>100%</b>

Source: Fairfax, Virginia (2018) and Montgomery County, Maryland (2019) GIS Data

The Build Alternative is not anticipated to encourage or accelerate land use changes that are not already expected by the localities within the study area. The construction of the Build Alternative is unlikely to create pressure on public officials to make changes to land use plans or allow types of development in areas not currently approved for it or to allow greater development densities since improvements to I-495 have been studied for several decades (see **Section 4.2.2**). Per the *Fairfax County Comprehensive Plan*, Tysons may experience an increase in density, but these increases cannot be directly attributed to the proposed I-495 improvements.

No induced growth would be expected as a result of the Build Alternative; therefore, there would likely be no effects related to the lack of induced growth.

### ***Effects to Natural Resources***

#### Encroachment Effects

*Water Resources:* Direct impacts to streams and wetlands may also result in indirect impacts to offsite streams and wetlands due to hydrologic alteration or isolation. Portions of wetlands or streams which extend outside of the LOD may be subject to indirect impacts if their hydrology is altered due to direct impacts occurring within the LOD. Disruptions in contributing groundwater and surface water flow upstream may result in stream channel degradation, creating chemical, physical, and biological disconnect between the stream and floodplain downstream. Over time, direct impacts upstream may alter natural stream channel succession leading to increased erosion and destabilization of stream channel banks. If hydrology is maintained to the portions outside of the LOD, these waters would likely retain proper functions such as providing habitat, water quality benefits, and biogeochemical services. Culvert extensions would be designed and installed to prevent habitat fragmentation and changes in hydrologic regime. Additionally, culvert extensions would provide habitat corridors through already fragmented areas.

The increase in impervious surface area has the potential to adversely affect water quality, streams, wetlands, floodplains, aquatic habitats, and anadromous fish use waters occurring in the Natural Resources ICE Study Area. Increased impervious surface from the proposed project could increase runoff volume and velocity. Runoff from roadways could contain heavy metals, salt, organic compounds, and nutrients, which could facilitate the degradation of nearby terrestrial and aquatic habitat through deposition of sediments or contamination from chemical pollutants. This could result in accelerated changes in the microbenthic community structure and composition, which in turn could affect the fish and amphibian populations that rely on them as a food source, as well as the birds and aquatic mammals that prey on the fish and amphibians. Modern temporary and permanent stormwater management (SWM) measures, including SWM ponds, sediment basins, vegetative controls, and other measures would be implemented, in accordance with

the Virginia Stormwater Management Program (VSMP) and applicable guidance, to minimize potential degradation of water quality due to increased impervious surface and drainage alteration. These measures would reduce or detain discharge volumes and remove many pollutants before discharging into the receiving impaired water.

Potential indirect impacts to natural resources during construction include erosion and sedimentation or accidental spills of hazardous materials from construction equipment. By following proper spill prevention and ESC procedures as contained in 9VAC25-880 and VDOT drainage manual, the remaining potential construction-related impacts would be minimized.

*Floodplains:* Construction of the Build Alternative could potentially cause long-term minor adverse indirect impacts to floodplains by altering existing drainage patterns and flood flows. However, with adequately sized culverts and bridges, no indirect effects to floodplains would be anticipated.

*Wildlife Habitat:* Portions of wetlands or streams which extend outside of the LOD may be subject to indirect impacts if their hydrology is altered due to direct impacts occurring within the LOD and may contribute to habitat fragmentation. Culvert extensions will be designed and installed to prevent any additional habitat fragmentation to wetlands and streams and provide habitat corridors for already fragmented riparian systems. Fragmentation of existing forested areas is not expected to occur under the Build Alternative. As vegetation is cleared along the outside edges of the current I-495 travel lanes, the Build Alternative would extend into already fragmented forested areas. The Build Alternative would not create any fragmented forested areas but reduce the amount of available forested land within the overall footprint of the study area itself.

Increase in impervious surface area has the potential to adversely affect both aquatic and terrestrial wildlife habitat by increasing runoff volume and velocity. Runoff from roadways can contain a variety of pollutants which can contribute to the degradation of nearby habitats through the deposition of sediments or contamination from chemical pollutants. However, construction of stormwater facilities, as discussed above, would serve to neutralize the pollution impacts.

*Threatened, Endangered, and Special Status Species:* Impacts to threatened, endangered, and special status species would be similar to the impacts described to wildlife, except that the life history characteristics of threatened, endangered, and special status species tend to render them less resilient when faced with habitat loss, alteration, or competition from invasive species. Even so, the indirect effects would be minor, given that there is anticipated to be minimal direct impacts to potentially suitable habitat for threatened, endangered, or special status species and no known occurrences of these species have been documented within the LOD of Build Alternative (see the *I-495 Natural Resources Technical Report* [VDOT, 2020c] for more information). In addition, any known occurrences of these species are far enough away from the LOD that any indirect effects would be negligible.

The closest NLEB hibernaculum is approximately 86 miles away from the project site. The study area is not within the vicinity of any known little brown bat or tri-colored bat hibernacula or maternity roosts though documented occurrences of both species were identified within a 2-mile radius of the study area. No observations of rusty patched bumble bee have been documented since before 2000. There is suitable habitat for the wood turtle within the study area, and additional coordination with VDGIF regarding this species is currently underway. Due to the proximity of specific habitat to the study area or the lack of

documented occurrences, the little brown bat, northern long-eared bat, tri-colored bat, and rusty patched bumble bee are not anticipated to experience any indirect effects resulting from the project.

#### Induced Growth Impacts

As discussed in **Section 2**, the Build Alternative is not anticipated to result in induced growth. Therefore, no indirect impacts to water resources, floodplains, threatened, endangered, special status species, and wildlife would be attributed to induced growth as a result of this project. Should future growth and development in the vicinity of the Build Alternative interchanges and feeder roads impact any of the above, individual development would be subject to review, approval, and permits from local, state, or federal agencies (including the USACE) before any impacts would occur. New development in previously developed areas could be required to replace outdated stormwater control and drainage systems and replace impervious surfaces with more permeable surfaces, lessening impacts to water quality that may otherwise occur.

#### ***Effects to Historic Resources***

Effects to archaeological and architectural historic properties are discussed in detail in the *I-495 Section 4(f) and Section 6(f) Technical Memorandum* (VDOT, 2020d). VDOT is continuing coordination with the National Park Service and the Virginia State Historic Preservation Office to make a conclusion in regard to impacts to historic and archaeological resources.

#### Encroachment Effects

Quicker and more reliable access to historic sites in the study area such as the GWMP or Georgetown Pike could potentially reduce obstacles to increased visitation. This would be beneficial if access to historic properties is controlled; however, under the Build Alternative this would be difficult given that both NRHP-listed resources are used for transportation within the study area. It is not anticipated that an increase in visitation to the GWMP or Georgetown Pike would degrade the integrity of these resources.

During construction, access to historic properties in the Historic Resources APE (the GWMP and Georgetown Pike) is anticipated to remain open, but could be affected by temporary detours, potentially affecting visitation. These construction effects would be short term and therefore minor.

#### Induced Growth Impacts

As discussed in **Section 4.6.2**, the Build Alternative is not anticipated to result in induced growth. Therefore, no indirect impacts to cultural resources can be attributed to induced growth as a result of this project.

### **4.7 STEP 7: ASSESS CONSEQUENCES AND DEVELOP MITIGATION**

The No Build Alternative would not result in substantial indirect impacts to any resource. Therefore, mitigation is not required for the No Build Alternative. The following sections assess the consequences and mitigation for potential impacts resulting from the Build Alternative.

### 4.7.1 Build Alternative

#### *Encroachment Effects*

##### Socioeconomic Resources

Temporary and permanent right-of-way requirements would be limited primarily to narrow strips adjacent to I-495 in the study area. The Build Alternative would not change the overall existing and planned land use patterns in the Socioeconomic Resources ICE Study Area. The comprehensive plans for all localities within the Socioeconomic Resources ICE Study Area state that redevelopment and new development is planned and likely to occur. These plans for development and changes in land use are likely to happen independently of the implementation of this project. In accordance with the Uniform Relocation Assistance and Real Property Policies Act of 1970, as amended, affected property owners would be fairly compensated for this minor acquisition along the right-of-way.

The additional capacity on I-495 would positively impact all communities, including the census block groups which contain EJ populations. Any potential adverse indirect impacts as a result of the Build Alternative are anticipated to affect all communities equally. Therefore, a disproportionately high and adverse indirect impact is not anticipated on EJ populations.

Temporary indirect effects to socioeconomic resources from temporary road closures and detours during construction would be minimized by informing the affected communities and businesses in advance of when such circumstances would occur and working with individuals and the community to potentially adjust schedules and identify alternative access.

##### Natural Resources

Potential indirect effects to wetlands, streams, floodplains, water quality, wildlife habitat, and threatened or endangered species are not anticipated to be substantial and may result from temporary construction impacts and increased stormwater runoff due to increases in impervious surface area. Potential indirect effects to wetlands, streams, and floodplains would be minimized by local, state, and federal regulations governing construction impacts in these areas.

*Water Resources:* Mitigation for impacts to water resources generally consists of three components: avoidance, minimization, and compensation. Avoiding and minimizing direct effects would also serve to reduce indirect effects. Minimization efforts would be considered during final design and through adjustments in construction means and methods to reduce permanent and temporary stream and wetland impacts. Streams may be relocated where possible to preserve existing functions and values. Unavoidable stream relocations would be performed using natural stream design, which means that the channel would be designed to mimic the dimension, pattern, and profile of a representative reference stream reach. Compensation for unavoidable impacts to wetlands and streams would be provided through the purchase of compensation credits from an approved mitigation bank within the watershed or within an adjacent watershed, ensuring no net loss of streams or wetlands within the watershed.

Modern temporary and permanent SWM measures would be implemented, in accordance with the VSMP and applicable guidance, to minimize potential degradation of water quality due to increased impervious surface and drainage alteration. These measures would reduce or detain discharge volumes and remove many pollutants before discharging into the receiving impaired water. During construction, the use of ESC measures and best management practices in accordance with the *Virginia Erosion and Sediment Control*

*Handbook*, such as silt fence installation, culvert inlet and outlet protection, diversion ditches, temporary sediment traps and basins, and vegetative and structural streambank stabilization, along with temporary and permanent seeding, would prevent sedimentation and divert runoff away from receiving streams and wetlands (VDEQ, 2019b). Additional measures to minimize impacts include: blocking no more than 50% of the streamflow at any given time; ensuring groundwater recharge through the location of outfalls and infiltration trenches; and locating stormwater management facilities outside of waters of the US, including streams and wetlands.

*Floodplains:* With adequately sized culverts and bridges, no indirect effects to floodplains would be anticipated, and thus no further minimization or mitigation is required.

*Wildlife Habitat:* Potential impacts to wildlife habitat expected as a result of the Build Alternative could be minimized through use of design measures such as countersinking culverts, appropriately sizing culverts using VDOT drainage criteria, and reducing the roadway cut or fill footprint. Countersinking culverts and constructing bridges minimizes habitat impacts by allowing the natural hydrologic processes to remain largely intact while also providing wildlife crossings. In addition, temporary impacts would be reduced through proper location and minimization of staging areas and construction access roads in valuable habitats. To prevent the introduction and establishment of invasive species, during construction, the contractor would adhere to VDOT's Road and Bridge Specifications Manual, Chapter 40 of Title 3.2 of the Code of Virginia (2VAC-5-390-20) and other applicable regulations.

*Threatened, Endangered, and Special Status Species:* Direct loss of threatened, endangered, and special status species is not expected as a result of the Build Alternative. However, potential indirect impacts to threatened, endangered, and special status species could be minimized through design measures such as countersinking culverts, constructing stormwater management facilities, reducing construction footprint, avoiding key habitat, implementing stormwater and ESC measures, and utilizing best management practices. In addition, temporary impacts could further be reduced through proper location and minimization of staging areas, construction access roads, and modifying construction techniques in valuable habitats. Additional coordination with VDGI and USFWS would occur prior to construction in the advanced stages of the project design. Consultation would occur before the permit decision, as any mitigation measures, conditions, or restrictions determined necessary by USFWS would be included by regulatory agencies as conditions of any permit issued. Mitigation measures may include presence/absence surveys; contractor training in recognizing and avoiding threatened, endangered, and special status species and their habitats; or restoration of habitat.

### Historic Resources

Some indirect effects are possible with the Build Alternative. VDOT will coordinate its findings of the *I-495 Cultural Resources Survey Report* with the SHPO and will seek the concurrence of the SHPO regarding what effect the project will have on the historic sites within the Historic Resources APE.

### ***Induced Growth***

The Build Alternative is not anticipated to induce growth as the proposed project does not include new access points and is within an existing transportation corridor. If induced growth does occur, it is anticipated to occur as infill or redevelopment around existing interchanges in previously developed areas, however; according to CEQ guidelines, no causal relationship can be shown to exist between infill development and a project that is primarily located within existing right-of-way. No mitigation measures are proposed.

## 5.0 CUMULATIVE IMPACTS

As noted in **Section 3.0**, the cumulative effects analysis is based on the process outlined in *Fritiofson v. Alexander*, 772 F.2d 1225 (5th Cir. 1985), as described in FHWA's *Guidance: Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process* (FHWA, 2003). The following sections follow this direction.

### 5.1 WHAT IS THE GEOGRAPHIC AREA AND TEMPORAL BOUNDARIES AFFECTED BY THE STUDY?

**Figure 5-1** shows the geographic limits of the Cumulative Impacts Study Area. The geographic boundary for cumulative impacts is the full environmental study area for the resource inventory and alternatives analysis plus the Natural Resources ICE Study Area, the Socioeconomic Resources ICE Study Area, and the Historic Resources APE as described in **Section 4.2.1** of this report.

The temporal boundary established for the I-495 Express Lanes Northern Extension cumulative impacts analysis begins in 1964 and extends to 2045. The past timeframe was selected based on the construction date of I-495 in the study corridor. The future time bracket was selected because it encompasses the 2045 design year for the project and existing regional plans (see **Section 4.2.2, Directions and Goals**) and projections have been forecasted through 2045. Potential future development beyond the 2045 design year is not considered reasonably foreseeable.

### 5.2 WHAT ARE THE RESOURCES AFFECTED BY THE STUDY?

The resources affected by the Build Alternative would be the same as those resources identified in **Section 4.3 Step 3: Inventory of Sensitive Resources in the Study Area** of the indirect effects analysis.

### 5.3 WHAT ARE OTHER PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS THAT HAVE IMPACTED OR MAY IMPACT THESE RESOURCES?

To determine cumulative impacts to these resources and areas, information was gathered relating to current and foreseeable future projects in the study area. This information was collected by reviewing available plans and contacting local, regional, and federal agencies and organizations in the study area (see list in **Section 4.1**).

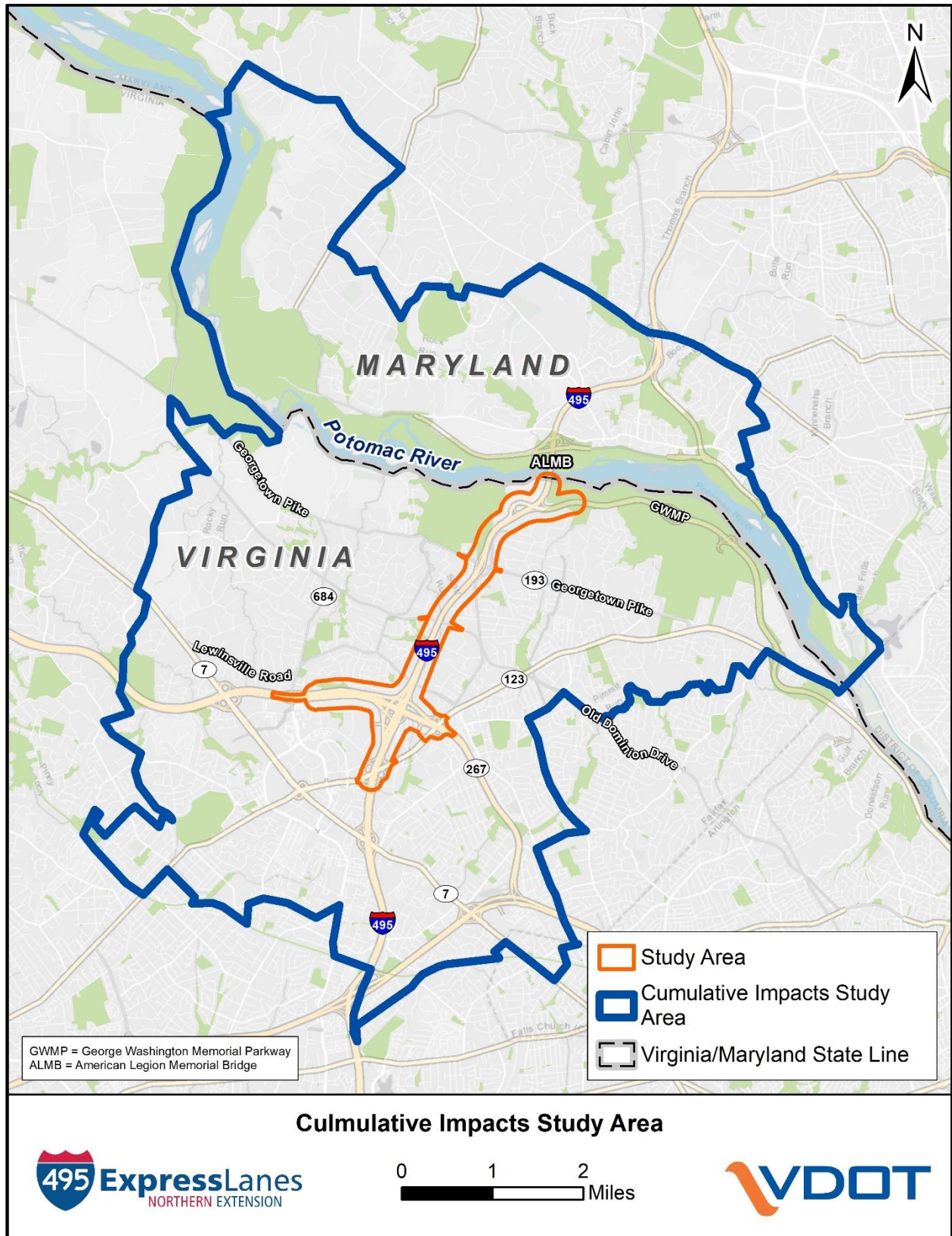


Figure 5-1. Cumulative Impacts Study Area



### 5.3.1 Past Actions

As discussed in **Section 4.2**, the continual land use intensification in Northern Virginia has contributed to increased benefits to the community from expanding housing options to opportunities for employment but has also led to a steady decline in natural and historic resource conditions within the study area. The following identifies specific past actions since 1964 that have contributed to existing conditions within the Cumulative Impacts Study Area. The following past transportation and major development activities are focused on the most relevant to understanding the potential cumulative impacts of the proposed project alternatives. The major transportation projects include:

- Construction of I-495 and the ALMB was completed in 1964. The east part of I-495 is also I-95. I-495 is a 64-mile, multi-lane, circumferential freeway centered around Washington, D.C. and passing through Maryland and Virginia. The Virginia portion of I-495 is 22 miles, extending from the Woodrow Wilson Bridge in Alexandria to the ALMB in Fairfax County. Originally, I-495 consisted of six lanes for most of its length except for 14.5 miles between the northern Potomac crossing (now the ALMB) and Interstate 95 (I-95) in Springfield, which was four lanes. Since its completion in 1964, many modifications and improvements have been implemented, such as the addition of lanes, construction or modification of interchanges, and safety improvements. In 1977, the Virginia side of I-495 was widened from four to eight lanes up to Route 193 (Georgetown Pike). In 1992, a portion of I-495 between Route 193 and the Interstate 270 (I-270) spur in Maryland was widened to eight lanes, and the ALMB was widened to 10 lanes (eight through lanes and two auxiliary lanes). Beginning in 2008, four express lanes were constructed along 14 miles of I-495 between the existing GP lanes from Old Dominion Drive to the I-95/I-495/I-395 interchange in Springfield. More than 50 aged bridges and overpasses were replaced (VDOT, 2014). The I-495 Express Lanes opened to traffic in November 2012.
- The GWMP is a scenic roadway and memorial to the first president of the United States, George Washington. The GMWP was built in stages between 1929 and 1970, and was opened to traffic at I-495 at the end of 1962.
- The Silver Line Metrorail line opened in 2014 and crosses over I-495 at Route 123 with four stations in Tysons. Metrorail's Silver Line operates on two tracks from Wiehle-Reston East to Largo Town Center and has a total of 28 existing stations in Fairfax County, Arlington County, the District of Columbia, and Prince George's County, Maryland. Six more stations are currently under construction between Wiehle-Reston East and Loudoun County, including a station at Dulles International Airport (IAD).
- The Route 267/Dulles Corridor extends 14 miles from I-66 to IAD and consists of three separate facilities. The DAAR, a four-lane limited-access highway that provides toll-free access to IAD, was constructed in 1962 as part of the construction of IAD. The DTR, an eight-lane tolled facility that runs along the outside of the DAAR, was added to the corridor in 1984. South of Route 123, the DAAR and DTR come together to form a single limited-access facility called the Dulles Connector Road (DCR), which was extended from Route 123 to I-66 in 1985. The corridor is currently operated by Metropolitan Washington Airports Authority.
- Georgetown Pike (Route 193) is a state highway that runs 11.79 miles and meets with I-495 in McLean. The state highway was originally built in 1827 and was designated as the first Virginia Byway for its scenic value in 1974.

Beginning in the 1960s and extending to the early 1980s, many individual development projects transformed the Cumulative Impacts Study Area to include low to high-density development that exist today. Growth associated with construction of the interstates and Metrorail was purposefully focused by community planning and transit-oriented development within McLean and Tysons areas. Past development and other non-transportation projects with notable impacts to environmental resources include:

- Scott's Run Nature Preserve is an approximately 336-acre preserve located in McLean, north of Georgetown Pike and west of the I-495 corridor. The Preserve was established as a recreational resource in 1970 when the land was purchased by Fairfax County, with assistance from the Department of the Interior and state and local governments. Scott's Run Nature Preserve is open to the public and is predominantly made up of natural woods, bluffs, and hiking trails.
- The Preserve at Scotts Run residential subdivision was completed in 2013. The subdivision impacted less than two acres of wetlands and 1,500 linear feet of stream within the Scotts Run watershed. The project included a walking trail and pedestrian crossing of Scott Run and established a conservation easement along Scott Run. In addition, Fairfax County has established a separate easement within the conservation easement for the completion of a future trail connection to the Cross County Trail System.

The following transportation project has been recently completed within or in close proximity to the study area:

- The Route 7 over the Dulles Toll Road project included the rehabilitation of two Route 7 bridges over the DTR, built in 1960, and widening of Route 7 from four to six lanes between Tyco Road and Jarrett Valley Drive. The project also added 6,000 feet of lighted shared-use path that would tie into future western trails and provides multimodal access to the Spring Hill Metro Station. Also included were pedestrian tunnels under and walkways over ramps for the DTR. Construction was completed in May 2018.

The following non-transportation projects have been recently completed within the study area:

- There are 17 active or recently constructed stormwater improvement projects, identified in a scoping letter response from the Fairfax County Board of Supervisors dated May 1, 2018, within the Scotts Runs and Dead Run watersheds in the Cumulative ICE study area, particularly in the heavily urbanized Upper Scotts Run sub-watershed. Project types include multiple stream restorations, flood mitigation, and reforestation.
- Approximately five residential developments have resulted or would result in impacts to wetlands and streams within the Scotts Run watershed since 2012.
- The Lewinsville Center consists of 82 housing units for independent senior citizens, an adult day care facility, and two child day care facilities. The center opened in June 2019.
- The McClean Community Center completed a renovation project in January 2019 which included a better SWM system, additional parking spaces, additional meeting and multipurpose rooms, and other improvements (McLean Community Center, 2019).

### 5.3.2 Present and Reasonably Foreseeable Future Actions

A number of development actions are occurring or are planned to occur that could contribute to cumulative impacts on resources affected by the Build Alternative. In addition to the proposed project under consideration in this EA, there are numerous VDOT and local actions planned within the Cumulative Impacts Study Area. These actions were identified through the review of the following documents, plans, or lists:

- CLRP 2016 Amendment for the National Capital Region (MWCOG, 2016)
- Fairfax County Transportation Priorities Plan (FCDOT, updated 2017)
- NPS Planning, Environment, and Public Comment website (NPS, 2019)
- Fairfax County Department of Planning and Zoning GIS data (Fairfax County, 2019b)
- Fairfax County Capital Improvement Program FY 2019-FY 2023 (Fairfax County, 2018a)
- Fairfax County Park Authority CIP (FCPA, 2017)
- Fairfax County Planning Division Public Facilities Review list (Fairfax County Planning Division, 2019)
- Fairfax County LDSNet (Fairfax County, 2019a)
- Tysons Metrorail Station Access Management Study (FCDOT, 2011)
- VMRC Habitat Management Permits and Applications list (VMRC, 2019)
- VDEQ VWP Project GIS data (VDEQ, 2019)

When conducting cumulative effects analyses, FHWA and VDOT consider “Reasonably Foreseeable Future Actions” to be those actions that are fiscally constrained in the region’s transportation plans. Projects included in the documents, plans, or lists provided below are treated as reasonably foreseeable actions because future construction funds have been set aside for them in the planning process. Due to scarce financial resources, projects that do not have identified funding may not be constructed and are therefore not reasonably foreseeable. These projects would all contribute to cumulative effects related to socioeconomic, natural, and historic resources.

The following transportation projects are ongoing within or in close proximity to the study area:

- Jones Branch Connector is the construction of a new link from Jones Branch Drive to Route 123 in Fairfax County. Construction is nearly complete and the bridge is open to traffic.
- Tysons/Old Meadow Road Bike/Ped Improvements will involve construction of a 10-foot shared-use path and pedestrian bridge from the intersection of Route 123 and Old Meadow Road east of I-495 to a location near the intersection of Tysons One Place and Fashion Boulevard west of I-495.
- Miscellaneous road improvements and options have been proposed to reconfigure the interchange at Route 123/GWMP to mitigate residential street traffic congestion and I-495 access at the Balls Hill Road and Georgetown Pike intersection. This project is currently in the right-of-way acquisition and final design phase.

**Table 5-1** lists additional future transportation projects were identified through review of the documents and plans listed above and through coordination with jurisdictions and agencies in the study area.

**Table 5-1. Transportation Projects within the Cumulative ICE Study Area**

Project Description	Proposer	Anticipated Construction Date
Widening of the DAAR to 3 lanes in each direction	MWAA	Ongoing (2018 – 2019)
Dulles Interchange Long Range Plan ramps	MWAA	2030
I-495 Managed Lanes/I-270 Managed Lanes in Maryland	MDOT SHA	2025

Sources: NCRTPB, 2016; VDOT 2009b; GEC, 2008

MWAA = Metropolitan Washington Airports Authority; MDOT SHA = Maryland Department of Transportation State Highway Authority; FCDOT = Fairfax County Department of Transportation

The following non-transportation projects are ongoing within the study area:

- The Capital One redevelopment project, located northeast of the I-495/Route 123 interchange, is currently under construction and is anticipated to result in stream and wetland impacts within the Scotts Run watershed.

**Table 5-2** lists future non-transportation projects identified through review of the documents and plans listed above and through coordination with jurisdictions and agencies in the study area.

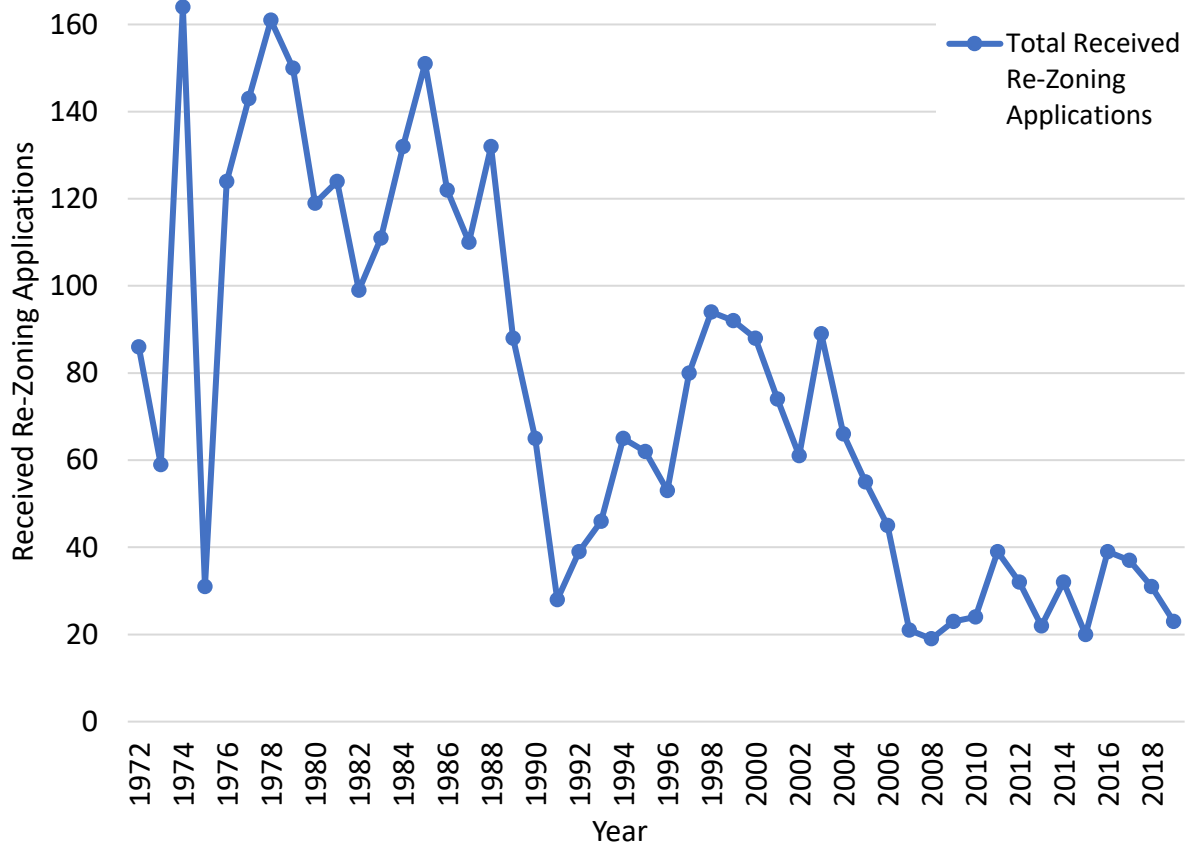
**Table 5-2. Non-Transportation Projects within the Cumulative ICE Study Area**

Project Description	Proposer	Timeframe	Description
Area 1 Maintenance Facility Replacement	FCPA	Planning Phase	Demolition and reconstruction of expanded FCPA maintenance facility
Scotts Run – Fire Station #44	FCDPWES	Planning Phase	Planned Fairfax County Fire and Rescue Department Station at 1765 Old Meadow Lane anticipated to be operational in December 2020
25 active, pending zoning cases within Tysons Comprehensive Plan Area	Private developers	Ongoing	Development and redevelopment cases for mixed-use, transit-oriented developments
65 acres of new public parkland in Tysons	FCPA	Ongoing	Committed as part of private development zoning applications since 2010
Scott's Run Trail	FCDOT	Construction Complete 2020	Approximately half mile long 8-foot wide trail connecting Margarity Road to Colshire Meadow Drive
Assisted Living Medical Care Facility	Private Developer	Planning Phase	90,000 square foot assisted living facility with more than 50 beds

Sources: Fairfax County Planning Division, 2019; Fairfax County, 2019a; FCPA, 2017; Fairfax County, 2018a; FCDOT, 2011  
FCPA = Fairfax County Parks Authority; FCDPWES = Fairfax County Department of Public Works and Environmental Services; FCDOT = Fairfax County Department of Transportation

Fairfax County has received more than 3,500 re-zoning applications since 1972. The annual number of applications processed has decreased overtime with most re-zoning applications being processed in the two time periods between 1974 and 1988 and later between 1994 and 2004, as shown in **Figure 5-2**, corresponding to the original development of the study area and the continuing infill. This data shows the reduction in in-fill development opportunities over time. These individual zoning cases are not identified **Table 5-1** or **Table 5-2**.

A large number of cases in the past few decades have been related to the Tysons planned unit development and generally consist of mixed-use, transit-oriented developments. Outside of Tysons, zoning cases generally consist of low-density residential developments and subdivisions. Many of these development projects will require permits from USACE or VDEQ for impacts to wetlands and streams. Trends in the number of use permits, development plans, and other applications submitted to the Fairfax County Land Development Services Department followed similar trends in annual submission quantities as the re-zoning applications.



**Figure 5-2. Fairfax County Received Re-Zoning Applications 1972-2019**

## 5.4 WHAT WERE THOSE IMPACTS?

Cumulative effects consist of the impacts of under consideration in this EA and the impacts of the past, present and reasonably foreseeable future actions. Past, present, and reasonably foreseeable actions have already been impacted or have the potential to impact socioeconomic, natural, or historic resources, as does the proposed project. This analysis relies on CEQ guidelines to assess the severity of an impact based on context and intensity. Context may be geographic at multiple scales such as society as a whole, an affected region, affected interests, and specific localities (CEQ, 1997). Intensity, as defined by CEQ, is the severity of impact with regard to multiple factors, including:

- Impacts both beneficial and adverse
- Degree of public health and safety impacted
- Unique characteristics of the geographic area
- Degree of controversy surrounding that action and the effect
- Potential to set precedent for future actions
- Cumulative effects which may be significant, even though the action itself would not create significant impacts
- Whether there is a violation of federal, state, or local law or requirements meant to protect the environment

Impacts with respect to each of the intensity criteria can be described in various levels of severity (**Table 5-3**). The significance or importance of impacts is determined by evaluating the proposed action against existing environmental standards, thresholds, guidelines, or objectives established by federal, state, and local agencies. These impact significance factors are applied to all resource areas.

**Table 5-3. General Effects Determination Matrix**

Severity	Extent	Duration	Likelihood
Major	Large	Long	Probable
Moderate	Medium	Medium	Possible
Minor	Small	Short	Unlikely

A large extent would be statewide, medium would be regional and small would be local. For most resources, a long duration corresponds to over five years, a medium duration would be one to five years, and a short duration would be less than one year. These potential effects are taken into consideration in the following discussions of cumulative effects of the alternatives to different resources. The following briefly discusses the cumulative effects to land use, socioeconomic, natural, and historic resources.

### 5.4.1 Socioeconomic Resources

The cumulative impacts to socioeconomic resources due to past and present actions are closely related and are described together in the following sections.

Since the 1960s, the actions listed in **Section 5.3.1** and **Section 5.3.2** have led to rapid residential and commercial development. Past and present actions have been both beneficial and adverse to socioeconomic resources within the ICE Study Areas, and it is expected reasonably foreseeable future actions could as

well. Past and present growth and development has increased the number of communities as well as the standards of living for communities, provided for community cohesion and community and recreational facilities, and led to economic growth and expansion. Additionally, such growth and development has benefited local economies by improving access to transportation networks, commercial centers, markets, and customers. This growth and development have facilitated the existing land uses, population dynamics, and income levels within the Socioeconomic Resources ICE Study Area today.

Extension of the I-495 Express Lanes would not result in new fragmentation or isolation of any communities within the study area because the proposed improvements would take place primarily within the existing right-of-way, and the I-495 corridor is an existing roadway surrounded by established communities that were primarily developed after its initial construction. No further impacts to neighborhood connectivity or cohesion within the study area would occur, and recurring impacts on those neighborhoods due to direct effects of the original I-495 construction is limited. Overall impacts on socioeconomic resources may occur from other infrastructure and development projects in the Socioeconomic Resources ICE Study Area.

The past, present, and reasonably foreseeable actions have facilitated this growth and improved the quality of life within the Socioeconomic Resources ICE Study Area. The Socioeconomic Resources ICE Study Area encompasses mixed use, commercial, governmental and open space and recreational, and residential uses. Past and present transportation improvement projects benefit communities and community facilities by improving access, mobility, and congestion. Future transportation projects would continue to improve access to community facilities and businesses. These types of changes benefit all populations, including minority and low income.

Also considered was recurring community impacts, which capture effects of the current action when combined with previous actions. The previous actions could be from public or private sources and could include infrastructure projects, changes in development or land use, public policies, or other types of actions. Recurring community impacts could occur even if the current impact is relatively minor, and impacts could be either direct or indirect. The community's perception of recurring impacts is used along with quantifiable impacts to evaluate the total level of cumulative impacts.

### ***No Build Alternative***

The No Build Alternative would not reduce congestion, provide additional travel choices, or improve travel reliability. Without adding capacity to I-495, congestion would continue to increase and may negatively impact adjacent and parallel routes. This may also lead to negative economic and social consequences as drivers may reduce trips in the area or completely avoid the area due to the congestion. Therefore, the No Build Alternative would likely have a minor adverse cumulative effect on communities, community facilities, and EJ populations. This lack of improvement would be felt by all residents, including minority populations, and thus would not impact minority populations disproportionately.

### ***Build Alternative***

Past growth and development have resulted in largely developed suburban and urban sections of Fairfax and Montgomery Counties along the I-495 corridor. Increased business and employment from past and present growth and development, including the original construction of I-495 completed in 1964, has benefited economic resources in Fairfax and Montgomery Counties in the Socioeconomic Resources ICE Study Area. The construction of I-495 itself has benefited local economies and long-term employment from

increased access to customers, businesses, and jobs. However, existing congestion reduces access to markets and customers, and opportunities that could otherwise occur.

The Build Alternative is anticipated to support this growth by reducing daily congestion and accommodating travel demand more efficiently, providing higher reliability of travel times, and expanding travel choices by increasing the attractiveness and utility of ridesharing and transit usage while also providing an option for single occupancy vehicles to bypass congested conditions.

Future transportation projects and development would continue to increase access to community facilities and recreational resources while potentially displacing others. The Build Alternative would provide additional Express Lanes in the right-of-way of an existing interstate. The access, function, and amenities of those facilities adjacent to the study area would remain unchanged. Overall, the Build Alternative's contribution to cumulative effects for community facilities and recreational resources would be minor because the direct and indirect effects would be minor.

As no residential or business relocations are required under the Build Alternative, it would not contribute negatively to the cumulative effects for community cohesion in the study area. It is anticipated that the Build Alternative would have no effect on community cohesion since no new physical barriers to neighborhood connectivity would be introduced (VDOT, 2020c).

Previous actions may have negatively affected EJ communities, but as described in **Section 4.6.2, Socioeconomic Indirect Effects of the Build Alternative**, a disproportionately high or adverse impact is not anticipated on EJ communities by this project. Rather, the Build Alternative would provide beneficial effects to minority populations and other travelers through reduced congestion and travel time in the study area. Future federal and non-federal development could continue to have potential disproportionate and highly adverse impacts to minority and low-income populations, as well as benefits. However, federal regulations would continue to avoid these disproportionate and highly adverse effects for their authorized actions to minority and low-income populations whenever possible. Overall, the Build Alternative's contribution to cumulative effects for EJ communities would be minor because the direct and indirect effects would be minor.

#### **5.4.2 Natural Resources**

The following analysis is based on review of historic aerials and topographic maps that was conducted in **Section 4.2.2**.

Past growth and development actions in the Natural Resources ICE Study Area have led to the degradation and loss of natural resources over time. The majority of conversion of natural areas to developed land has occurred through the creation of reservoirs; expansion of road and rail networks; and industrial, residential, and mixed-use land development, with much of this conversion occurring without the benefit of modern stormwater management facilities and water quality regulations. Intense land use has resulted in reduced water quality; impairment of waters for human and wildlife use; loss of wetlands, streams, and floodplains; loss of terrestrial wildlife from over-exploitation; and habitat loss, fragmentation, and degradation. Development projects conducted before the 1970s, in the absence of major environmental regulations, were generally more impactful than more recent projects and resulted in much of the current impairment to natural resources. In the 1970s a number of landmark environmental protection laws led to the development of federal, state, and local regulations that have greatly slowed the loss of remaining wildlife and wildlife habitat, improved wildlife habitat and water quality, and recovered protected species. These regulations



generally require avoidance, minimization, and mitigation of adverse impacts to natural resources. Current environmental regulations, natural resource planning, conservation, and restoration efforts have protected and reduced impacts to natural resources more than what would otherwise have continued to occur prior to the 1970s. Future growth and development in the Natural Resources ICE Study Area would be subject to the same or similar environmental regulations that would continue to minimize impacts to natural resources.

### ***No Build Alternative***

The No Build Alternative would not contribute to cumulative natural resource impacts. Under the No-Build Alternative, existing water surface impairments would continue as well as the continued loss of natural resources due to present and ongoing developments but would not result from implementation of the No Build Alternative.

### ***Build Alternative***

As previously discussed, past growth and development has diminished natural resources within the Natural Resources ICE Study Area. Intensification of land use in the region has resulted in adverse impacts to water quality; loss of wetlands, streams, and floodplains; wildlife population loss from overexploitation and loss of habitat; fragmented habitat; and degraded habitat quality. Impacts that occurred early in the development of the region had a greater impact than more recent projects, given the lack of previous development and absence of environmental regulations. Aquatic impacts have included stream piping, relocation, channelization, and flow alteration.

These past actions have limited and degraded the quality of habitat for existing species. This has led to some species becoming threatened and endangered with extinction. Federal, state, and local regulations enacted over the last 50 years have done much to slow the loss of remaining wildlife and wildlife habitat, improve wildlife habitat and water quality, and recover protected species. These regulations require consideration of avoidance, minimization, and mitigation of adverse impacts to natural resources. Conservation efforts have also positively contributed to natural resources in the region, such as Scott's Run Nature Preserve, the GWMP, local parks, RPAs, and other conservation easements and holdings in the Natural Resources ICE Study Area.

Future growth and development in the Natural Resources ICE Study Area would be subject to the land use policies of each jurisdiction that aim to concentrate growth in existing urban areas while preserving natural lands.

Future growth and development could possibly further reduce and degrade water resources and terrestrial and aquatic habitat for the long term. However, federal, state, and local regulations would continue for the foreseeable future and would continue to require minimization, mitigation, and compensation for impacts to wetlands, streams, floodplains, and RPAs, as well as direct and indirect effects to terrestrial and aquatic habitat.

Some present and reasonably foreseeable future actions include infill development or redevelopment, which has the potential to improve water quality if outdated stormwater controls and drainage systems are replaced and updated. All present and future actions would be subject to natural resource protections afforded by federal, state, and local regulations. Additionally, local comprehensive planning natural resource management plans would preserve remaining highly valued wildlife habitat and water quality by directing growth to specific areas and densities, with the goal of being sustainable into the future. Local planning

agencies are responsible for stream restoration and outfall rehabilitation projects that would improve water quality, and therefore habitat, in the Natural Resources ICE Study Area.

The Build Alternative could result in short-term reduced water quality, as well as changes to floodwater storage capacity and retention times (floodplain impacts) and vegetative community composition and structure (forestland and wetland impacts). The construction and post-construction discharges of stormwater could possibly contribute to minor, localized (small extent) increases in the pollutants and nutrients causing impairments. However, drainage design for waterway crossing structures is expected to be in conformance with current stormwater regulations to minimize downstream impacts to natural resources and water quality. The cumulative effects should further be minimized by implementation of local and state-mandated BMPs. Therefore, the Build Alternative is unlikely to substantially contribute to the further impairment of any impaired waterbody.

Adherence to VDOT specifications would minimize the Build Alternative's contribution to cumulative effects (either direct or indirect) on habitat and protected species from the introduction of invasive species. As discussed, the Build Alternative's cumulative effect on protected species and their habitat would be mitigated through coordination with the VDGIF, VDCR, and USFWS, during the permitting and design process. The mitigation measures used would be determined during the coordination and may include use of time-of-year restrictions on construction, contractor training in recognizing and avoiding threatened and endangered species and their habitats, and restoration of habitat. Through use of these measures, it is anticipated that the Build Alternative would have a minor cumulative contribution to adverse impacts to protected species in the study area.

### 5.4.3 Historic Resources

Projects to improve or maintain historic resources have taken place within the Historic Resources APE, such as the National Park Service adding natural stone retaining walls along the GWMP. Adjacent developments may detract from the viewshed of the resources, though these would be done in coordination with the National Park Service when those projects are state or federally funded. Transportation improvements may also increase visitation to historic properties open to the public, sustaining historic resources tourism and providing incentives for preservation. Other incentives for historic preservation are offered by federal, state, and local governments in the form of grants and tax breaks.

## 5.5 WHAT IS THE OVERALL IMPACT ON THESE RESOURCES FROM THE ACCUMULATION OF THE ACTIONS?

Past and present actions have shaped the current state of land use and socioeconomic, natural, and historic resources within the Cumulative Impacts Study Area. These actions have been both beneficial and adverse to land use, socioeconomic, natural, and historic resources within the Cumulative Impacts Study Area.

The Build Alternative is anticipated to support continued growth and development in and around the study area. The Build Alternative's contribution to cumulative effects for community facilities and recreational resources would be minor because the direct and indirect effects would be minor. It is also anticipated that the Build Alternative would have no effect on community cohesion since no new physical barriers to neighborhood connectivity would be introduced.

The Build Alternative could result in short-term reduced water quality, floodplain impacts, and forestland and wetland impacts, but should be minimized by implementation of state-mandated BMPs and

conformance with current stormwater regulations. Therefore, the Build Alternative is unlikely to substantially contribute to the further impairment of any impaired waterbody. The Build Alternative's cumulative effect on protected species and their habitat would be mitigated through coordination with permitting agencies and minimized with avoidance measures. It is anticipated that the Build Alternative would have a minor cumulative contribution to adverse impacts to protected species in the study area through use of these measures.

All effects to archaeological and historic architectural properties, including indirect effects, have been considered. Transportation improvements can also increase visitation to historic properties open to the public, sustaining historic resources tourism and providing incentives for preservation.

Past and present actions have shaped the current state of socioeconomic, natural, and historic resources within the associated ICE study areas, and future actions would continue to shape these resources irrespective of this project. However, since the region is already developed, protected (e.g., government owned land, parkland, and conservation lands) or already expected to be developed by the encompassing localities, overall cumulative effects of the No Build Alternative and Build Alternative is expected to be minimal. In addition, current regulatory requirements and planning practices are helping to avoid or minimize the contribution of present and future actions to adverse cumulative effects for socioeconomic, natural, and historic resources.

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