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RESOURCE IDENTIFICATION AND IMPACT ANALYSIS METHODOLOGIES

Interstate 495 Southside Express Lanes Study

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ABBREVIATIONS AND ACRONYMS

ACS	American Community Survey
BMP	Best Management Practice
CAD	Computer Aided Design
CBPA	Chesapeake Bay Preservation Act
CEDAR	Comprehensive Environmental Data and Reporting System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COMAR	Code of Maryland Regulations
CWA	Clean Water Act
CZMP	Coastal Zone Management Program
DEQ	Virginia Department of Environmental Quality
DWR	Virginia Department of Wildlife Resources
EFH	Essential Fish Habitat
EJ	Environmental Justice
EM	Environmental Memorandum
EPA	Environmental Protection Agency
FCA	Forest Conservation Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIDS	Forest Interior Dwelling Birds
GIS	Geographic Information System
GPS	Global Positioning System
HHS	United States Department of Health and Human Services
ICE	Indirect and Cumulative Effects
LEDPA	Least Environmentally Damaging Practicable Alternative
LEP	Limited English Proficiency

LOD	Limits of Disturbance
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MDOT	Maryland Department of Transportation
MHW	Mean High Water
MLW	Mean Low Water
NAVD88	North American Vertical Datum of 1988
NCDOT	North Carolina Department of Transportation
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRTR	Natural Resources Technical Report
PIM	Public Information Meeting
RPA	Resource Protection Area
SAV	Submerged Aquatic Vegetation
SDWA	Safe Drinking Water Act
SEL	Southside Express Lanes
SHA	State Highway Administration
SSPRA	Sensitive Species Project Review Area
TRB	Transportation Research Board
U.S.	United States
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USM	Unified Stream Methodology
VAC	Virginia Administrative Code
VDCR	Virginia Department of Conservation and Recreation
VDCR-DNH	Virginia Department of Conservation and Recreation–Division of Natural Heritage
VDOT	Virginia Department of Transportation
VMRC	Virginia Marine Resources Commission
WSA	Water and Science Administration
WSSC	Wetlands of Special State Concern

1 INTRODUCTION

The National Environmental Policy Act of 1969 (NEPA), at [42 USC 4321 et seq.](#), indicates that it is a continuing Federal policy "to use all practicable means and measures...to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations." NEPA directs "a systematic, interdisciplinary approach" to planning and decision-making and detailed statements which assess the environmental impact of, and alternatives to, major Federal actions significantly affecting the environment. These statements are commonly referred to as Environmental Impact Statements and Environmental Assessments.

The NEPA review includes extensive technical analyses and appropriate documentation, to evaluate the potential impacts of a reasonable range of alternatives investigated as part of the review process. It also provides a framework for meeting other environmental review requirements, such as those under the Endangered Species Act of 1973, the National Historic Preservation Act of 1966, and the Clean Water Act (CWA).

For the analysis of transportation projects in the Commonwealth of Virginia, the Virginia Department of Transportation (VDOT) and the Federal Highway Administration (FHWA) apply the same methodologies for a number of resources analyzed in all NEPA studies. These methodologies are consistent with existing regulation and guidance or have been developed based on collaborative interagency coordination with resources and regulatory agencies over a number of years. In other cases, for some environmental resources, additional level of detail or specific environmental analysis methodologies may be required on a study-by-study basis.

The purpose of this document is to describe the resources and methodologies VDOT and FHWA will use to complete the environmental review and NEPA analysis for the Interstate 495 Southside Express Lanes Study (I-495 SEL Study). This methodology document was distributed to all agencies to inform the concurrence on study methodologies. Many of the methods described in this document have become standard, as VDOT and FHWA have coordinated with agencies with purview over the given resource to develop acceptable methods for a NEPA study.

This document has been developed to provide enhanced discussion regarding the methodologies that are specific to the I-495 SEL Study. VDOT and FHWA are seeking input and feedback from the agencies with special expertise or jurisdiction by law to inform the level of detail necessary to adequately address potential impacts identified during the study's environmental review process.

Methodologies for identifying and assessing impacts on cultural and historic resources, air quality, noise, hazardous materials, engineering, extreme weather/resiliency/sea level rise/climate change, and traffic analyses during the NEPA review are not discussed in this document. Methodologies for these resources are developed in accordance with applicable Federal, state, and local laws, regulations, guidance, and policies. Detailed descriptions of methodologies for these resources will be provided in the NEPA document and/or associated technical memorandums and technical reports, as applicable. These methodologies will incorporate the most up-to-date methods, policies, procedures, and agreements being applied to this study, and will be made available at appropriate times for agency review and comment during the NEPA process.

The preliminary study area includes National Park Service (NPS) property. Therefore, all impacts specific to NPS properties will be identified as impacting NPS resources. Wherever and whenever possible, impacts specific to NPS resources will be quantified. This information will assist NPS in its decision-making and facilitate NPS adoption of any resulting NEPA document, if necessary. If NPS resources are affected, VDOT and FHWA will collaborate closely with NPS to determine the appropriate legal authorities required to enable

any project resulting from the NEPA study to move forward.

2 STUDY DESCRIPTION, GOALS AND OBJECTIVES, AND PRELIMINARY ALTERNATIVES

The I-495 SEL Study will assess the proposed extension of the Express Lanes system on the southern section of the I-495 Capital Beltway, by about 11 miles from the Springfield interchange (I-95/I-395/I-495) in Fairfax County, Virginia, across the Woodrow Wilson Bridge, to approximately the MD 210 interchange in Prince George's County, Maryland. Goals and objectives of the I-495 SEL Study are to extend and provide continuity of the Express Lanes system on the I-495 Capital Beltway; provide additional travel choices; reduce congestion; improve travel reliability; improve safety; and provide consistency with local and regional plans. VDOT is conducting the I-495 SEL Study in cooperation with FHWA and in close coordination with other federal, state, and local agencies in Virginia and Maryland.

More information on the I-495 SEL Study is available on VDOT's website at:

<https://www.virginiadot.org/projects/northern-virginia/495southsideexpresslanes.asp>

The I-495 SEL Study will evaluate a one-lane express lanes alternative, a two-lane express lanes alternative, a no build alternative, and be informed by agency and public input. Other alternatives considered by VDOT for extending the Express Lanes system will be discussed in the NEPA document, as applicable.

3 STUDY AREA AND MAPPING

The preliminary study area for the I-495 SEL Study is shown on **Figure 2-1**.¹ In general, the following mapping is anticipated to be available at various coordination and concurrence points in the merged process. Additional mapping may be introduced as necessary in each of the coordination and concurrence points listed below or at subsequent steps not listed here. This list is provided to inform the review of this document and is not considered to be one of the impact methodologies documented in the following sections.

- Scoping and Environmental Analysis Methodologies
 - Study area limits/location map
 - Indirect and Cumulative Effects (ICE) mapping for Induced Growth study area, Natural Resources Study Area, and Socioeconomic Resources Study Area
- Purpose and Need
 - Study area map
 - Accident location, number, type, and severity
 - Operational and/or roadway deficiencies
 - Average Daily Traffic, AM/PM peak hour volumes
 - Origin and destination information
 - Travel demand information

¹ Resource-specific study areas for the purposes of impact analysis may have different extents depending on the resource.

Figure 3-1: Study Area



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- Alternatives Development
 - Refined study area map
 - Mapping of land cover, known cultural resources, field delineated Waters of the United States (U.S.), including wetlands, and other sensitive resources in the study area that could inform a decision regarding the alternatives development process
 - NEPA Documentation Development and Review
 - Natural resources (including, but not limited to, field delineations to include applicable mapping for alternatives retained for further analysis, wildlife, and wildlife habitat, threatened and endangered species, and species habitat within the study area)
 - Socioeconomic resources (including, but not limited to, businesses and residences based on available Geographic Information System [GIS] and locality data, population and demographics, and Environmental Justice [EJ] communities)
 - Hazardous materials sites
 - Section 4(f) and/or Section 6(f) resources identified as part of the study
 - Previously known and newly identified cultural and historic resources
 - Other resources within the refined study area (based on alternatives retained for further analysis), identified as necessary for the study

4 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE (EJ)

The purpose of this methodology document is to provide an overview of those topics that need to be considered in the NEPA study and the general methods used to identify those resources which may occur within the study area. The study area represents the area designated for environmental study and data collection and does not imply a limit of disturbance or a limit of right-of-way impact resulting from the study. The socioeconomic resource information collected using these methods will be used to develop and inform the study. The methods used and the results obtained, will be documented in a Socioeconomic, Land Use, and Right-of-Way Technical Report and an EJ Technical Memorandum.

Socioeconomic resources in the defined study area will be identified based on agency input, review of existing available studies, analysis of GIS or Computer Aided Design (CAD) database information, and field reconnaissance of the study area. The study area will be established to fully capture the range of resources required to provide appropriate analyses of existing conditions and potential impacts from the proposed action. The extent of the study area may vary depending on the resource being considered.

4.1 SOCIOECONOMIC RESOURCES

4.1.1 Regulatory Context

NEPA calls for integrated use of the social sciences in assessing impacts on the “human environment.” The Council on Environmental Quality’s (CEQ) regulations for implementing the procedural provisions of NEPA indicate the “human environment” shall be interpreted comprehensively to include not only the natural and physical environment, but the relationship of people with that environment ([40 CFR 1508.1\(m\)](#)).

Federal agencies need to assess not only ecological effects, but also “aesthetic... cultural, economic [or] social... effects” ([40 CFR 1508.1\(g\)\(1\)](#)). The FHWA Technical Advisory T6640.8A [Guidance for Preparing and Processing Environmental and Section 4\(f\) Documents](#) indicates that NEPA documents should consider social impacts, to the extent they are distinguishable, for changes to neighborhoods or community cohesion; travel

patterns and accessibility (e.g., vehicular, commuter, bicycle, or pedestrian); and impacts on school districts, parks and recreation areas, places of worship, businesses, police, and fire protection stations, etc.

4.1.2 Parks and Recreation Areas

4.1.2.1 Identification and Existing Conditions

Pedestrian and bicycle connectivity, as well as existing and planned parks and recreation areas in the study area, including trails, shared use paths, and other pedestrian and bicycle facilities such as those connecting Maryland and Virginia, will be identified using VDOT, City of Alexandria, Fairfax County, Maryland-National Capital Park and Planning Commission, Maryland Department of Transportation (MDOT) State Highway Administration (SHA), Maryland Department of Natural Resources (MDNR), and Prince George's County, Maryland GIS data; consultation with NPS; review of local and regional park and open space plans and trail system maps; and other relevant sources as applicable. The name, location, ownership, acreage or length, functions (passive or active recreation), and history of each park and recreation area will be described. A map showing the location and boundaries of each park or recreation area will be developed. When available, quantitative data on visitations and usage will be provided. Use data for Oxon Cove Park, Oxon Hill Farm, and Jones Point Park will be requested from NPS. The quality of visitor or user experience will be characterized based on these data and other factors such as noise levels, existing amenities, quality of the visual environment, etc.

4.1.2.2 Environmental Consequences

The impact analysis will evaluate pedestrian and bicycle connectivity as well as impacts on existing and planned parks and recreation areas, including trails, shared use paths, and other pedestrian and bicycle facilities such as those connecting Maryland and Virginia, for both the construction and post-construction periods, in both the short term and the long term. The following factors will be considered: Whether a portion or all the parks and recreation areas identified within the study area overlap with the I-495 SEL Study's limits of disturbance (LOD)²; whether impacts on related resources, including impacts affecting visual quality and viewsheds, may affect park user and visitor experience; whether there would be a temporary or permanent loss of significant trees³ and other vegetation; and whether there would be changes in accessibility or connectivity. The alternatives will be developed to a level of preliminary design sufficient to perform a meaningful assessment of the potential visual impacts.

Impacts on parks and recreation areas will be described in the Socioeconomic, Land Use, and Right-of-Way Technical Report and summarized in the NEPA document.⁴ Potential impacts on NPS-owned and maintained properties will be conducted consistent with relevant NPS regulations and guidelines, including NPS Director's Order 12.

² The LOD used in the NEPA study is based on planning-level information and would be refined during final design/construction. The NEPA LOD represents the "worst case" scenario based on a level of design which is permissible by the resource agencies. The document will generally describe how it is anticipated that these impacts could be reduced during final design, and permit modifications would be completed accordingly.

³ Significant trees in the I-495 SEL study area will be identified through review of the Virginia Big Tree List and by the Maryland Big Tree Program.

⁴ Impacts on parks and recreation areas will be considered under Section 4(f) of the U.S. Department of Transportation Act of 1966. Draft and Final Section 4(f) Evaluations will be prepared along with the NEPA documentation. For those parks and recreation areas that are also historic properties listed or eligible for listing in the National Register of Historic Places, such as the George Washington Memorial Parkway, potential effects will be considered in compliance with Section 106 of the National Historic Preservation Act.

4.1.3 Communities and Community Facilities

4.1.3.1 Identification and Existing Conditions

Transportation projects have the potential to directly affect communities and their cohesion. Community cohesion is a concept relating to community identity that can be affected by splitting neighborhoods, isolating a portion of a neighborhood or an ethnic group, generating new development, changing property values, or separating residents from community facilities. The level of cohesion in communities may vary depending on how long residents have stayed or plan to stay in the area and the accessibility to services and community facilities.

Community and community facility characteristics will be identified in the study area using available information, including the information provided by local and regional planning agencies. Resources may be identified by reviewing GIS or CAD data obtained from the City of Alexandria and Fairfax County in Virginia and Prince George’s County, Maryland; online mapping; and comprehensive or area plans. Appropriate local planning officials, emergency and public safety services officials (fire/police/emergency), and others will be contacted for assistance in identifying community facilities, as needed. Communities and community facilities will be mapped and described. At a minimum, the following community facilities will be identified, if present:

- Schools
- Post Offices
- Police/Fire/Rescue Services
- Hospitals
- Public airport facilities
- Government Offices
- Places of Worship
- Libraries
- Community Centers

4.1.3.2 Environmental Consequences

Transportation impacts on community cohesion “may be beneficial or adverse, and may include splitting neighborhoods, isolating a portion of a neighborhood or an ethnic group or separating residents from community facilities” (FHWA, 1987). Construction of transportation infrastructure can disrupt community cohesion by changing connectivity between residential neighborhoods (i.e., physically dividing communities), displacing residents, disrupting access to community facilities on a temporary or permanent basis, and introducing noise and visual elements incompatible with existing surrounding conditions (FHWA, 1996; FHWA, 1998). Transportation projects also may enhance access within communities by improving connectivity. Potential impacts on community cohesion will be qualitatively assessed for communities within and adjacent to the study area.

Impacts on community facilities may include potential acquisition (including temporary, permanent, partial, or full acquisitions); noise impacts; or any changes to accessibility in the long and short terms during and after construction. These impacts will be described in the Socioeconomic, Land Use, and Right-of-Way Technical Report and summarized in the NEPA document.

4.1.4 Population and Housing

4.1.4.1 Identification and Existing Conditions

The most recent and appropriate U.S. Census Bureau data (either the Decennial Census or American Community Survey [ACS] five-year data) will be used to identify resident population and housing characteristics such as total number and type of housing units. ACS data is based on sample survey that can

have relatively large margins of error at the census block group level; however, where such ACS data is available, it usually represents the best available information at the time and is more reflective of existing conditions than potentially out-of-date Decennial Census data. Data will be collected for the selected geographic area of analysis and compared to similar data for Fairfax County, the City of Alexandria, Prince George’s County, the Commonwealth of Virginia, and the State of Maryland, as applicable. This data will also be used to inform the EJ analysis described in **Section 3.2**.

Socioeconomic data will be updated with 2020 Decennial Census data as needed if it becomes available during the course of the I-495 SEL Study.

4.1.4.2 Impact Assessment

Potential impacts of the alternatives on resident population and housing will be identified quantitatively based on the number of residential acquisitions (partial or full), and qualitatively, based on potential changes in neighborhood environment. These impacts will be described in the Socioeconomic, Land Use, and Right-of-Way Technical Report for the study and summarized in the NEPA document.

4.1.5 Economic Resources

4.1.5.1 Identification and Existing Conditions

Economic data including household income data employment will be collected from the most recent census data at the selected geographic area of analysis. Business patterns such as number of establishments per North American Industry Classification System code; estimated employee counts; and estimated revenue will be acquired from the U.S. Census Bureau Zip Code Business Statistics or the latest available dataset. In some cases, this analysis may also include documented travel patterns within the study area for employment or recreation. Income data will also be used to inform the EJ analysis, described in **Section 3.2** below.

4.1.5.2 Impact Assessment

Impacts on income, employment, and business patterns will be identified based on the number of commercial and industrial acquisitions and changes to access in the long and short terms during and after construction. These impacts will be described in the Socioeconomic, Land Use, and Right-of-Way Technical Report and summarized in the NEPA document.

4.1.6 Land Use

4.1.6.1 Identification and Existing Conditions

Existing and future land use data will be compiled from available published sources (e.g., local comprehensive and area plans; zoning and land use maps); information received from the City of Alexandria, Fairfax County, and Prince George’s County; GIS or CAD layers to be provided by VDOT or the localities; field reconnaissance; and other sources as appropriate. Land use will be field verified to ensure accuracy wherever possible. A standardized land use classification system will be used to categorize land use types (residential, commercial, industrial, public, open water, vacant, etc.). Mapping and graphics of land use and accompanying tables will be produced, as appropriate, summarizing land use distribution within the study area. Land use in the study area will be described qualitatively and compared to land use in the localities at large. Planned land uses will also be described.

4.1.6.2 Impact Assessment

Impacts on land use will be characterized by conversion to transportation use based on permanent right-of-way acquisitions only, if applicable (temporary, short-term right-of-way acquisition is not considered converted land). Total right-of-way acreage needs, based on planning-level conceptual design, will be estimated. The impact analysis will also consider the compatibility of I-495 SEL Study with existing and

planned land use, and the potential for the creation of land use incompatibilities.

These impacts will be described in the Socioeconomic, Land Use, and Right-of-Way Technical Report and summarized in the NEPA document. Impacts on future land use in the study area will be analyzed in the Indirect and Cumulative Effects Technical Report.

4.2 ENVIRONMENTAL JUSTICE

4.2.1 Regulatory Context

NEPA does not specifically address impacts on minorities or low-income persons. Rather, NEPA is an umbrella law under which compliance with other environmental laws and regulations is achieved.

FHWA regulations require that project compliance with all applicable environmental laws, executive orders, and other legal requirements be documented, to the extent possible, within the appropriate NEPA documentation.

President Clinton issued [Executive Order 12898](#) on February 11, 1994, which reinforces the importance of fundamental rights and legal requirements contained in Title VI of the Civil Rights Act of 1964 ([Public Law 88-352, 78 Statute 241](#)) and NEPA. The Executive Order directs that "each Federal agency and State Highway Administration/ Department of Transportation make achieving EJ part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low- income populations".

In addition to these executive orders and acts, the EJ analysis will consider the definitions, methodologies, and guidance provided in CEQ's [Environmental Justice Guidance Under the National Environmental Policy Act](#) (1997); U.S. Department of Transportation (USDOT) Order 5610.2(a); FHWA EJ Order 6640.23A, [Actions to Address Environmental Justice in Minority Populations and Low-Income Populations](#) (2012); FHWA memorandum [Guidance on Environmental Justice and NEPA](#) (2011); and the FHWA [Environmental Justice Reference Guide](#) (2015).

The strategies developed under Executive Order 12898 and the USDOT/FHWA policies on EJ take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of Federal transportation projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law, while ensuring EJ communities are proactively provided meaningful opportunities for public participation in project development and decision-making.

FHWA, as the lead federal agency, may prescribe the level of EJ outreach and analysis necessary to reach a NEPA decision.

4.2.2 Identification

The terms "minority" and "low-income" have been defined in the USDOT and FHWA EJ Orders as follows and will be used in the preliminary analysis:

- **Minority Individual** – The USDOT and FHWA EJ Orders define a minority individual as belonging to one of the following groups: (1) Black: a person having origins in any of the black racial groups of Africa; (2) Hispanic or Latino: a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race; (3) Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent; (4) American Indian and Alaskan Native: a person having origins in any of the original people of North America, South America (including Central America), and who maintains cultural identification through Tribal affiliation or community recognition; or (5) Native Hawaiian and Other Pacific Islander: a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

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- **Low-Income Individual** – The FHWA and USDOT EJ Orders define a “low-income” individual as a person whose median household income is at or below the [U.S. Department of Health and Human Services \(HHS\) poverty guidelines](#).

Executive Order 12898 and the USDOT/FHWA EJ Orders are concerned with identifying minority and low-income populations. VDOT, working closely with FHWA and the U.S. Environmental Protection Agency (EPA), has developed a standard method for identifying EJ populations for transportation studies in Virginia. In 2017, this method was updated through coordination with these two agencies and the approved method will be applied to this study until further guidance is provided. Using these approved methods, the following definitions apply:

- **Minority Populations** – Any readily identifiable groups of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed USDOT/FHWA program, policy, or activity (USDOT and FHWA EJ Orders). A minority population is present when: (a) the minority population of the affected area exceeds 50 percent 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, 1997). The appropriate geographic area for this study will be the block group based on the size and scope of the proposed action. The minority population for a block group in the study area will be found to be “meaningfully greater” than surrounding block groups in the study area if its minority population is greater than the value of the average minority population percentage of the Metropolitan Washington Council of Governments member localities, or the minority population percentage of Alexandria, Fairfax County, or Prince George’s County, whichever establishes the lower and more conservative threshold.
- **Low-Income Population** – Any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed USDOT/FHWA program, policy, or activity (USDOT/FHWA EJ Orders). For this study, low-income populations will be identified at the block group level when a block group’s median household income is at, or below, the HHS poverty level for the [average household size](#) of the block groups used in the analysis. If there is any question as to the appropriate household size for the study, a conservative approach will be taken and documented.

The U.S. Census Bureau collects information on the number of residents identifying as minorities and this data will be used in each analysis for identifying minority populations. The 2020 Decennial Census minority data will be used for the EJ analysis; otherwise, the most recent 5-year ACS estimate will be used. U.S. Census Bureau data will also be used to identify populations with Limited English Proficiency (LEP) to meet the potential translation or interpretive needs of a community. EPA’s EJSCREEN tool will be consulted to verify consistency of data. The HHS poverty guidelines will be used to establish the poverty threshold for the block groups in the study area. For comparative purposes, similar data will be collected at the City/County and state level, for presentation in the analysis results.

During the development of the Socioeconomic, Land Use, and Right-of-Way Technical Report, census data on EJ populations will be verified with Alexandria, Fairfax County, and Prince George’s County, which will also be asked for input on where EJ populations may be in the study area. In addition, relevant community groups and organizations that work with minority and low-income communities will be consulted to identify any known communities that may not show up in census data, and to confirm the presence of communities identified through desktop review. This will also help improve dissemination of information to minority and

low-income communities.

The study will provide a map showing the locations of study area block groups and their minority and low-income population status. In addition, the number of persons of some other race alone, two or more races, and white persons alone per census block group, and median household income of block groups will be identified and whether the census block group meets the definition of an EJ minority or low-income population.

4.2.3 Impact Assessment

The EJ impact assessment will consider the potential impacts from extending the Express Lanes system on low-income populations and populations of color in the Study area, in terms of cost, travel time, mitigation measures, and other aspects as applicable. If impacts on EJ populations are identified, the impacts experienced by the affected population will be compared to those experienced in non-EJ population areas. VDOT and FHWA will determine if a disproportionately high and adverse effect on minority and low-income populations will occur, as defined by the FHWA EJ Order, when the impact:

- Would be predominately borne by a minority and/or low-income population
- Would be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that would be suffered by the non-minority population and/or non-low-income population

Measures to avoid, minimize, or offset adverse effects, as well as benefits to minority and low-income populations from the alternatives analyzed, will be considered in making the determination of whether an impact on EJ populations is disproportionately high and adverse. If disproportionately high and adverse effects on a minority or low-income population are identified, and practicable mitigation measures or other feasible alternatives would not further reduce the impact, FHWA will consider whether there is substantial need for the project based on overall public interest. FHWA may only approve selection of the alternative with the least adverse effects on protected EJ populations, unless the alternative has either:

- Adverse social, economic, environmental, or human health impacts that are more severe
- Would involve increased costs of an extraordinary magnitude

During construction, short-term road closures and detours may affect communities by potentially increasing commuting times or emergency vehicle response times, and by limiting or restricting access to residential areas. Other potential effects may include increased noise, vibration, dust, or visual disturbance during construction and increased vibration, noise, and visual disturbance during operation. These potential short and long-term effects will be assessed. The goal of this analysis is to provide FHWA with enough information to determine if there is a disproportionate and adverse impact on EJ communities. In addition, the information collected through the NEPA process can inform EJ coordination required in future phases of the project.

As preliminary design and assessment of impacts advances, consideration of each alternative's impacts on individual minority or low-income persons is necessary. For instance, minority or low-income extended families may be located adjacent to each other to assist each other with dependent care. In this type of circumstance, relocation of one household away from another may impose disproportionately high and adverse effects on minority or low-income individuals (see FHWA's [Environmental Justice Reference Guide](#) (2015) for detailed discussion). Documentation supporting and explaining the determination of disproportionately high and adverse impacts on EJ populations will be included in an Environmental Justice Technical Memorandum and summarized in the NEPA document.

5 NATURAL RESOURCES

This section provides an overview of the topics that will be considered during the I-495 SEL Study and the general methods used to identify the natural resources occurring in the study area. Each resource discussed in this section will be considered to determine if there would be measurable direct, indirect, cumulative, or temporary impacts to be analyzed in the Natural Resources Technical Report (NRTR) and NEPA document. The methods described below will be used to identify resources that are present and assess potential impacts on those resources. The natural resources information collected will be used to develop and inform the study. The methods used, and the results obtained, will be documented in the NRTR and the NEPA document.

Natural resources in the study area will be identified based on agency input; review of existing available scientific literature; analysis of GIS or CAD information; and field reconnaissance of the study area or field survey as needed. The CEDAR database will be used, to the extent practicable, to identify natural resource features in the study area. Desktop analysis informed from other sources will also be considered, as applicable.

In addition to the resources described below, the introduction to the NEPA document will include a general description of the study area, including a summary of the topography, soils, land cover types, and level of development that currently exist.

5.1 THREATENED AND ENDANGERED SPECIES

5.1.1 Regulatory Context

The Federal Endangered Species Act of 1973 (16 U.S.C. 1531-1544), and subsequent amendments and regulations, define basic protections for federally listed wildlife and plants that are considered threatened, endangered, or species of greatest conservation need. Section 7 of the Act requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species.

The Virginia Endangered Species Act of 1972 (found at former VA Code §§ 29-233, 29-234 in 1986 and found at [VA Code §§ 29.1-563 to -570](#)) and the [Endangered Plant and Insect Species Act](#) of 1979 protect species that are listed as threatened or endangered. The Virginia Department of Wildlife Resources (DWR) and the Virginia Department of Agriculture and Consumer Services are responsible for administering and enforcing the endangered species regulations. In Maryland, the Maryland Nongame Endangered Species Conservation Act (Md. Code Ann., Nat. Res., § 10-2A-01 through 09) regulates activities that impact plants and wildlife, including their habitats, listed on the Maryland Threatened and Endangered Species list. Protections under the Act are for species listed as Endangered, Threatened, or In Need of Conservation (animals only). Any Federal, state, local, or private constructing agency is required to cooperate and consult with MDNR regarding: the presence of listed species within a project area, field verification of habitat and/or populations of listed species, and avoidance and minimization efforts, as appropriate.

Although bald eagles (*Haliaeetus leucocephalus*) are no longer federally or state listed, they remain protected under the Bald and Golden Eagle Protection Act ([16 U.S.C. 668-668c](#)). Nesting sites are commonly located in large, forested areas adjacent to marshes, on farmland, or in seed tree cut over areas.

5.1.2 Identification and Existing Conditions

State and federally listed species that are reported to occur within the vicinity of the study area will be identified through use of the U.S. Fish and Wildlife Services' (USFWS) [Information for Planning and](#)

[Consultation database](#), National Oceanic and Atmospheric Administration [Section 7 Mapper](#), [Maryland's GIS Data Catalog](#), DWR's [Virginia Fish and Wildlife Information Service database \(VFWIS\)](#), Virginia's Department of Conservation and Recreation (VDCR), Division of Natural Heritage's (VDCR-DNH) [Natural Heritage Data Explorer](#), a submitted environmental review request to the Maryland Department of Natural Resources, as well as use of resource information provided by other agencies and previous studies in or near the study area. Following the review of these sources, a list of potentially present federal and state listed species will be prepared. As applicable, the study will also be informed by queries of publicly available datasets such as DWR's [Northern Long-Eared Bat Winter Habitat and Roost Trees Application](#) and [Little Brown Bat and Tri-colored Bat Winter Habitat and Roost Trees Application](#).

The Center for Conservation Biology's [Virginia Bald Eagle Nest Locator](#) and data from the USFWS will be used to identify known bald eagle nests in the study area and within one mile of locations of blasting or other loud noise associated with the project if that information is available during the NEPA stage. Finally, the USFWS [Virginia Field Office's Bald Eagle Map Tool](#) will be used to determine if the study area intersects with a designated bald eagle concentration area. Supporting documentation from appropriate agencies with authority over threatened and endangered species will be included in the NEPA document and supporting documents.

5.1.3 Environmental Consequences

An initial desktop analysis will be conducted to determine areas that may contain suitable habitat for the listed species identified through the database reviews or through agency input. Desktop data gathered in the preliminary study phase will be used to determine habitat types that correspond with habitat criteria for the list of species. This analysis will be conducted using multiple resources such as existing land cover map products, review of existing topography, wetland mapping, and aerial and infrared photography, as available. This information, in addition to the information resulting from agency coordination, will be used to determine general areas that may provide suitable habitat for the individual species and will document any known/potential wildlife corridors or the absence of any within the study area.

To evaluate the potential impacts of the project on species potentially occurring in the study area, it may be necessary to identify the potential habitat for the listed species in the study area through a field assessment. The results from this assessment will be included in the NRTR and summarized in the NEPA document.

Maps may then be generated depicting potential habitat areas based on both desktop and field analysis. This will also aid in understanding the project's potential effect on habitat fragmentation, which may be evaluated by determining whether impacts within the study area affect the interior core of intact habitat blocks or along their periphery or to unique isolated habitat areas. Invasive species and associated requirements will be considered consistent with applicable regulations and policies.

To streamline environmental permitting, VDOT will identify the recommend preferred alternative prior to publication of the NEPA document and provide information needed for the Federal agencies to make an effects determination for threatened and endangered species potentially affected by the preferred alternative. This information will include results from onsite evaluations completed to assess the potential habitat for the listed species in the study area. The results from this assessment will be provided to the resource agencies, included in the NRTR, and summarized in the NEPA document.

5.2 SURFACE WATER RESOURCES

5.2.1 Regulatory Context

5.2.1.1 Navigable Waters

Construction of new-bridged crossings and reconstruction or modification of existing crossings over navigable

Waters of the United States requires U.S. Coast Guard approval in accordance with [Section 9 of the Rivers and Harbors Act of 1899](#) and the [General Bridge Act of 1946](#).

5.2.1.2 Waters of the United States

The United States Army Corps of Engineers (USACE), acting under Section 10 of the Rivers and Harbors Act ([33 U.S.C. 401 et seq.](#)), regulates work in, or affecting, navigable Waters of the United States. Water resources are further federally regulated by the USACE and EPA under the [Federal Water Pollution Control Act](#) (i.e., the 1972 CWA amended in 1977). Under the CWA, USACE serves as the permitting agency while EPA provides oversight of the CWA permitting program. The regulations set forth in [40 CFR Section 230](#) (*Guidelines for Specification of Disposal Sites for Dredged or Fill Material*) are the substantive criteria issued by the EPA and used in evaluating discharges of dredged fill into waters of the US. The Guidelines provide regulations outlining measures to avoid, minimize, and compensate for impacts. For any permit to be issued under Section 404 of the Clean Water Act, the proposed action must address all relevant portions of the Guidelines. This process allows USACE to arrive at the identification of the Least Environmentally Damaging Practicable Alternative (LEDPA). The LEDPA is the only project USACE can permit and is not identified until the permitting process is complete.

[Executive Order 11990](#), Protection of Wetlands (May 24, 1977), established a national policy and mandates that each Federal agency acts to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural value. The EPA, USACE, the Virginia Water Control Board, the Virginia Department of Environmental Quality (DEQ), and the Maryland Department of the Environment (MDE) regulate wetlands in accordance with the CWA and the [Water Quality Act of 1987](#).

In Virginia, as detailed in the Virginia Administrative Code (VAC), DEQ is the authority that provides the Section 401 certification through its Virginia Water Protection Permit Program ([9 VAC 25-210](#)) which gets its statutory authority from [62.1-44.15](#) of the Code of Virginia. In Maryland, Section 401 certification is provided by MDE in accordance with the Code of Maryland Regulations ([COMAR 26.08.02.10](#)).

In Virginia, through authority granted to the VMRC in [§28.2-103](#) of the Code of Virginia, the Commonwealth regulates state-owned bottomlands, non-vegetated wetlands, and vegetated wetlands. State-owned bottomlands occur below mean low water in tidal systems, and non-tidal streams with drainage areas over 5 square miles in size.

In Maryland, through authority granted to MDE with the Tidal Wetlands Act, state tidal wetlands include all open water, and vegetated wetlands below mean high water, which are owned by the State of Maryland. Private wetlands include all tidal wetlands, above the mean high-water line, and which are in private ownership. Licenses, issued by the State's Board of Public Works based on recommendations from MDE's Water and Science Administration (WSA), are required for projects in State wetlands. Permits are issued directly by WSA for projects in private wetlands. A permit or license must be obtained before a person fills, dredges, or otherwise alters a tidal wetland ([COMAR 23.02.04](#)).

Maryland's Nontidal Wetlands Protection Act, for which MDE is the lead agency, protects nontidal wetlands by regulating and restricting all activities that could impact nontidal wetlands or waters of the state. Three aspects of Maryland's law differ from federal regulation in the regulation of isolated wetlands, the alteration of vegetation and hydrology, and regulation of a 25-foot buffer. Buffer requirements are expanded to 100 feet for "nontidal wetlands of special State concern". These wetland areas are designated by regulation and mapped as having exceptional ecological or educational value of Statewide significance ([COMAR 26.23.01](#)).

5.2.1.3 Chesapeake Bay Resource Protection Areas

Chesapeake Bay Resources are afforded Federal protection under [Executive Order 13508](#). At the state level,

the [Chesapeake Bay Preservation Act](#) (CBPA) was enacted by the Virginia General Assembly in 1988 to protect and manage Virginia’s “coastal zone.” The CBPA requires local governments in the coastal zone to include water quality protection measures in their zoning and subdivision ordinances and in their comprehensive plans.

Within the Chesapeake Bay watershed of coastal counties, Resource Protection Areas (RPA) include tidal wetlands, tidal shores, waterbodies with perennial flow, and non-tidal wetlands connected by surface flow and contiguous to tidal wetlands or perennial water bodies, as well as a 100-foot vegetated buffer area located adjacent to and landward of these features. Alexandria and Fairfax County are considered part of Tidewater Virginia in this context because their water drains into the Potomac River and ultimately the Chesapeake Bay.

5.2.1.4 Chesapeake Bay Critical Areas

Maryland’s Chesapeake Bay Critical Area includes land 1,000 feet from the tidal influence of the Chesapeake Bay. Development in the Critical Area is regulated by the MDNR Critical Area Commission. Protection is focused on the Critical Area Buffer, a naturally vegetated 100-foot buffer landward from the mean high water line of tidal waters or from the edge of tidal wetlands and tributary streams ([COMAR 27.01.09.01](#)). The minimum standards also provide for conservation of non-tidal wetlands including the establishment of a vegetated buffer of 25 feet around areas identified as nontidal wetlands.

5.2.1.5 Floodplains

Several Federal directives regulate construction in floodplains to ensure that consideration is given to avoidance and mitigation of adverse effects on floodplains. These Federal directives include the [National Flood Insurance Act of 1968, Executive Order 11988](#) (May 24, 1977), and U.S. Department of Transportation Order 5650.2, entitled “[Floodplain Management and Protection](#)”. The National Flood Insurance Act of 1968 established the National Flood Insurance Program (NFIP), which is administered by the Federal Emergency Management Agency (FEMA). In Virginia, the VDCR is responsible for coordination of all state floodplain programs. Local flood insurance programs administered by localities under the NFIP also regulate development within floodplains. In Maryland, the MDE is responsible for coordination of all state floodplain programs. Local flood insurance programs administered by localities under the NFIP also regulate development within floodplains.

5.2.1.6 Wild and Scenic Rivers

The National Wild and Scenic Rivers Act (16 U.S.C. 1271-1287) prohibits Federal agencies from activities (funding, approving, or implementing a project or action) that would adversely affect the values for which the river was designated. VDOT must consult with the managing agencies during the NEPA process on projects that affect designated rivers or their immediate environments. It is not anticipated that the I-495 SEL Study will affect the values of any designated wild and scenic river.

5.2.2 Identification and Existing Conditions

5.2.2.1 River Basins (Watersheds)

River basins, their size, and location will be identified through use of the [National Watershed Boundary Dataset](#). A discussion of the watershed boundaries will be included in the NRTR and NEPA document, to provide an understanding of the location and flow of surface waters within the study area.

5.2.2.2 Navigable Waters

By regulation, all tidal waterbodies in Virginia are considered to be navigable. In addition, other rivers and streams in Virginia have had final determinations made of their navigability or non-navigability. Navigable

waters in the study area will be identified based on their flow regime (tidal vs. non-tidal) during the study’s Waters of the United States delineation or inclusion on the most recent [Navigable Waters of the United States](#) list produced by the USACE Norfolk District and/or Baltimore District. In Maryland, Maryland Transit has produced a digital GIS dataset representing the [Navigable Waterways](#) in the state. If such waters are identified in the study area and/or other USACE civil works projects are identified within the study area, VDOT will coordinate internally to determine the level of analysis that will be included in the NEPA document to satisfy a Section 408 review by the USACE and a future U.S. Coast Guard permit, if required. It is important to note that USACE’s review under Section 408 is not limited to navigable waters but all Federal civil works projects.

5.2.2.3 Waters of the United States

Identification

Waters of the United States will be field delineated within the study area depicted on **Figure 2-1**, with the exception of those areas recently delineated as part of other VDOT studies, if any, with currently valid jurisdictional determinations. Waters of the United States information from these previous study areas will be used to inform the I-495 SEL Study analysis as applicable. VDOT will request from the NPS wetland and waters information derived from enhanced inventories conducted in park properties in the study area, if available. VDOT will also request from the USACE, under the Freedom of Information Act, any still-valid jurisdictional determinations performed by others in the study area to inform this study.

Prior to initiating fieldwork, VDOT will complete a tidal benchmark data analysis to pre-determine and map the VMRC jurisdictional limits in the study area in Virginia. The closest National Oceanic and Atmospheric Administration (NOAA) tidal station to the study area, which includes datum information, is Washington, DC (**Table 4-1**). Using elevation data (such as from the United States Geological Survey (USGS) National Elevation Dataset, USGS Light Detection and Ranging (LIDAR) dataset, and VDOT or locality contour data), VDOT will develop two-foot contours for the study area using the elevation data and the calculated VMRC jurisdictional limits elevation. VDOT will produce a digital, GIS representation of VMRC’s jurisdictional limits. In addition, the Maryland Water Resources Registry will also be consulted. A line representing the VMRC limits will be included on field mapping and the handheld Global Positioning System (GPS) units utilized for collecting location data during the delineation. During the delineation, VDOT will conduct visual observations of the plant species present along the VMRC jurisdictional line in tidal areas. If a species listed in [§ 28.2-1300](#) is present, VMRC’s jurisdictional limits extending to the 1.5 times the mean tide range above the mean low water (MLW) elevation from the Washington, DC station (~2.93 feet relative to North American Vertical Datum of 1988 [NAVD 88]) will be confirmed in that area. If a listed species is not present, the VMRC’s jurisdictional limits for that area of observation will be shifted waterward to the mean high water (MHW) elevation. Field staff will complete tidal wetland confirmation points at the area of observation, recording the presence or absence of listed species, the species identification if present, and obtain a photograph and GPS location of the confirmation area.

Table 5.1: National Oceanic and Atmospheric Administration Tidal Station Datums

Tidal Station	MLW Elevation ¹	MHW Elevation ¹	VMRC Jurisdictional Limits (1.5 x Mean Tide Range + MLW) ¹	Highest Astronomical Tide ¹
Washington, DC	-1.25 Feet	1.54 Feet	2.93 Feet	2.41 Feet

1. Elevations relative to NAVD88 datum

(<https://tidesandcurrents.noaa.gov/datums.html?datum=NAVD88&units=0&epoch=0&id=8594900&name=Washington&state=DC>)

In Maryland, VDOT will utilize Maryland's 1972 Tidal Wetlands Maps to identify the regulatory boundaries of wetlands under the jurisdiction of the Maryland Tidal Wetlands Act in the Maryland portion of the SEL Study Area. These wetlands may include both freshwater and brackish systems, with emergent, shrub/shrub, and forested vegetation. Along with limits identified using the 1972 mapping, and similar to the method utilized in the Virginia portion of the Study Area, tidal information available from NOAA's Washington, DC tidal station (Station ID: 8594900) will be used to determine the jurisdictional limits of tidal wetlands in the Maryland portion of the Study Area. These limits will be determined as the landward extent of the highest astronomical tide line which is approximately 2.41 feet relative to NAVD88 (**Table 4-1**).

For USACE-jurisdictional limits, the methods to be used for the field delineation will include those outlined in the 2010 [Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region](#) (Version 2.0) and supplemental guidance issued by the USACE. The methods described in the guidance documents will be used to identify and delineate the boundaries of jurisdictional features in the majority of the study area in Virginia and in the state right-of-way in Maryland. However, non-intrusive investigations will be conducted on private property in Maryland and NPS property in Maryland and Virginia. In these areas, wetland determinations will be made using presence/absence of hydrophytic vegetation and non-intrusive signs of wetland hydrology. Using best professional judgement, it will be assumed that an area is a wetland if hydrophytic vegetation and visual hydrology indicators are present.

The outer boundaries of the most landward feature (wetland, stream, or open-water area) will be flagged in the field with survey flagging. Streams, ditches, and open water areas occurring within larger wetland areas will be either flagged in the field or digitized using aerial imagery. VDOT does not propose to flag boundaries between different Cowardin-classified wetland systems, nor along the limits of VMRC or Maryland jurisdiction. Wetland Determination Data Forms will be completed to document representative conditions in wetlands and the adjacent uplands and photos of the data points will be collected and organized. However, as permits will not be requested during the NEPA phase of this study, and a jurisdictional determination would likely expire before permits are requested, a jurisdictional determination of delineated wetlands and waters will not be requested for the I-495 SEL Study.

VDOT will coordinate directly with the USACE Norfolk District regarding the review of jurisdictional wetlands and water features delineated in Virginia and Maryland during this study. As needed, the USACE Norfolk District will coordinate with the USACE Baltimore District regarding additional review of jurisdictional wetland and water features delineated in Maryland. VDOT will also coordinate directly with VDEQ and MDE regarding wetland and water resources under the jurisdictions of those agencies in Virginia and Maryland, respectively.

Data Collection

Jurisdictional feature boundaries will be recorded for later use in a GIS or CAD software using a sub-meter accurate GPS. All jurisdictional features will be characterized and quantified using the Cowardin Classification system. Flag points will be processed using ArcGIS and shapefiles of wetlands and waters will be created and shown on maps provided in the study's NRTR and NEPA document. The NRTR will include the wetland determination data forms, Waters of the United States, soil, floodplain, and vicinity mapping, as well as representative photographs of the study area. The report will include quantification of delineated stream resources (linear feet) and wetlands and open-water resources (acres) in tabular form for those areas not covered by previous VDOT Jurisdictional Determination. The total acreage or linear footage of Waters of the United States within the study area will be presented in tabular form by Cowardin classification in the NRTR and NEPA document. A digital copy of the wetland report and geospatial files will be provided to MDOT SHA when available.

Assessment

The [Unified Stream Methodology](#) (USM) is a collaborative effort between the USACE, Norfolk District, and

DEQ. The methodology is used to rapidly assess what the stream compensation requirements would be for permitted stream impacts and the number of “credits” obtainable through implementation of various stream compensation practices. VDOT will collect data in the field to complete a USM assessment form (Form 1 or 1a, and Form 2) for each non-tidal stream delineated in the study area.

5.2.2.4 USACE Wetland Attribute Form

The USACE Norfolk District issued a Public Notice in May 2020 announcing the availability of the District’s Wetland Attribute Form which is recommended for use on all permit applications that propose wetland impacts equal to, or greater than, one acre in size. The form provides a detailed, rapid, and qualitative description of the physical, chemical, and biological characteristics of wetlands being evaluated under the CWA Section 404 permitting process. VDOT will complete a wetland attribute form for each wetland community type within the Virginia Portion of the I-495 SEL Study Area as recommended by the USACE in the form’s instruction manual. Wetland community types will be those defined using the VDCR’s Natural Communities of Virginia: Classification of Ecological Groups and Community Types (Version 3.2).

The assessment will be completed with analysis of resources including topographic mapping, delineation data, and aerial imagery to support information collected during site visits. The following will be included with each form:

- Drawings depicting the wetland area and surrounding landscape
- Vegetation inventory
- Potential wildlife species
- Photos of the wetland
- Information generated using the Virginia Department of Environmental Quality’s Virginia Wetland Condition Assessment Tool, EPA Region 3’s Water Protection Division Watershed Resources Registry, EPA’s Waters GeoViewer, or other similar resource

A descriptive approach will be used to identify wetland attributes and qualifiers using knowledge of wetland science, combined with in-field data collection using a checklist method. The nine attributes which will be evaluated include: groundwater recharge/discharge; flood flow alteration; fish and shellfish habitat; sediment/pollution retention; nutrient removal/retention/ transformation; production export; streambank erosion/shoreline stabilization; wildlife habitat; and rare/threatened/endangered species.

The focus will be on these principal attributes to assimilate information for this study with multiple wetland types and locations. Investigators will determine presence/absence of each attribute and qualifier based upon analysis and field data collection and describe the bases for conclusions. The final product will be developed to a level of detail sufficient to inform the NEPA study.

5.2.2.5 Functional Assessment

With the ecological and societal benefits of wetlands in mind, VDOT will utilize a method similar to the Highway Methodology, which originated in the New England District of the USACE ([USACE, 1993](#); [1999](#)), to document the functions and values of representative wetlands within the study area. The Highway Methodology approach provides a qualitative description of the physical characteristics of the evaluated wetlands, identifies the functions and values exhibited, and provides the basis for the conclusions using "best professional judgment". While the method applies a descriptive approach to evaluating wetlands, it uses a format that is organized, predictable, and easily documented for each function and value, incorporating both wetland science and human judgment of values. The final product will be developed to a level of detail to inform the NRTR and the NEPA document.

5.2.2.6 Maryland Stream Mitigation Framework

VDOT will utilize the guidelines and standards associated with the Maryland Stream Mitigation Framework to assess streams within the Maryland portion of the Study Area and document existing conditions. The [EPA Rapid Bioassessment](#) methods will be completed for each waterway, which is sufficient for NEPA investigations and impact calculations. Functional Pyramid assessments on impacted reaches longer than 300 feet may be required during permitting but are not proposed for the NEPA phase of this study.

5.2.2.7 Wetlands of Special State Concern

In Maryland certain wetlands with rare, threatened, endangered species or unique habitat receive special attention. The Code of Maryland ([COMAR 26.23.06](#)) identifies these Wetlands of Special State Concern (WSSC) and affords them certain protections including a 100-foot buffer from development. MDE is responsible for identifying and regulating these wetlands.

5.2.2.8 Water Quality

Water quality can affect designated uses of study area waters by human and/or aquatic life. Impaired waters, their location, extent, impairment, and source as found on [DEQ's](#) and [MDE's](#) most recent 303(d) lists will be noted within the study area. Any special designations, and the qualities that made these waters eligible for such designations, will be noted and the readily available reports will be summarized in the NRTR and the NEPA document. The NEPA document also will qualitatively discuss existing stormwater runoff or point source pollution known to occur within, or adjacent to, the study area.

5.2.2.9 Chesapeake Bay Resource Protection Areas

Chesapeake Bay RPA data for the study area in Virginia will be developed based on the location and classification of wetlands and waters delineated in the study area for this study or previously confirmed in the study area with use of reference jurisdictional determination or delineation information. An evaluation conducted using GIS or CAD will be completed to determine the location and extent of RPAs in the study area in Virginia. However, under the Chesapeake Bay Preservation Area Designation and Management Regulations, public roads and their associated structures are conditionally exempt from RPA impact review provided they are constructed in accordance with the State Water Control Law ([§62.1 - 44.2 et seq.](#) of the Code of Virginia).

5.2.2.10 Chesapeake Bay Critical Areas

Chesapeake Bay Critical Area data for the study area in Maryland will be developed based on the location and classification of wetlands and waters delineated in the study area for this study or previously confirmed in the study area with use of reference jurisdictional determination or delineation information. These will be compared with the limits of defined Critical Area and buffers available in database information obtained through Maryland's iMAP. An evaluation conducted using GIS or CAD will be completed to determine the location and Critical Areas in Maryland. Additional parameters for defining the Critical Area will be considered and incorporated as applicable based on data and input provided by Maryland state agencies with regulatory oversight. This information will be reported in the NRTR and the NEPA document.

5.2.2.11 Floodplains

FEMA is required to identify and map the nation's flood-prone areas through the development of Flood Insurance Rate Maps. Digital floodplain data from the National Flood Hazard Layer will be obtained from the [FEMA Flood Map Service Center](#) and overlain in GIS or CAD to determine the acreage of 100- and 500-year floodplains in the study area. The floodplain areas identified will be those associated with waterbodies that control hydrology, affecting the floodplain elevation in the floodplain area. This information will be reported

in the NRTR and the NEPA document.

5.2.3 Environmental Consequences

Water resources, including wetlands, within the study area will be mapped in GIS or CAD. Potential impacts will be calculated by performing GIS or CAD overlays of the LOD of each alternative with the boundaries of the identified resources. Waters of the United States impact values will be reported as well as totals by Cowardin classification. Potential avoidance and minimization measures will be evaluated in the NRTR and NEPA document. The environmental consequences of unavoidable impacts will be qualitatively evaluated and discussed. This discussion will be based on data sheets and field photos included in the NRTR and will include a qualitative discussion of the impacts on the wetland attributes of these resources that were identified during the assessments completed in the study area by this and other study and projects.

The NEPA document and NRTR will discuss potential mitigation requirements for each alternative based on the joint rulemaking by the USACE and EPA called [Compensatory Mitigation for Losses of Aquatic Resources: Final Rule](#) and the steps taken in the mitigation process for the study. All potential wetland impacts on NPS property will be managed and mitigated as directed by NPS [Procedural Manual #77-1: Wetland Protection](#). The planning-level mitigation requirements will be supplemented with the USM and Maryland Stream Mitigation Framework information collected for the study.

Potential impacts on RPAs and Critical Areas will be assessed by performing GIS or CAD overlays of the LOD with identified RPAs and Critical Areas in the study area. Similarly, potential impacts on floodplains will be calculated by performing GIS or CAD overlays with the identified floodplains. Total impact values will be reported in the NRTR and summarized in the NEPA document. Potential avoidance and minimization measures will be evaluated, and the environmental consequences of unavoidable impacts will be qualitatively evaluated and discussed.

The NEPA document will qualitatively discuss potential impacts related to the increase in impervious surface. This analysis will discuss what would occur in the absence of stormwater management best management practices (BMPs) as well as what would be anticipated to occur with BMPs in place.

5.3 GROUNDWATER RESOURCES

5.3.1 Regulatory Context

The EPA's Sole Source Aquifer program (authorized by Section 1424(e) of the Safe Drinking Water Act (SDWA) of 1974 ([Public Law 93-523, 42 U.S.C. 300f et. seq](#)) enables them to designate an aquifer as a sole source of drinking water and establish a review area. The SDWA is the main federal law that ensures the quality of Americans' drinking water. Under SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells.

The [Code of Virginia, §15.2-2223](#) and [§15.2-2283](#), includes ground water protection provisions for local governments to consider when developing Comprehensive Plans and/or zoning ordinances. The selection of management methods to protect ground water is determined at the local level.

DEQ, under the [Ground Water Management Act of 1992](#), manages groundwater withdrawals in certain areas called groundwater management areas. As defined in [9VAC25-600-10](#), a groundwater management area is a geographically defined groundwater area in which the State Water Control Board has deemed the levels, supply, or quality of groundwater is adverse to public welfare, health, and safety.

A number of state agencies in Maryland are involved with the protection of Maryland’s groundwater resources, including the MDE, the Maryland Department of Agriculture, and the MDNR. Maryland’s Public Drinking Water Regulations are defined in ([COMAR 26.04.01](#)) and Water Quality Standards are defined in ([COMAR 26.08.02](#)).

5.3.2 Identification and Existing Conditions

Aquifers/water supplies in the study area vicinity, including designated sole-source aquifers, groundwater management areas, and public water supplies will be identified using input from study area localities and other agencies, VDOT’s most recent version of CEDAR data, Maryland’s iMAP, and other widely available public data sets. The location of aquifers, water supplies, and groundwater management areas will be determined by performing GIS or CAD overlays of the study area and boundaries of the identified resources.

5.3.3 Environmental Consequences

Potential impacts will be calculated by performing GIS or CAD overlays of the LOD with the boundaries of the identified resources. Total resource impact values will be included in the NRTR and summarized in the NEPA document. Potential avoidance and minimization measures will be evaluated, and the environmental consequences of unavoidable impacts will be qualitatively evaluated and discussed.

5.4 COASTAL ZONE MANAGEMENT RESOURCES

5.4.1 Regulatory Context

Federal projects occurring within a state’s designated coastal zone, including cumulative and secondary impacts, must be consistent with the enforceable policy of the state’s federally approved Coastal Zone Management Program (CZMP) per Section 307 of the [Federal Coastal Zone Management Act of 1972](#), as amended, and NOAA regulations ([15 CFR §930](#)). Such actions require a consistency determination that receives concurrence from the state. In Virginia and Maryland, DEQ and MDE are responsible for coordinating consistency determination reviews and providing concurrence, respectively.

In addition to the enforceable regulatory programs, the CZMP also includes advisory policies to protect coastal resources. When reviewing projects, the agencies implementing these policies provide comments regarding potential impacts on coastal resources.

5.5 IDENTIFICATION AND EXISTING CONDITIONS

Virginia’s coastal zone encompasses the 29 counties, 17 cities, and 42 incorporated towns in Tidewater Virginia, as defined in the [Code of Virginia 28.2-100](#). In Maryland, the coastal zone encompasses the City of Baltimore and 16 counties that border the Atlantic Ocean, Chesapeake Bay, and the tidal reach of the Potomac River south of Washington, D.C. Proposed improvements in the I-495 SEL Study would occur within the Virginia and Maryland coastal zones and therefore, must be consistent with the enforceable policies of the Virginia and Maryland CZMPs.

5.5.1 Environmental Consequences

Maryland and Virginia have established processes for reviewing and concurring with coastal zone consistency determinations for federally authorized projects or activities with foreseeable effects on coastal resources. Coastal zone consistency reviews will not be requested for the I-495 SEL Study during the NEPA phase. However, applicable consistency review and concurrence requirements will be described in the NRTR and NEPA document, and will be completed during the subsequent permitting process.

5.6 WILDLIFE AND HABITAT

5.6.1 Regulatory Context

5.6.1.1 Anadromous Fish Use

Under the Fish & Wildlife Coordination Act ([16 U.S.C. 661-667d](#)), DWR, and VMRC, in combination with NOAA Fisheries, oversee anadromous fish in Virginia. NOAA Fisheries has jurisdiction over anadromous fish, including the Atlantic sturgeon (*Acipenser oxyrinchus*), listed under the Endangered Species Act through their Office of Protected Resources. DWR restricts instream work in designated anadromous fish use areas during certain times of the year.

In Maryland, agencies planning or proposing development on State-owned lands within the Critical Area shall, with the assistance of the MDNR, identify whether the development will occur in the watersheds of anadromous fish spawning streams ([COMAR 27.02.05.13](#)). The agency shall develop measures for avoiding adverse impacts of any activities occurring on those portions of any watershed within the Critical Area which drain into anadromous fish spawning streams. Finally, the construction, repair, or maintenance activities associated with bridges, or other stream crossings or with utilities and roads, which involve disturbance within the buffer, or which occur instream shall be prohibited between March 1 and May 15.

Proposed alterations to stream crossings in Maryland in Virginia that could affect anadromous fish passage or use will be identified and addressed during the NEPA process, as applicable.

5.6.1.2 Essential Fish Habitat

The Federal Magnuson-Steven Fisheries Conservation and Management Act of 1976 ([Public Law 109-479](#)), as amended, provides for the conservation and management of the nation's fishery resources through the preparation and implementation of fishery management plans. Federal agencies are required to consult with the National Marine Fisheries Service (NMFS) on proposed actions that may affect Essential Fish Habitat (EFH); that is, waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. State agencies in Virginia and Maryland with expertise or regulatory oversight of EFH resources will also be provided with opportunities to review and comment at appropriate times during the NEPA process.

5.6.1.3 Submerged Aquatic Vegetation

Submerged Aquatic Vegetation (SAV) includes an assemblage of underwater plants found in shallow waters of the Chesapeake Bay and its river tributaries as well as coastal bays of Virginia and Maryland. According to [4 VAC 20-337-30](#) any removal of SAV from State bottom or planting of nursery stock SAV for any purpose, other than pre-approved research or scientific investigation, would require prior approval by VMRC. Any request to remove SAV from, or plant SAV upon, State bottom would need to be accompanied by a complete Joint Permit Application submitted to the VMRC. Consideration of SAV may be coupled with EFH concerns and require coordination with NMFS as well as permitting review by the USACE.

In Maryland, MDNR is charged with protecting SAV. Currently there are three laws that protect SAV from disruption:

- General protections are included in [Article-Natural Resources § 4-213](#)
- Protection from possible disruption by hydraulic escalator clam dredges is afforded by [Article-Natural Resources § 4-1006.1](#)
- Protection from possible disruption by shellfish aquaculture activities is afforded by [Article-Natural Resources § 4-11A.01](#)

5.6.1.4 Shellfish Areas

The VMRC through authority contained in [§§28.2-201](#) and [28.2-503](#) of the Code of Virginia establishes shellfish management areas and clam broodstock management areas within Virginia. The agency also regulates impacts on these areas through activities such as dredging. Certain seasonal dredging limitations may be imposed on a site-specific basis depending on sediment type, proximity to shellfish areas or spawning grounds, dredging method, the project's size, location, and measures taken to reduce turbidity. In important spawning and nursery areas in fresh and near fresh waters, dredging may be restricted to the months of November through mid-March. Sidecast dredging with overboard disposal would only be authorized under exceptional circumstances. Dredging in or near shellfish areas, both public and private, beds of SAV and other highly productive areas is discouraged. In cases where no other alternatives exist, a plan for compensation for the lost or impacted resources would be required. According to VMRC's [Chesapeake Bay Map](#), the I-495 SEL Study Area does not include any shellfish management areas, clam broodstock management areas, public grounds, oyster sanctuaries, or harvest grounds in the state of Virginia.

In Maryland, the MDNR is required to publish maps and coordinates of oyster sanctuaries, harvest reserve areas, and areas closed to shellfish harvest by MDE. The MDNR shellfish closures include sanctuaries which are areas which are closed to shellfish harvest and often contain oyster restoration projects to help enhance oyster populations for their environmental benefits. These areas are permanent closures. Reserves are areas which are enhanced, then opened for periodic harvest when certain criteria are met. According to [Maryland's Shellfish Harvesting and Closure Area Map](#), the I-495 SEL Study Area contains non-shellfish waters. No impacts on shellfish areas are anticipated with the I-495 SEL Study in Virginia or Maryland.

5.6.1.5 Trout Streams

DWR's cold water streams survey has mapped wild (Class I-IV) or stockable (Class V and VI) trout streams in the state. DWR restricts instream work in trout streams and their tributaries containing brook or brown trout October 1 through March 31 each year. Instream work is restricted in rainbow trout waters from March 15 through May 15 each year. The I-495 SEL Study Area does not contain any trout streams in Virginia.

In Maryland, the MDNR has mapped trout management areas and regulates closure periods, special provisions, and tackle restrictions in these areas ([COMAR 08.02.11.01](#)). According to their [Trout Management Areas](#) map, no management areas occur in the I-495 SEL Study Area. No impacts on trout, cold water streams, or trout management areas are anticipated with the I-495 SEL Study.

5.6.1.6 Virginia Designated Threatened and Endangered Species Waters

DWR has identified and mapped streams and rivers that contain documented occurrences of Federal/state or state listed threatened or endangered species and their associated habitat. DWR institutes time-of-year restrictions to instream work in mapped threatened and endangered species waters. The time-of-year restriction is dependent upon the species known to inhabit the stream/river and the habitat's location. No impacts on DWR designated threatened or endangered species waters are anticipated within the I-495 SEL Study Area.

5.6.1.7 Terrestrial Habitat

House Bill 1695, Wildlife Corridor Action Plan, passed the Virginia House and Senate in February 2020 and was approved by the Virginia Governor in March of that year. The bill directs DWR, in collaboration with VDOT and VDCR, to create a Wildlife Corridor Action Plan (Plan) which is anticipated to be submitted by September 1, 2022, and every four years thereafter, to the Chairs of the House Committee on Agriculture, Chesapeake and Natural Resources and the Senate Committee on Agriculture, Conservation and Natural Resources. The completed plan is to identify wildlife corridors, defined as areas connecting fragmented

wildlife habitats that are separated by human activities or infrastructure, and recommend wildlife crossing projects intended to promote driver safety and wildlife connectivity. The bill also provides that VDOT shall (1) include the impact on any wildlife corridor identified in the Plan in any environmental impact report for a highway construction project, and (2) consider measures for the mitigation of harm caused to wildlife by a highway in the design options for the construction of such highway.

The Maryland Forest Conservation Act (FCA) was enacted in 1991 to minimize the loss of Maryland's forest resources during land development by making the identification and protection of forests and other sensitive areas an integral part of the site planning process ([COMAR 08.19](#)). Although the MDNR administers the FCA, it is implemented on a local level. Gaining approval of a Forest Conservation Plan (development of more than one acre) may require long-term protection of included priority areas or planting/replanting (afforestation or reforestation) a sensitive area off-site.

The Maryland Roadside Tree Law, passed in 1914, and its regulations were developed to protect the state's roadside trees by ensuring their proper care and protection and to ensure their compatibility with an efficient and dependable public utility system. The MDNR protects trees along public road rights-of way through enforcement of the Roadside Tree Law ([COMAR 08.07.02](#))

The Chesapeake Bay Critical Area Program was established in 1984 with the passage of the Critical Area Act. The law mandated the development of regulations. Based on goals set forth by the Act, minimum requirements were developed to protect water quality, conserve plant and wildlife habitat and direct growth and development. One of the requirements is the protection and conservation of breeding habitat for forest interior dwelling birds (FIDS). Two FIDS habitat types for which conservation is mandated include:

- Existing riparian forests (for example, those relatively mature forests of at least 300 feet in width which occur adjacent to streams, wetlands, or the Bay shoreline, which are documented breeding areas) ([COMAR 27.01.09.04C\(2\)\(a\)\(iii\)](#))
- Forest areas utilized as breeding areas by forest interior dwelling birds and other wildlife species (for example, relatively mature forested areas within the Critical Area of 100 acres or more, or forest connected with these areas) ([COMAR 27.01.09.04C\(2\)\(a\)\(iv\)](#))

5.6.1.8 Sensitive Species Project Review Areas

[Sensitive Species Project Review Areas](#) (SSPRA) are a digital map data layer which primarily represents the general locations of documented rare, threatened, and endangered species maintained by MDNR. This data layer contains buffered polygons representing habitats of threatened and endangered species. The data layer incorporates various types of regulated areas under the Critical Area Criteria and other areas of concern statewide, including Natural Heritage Areas, Listed Species Sites, Other or Locally Significant Habitat Areas, Colonial Waterbird Sites, Nontidal Wetlands of Special State Concern, and Geographic Areas of Particular Concern. No impacts on SSPRA are anticipated within the I-495 SEL Study Area.

5.6.1.9 Invasive Species

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

details state regulations of invasive plants ([COMAR 15.06.04](#)), non-native aquatic organisms ([COMAR 08.02.19.04](#)), and noxious weeds and seeds ([COMAR 15.08.01.05](#)).

5.6.1.10 Other Wildlife Regulations

USFWS, NOAA, and DWR act as consulting agencies under the United States Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and provide environmental analysis of projects or permit applications coordinated through the Federal Energy Regulatory Commission, the USACE, and other state or Federal agencies.

The Migratory Bird Treaty Act ([16 U.S.C. 703-712](#)) makes it unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, or kill migratory birds. The law applies to the removal of nests (such as swallow nests on bridges) occupied by migratory birds during the breeding season.

In December 2020, the Board of Wildlife Resources in Virginia proposed regulations establishing a framework for a permitting program on the incidental take of migratory birds in Virginia which became effective on July 1, 2021. Construction activities within certain sectors, including transportation projects, would be required to obtain a permit. VDWR is to develop sector-specific plans defining thresholds for coverage; best practices that must be employed to be covered under a permit; any geographic or species-specific requirements; compensation required if impacts cannot be avoided or minimized; and other considerations. If an applicant is able to construct a project within those parameters, the project would be covered under a “general permit.” If the applicant is unable to construct a project within those parameters, or a project occurs in a biologically significant area, the applicant would need to apply for an individual project permit. Individual permit applications, in particular, would require involvement of and coordination with VDWR’s subject matter experts.

In compliance with Sections 303(d), 305(b), and 314 of the CWA and the Safe Drinking Water Act, DEQ and MDE have developed a prioritized list of waterbodies that currently do not meet state water quality standards. Virginia’s water quality standards ([9 VAC 25-260](#)) define the water quality needed to support each identified use by establishing numeric physical and chemical criteria. In Maryland, the Numerical Criteria for Toxic Substances in Surface Waters are provided in the Code of Maryland Regulations ([COMAR 26.08.02.03-2](#)). If a waterbody fails to meet the water quality standards, it cannot support one or more of its designated uses. These waters are considered impaired and placed on the state’s 303(d) list, as required by the CWA.

5.6.2 Identification and Existing Conditions

Native wildlife, wildlife refuges, protected species, and management areas in the study area will be evaluated. Desktop data will obtain information from state (DWR, VDCR, MDNR, MDE) and Federal (USFWS, NMFS) wildlife agencies concerning the location, preferred habitat type, and time-of-year during which terrestrial and aquatic species might typically be found within the study area. For aquatic habitat, the location and extent of EFH in the study area would be determined using the most recent version of desktop data obtained from the NMFS. The location and extent of SAV in the study area would be determined using the most recent five years of survey data available from the Virginia Institute of Marine Science, and data available with the Maryland SAV dataset available through iMAP. Data available with the DWR’s VFWIS would be used to identify threatened and endangered species waters and anadromous fish use areas in the study area. The location and extent of anadromous fish use areas in Maryland would be determined using designated finfish habitat for yellow perch, white perch, striped bass, and herring available with iMAP and the most recent report on [Marine and Estuarine Finfish Ecological and Habitat Investigations](#) available from the MDNR’s Fisheries Habitat and Ecosystem Program.

The potential for terrestrial wildlife habitat within the study area will be assessed using available resources such as [The Natural Communities of Virginia: Classification of Ecological Community Groups and Community](#)

[Types](#) (Fleming et al., 2020), [The Natural Communities of Maryland: 2016 Natural Community Classification Framework](#) (J. W. Harrison, 2016), literature review of the EPA's Ecoregions, and the most recent version of the [National Land Cover Database](#) from the Multi-Resolution Land Characteristics Consortium to classify land cover within the study area. The VDCR-DNH Natural Heritage Data Explorer will be queried for occurrences of natural heritage resources, including Conservation Sites, located within the vicinity of the study area. Maryland's iMAP will be queried for occurrences of SSPRA, FIDS habitat, Natural Heritage Areas, and WSSC. This archival research will be supplemented by field observations. Further corresponding with natural resources field work, VDOT will evaluate wooded portions of the study area for the general size and health of tree species in Maryland. This effort will aid with eventual compliance with the MD Forest Conservation Act and Roadside Tree Law. Tree growth, mortality, and size classes will change significantly over time; therefore, a formal survey should be performed during the permitting phase of the project, following NEPA.

The NEPA document also will include information on existing wildlife corridors in and around the study area. These corridors may be identified using aerial mapping, through coordination with regulatory agencies with purview over wildlife resources, identification in Virginia's Wildlife Corridor Action Plan, and/or as part of field work carried out under other tasks. The presence or absence of such corridors will be documented in the NRTR and summarized in the NEPA document, focusing on the quality of the habitat corridor, if it is fragmented already, and what species may utilize such a corridor. The study also will address how different alternatives avoid or minimize impacts on these resources.

Using the collected data, along with the information collected as part of threatened and endangered species identification efforts, an evaluation will be performed to assess wildlife and habitat that exists and identify species movement within the study area. This information will be coordinated with the resource agencies to obtain their local knowledge of wildlife movement within the study area.

The NRTR and NEPA document will discuss the potential for, and type of, invasive species that could occur within the study area. This discussion will include how previous development has allowed these species to establish within the study area.

5.6.3 Environmental Consequences

Potential impacts will be calculated by performing GIS or CAD overlays of the LOD with identified resources or habitat in the study area. Total impact values to resources (i.e., trout streams, EFH, anadromous fish use areas, etc.) and habitat including, but not limited to, SAV beds, forested corridors, and wildlife corridors will be included in the NRTR, and summarized in the NEPA document. Potential avoidance and minimization measures will be evaluated, and the environmental consequences of unavoidable impacts will be evaluated. Potential mitigation measures developed through coordination between VDOT and affected agencies and/or landowners would be included in the NRTR and coordinated through the Section 4f process, as applicable.

The NRTR document will generally discuss how the proposed action(s) could influence invasive species and commit to following existing VDOT specifications for reducing the spread of invasive species if the project advances. The spread of invasive species would be minimized by following VDOT's Road and Bridge Specifications manual, and other applicable regulations.

5.7 WATER SUPPLY

5.7.1 Regulatory Context

Virginia Administrative Code [9VAC25-260-390](#) identifies special water quality standards for public water supply waters in the Potomac River Basin (Potomac River Sub Basin), which contains the study area. Virginia's surface water quality standards also include criteria for man-made lakes and reservoirs to protect aquatic life and recreational designated uses from the impacts of nutrients. In Maryland, surface water quality standards

are included in MDE regulations located in ([COMAR 26.08.02](#)). Groundwater supply source protections are discussed in **Section 4.3**.

5.7.2 Identification and Existing Conditions

The location of the Virginia Department of Health-registered surface water intakes and intake watersheds and groundwater source points will be determined for the study area using the most recent version of CEDAR data available or use of data provided by the Virginia Department of Health during the scoping phase of the study. In Maryland, the [Designated Uses/Use Class Map](#) would be used to determine the location and extent of surface water classes in the study area.

5.7.3 Environmental Consequences

Potential impacts will be calculated by performing GIS or CAD overlays of the LOD with identified water supply sources in the study area. Total impact values to sources will be included in the NRTR and summarized in the NEPA document. Potential avoidance and minimization measures will be evaluated, and the environmental consequences of unavoidable impacts will be qualitatively evaluated and discussed.

6 INDIRECT AND CUMULATIVE EFFECTS

This section describes VDOT's established approach to indirect and cumulative effect analysis. The approach discussed here will be refined and tailored to the I-495 SEL Study as alternatives and impact analyses progress but will remain consistent with the general approach described below.

6.1 REGULATORY CONTEXT

In June 2020 VDOT formalized *Virginia Department of Transportation: Environmental Division ICE Analysis Environmental Memorandum* (EM-NEPA-715) which provides direction for completing ICE analyses for VDOT studies. This EM will serve as the basis for the level of detail included with the ICE analysis completed for the NEPA document.

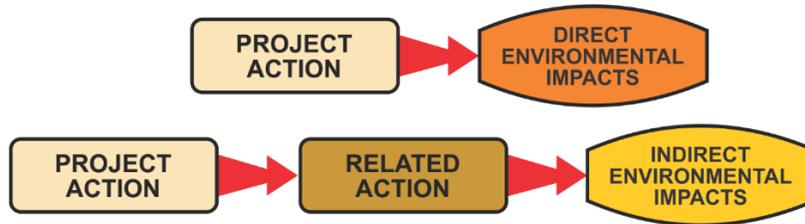
The final rule updating the CEQ regulations for implementing NEPA, issued on July 16, 2020, removes the requirement to assess ICE. However, the updated regulations do not prohibit consideration of ICE. Therefore, the I-495 SEL Study will evaluate ICE as documented in the EM, following the requirements and processes outlined in FHWA's [Position Paper on Secondary and Cumulative Impact Assessment in the Highway Project Development Process](#) (1992), FHWA's [Questions and Answers on Considering Indirect and Cumulative Impacts in the NEPA Process](#) (2019), the Transportation Research Board's (TRB) National Cooperative Highway Research Program (NCHRP) Report 466: [Desk Reference for Estimating the Indirect Effect of Proposed Transportation Projects](#) (2002), NCHRP Project 25-25 Task 22: [Forecasting Indirect Land Use Effects for Transportation Projects](#) (2007), NCHRP Project 25-25 Task 11: [Indirect and Cumulative Impact Analysis](#) (2006), as well as [CEQ's Considering Cumulative Effects under the National Environmental Policy Act](#) (1997) and [Guidance on the Consideration of Past Actions in Cumulative Effects Analysis](#) (2005). VDOT will also consider and incorporate other federal, state, and/or agency regulations or guidance in effect at the time the ICE analysis is prepared for this study, as applicable.

For the purpose of the ICE analysis, effects are defined as follows:

- Direct effects are caused by the action and occur at the same time and place
- Indirect effects 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. These indirect effects are

related actions that would or could not occur without the implementation of the proposed project, as illustrated in **Figure 5-1**.

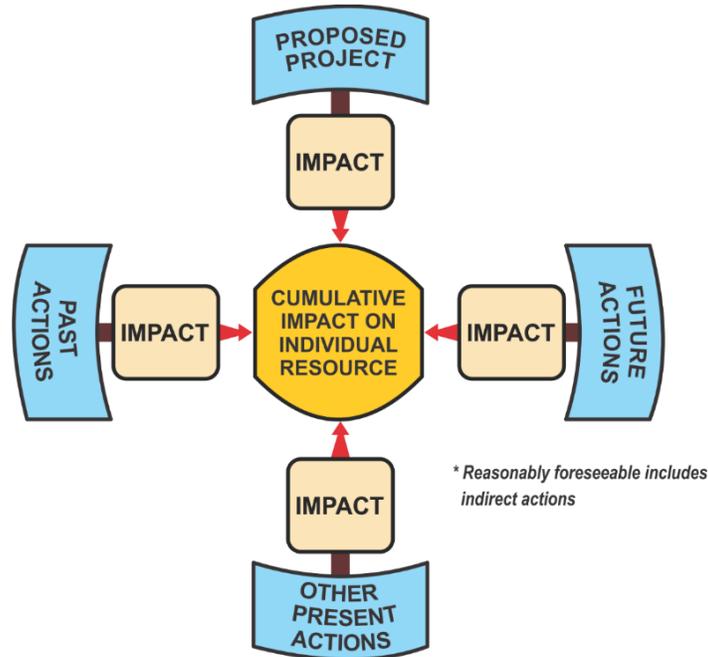
Figure 6-1: Direct vs. Indirect Environmental Impacts



Source: FHWA (2019).

Cumulative impact is 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 impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative impacts include the total of all impacts, direct and indirect, experienced by a particular resource that have occurred, are occurring, and would likely occur as a result of any action or influence, including effects of a Federal activity (EPA, 1999), as illustrated in **Figure 5-2**.

Figure 6-2: Cumulative Impacts



* Reasonably foreseeable includes indirect actions

Source: FHWA (2019).

The terms “effects” and “impacts” are considered synonymous, as used in the CEQ regulations. CEQ has provided guidance on how to define reasonably foreseeable actions, based upon court opinions. CEQ makes it 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 impacts (CEQ 1981, amended 1986, [Forty Most Asked Questions Concerning CEQ's](#)

[National Environmental Policy Act Regulations](#)). 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, 2019 [Questions and Answers on Considering Indirect and Cumulative Impacts in the NEPA Process](#)). This direction on identifying reasonably foreseeable actions will be considered in both the indirect effects and cumulative effects analyses. The specific methodologies on how these analyses will be conducted are presented for ICE, respectively.

6.2 METHODOLOGY

6.2.1 Indirect Effects

VDOT and FHWA have agreed that the methods to be used for analyzing indirect effects are those described in the TRB's NCHRP Report 466, [Desk Reference for Estimating the Indirect Effect of Proposed Transportation Projects](#) (TRB, 2002). This approach was discussed at the February 4, 2015, Federal agency partnering meeting as the general approach to be used for indirect effects analyses in VDOT location studies.

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

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

The NCHRP Report 466 describes an eight-step framework for estimating indirect effects; however, VDOT analyses combine **Steps 6 and 7** into one step to analyze indirect effects and evaluate the analysis results. The seven steps are:

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 Potentially Significant Indirect Effects for Analysis

Step 6. Analyze Indirect Effects and Evaluate Analysis Results

Step 7. Assess Consequences and Develop Mitigation

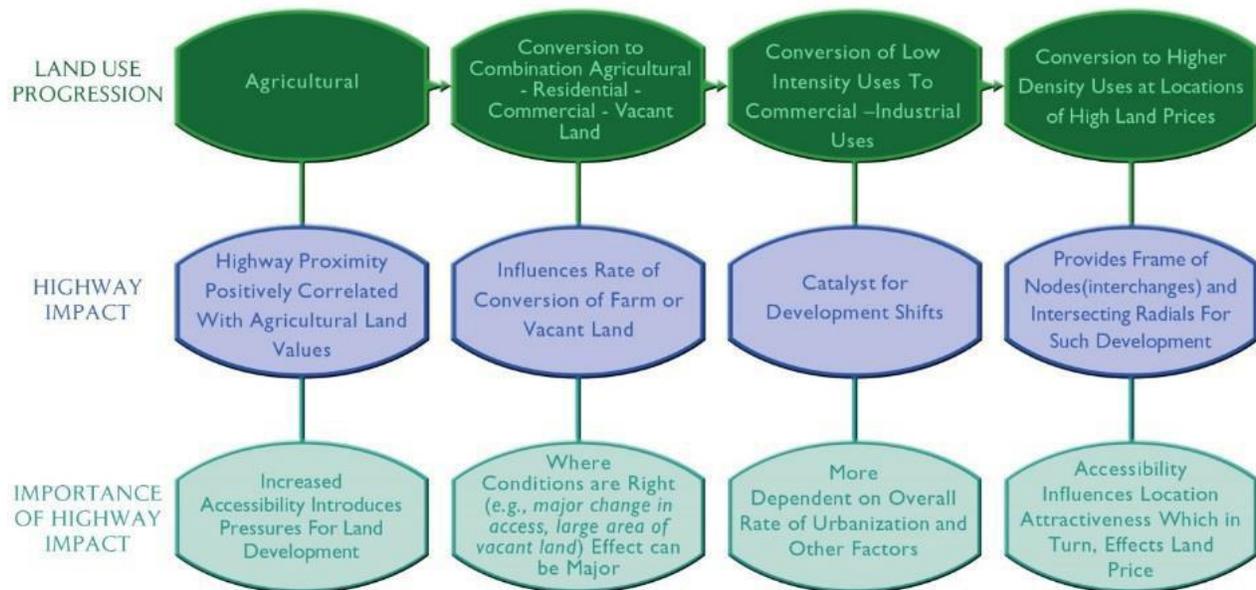
In addition, the ICE analysis will follow EM-NEPA-715, which incorporates guidance developed by the North Carolina Department of Transportation's (NCDOT) [Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, Vol. II: Practitioners Handbook](#) (NCDOT, 2001), in identifying important characteristics for induced growth in the study area and methodologies in establishing the appropriate geographic boundaries for examining potential induced growth.

Transportation projects 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. Development of vacant land, or conversion of the built environment to more intensive uses, is often a consequence of transportation

projects. Important characteristics for induced growth are the guidance. These characteristics include existing land use conditions in the project area, increased accessibility that may result from new transportation projects, local political and economic conditions, and the availability of other infrastructure and the rate of urbanization in the region.

The guidance illustrates the different stages of development and how a transportation project may influence induced growth impacts (Figure 5-3). The guidance indicates induced growth impacts are most often found, and will be evaluated in, an induced growth study area extending up to 1 mile around a freeway interchange and 2 to 5 miles along major feeder roads. Two principal factors influencing the likelihood of induced growth are the extent and maturity of the existing transportation infrastructure and land availability. It should be noted that, while the guidance is intended to have a broad application with emphasis on highway projects, the I-495 SEL Study focuses on the potential construction of an active transportation connection in a highly urbanized environment with significant protected lands. As a result, land uses are unlikely to change substantially because of the proposed action. Therefore, the guidance will be adapted to fit the context and alternatives being evaluated.

Figure 6-3: Highway Investment on Typical Progress of Urbanization



Source: NCDOT (2001)

To complete these steps, the required analyses rely on planning judgment that is described in the NCHRP 25-25 program, Task 22, [Forecasting Indirect Land Use Effects of Transportation Projects](#) (TRB, 2007). Planning judgment relies on experience and expertise of the study team combined with previously published reports and data. As stated in that report, “Planning judgment is a structured process for analyzing and forecasting land use change that relies on an understanding of the basics of transportation/land use interactions, basic data sources, asking the right questions, and using rules of thumb from research to make informed judgments.” For the purposes of this study process, VDOT planners and technical experts, with opportunity for review and comment from Cooperating and Participating Agencies, will make judgments about impacts rather than modeling to provide estimates of those impacts. The indirect effects analysis of wetlands and other natural resources, such as streams and wildlife habitat, is also based on an understanding of the proposed design, the natural resources in the study area, professional experience, past scientific studies of the effects of similar projects, and input from appropriate regulatory agencies during the scoping process.

The direction provided in the TRB document will be the basis for the indirect effects analysis.

6.2.1.1 Step 1: Scoping

Scoping for Location Studies will involve a proactive approach. Scoping letters will be sent to local, state, and Federal agencies and non-governmental organizations. Letters will be tailored to each recipient requesting additional input and information on resources and issues they have knowledge of or are within their purview. Where appropriate, letters will include a questionnaire that addresses the following topics, as appropriate:

- Input on the appropriate ICE study area for specific resources of interest, such as natural resources or communities that should be included in the ICE study area
- Input on existing and historical data/reports for resources within the proposed ICE study area(s). To conduct meaningful analysis of a broader study area, agencies will be asked to identify available data to document the proposed ICE study area and changes over time. For example, this may include data on existing wetlands and streams or population and employment trends
- Validation of data within the study area. Scoping letters sent to local/regional planning agencies will reference, or be accompanied by, recent census data to ensure it is the best/most accurate data to use for the ICE analysis. This also supports socioeconomic and EJ analysis in the NEPA document
- A request for other unspecified input into the ICE analysis

The scoping process will include reviewing local planning documents and other resources such as previously completed NEPA documents to better inform the ICE analysis. Additional public scoping outreach will occur through Public Information Meetings (PIM) and agency meetings. These reviews and meetings will be used to inform the ICE assessment and to develop qualitative and quantitative analysis methods applicable to the resource areas under review. Concurring, Cooperating, and Participating agencies may also provide additional information to inform the ICE analysis in response to their review of the methods proposed for the study. This approach will allow all data/input to be identified during scoping and inform development of the ICE Technical Report that can be presented to agencies while minimizing data gaps or discrepancies.

Accomplishments of **Step 1** will consist of written and graphical content for inclusion in the ICE Technical Report and NEPA document, concerning:

- List of interested agencies/organizations/persons for contact regarding ICE during scoping
- Results of review of previous NEPA documentation and public and agency comments on the documentation to help identify important issues to be addressed
- A matrix summary of ICE comments, data, and questions received during scoping/meetings
- Results of review of comments submitted during scoping and PIMs
- Results of research of current local comprehensive plans and other local and regional planning documents to help identify important issues to be addressed
- Description of coordination undertaken with agency and local and regional officials to establish the scope of the indirect effects analysis. This will include input and data from Concurring agencies and other groups, or agencies contacted that provide information for the study
- Graphics depicting the geographic boundaries of the indirect effects analysis

6.2.1.2 Step 2: Identifying Study Area Directions and Goals

This step provides the context for understanding changes and trends that have occurred over time resulting in current resource conditions in the study area and identifies goals as expressed in area plans for the future.

This section “tells the story” of the study area over the temporal bounds of the ICE analysis based on information gathered during scoping and review of data to assess trends. As such, the geographic study areas appropriate for assessing indirect effects on particular resources will be defined in this step.

Completion of **Step 2** will consist of written, tabular, and graphical content for inclusion in the ICE Technical Report:

- Population and employment trends based on census and geographic data
- Growth trends based on reports, historic USGS maps, and aerial photography
- Planning and forecasting documents concerning past, present, and future economic development, employment, land use, zoning, transportation, resource protection, and recreation
- The history of the origins of the proposed action and previous studies undertaken in its development

6.2.1.3 Step 3: Inventory Notable Features in the Study Area

Notable features are those social, ecological, recreational, or historical resources considered valuable or unique and which may be less able to bear impacts from a transportation improvement. Previous planning documents for the proposed action will be reviewed to assist in developing the list of notable features. Coupled with current information and comments gathered during scoping; these results will then be provided to VDOT’s resource analysts for consideration in individual technical reports supporting the NEPA document. The final list of notable features will be selected at this step based on the potential for direct effects of the alternatives described in resource-specific technical reports, and potential for their indirect effects. Potential indirect effects on resources will be presented in the order discussed in the NEPA document.

Step 3 will result in written and graphical content for describing the notable features in the study area in the ICE Technical Report and NEPA document.

6.2.1.4 Step 4: Identify Impact-Causing Activities of the Proposed Action and Alternatives

The goal of this step will be to summarize the potential direct impacts of the proposed alternatives to notable features as discussed in **Step 3** and provide consistency with regional direction and goals as presented in **Step 2** so that their causal relation to indirect effects can be discussed in the following sections. Direct effects as summarized in the NEPA document will be evaluated.

Completion of **Step 4** will result in a comprehensive list of impact-causing actions of each of the study alternatives for inclusion in the ICE Technical Report and NEPA document.

6.2.1.5 Step 5: Identify Potentially Significant Indirect Effects for Analysis

The resources potentially indirectly affected as a result of direct impacts of each alternative will be presented in **Step 5**. For each resource, the analysis will summarize how the impact-causing activities discussed in **Step 4** may result in indirect effects on the notable features discussed in **Step 3**. **Step 5** will provide a summary table of 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
- Whether further analysis is warranted

For those notable features identified in **Step 3** that are not carried forward for detailed analysis of potential indirect effects, a brief explanation of the rationale of the decision will be provided.

The indirect effects analysis will focus on the potential for ecological and socioeconomic impacts resulting from the alternatives that could occur outside of the area of direct impact including encroachment-alteration impacts, induced growth impacts, and impacts related to induced growth.

Induced growth effects are an important part of the indirect effects analysis. The NCDOT guidance describes the conditions in which induced growth may occur. **Step 5** will use VDOT language, based on NCDOT guidance, in the ICE Technical Report and NEPA document to describe transportation investment impacts on the typical process to urbanization. If any Build Alternative evaluated in the NEPA document would increase capacity on study area roadways or provide new or improved access to adjacent lands adjacent to the transportation investment, induced growth could occur and would be considered.

In summary, the results of **Step 5** will be included within a table outlining the indirect effects being considered. Moreover, this effort will identify those notable features with indirect effects to be carried forward for analysis for inclusion in the ICE Technical Report and NEPA document.

6.2.1.6 Step 6: Analyze Indirect Effects and Evaluate Analysis Results

Using planning judgment, this step will fully explore the indirect effects and induced growth potentially resulting from each of the alternatives analyzed in the NEPA document. The written section will also be organized to match the order of presentation in the NEPA document. Each alternative, including the No Build Alternative, will be discussed individually. Impacts associated with induced growth will be discussed separately from other indirect effects. The induced growth analysis will identify the designated growth areas within the Induced Growth Study Area and calculate the acres by land use class that are outside of designated growth areas but within the Induced Growth Study Area. Undeveloped land outside the designated growth areas within the Induced Growth Study Area establishes a baseline for potential induced growth for the applicable build alternative. As the majority of the study area is located in highly urbanized portions of Alexandria and Fairfax County in Virginia and Prince George's County in Maryland, and partially bounded by NPS-owned land in Prince George's County, it is anticipated that developable land within the Induced Growth Study Area will be limited.

Developed lands, wetlands, streams, and floodplains in the Induced Growth Study Area will be generally identified based on the most recent National Land Cover Dataset, the National Wetlands Inventory, and the National Hydrography Dataset, respectively. VDOT and FHWA will conduct early coordination regarding this step to finalize the list of indirect and induced growth effects on each resource and resulting discussions before presenting the list to the agencies.

Step 6 will conclude with written and graphical content for inclusion in the ICE Technical Report and NEPA document.

6.2.1.7 Step 7: Assess Consequences and Develop Mitigation

Step 7 will summarize how the impacts identified in the previous section affects the overall resource and/or study area and will provide a summary of potential mitigation measures (if appropriate). The severity of the effects will be presented by alternative. Commonly applied minimization and avoidance measures to avoid or lessen the severity of indirect impacts, including those of induced growth, will be discussed in the NEPA document.

Step 7 will also summarize the indirect and induced growth effects compared to the goals described in **Step 2** and notable features of the study area presented in **Step 3**. This summary will be included in the ICE Technical Report and NEPA document.

6.2.2 Cumulative Effects

Much of the information relevant to the cumulative effects analysis will be gathered from the indirect and induced growth effects analyses. To document cumulative effects for a study, the analysis will follow the 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](#) (2019). The parts of this process are described below.

6.2.2.1 What is the geographic area affected by the study?

The geographic boundaries for the cumulative effects analysis will be based on the individual natural, socioeconomic, and historic resources study areas established for the indirect effects analyses, which may be larger than the study area for direct effects.

6.2.2.2 What are the temporal boundaries for the study?

The analysis of cumulative effects must consider past, present, and reasonably foreseeable future actions. The temporal boundaries set the timeframe in which "past" and "future" actions will be considered in the analysis. Based on available information, the study will include the original construction dates of the existing transportation system and discuss conditions of specific resources to qualitatively document the transition from undeveloped lands to the study area's current urban and suburban setting. The future timeframe will be based on the design year for proposed projects, which is the latest year for which the proposed improvement is expected to perform as designed.

The result of this effort will be a written description of temporal boundaries for the analysis in the ICE Technical Report and NEPA document.

6.2.2.3 What are the resources affected by the study?

The resources affected by the study will be the same as the notable features identified in **Step 3** of the indirect effects analysis. The results will be the same as for **Step 3** for inclusion in the ICE Technical Report and NEPA document.

6.2.2.4 What are the other past, present, and reasonably foreseeable actions that have impacted or may impact these resources?

Impacts from other past, present, and reasonably foreseeable future actions on resources or notable features within the study area's geographic and temporal boundaries will be identified. This will be accomplished in several ways:

- By referring to historic documentation of past actions (including development) and their environmental effects gathered in **Step 2**
- Reviewing information gathered during scoping
- Consulting with local and regional agencies on their current and future projects
- Acquiring data on past, present, and future projects and permits issued from relevant land managing and permitting agencies
- Reviewing previously completed NEPA documents and local comprehensive plans and forecasts

In sum, addressing this question will result in a list of relevant past, present, and reasonably foreseeable actions to include in the ICE Technical Report and NEPA document.

6.2.2.5 What were those impacts?

Past, present, and reasonably foreseeable impacts on notable features occurring within the geographic and temporal boundaries of the ICE study area, including those indirect and direct effects of the evaluated alternatives, will be presented separately. The relative incremental contribution of the proposed alternatives to cumulative effects on specific resources, both beneficial and adverse, will be documented.

Quantitative and qualitative methods to assess the impacts will be informed by scoping, agency coordination, and the availability of published data. For example, it is anticipated that USACE may provide permitted wetland and stream impact information within a given watershed over a specific time range. This will identify estimated past impacts within the Cumulative Effects Study Area. Historic aerial photographs and topographic maps may also assist in the absence of quantitative data, and those important to the analysis will be appended to the ICE Technical Report, if utilized. In the absence of NEPA documents and permits, quantification of impacts from previous projects may not be possible. In these cases, the discussion will focus on impact trends, locations, and the general magnitude of impacts. In addition, the general conditions of resources in the study area will be evaluated using existing information such as the presence of impaired waters, and condition information obtained through use of DEQ's Wetland Condition Assessment Tool, and the Interactive Stream Assessment Resource database maintained by Virginia Commonwealth University.

Reasonably foreseeable impacts will be identified based on trends and agency forecasts, such as long-range transportation plans and economic and demographic forecasts within the geographic and temporal frames of reference for the study.

The assessment of impacts will result in a tabular presentation of impact descriptions by resource and alternative, accompanied by explanatory text and graphics as needed for inclusion in the ICE Technical Report and NEPA document.

6.2.2.6 What is the overall impact on these various resources from the accumulation of the actions?

The overall impacts on various notable features will be summarized based on the accumulation of impacts caused by evaluated alternatives in combination with other past, present, and reasonably foreseeable actions. The significance and magnitude of the overall cumulative impact of the evaluated alternatives will be summarized. Tabular and narrative conclusions of the cumulative effects analysis will be included in the ICE Technical Report and NEPA document.

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