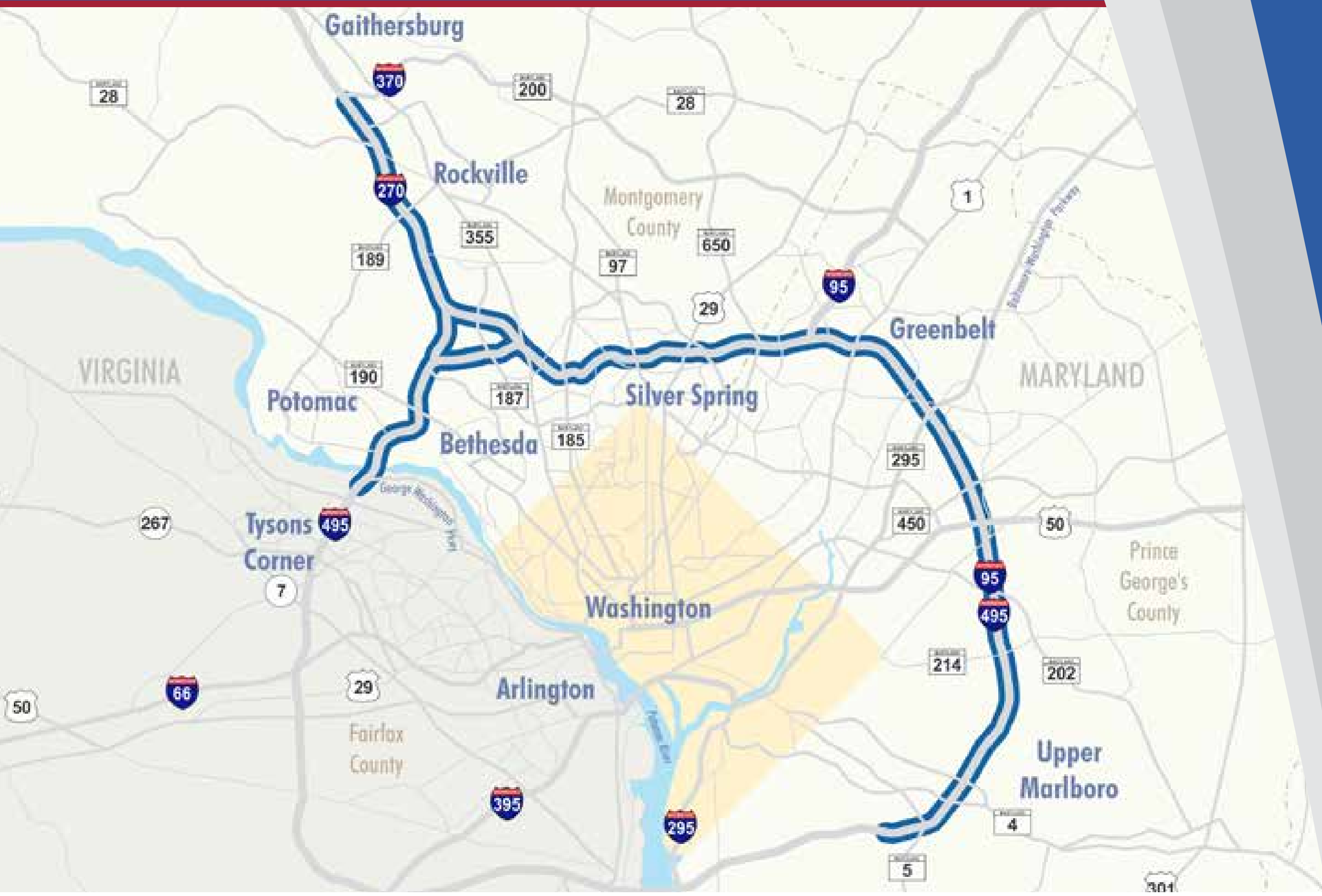
I-495 & I-270 MANAGED LANES STUDY

Draft Environmental Impact Statement and Draft Section 4(f) Evaluation

June 2020

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

U.S. Department of Transportation
Federal Highway Administration



I-495 & I-270 MANAGED LANES STUDY

Montgomery and Prince George's Counties, Maryland & Fairfax County, Virginia

DRAFT ENVIRONMENTAL IMPACT STATEMENT
and
DRAFT SECTION 4(f) EVALUATION

Submitted Pursuant to:
42 U.S.C. §4332(2)(C) and 49 U.S.C. §303

By:
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
and
MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

In Cooperation with:
U.S. Army Corp of Engineers, National Park Service
U.S. Environmental Protection Agency, National Capital Planning Commission,
Maryland Department of Environment, Maryland Department of Natural Resources,
Virginia Department of Transportation, and Maryland National Capital Park and Planning Commission

06/22/2020
Date of Approval

Tim Smith
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State Highway Administration

6/24/2020
Date of Approval

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The purpose of the I-495 & I-270 Managed Lanes Study is to develop a travel demand management solution(s) that addresses congestion, improves trip reliability on I-495 and I-270 within the Study limits, and enhances existing and planned multimodal mobility and connectivity. The specific Study scope includes: I-495 from south of the George Washington Memorial Parkway in Fairfax County, Virginia, including improvements to the American Legion Bridge over the Potomac River, to west of MD 5, and along I-270 from I-495 to north of I-370, including the East and West I-270 Spurs. This Draft Environmental Impact Statement (DEIS) presents the Study Purpose and Need, reasonable alternatives, the existing environmental conditions, and the analysis of the anticipated beneficial and adverse environmental effects of the alternatives. The DEIS provides a comparative analysis between the No Build Alternative and six Build Alternatives; the Preferred Alternative will be identified in the Final Environmental Impact Statement (FEIS). Comments on the DEIS are due by October 8, 2020 and should be sent to Lisa B. Choplin at the above address or submitted using the online comment form at 495-270-p3.com/DEIS. The Federal Highway Administration does not intend to issue a combined FEIS / Record of Decision.

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MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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ABBREVIATIONS AND ACRONYMS

AA	Alternatives Analysis
AASHTO	American Association of State Highway and Transportation Officials
AADT	Average Annual Daily Traffic
ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
ADT	Annual Daily Traffic
APE	Area of Potential Effects
ARDS	Alternatives Retained for Detailed Study
AST	Aboveground Storage Tank
ATM	Active Traffic Management
BMP	Best Management Practice
BO	Biological Opinion
BRT	Bus Rapid Transit
CAA	Clean Air Act
CCT	Corridor Cities Transitway
C-D	Collector-Distributor
CCA	Capper-Cramton Act
CDP	Census Designated Place
CEA	Community Effects Assessment
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	Methane
CLRP	Constrained Long-Range Plan
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COMAR	Code of Maryland Regulations
CP_v	Channel Protection Volume
CRZ	Critical Root Zone
CSXT	CSX Transportation
CTB	Consolidated Transportation Bonds
CWA	Clean Water Act
dB	Decibel
dBA	A-weighted Decibel
DEIS	Draft Environmental Impact Statement
DHR	Department of Historical Resources
DMS	Dynamic message signs
DSL	Dynamic speed limit
E&S	Erosion and Sediment Control
EA	Environmental Assessment
EDR	Environmental Data Resources, Inc.

EFH	Essential Fish Habitat
EIA	Energy Information Administration
EJ	Environmental Justice
EO	Executive Order
ESD	Environmental Site Design
ETC	Electronic Toll Collection
ETL	Express Toll Lane
FAQs	Frequently Asked Questions
FAST	Fixing America's Surface Transportation Act
FCDPWES	Fairfax County Department of Public Works and Environmental Services
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FFPA	Farmland Protection Policy Act
FHWA	Federal Highway Administration
FIDS	Forest Interior Dwelling Bird Species
FTA	Federal Transit Administration
FWCA	Fish and Wildlife Coordination Act
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GI	Green Infrastructure
GIA	Green Infrastructure Assessment
GIS	Geographic Information System
GP	General Purpose
GWMP	George Washington Memorial Parkway
HCS	Highway Capacity Software
HFC	Hydrofluorocarbons
HOT	High-occupancy Toll
HOV	High-occupancy Vehicle
HUD	Housing and Urban Development
IAWG	Interagency Working Group
IBI	Indices of Biological Integrity
ICC	Intercounty Connector
ICE	Indirect and Cumulative Effects
ICM	Innovative Congestion Management
IPaC	Information Planning and Consultation
IRVM	Integrated Roadside Vegetation Management
JBA	Joint Base Andrews
LF	Linear Feet
LOD	Limits of Disturbance
LOS	Level of Service
LUST	Leaking Underground Storage Tank

MARC	Maryland Area Regional Commuter
MBSS	Maryland Biological Stream Survey
MCDEP	Montgomery County Department of Environmental Protection
MDE	Maryland Department of the Environment
MDL	Maryland Department of Labor
MDNR	Maryland Department of Natural Resources
MDOT SHA	Maryland Department of Transportation State Highway Administration
MDP	Maryland Department of Planning
MDTA	Maryland Transportation Authority
MGS	Maryland Geological Survey
MHT	Maryland Historical Trust
M-NCPPC	Maryland-National Capital Park and Planning Commission
MOU	Memorandum of Understanding
MP	Master Plan
MSATs	Mobile Source Air Toxics
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSTM	Maryland Statewide Transportation Model
MTA	Maryland Transit Administration
MWCOG	Metropolitan Washington Council of Governments
N_2O	Nitrous Oxide
NAAQS	National Air Quality Standards
NAC	Noise Abatement Criteria
NB	Northbound
NCHRP	National Cooperative Highway Research Program
NCPC	National Capital Planning Commission
NCRTPB	National Capital Region Transportation Planning Board
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLEB	Northern Long-eared Bat
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPL	National Priorities List
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	Noise-sensitive Area
NWI	National Wetlands Inventory
O_3	Ozone
OFD	One Federal Decision

OHW	Ordinary High Water
OMB	Office of Management and Budget
OWJ	Officials with Jurisdiction
P3	Public-Private Partnership
PA	Programmatic Agreement
Pb	Lead
PCB	Polychlorinated Biphenyl
PECs	Potential Environmental Concerns
PEM	Palustrine Emergent
PFO	Palustrine Forested
PGDoE	Prince George's County Department of the Environment
PM	Particulate Matter
PSI	Preliminary Site Investigations
PSS	Palustrine Scrub-shrub
PTI	Planning Time Index
Q_p	Quantity Management
QW	Queue Warning
RBP	Rapid Bioassessment Protocol
Re_v	Recharge Volume
RFP	Request for Proposals
ROD	Record of Decision
ROW	Right-of-way
RTE	Rare, Threatened, and Endangered
SB	Southbound
SDWA	Safe Drinking Water Act
SF	Square Feet
SGCN	Species of Greatest Conservation Need
SO_2	Sulfur Dioxide
SPA	Special Protection Area
SPUI	Single Point Urban Interchange
SSPRA	Sensitive Species Project Review Areas
SVP	Stream Valley Park
SWM	Stormwater Management
TAZ	Traffic Analysis Zone
TDM	Transportation Demand Management
TEA	Targeted Ecological Area
TFAD	Travel Forecasting and Analysis Division
TIP	Transportation Improvement Program
TMDL	Total Maximum Daily Loads
TNM	Traffic Noise Model
TPB	Transportation Planning Board

TSM	Transportation System Management
TTI	Travel Time Index
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USDA BARC	United States Department of Agriculture Beltsville Agricultural Research Center
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground Storage Tank
VAC	Code of Virginia
VDACS	Virginia Department of Agriculture and Consumer Services
VDCR	Virginia Department of Conservation and Recreation
VDCR-DNH	Virginia Department of Conservation and Recreation- National Heritage
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
VDH	Virginia Department of Health
VDOF	Virginia Department of Forestry
VDOT	Virginia Department of Transportation
VMRC	Virginia Marine Resources Commission
VWPP	Virginia Water Protection Permit
VMT	Vehicle Miles Traveled
WHS	Wildlife and Heritage Service
WMATA	Washington Metropolitan Area Transit Authority
WQV	Water Quality Volume

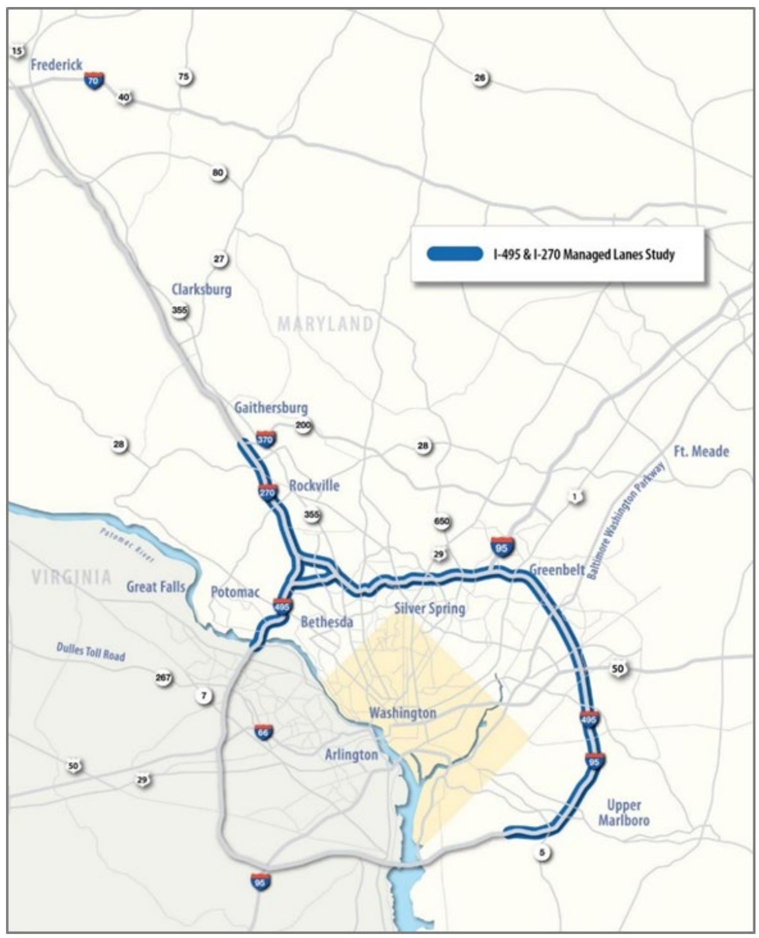
EXECUTIVE SUMMARY

Study Overview

What Is the I-495 & I-270 Managed Lanes Study?

The I-495 & I-270 Managed Lanes Study (Study) is the first element of the broader I-495 & I-270 Public-Private Partnership (P3) Program. This Study is considering alternatives that address roadway congestion within the specific Study scope of 48 miles from I-495 from south of the George Washington Memorial Parkway in Fairfax County, Virginia, including improvements to the American Legion Bridge over the Potomac River, to west of MD 5, and along I-270 from I-495 to north of I-370, including the East and West I-270 Spurs. I-495 and I-270 in Maryland are the two most heavily traveled freeways in Maryland, each with an Average Annual Daily Traffic (AADT) volume up to 260,000 vehicles per day in 2018 (MDOT SHA, 2019) (refer to **Figure ES- 1**).

Figure ES- 1: I-495 & I-270 Managed Lanes Study Corridors



The Study evaluated rational end points, known as logical termini. The Study extends beyond the logical termini to include the area of influence for traffic and environmental analyses. There are three logical termini for the MLS as follows:

- **Western Terminus**: on I-495, 0.4 miles south of George Washington Memorial Parkway interchange; allows outer loop mainline improvements that are carried to the George Washington Memorial Parkway to be merged and transitioned into the existing mainline lanes without causing congestion due to lane drops and merges. The managed lanes would connect directly into the proposed extension of the Virginia Express Lanes.
- **Southern Terminus**: on I-495, 1.3 miles west of MD 5; allows inner loop mainline improvements that are carried to MD 5, a regional access controlled north-south highway, to be merged into the existing mainline lanes before the express-local system without causing congestion due to lane drops, weaving, and merging.

- **Northern Terminus**: on I-270, 0.6 miles north of I-370; allows northbound mainline improvements that are carried to I-370 to be merged and transitioned into the existing general purpose lanes and the high occupancy vehicle (HOV) lane safely, minimizing congestion due to lane drops and merges. I-370 links to MD 200, a major east-west tolled highway. The HOV lane from 0.6 miles north of I-370 will continue to its current terminus at MD 121 (Clarksburg Road), 8 miles north of I-370.

The traffic modeling and analysis has encompassed the next interchange beyond these three limits as the area of traffic influence. Furthermore, the logical termini for the area of environmental review and analysis area have been extended beyond these intersecting roadways to account for the necessary distance for the mainline improvements to tie into the existing roadway operations.

Who Is Leading the Study?

The Federal Highway Administration (FHWA), as the Lead Federal Agency, and Maryland Department of Transportation State Highway Administration (MDOT SHA), as the Local Project Sponsor, have prepared a Draft Environmental Impact Statement (DEIS) under the National Environmental Policy Act (NEPA) for the I-495 & I-270 Managed Lanes Study.

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What Other Agencies Are Involved in the Study?

FHWA and MDOT SHA have conducted extensive outreach with Federal, state, regional, and local agencies, in addition to interested stakeholders and the general public, throughout the duration of the Study. At the initiation of the Study, an Agency Coordination Plan was developed. The purpose of the Plan was to establish the structure and timing for coordination with the involved agencies during the Study (refer to **Chapter 7** and **Appendix P** of the DEIS for additional details).

Agencies actively involved in the Study include Cooperating and Participating Agencies. Cooperating Agencies are Federal agencies other than a Lead Agency that have jurisdiction by law or special expertise with respect to any environmental resources potentially impacted[1]. Participating Agencies are any Federal, state, tribal, regional, and local agencies that may have an interest in the Study and the environmental review process[2]. At the initiation of the Study, agencies were invited to be Cooperating, Participating, and Notified Agencies[3]. There are eight Cooperating, 18 Participating, and seven Notified Agencies for the Study. Refer to **Chapter 7, Table 7-1** for a complete list of these agencies and their roles.

The Cooperating Agencies for the Study are:

- US Army Corps of Engineers (USACE) Baltimore District
- US Environmental Protection Agency (EPA)
- National Park Service (NPS)
- National Capital Planning Commission (NCPC)
- MD Department of Environment (MDE)
- Maryland Department of Natural Resources (MDNR)
- Virginia DOT (VDOT)
- Maryland-National Capital Park and Planning Commission (M-NCPPC)

[1] Cooperating Agency as defined in 40 CFR 1508.5. A State or local agency of similar qualifications or, when the effects are on lands of tribal interest, a Native American tribe may, by agreement with the lead agencies, also become a Cooperating Agency.
[2] Participating Agency as defined in 23 USC 139(d)
[3] Notified Agencies have been defined for this Study to include all other agencies who could have an interest in the Study, or that have a role that is yet to be determined. These agencies would be notified of Study milestones concurrently with the public and those milestone notification points are part of the public involvement plan.

FHWA and MDOT SHA have held Interagency Working Group Meetings, as well as resource specific meetings with the agencies, and will continue to hold meetings with the Cooperating, Participating and other interested agencies to keep them informed and engaged in the environmental review process.

How Has the Public Been Engaged in the Study?

The public has been engaged at every step of the process, and are a key component of the NEPA process, including the review of this DEIS. To date, MDOT SHA has extensively engaged the public through the following ways, among others:

- Large Public Workshops
  - Four (4) Scoping Public Workshops
  - Four (4) Alternatives Public Workshops
  - Eight (8) Alternatives Retained for Detailed Study Public Workshops
- Community Association Meetings (21)
- Stakeholder/Large Landowner Meetings (85)
- Presentations to regional, state and local elected officials
- Actively maintaining public and elected officials mailing lists
- Program and Study Newsletters (3)
- Public and Elected Official Email Blasts
- Targeted Outreach to Underserved Communities
- Social Media
- Radio
- Regional and local newspapers
- P3 Program webpage (495-270-p3.com/)

How Has the Covid-19 Pandemic Impacted the Study?

MDOT SHA recognizes the substantial impact of the COVID-19 stay-at-home order on current transportation patterns throughout the region. We understand COVID-19 is impacting all Marylanders today – in how we work, in how we spend our free time, and in how we travel. While MDOT's number one priority is the health and safety of Marylanders, we are continuing with our efforts to ensure transportation improvements are being developed to meet our State's needs not only for today but for the next 20-plus years. We are aware of the reduced traffic on interstates such as I-495 and I-270 due to the COVID-19 stay-at-home order. MDOT SHA also acknowledges the uncertainty surrounding post-shutdown traffic levels and transit use. There is no definitive traffic model to predict how this unprecedented global pandemic will affect long-term future traffic projections and transit use. MDOT SHA is committed to tracking trends in travel behavior and monitoring traffic volumes over time as businesses and schools slowly begin to reopen. We will evaluate and consider all new information that becomes available to ensure the solutions will meet the needs of Marylanders now and in the future.

Draft Environmental Impact Statement

What Is the Draft Environmental Impact Statement?

The Draft Environmental Impact Statement (DEIS) provides a detailed description of the Study Purpose and Need, reasonable alternatives, the existing environmental conditions, and the analysis of the anticipated beneficial and adverse environmental effects and consequences of the alternatives, and potential mitigation. The DEIS provides a comparative analysis between the No Build Alternative and the Build Alternatives so that interested citizens, elected officials, government agencies, businesses, and other stakeholders can assess the potential social, cultural, and natural environmental effects of the Study. The DEIS is supported by 19 technical reports, which are listed in the adjacent text box and appended to the document.

What are the Supporting Technical Reports to the DEIS?

A. Purpose and Need Statement
B. Alternatives Technical Report
C. Traffic Technical Report
D. Environmental Resource Mapping
E. Community Effects Assessment/ Environmental Justice Technical Report
F. Draft Section 4(f) Evaluation
G. Cultural Resources Technical Report
H. Draft Section 106 Programmatic Agreement
I. Air Quality Technical Report
J. Noise Analysis Technical Report
K. Hazardous Materials Technical Report
L. Natural Resources Technical Report
M. Avoidance, Minimization & Impacts Report (AMR)
N. Draft Compensatory Mitigation Plan
O. Indirect and Cumulative Effects Technical Report
P. Public Involvement & Agency Coordination Technical Report
Q. Conceptual Mitigation Plan
R. Joint Permit Application
S. Environmental Assessment Form

After circulation of the DEIS, a Final Environmental Impact Statement (FEIS) will be developed. The FEIS will identify the Preferred Alternative and focus on any additional analysis and refinements of the data, as well as responding to substantive comments received on the Draft EIS. Upon completion of the EIS process, the Federal Lead Agency issues a Record of Decision (ROD) which identifies the Selected Action as a result of the Study, after considering a reasonable range of alternatives and all practicable means to avoid, minimize, or mitigate environmental harm.

What Is the Format of the DEIS?

The DEIS provides a summary of the 19 technical reports and contains ten chapters. Detailed documentation of existing conditions, methodologies, assessments of effects, and conceptual mitigation, when applicable, are included in the Study technical reports appended to this DEIS (**Appendices A through S**).

- **Chapter 1** presents the Study's Purpose and Need. This chapter is supported by the *Purpose and Need Statement* (**Appendix A**).
- **Chapter 2** presents the chronology of alternatives development and analysis for the Study. It includes a description of the alternatives considered and screening analysis, including the No Build Alternative. It also describes other common elements of the Build Alternatives such as, limits of disturbance (LOD),[4] managed lanes access, stormwater management, construction and short-term effects, transit

[4] The limits of disturbance are the proposed boundary within which all construction, staging, materials storage, grading, clearing, erosion and sediment control, landscaping, drainage, stormwater management, noise barrier replacement/construction, and related activities would occur.

elements, pedestrian and bicycle considerations, tolling, financial viability, and the benefits of managed lanes. This chapter is supported by the *Alternatives Technical Report* (**Appendix B**).

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- **Chapter 3** presents the existing and future traffic conditions and the results from the traffic operational analyses conducted for each of the Build Alternatives. This chapter is supported by the *Traffic Technical Report* (**Appendix C**).
- **Chapter 4** presents the existing environmental conditions (affected environment) identified along the study corridors, the anticipated effects to the resources (environmental consequences), and measures to avoid, minimize, and mitigate potential environmental effects, where applicable. This chapter is supported by **Appendices D through R**.
- **Chapter 5** presents a summary of the *Draft Section 4(f) Evaluation*, which discusses the potential effects to significant public parks, recreational areas, and historic properties in compliance with Section 4(f) of the US Department of Transportation (USDOT) Act of 1966. This chapter is supported by *Draft Section 4(f) Evaluation* (**Appendix F**).
- **Chapter 6** presents the Executive Order 13807: *Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects*[5] that requires Federal agencies to process environmental reviews and authorization decisions for major infrastructure projects as "One Federal Decision."
- **Chapter 7** presents a summary of the public outreach and agency coordination for the Study that has occurred, to date. This chapter is supported by the *Public Involvement and Agency Coordination Technical Report* (**Appendix P**) and other resource-specific appendices.
- **Chapters 8 and 9** present the List of Preparers of the DEIS and the Distribution List of agencies, organizations, and persons to whom the DEIS was made available for review and comment.
- **Chapter 10** presents the references for the DEIS.

What Are Some Common Terms Used Throughout the DEIS?

- ***Study corridors***, as defined in the Study scope, includes I-495 from south of the George Washington Memorial Parkway in Fairfax County, Virginia, including the American Legion Bridge crossing over the Potomac River, to west of MD 5 in Prince George's County, Maryland; and I-270 from I-495 to I-370 in Montgomery County, including the east and west I-270 spurs north of I-495. (Refer to **Chapter 1** for additional details.)
- ***Corridor study boundary*** was defined as 48 miles long and approximately 300 feet on either side of the centerline of I-495 and I-270. It was used to define the data collection area for gathering information on existing environmental conditions. The corridor study boundary was used in the environmental resource investigations for Natural Resources, summarized in **Sections 4.11 through 4.20 of Chapter 4**, and parks and Section 4(f) Resources summarized in **Section 4.4** and **Chapter 5**.
- ***Limits of Disturbance (LOD)*** were defined for each Build Alternative as the proposed boundary within which all construction, staging, materials storage, grading, clearing, erosion and sediment control,

[5] https://www.whitehouse.gov/presidential-actions/presidential-executive-order-establishing-discipline-accountability-environmental-review-permitting-process-infrastructure/

landscaping, drainage, stormwater management (SWM), noise barrier replacement/construction, and related construction activities would occur (refer to **Chapter 2, Section 2.7.4**).

What Are The Ways to Comment on the DEIS and Draft Section 4(f) Document?

FHWA and MDOT SHA invite interested elected officials, state and local governments, other Federal agencies, Native American tribal governments, organizations, and members of the public to provide comments on the DEIS and Draft Section 4(f) Evaluation. The DEIS for the Study and technical reports can be viewed and downloaded from the project website at: https://495-270-p3.com/DEIS/

The public comment period opens on July 10, 2020 and will continue until October 8, 2020. ***Written and oral comments will be given equal consideration***, and FHWA will review all comments, and consider and respond to all substantive comments received or postmarked by that date in the preparation of the FEIS. Comments received or postmarked after that date will be reviewed and considered to the extent practicable. A series of virtual and in-person public hearings will occur at least 30 days after the Notice of Availability. Refer to https://495-270-p3.com/DEIS/ for the latest information on the Public Hearings dates and locations.

Comments on the DEIS may be made by:

- Oral testimony at one of the Public Hearings in the main hearing room
- Oral testimony to a court reporter at a Public Hearing in private in a separate room
- DEIS comment form at https://495-270-p3.com/DEIS/
- Email to MLS-NEPA-P3@mdot.maryland.gov
- Written comments on a comment form at a Public Hearing
- Letters to Lisa B. Choplin, DBIA, I-495 & I-270 P3 Program Director, I-495 & I-270 P3 Office, 707 North Calvert Street, Mail Stop P-601, Baltimore MD 21202

What Is the Study's Purpose and Need?

The Study Purpose and Need was developed through a comprehensive process that included the examination of past studies, a review of existing regional plans, and an analysis of the environmental and socioeconomic conditions in the region. The full Purpose and Need Statement that was concurred upon by the Cooperating Agencies[6] in November 2018 is included in **Appendix A**.

The Study's purpose is to develop a travel demand management solution(s) that addresses congestion, improves trip reliability on I-495 and I-270 within the Study limits, and enhances existing and planned multimodal mobility and connectivity.

The needs for the Study are:

- Accommodate Existing Traffic and Long-Term Traffic Growth
- Enhance Trip Reliability
- Provide Additional Roadway Travel Choices
- Accommodate Homeland Security
- Improve Movement of Goods and Services

[6] NCPC concurred on the Purpose and Need only; M-NCPPC did not concur on the Purpose and Need.

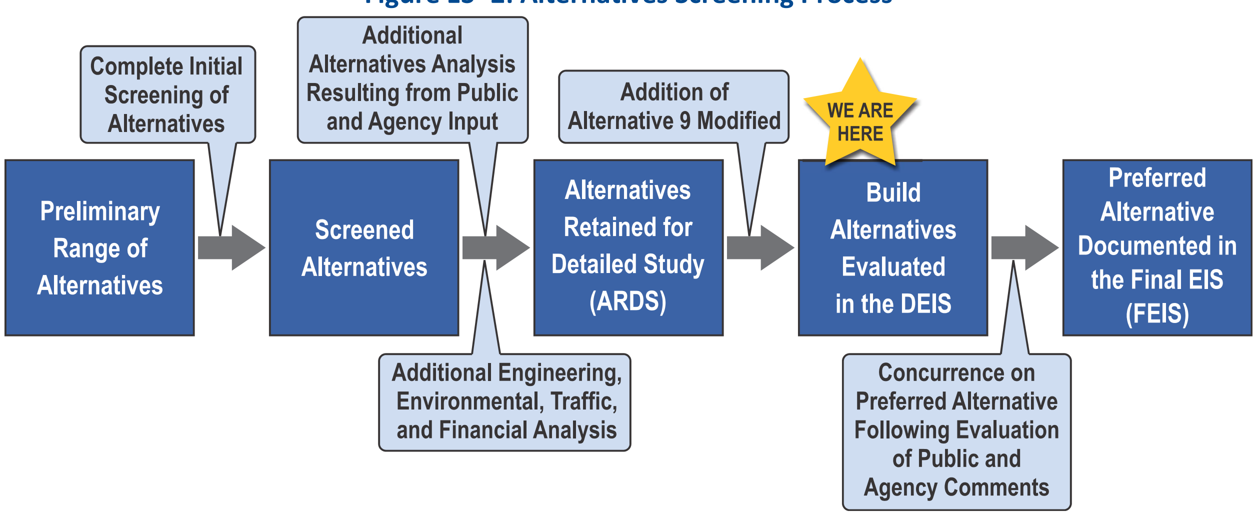
Two goals for the Study were identified in addition to the needs: (1) the use of alternative funding approaches for financial viability and (2) environmental responsibility. Refer to **Chapter 1** and **Appendix A** for additional information on the Study's Purpose and Need.

Alternatives Considered

What Is the Process to Screen the Alternatives Considered?

The alternatives development and screening can be described through a five-step process that narrows the Preliminary Range of Alternatives under consideration down to the Preferred Alternative (refer to **Figure ES- 2**). The first four steps are presented in this DEIS and the last step will be documented in the FEIS. This process was conducted in collaboration with agency partners and included public review. Through a series of analytical steps, as well as agency and public review, these Preliminary Alternatives were narrowed to the Screened Alternatives and then down to the Alternatives Retained for Detailed Study (ARDS) (refer to **Chapter 2**). Generally, in NEPA, the term ARDS refers to only those alternatives retained for detailed study; however, in this DEIS, additional alternatives were studied in detail and the substantial data analyzed is presented. Those alternatives which were studied in detail met the Purpose and Need and were determined to be reasonable are referred to as the Build Alternatives. As the level of design and analysis detail increased, the number of alternatives being considered decreased.

Figure ES- 2: Alternatives Screening Process



What Was the Preliminary Range of Alternatives Considered?

A range of 15 Preliminary Alternatives was identified based on previous, relevant studies and planning documents, and input received during the NEPA scoping process from the public and from Federal, state, and local regulatory agencies. The Preliminary Range of Alternatives included:

- Alternative 1: No Build
- Alternative 2: Transportation Systems Management / Transportation Demand Management (TSM/TDM)
- Alternative 3: Add one General Purpose (GP) Lane
- Alternative 4: Add one HOV lane in each direction on I-495 and retain existing HOV lane in each direction on I-270

- Alternative 5: Add one priced[7] managed lane network in each direction on I-495 and convert one existing HOV lane in each direction to a priced managed lane on I-270
- Alternative 6: Add two GP lanes in each direction on I-495 and I-270
- Alternative 7: Add two HOV lanes in each direction on I-495 and retain one existing HOV lane and add one HOV lane in each direction on I-270
- Alternative 8: Add two priced managed lanes in each direction on I-495 and add one priced managed lane in each direction and retain one existing HOV lane in each direction on I-270
- Alternative 9: Add two priced managed lanes in each direction on I-495 and convert one existing HOV lane to a priced managed lane and add one priced managed lane in each direction on I-270
- Alternative 10: Add two priced managed lanes in each direction on I-495 and on I-270 and retain one existing HOV lane in each direction on I-270 only
- Alternative 11: Physically separate traffic using C-D lanes, adding two GP lanes in each direction on I-495
- Alternative 12A: Convert existing GP lane on I-495 to contraflow lane during peak periods
- Alternative 12B: Convert existing HOV lane on I-270 to contraflow lane during peak periods
- Alternative 13A: Add two priced managed reversible lanes on I-495
- Alternative 13B: Convert existing HOV lanes to two priced managed reversible lanes on I-270
- Alternative 13C: Add two priced managed reversible lanes and retain one existing HOV lane in each direction on I-270
- Alternative 14A: Heavy Rail[8] transit
- Alternative 14B: Light Rail[9] transit
- Alternative 14C: Fixed guideway Bus Rapid Transit (BRT)[10] off alignment of existing roadway
- Alternative 15: Add one dedicated bus lane on I-495 and I-270

The analysis of the Preliminary Range of Alternatives was completed by applying screening criteria to each alternative related to the Study's Purpose and Need, refer to **Chapter 2, Section 2.5**. A qualitative assessment of these criteria was made using readily available information (data available from existing sources). An alternative was dropped from further consideration at this stage in the process only if the available information demonstrated it clearly did not meet the Study's Purpose and Need. Screened Alternatives were identified as those that met the screening criteria or required additional analysis to determine their ability to meet the Purpose and Need. The initial screening of alternatives was documented in the *Alternatives Technical Report* (**Appendix B**). Refer to **Chapter 2, Section 2.4** for additional details on the Preliminary Alternatives.

What Were the Screened Alternatives Considered?

The Screened Alternatives were presented to the public through the program website via written documentation and a video in February 2019 and included:

[7] Based on public and agency input, MDOT SHA defined priced managed lanes as High-Occupancy Toll (HOT) lanes or Express Toll Lanes (ETL) and the descriptions of the alternatives were modified accordingly.

[8] Heavy Rail is a mode of transit service (also called metro, subway, rapid transit, or rapid rail) operating on an electric railway with the capacity for a heavy volume of traffic. It is characterized by high speed and rapid acceleration passenger rail cars operating singly or in multi-car trains on fixed rails.

[9] Light Rail is a mode of transit service (also called streetcar, tramway, or trolley) operating passenger rail cars singly (or in short trains) on fixed rails. Light rail vehicles are typically driven electrically with power being drawn from an overhead electric line via a trolley or a pantograph and driven by an operator on board the vehicle.

[10] Bus Rapid Transit is a high-quality bus-based transit system that delivers fast and efficient service that may include dedicated lanes, busways, traffic signal priority, off-board fare collection, elevated platforms, and enhanced stations.

- Alternative 1: No Build – Though this alternative does not meet the Study's Purpose and Need, consistent with NEPA requirements, it was carried forward for further evaluation to serve as a base case for comparing the other alternatives
- Alternative 5: One HOT Managed Lane Network
- Alternative 8: Two ETL Managed Lanes Network on I-495 and one ETL and one HOV Lane Network on I-270
- Alternative 9: Two HOT Managed Lanes Network
- Alternative 10: Two ETL Managed Lanes Network on I-495 and I-270 and Retain one HOV Lane on I-270 only
- Alternative 13B: Two HOT Managed Lanes Network on I-495 and two Reversible HOT Managed Lanes Network on I-270
- Alternative 13C: Two ETL Managed Lanes Network on I-495 and two Reversible ETL Managed Lanes Network on I-270, and retain one HOV Lane on I-270 only

Additional engineering, traffic, financial, and environmental analyses were completed, and used to determine the reasonableness of the Screened Alternatives to be carried forward as the ARDS. The Recommended Alternatives Retained for Detailed Study (ARDS) included all of the Screened Alternatives and they were presented at the Spring 2019 Public Workshops. Following these workshops, the Recommended ARDS were further analyzed, and Alternative 5 was dropped from further consideration.

Why Was Alternative 5 Dropped from Further Consideration?

Alternative 5 was identified as a Screened Alternative and considered adding one priced managed lane in each direction on I-495 and converting one existing HOV lane in each direction to a priced managed lane on I-270. In response to agency comments and public input, MDOT SHA and FHWA further assessed the detailed analysis of Alternative 5 and found it would perform the worst of the Screened Alternatives for most metrics used to evaluate existing traffic and long-term traffic growth and trip reliability and would perform the worst amongst the Screened Alternatives in system-wide delay, corridor travel time, density/level of service[11], and travel time (general purpose lanes). In addition, Alternative 5 failed to meet the goal of financial viability, as it would require a significant public subsidy to deliver. Based on the financial analysis results and the deficiencies in addressing the existing traffic and long-term traffic growth and trip reliability, FHWA and MDOT SHA determined that Alternative 5 was not a reasonable alternative as it did not meet the Study's Purpose and Need, and it was not carried forward as an ARDS for the Study. However, to facilitate Cooperating Agencies' decisions for their actions and to be transparent, Alternative 5 is included in the comparison of impacts in **Chapters 3** and **4** of this DEIS. The results of the screening of alternatives and the rationale for the identification of the ARDS are summarized in **Chapter 2, Sections 2.5** and **2.6** and documented in the *Alternatives Technical Report* (**Appendix B**).

What Other Alternatives Have Been Considered?

MD 200 Diversion Alternative

Following the Spring 2019 Public Workshops and agency meetings, several Cooperating and Participating Agencies requested that MDOT SHA evaluate an alternative (the MD 200 Diversion Alternative) that would provide an alternative route for travelers to use MD 200 (Intercounty Connector) instead of the top side of I-495 between I-270 and I-95 to avoid or reduce impacts to significant, regulated resources and residential relocations.

[11] Level of Service (LOS) is a letter grade assigned to a section of roadway that measures the quality of traffic flow, ranging from LOS A to LOS F.

In the near term, the premise of this alternative has merit due to the currently available capacity on MD 200, a Maryland Transportation Authority (MDTA) facility. As such, MDOT SHA is working with MDTA to encourage through traffic from points north on I-95 that is destined for the American Legion Bridge or beyond (and the reverse movement) to utilize MD 200 to take advantage of the near-term spare capacity and potentially provide some relief to the top side of I-495. In an attempt to divert some of this traffic, MDOT SHA has proposed to MDTA to provide travel times for I-495 and MD 200 through the use of the existing dynamic messaging signs. If the travel times show the trip is shorter on MD 200 and the toll is amenable to travelers, then they may choose to divert to MD 200.

However, in addressing the Study's Purpose and Need, the MD 200 Diversion Alternative must also accommodate *long-term* traffic growth, enhance trip reliability, and improve the movement of goods and services. In the design year of 2040, the traffic analysis results indicated that the MD 200 Diversion Alternative would perform worse than most of the Screened Alternatives in many metrics used to evaluate the reasonableness of the alternatives. The MD 200 Diversion Alternative would not address the Study's Purpose and Need of accommodating long-term traffic growth, enhancing trip reliability or improving the movement of goods and services. A summary of the MD 200 Diversion Alternative analysis is included in **Chapter 2, Section 2.5.3.b** and documented in the *Alternatives Technical Report* (**Appendix B**).

Alternative 9 Modified (9M)

MDOT SHA and FHWA evaluated an additional alternative after the ARDS were identified called Alternative 9 Modified (Alternative 9M) in response to public and agency comments on the ARDS. Alternative 9M would consist of a blend of Alternative 5 and Alternative 9 in an effort to avoid or reduce impacts to sensitive environmental resources and property relocations on the top side of I-495 (I-270 West Spur and I-95). The analysis was completed to determine if this alternative, which includes a reduction of lanes on the top side of I-495, would sufficiently meet the Study's Purpose and Need. Overall, Alternative 9M would be a blend of these two Screened Alternatives with the primary difference on the top side of I-495 between I-270 West Spur and I-95 being the addition of one HOT lane instead of two HOT lanes in each direction.

Alternative 9M was evaluated to the same level of detail as the Screened Alternatives and was found to meet the Study's Purpose and Need, and therefore is included as a reasonable alternative in this DEIS. A summary of the Alternative 9 Modified analysis is included in **Chapter 2, Section 2.6.4** and is documented in Appendix B of the *Alternatives Technical Report* (**Appendix B**).

What Are the Alternatives Retained and Analyzed in the DEIS?

Preliminary engineering along with additional traffic, financial, and environmental analyses were considered to determine the reasonableness of the Screened Alternatives to be carried forward as the ARDS. This DEIS presents the additional analysis and comparison of impacts between the ARDS, hereinafter referred to as the **Build Alternatives**, and the No Build Alternative. The alternatives retained and analyzed in the DEIS are summarized in **Table ES- 1**. Refer to **Chapter 2** for additional discussion on the development of the alternatives for this Study.

Table ES- 1: Alternatives Retained and Analyzed in the DEIS

Alternative	Description
Alternative 1	No Build
Alternative 8	2-Lane, ETL Managed Lanes Network on I-495 and 1-ETL and 1-Lane HOV Managed Lane on I-270
Alternative 9	2-Lane, HOT Managed Lanes Network on both I-495 & I-270
Alternative 9 Modified (9M)	2-Lane, HOT Managed Lanes Network on west and east side of I-495 and on I-270; 1-Lane HOT Managed Lane on top side of I-495
Alternative 10	2-Lane, ETL Managed Lanes Network on I-495 & I-270 plus 1-Lane HOV Managed Lane on I-270 only
Alternative 13B	2-Lane, HOT Managed Lanes Network on I-495; HOT Managed, Reversible Lane Network on I-270
Alternative 13C	2-Lane, ETL Managed Lanes Network on I-495, ETL Managed, Reversible Lane Network and 1-Lane HOV Managed Lane on I-270

The No Build Alternative does not meet the Study's Purpose and Need but was retained for comparison with the other alternatives. The results of the screening of alternatives and the rationale for the identification of the alternatives retained and analyzed in the DEIS are summarized in **Chapter 2, Section 2.5** and documented in the *Alternatives Technical Report* (**Appendix B**).

What Transit Components Are Included in the Build Alternatives?

While standalone transit alternatives were found to not meet the Study's Purpose and Need, each Build Alternative includes the following transit elements consistent with the project purpose of enhancing existing and planned multimodal mobility and connectivity:

- Allowing free bus usage in the managed lanes to provide an increase in speed of travel, assurance of a reliable trip, and connection to local bus service/systems on arterials that directly connect to activity and economic centers.

- Accommodating direct and indirect connections to existing transit stations and planned Transit-Oriented Development at the Silver Spring Metro/MARC (US 29), Shady Grove Metro (I-370), Twinbrook Metro (Wootton Parkway), Montgomery Mall Transit Center (Westlake Terrace), Medical Center Metro (MD 187 and MD 185), Kensington MARC (MD 185), Greenbelt Metro/MARC (Cherrywood Lane), New Carrollton Metro/MARC/Amtrak (US 50), Largo Town Center Metro (MD 202 and MD 214), and Branch Avenue Metro (MD 5).

These elements are also being considered by the *Transit Work Group*, which includes representatives from the transit and planning jurisdictions who were both directly and indirectly affected by the P3 Program, including Montgomery, Prince George's, Frederick, Howard, Anne Arundel and Charles counties, as well as MDOT MTA commuter bus, MARC and WMATA, MDOT Secretary's Office of Planning and Capital Programming, MDOT SHA, FHWA, Federal Transit Administration (FTA), and the MWCOG. Initiated in May 2019, the Transit Work Group met eight times to provide input on existing transit services and help identify feasible opportunities for transit to use the managed lanes (refer to **Chapter 2, Section 2.7.6**).

The *Transit Service Coordination Report* was made available to the public in June 2020 on the P3 Program website (https://495-270-p3.com/transit-benefits/) and it is being used to inform affected counties and transit providers about the significant transit opportunities offered by managed lanes such as strategies to maximize the benefits of reliability and speed; provide a basis for the evaluation and prioritization of future capital and operating needs in the service area; and initiate discussions about ways to incorporate regional transit services into the P3 Program.

Is the Replacement of the American Legion Bridge Part of the Managed Lanes Study?

Yes, all Build Alternatives include the full replacement of the American Legion Bridge with a new, wider bridge (not widening of the existing bridge). The existing bridge is nearly 60 years old and would need to be replaced sometime over the next few decades regardless of this Study. The new bridge would be constructed in phases to maintain the same number of existing lanes at all times, and therefore the new bridge will be replaced in the same existing location.

How Have Public Comments on the Alternatives Been Considered?

To date, the public and stakeholders have been encouraged to provide comments on the scope of the Study, the Purpose and Need, range of alternatives, initial screening of alternatives, environmental and property avoidance and minimization measures, and potential mitigation measures. Through the public engagement process, MDOT SHA has taken a hard look at comments received and incorporated certain elements into the Study including, but not limited to: removing the existing Collector-Distributor lanes on I-270 to minimize right-of-way needs along I-270; committing to a pedestrian path along a new American Legion Bridge; eliminating or providing certain managed lanes direct access locations; avoiding relocation of the Rock Creek to significantly minimize impacts to this significant resource; committing to replacing all existing noise barriers; and incorporating certain transit elements while continuing to coordinate with local transit providers for additional opportunities to accommodate existing and planned multimodal connectivity and mobility. To address comments received from the public and agencies on the Recommended Alternatives Retained for Detailed Study (ARDS) and to avoid or minimize environmental and community impacts along the top side of I-495, MDOT SHA analyzed additional alternatives including MD 200 (ICC) Diversion Alternative and Alternative 9 Modified. The results of these analyses can be found in **Chapters 2, 3 and 4** as well as the *Draft Section 4(f) Evaluation* in **Appendix F**.

Tolling

Why Do the New Lanes Need to Be Tolled and Why Does the State Need a Developer to Build Them?

The State of Maryland does not have the funds to construct improvements of this magnitude with an estimated cost of approximately $8 to 10 Billion. Additionally, even with the tolls to pay back loans, the State does not have enough bonding capacity to take out loans to pay for the improvements. Therefore, the State will select a Developer through a competitive process and will enter into a P3 agreement whereby the Developer would design, build, finance, operate, and maintain the managed lanes for a period of time using the toll revenue. MDOT SHA would continue to own all of the lanes on I-495 and I-270 and ensure the highway meets their intended transportation function.

How Will the Managed Toll Lanes Work?

All of the Build Alternatives would include dynamic tolling for the managed lanes (HOT or ETL) for the full length of the Study. The toll rates would be adjusted dynamically within the approved toll rate range and could change in response to real-time variations in traffic conditions every five to 15 minutes. The tolls would be collected electronically at highway speeds, with no toll plazas, no toll booths, and no cash payments. Through this approach, traffic flow would be managed, congestion would be reduced, and a minimum average operating speed of 45 mph would be maintained in the managed lanes.

How Will the Toll Rates Be Set?

The toll rate ranges will be set following the process outlined in the Code of Maryland Regulations (COMAR) 11.07.05 – Public Notice of Toll Schedule Revisions, including public input. In general, a recommended range of toll rates will be developed to manage the traffic and ensure the facilities can meet the necessary traffic performance requirements. The toll rate range would include an upper limit on the toll rate per mile. The recommended toll rate range will be presented to the MDTA Board Members for review. Public hearings and a minimum 60-day public comment period will be held so the public has the opportunity to provide comments on the toll rate range. The public comments will be summarized for the MDTA Board Members (including proposed revisions, if necessary) and the Board will vote on the toll rate range. Once the managed lanes are opened, the toll rates will be adjusted dynamically within the approved MDTA toll rate range to ensure the traffic and lane performance requirements are achieved.

What Could the Toll Rates Be?

The planning study and the DEIS do not recommend the final proposed toll rate ranges for the managed lanes; however, potential toll rates were estimated to meet the goals of the Study (manage traffic demand and congestion on the I-270 and I-495, and ensure 45 mph in managed lanes), and to determine if the Build Alternatives would be financially viable. Therefore, for planning purposes only, the estimated opening year (2025) average weekday toll rates per mile (in 2020 $) for all time periods for passenger cars using an E-ZPass transponder were: $0.70/mile for Alternative 8; $0.69/mile for Alternative 9; $0.77 for Alternative 9M; $0.68/mile for Alternative 10; $0.73/mile for Alternative 13B; and $0.71/mile for Alternative 13C. Ultimately, the toll rate ranges will be set by the MDTA Board after public review and comment. It is not anticipated that the environmental and community impacts described in this DEIS would be substantially different once a final toll rate range is approved because the modeling process for estimating potential planning-level toll rates is similar to the modeling process to support analysis of toll rate ranges that will be presented to MDTA for consideration by the Board.

Transportation and Traffic

What Is a Managed Lane?

Highway facilities that use strategies, such as lane-use restrictions or congestion pricing, to optimize the number of vehicles that can travel the highway to maintain free-flowing speeds. Managed lanes are designed to operate at an acceptable level of service even when the adjacent general purpose lanes are congested. Because they are managed to control the number of vehicles using the lane to keep them flowing, managed lanes provide users with a more reliable option to reach their destination(s). Managed Lanes may include, but are not limited to: HOV lanes, HOT Lanes, ETLs, and bus-only lanes.

What Traffic Analysis Was Performed for the Study?

Detailed traffic operational analyses were performed for each of the Build Alternatives to evaluate their ability to meet the Study's Purpose and Need in the design year of 2040. The evaluation methodology included a three-step process. First, a regional forecasting model was developed for each of the Build Alternatives using the Metropolitan Washington Council of Governments Travel Demand Model (Metropolitan Washington Council of Governments (MWCOG) model), which is the model typically used by MDOT SHA and other transportation agencies to evaluate projects in the Washington, DC Metropolitan Area. MWCOG model Version 2.3.71 was used, which was the latest model version available when the analysis was initiated. Next, the outputs from the MWCOG model were used to develop balanced traffic volume projections for the design year of 2040 for each roadway segment and ramp movement within the Study limits for each Build Alternative during the peak periods. Finally, traffic simulation models for each of the Build Alternatives were developed using VISSIM software to determine the projected operational performance of several key metrics during the AM peak period (6:00 AM to 10:00 AM) and the PM peak period (3:00 PM to 7:00 PM).

What Are the Results of the Traffic Operational Analyses?

The design year 2040 traffic operational evaluation for each Alternative are summarized below and presented in **Chapter 3** of this DEIS.

- **Alternative 1 (No Build)** would not address any of the operational issues experienced under existing conditions, and it would not be able to accommodate long-term traffic growth, resulting in slow travel speeds, delays, long travel times, and an unreliable network.

1.

- **Alternative 5** was determined to not be a reasonable alternative, as it does not meet the Study's Purpose and Need due to deficiencies in addressing the existing traffic and long-term traffic growth and trip reliability. However, the results for Alternative 5 have been included in this DEIS for comparison purposes only. Refer to the *Alternatives Technical Report* (**Appendix B**) for more information.

- **Alternative 8**, **Alternative 13B**, and **Alternative 13C** would all outperform the No Build Alternative in every metric. However, these alternatives would not rank first in any of the operational metrics studied and would therefore only be expected to provide moderate benefits.

- **Alternative 9M** was not originally included as a Build Alternative, but it has been evaluated to the same level of detail. This alternative was studied as a blend of Alternative 5 and Alternative 9. Refer to **Chapter 2, Section 2.6.4** and the *Alternatives Technical Report* (**Appendix B**) for more information. Alternative 9M would outperform Alternative 1 in every metric, but it would not rank first in any of the operational metrics studied, similar to Alternative 8, Alternative 13B, and Alternative 13C.

2.

- **Alternative 9** and **Alternative 10** would consistently perform well in all the operational metrics studied, and each alternative ranked first in three of the six key metrics. Alternative 9 would perform the best in terms of average speed, LOS, and effect on the local network. Alternative 10 would perform the best in terms of delay, travel time index, and throughput. These two alternatives would be expected to provide the best operational benefits to the I-495 and I-270 Managed Lanes Study area and the surrounding transportation network. Refer to **Chapter 3** and **Appendix C** for detailed information.

Environmental Resources, Consequences and Mitigation

What Environmental Resources Were Considered in the Analysis Documented in the DEIS and Supporting Technical Reports?

Chapter 4 of the DEIS presents the existing environmental conditions (affected environment) identified along the study corridors, the anticipated effects to the resources (environmental consequences), and measures to avoid, minimize, and mitigate unavoidable effects to those resources. Additional opportunities to avoid and minimize effects will be considered and documented in the FEIS. The environmental resources and topics analyzed were:

1. Land Use and Zoning
2. Demographics
3. Communities and Community Facilities
4. Parks and Recreational Facilities
5. Property Acquisitions and Relocations
6. Visual and Aesthetic Resources
7. Historic Architectural and Archeological Resources
8. Air Quality
9. Noise
10. Hazardous Materials
11. Topography, Geology and Soils
12. Waters of the US and Waters of the State, including Wetlands
13. Watersheds and Surface Water Quality
14. Groundwater Hydrology
15. Floodplains
16. Vegetation and Terrestrial Habitat
17. Terrestrial Wildlife
18. Aquatic Biota
19. Rare, Threatened and Endangered Species
20. Unique and Sensitive Areas
21. Environmental Justice and Title VI Compliance
22. Indirect and Cumulative Effects
23. Consequences of Construction
24. Commitment of Resources

What Are the Effects of the Build Alternatives on the Environmental Resources?

The environmental consequences presented in **Chapter 4** are described for the No Build and Build Alternatives. Because the Build Alternatives would either expand and/or reconfigure existing highways, in a constrained built environment, and because the engineering requirements are similar between all Build Alternatives, the total scope of impacts is anticipated to be very similar. At this stage of design, quantified impacts presented are assumed to be permanent or long-term effects in the DEIS (refer to **Tables ES- 2 and 4-1**). As design is advanced on a Preferred Alternative, the long-term effects will be refined, and the specific short-term, construction-related effects will be segregated and quantified and documented in the FEIS. The anticipated construction effects are discussed qualitatively throughout **Chapter 4** and in **Chapter 2, Section 2.7.3**. The summary of environmental effects comparison between the No Build and Build Alternatives is presented in **Table ES- 2.**

What Avoidance and Minimization Opportunities Have Been Considered for Effects to Environmental Resources?

At this stage in the NEPA Study, avoidance and minimization opportunities to parklands, wetlands, wetland buffers, waterways, forests, and the Federal Emergency Management Agency's 100-year floodplain have been identified and coordinated with the regulatory and resource agencies. Impacts were avoided and minimized to the greatest extent practicable in all areas at this preliminary stage of the Study, and avoidance and minimization techniques were specifically refined in some areas of sensitive or recreationally valuable resources. Refer to **Chapter 4,** *Draft Section 4(f) Evaluation* (**Appendix F**), and *Avoidance, Minimization & Impacts Report* (**Appendix M**) for additional details. The effort to avoid, minimize and mitigate unavoidable impacts will continue through ongoing and future coordination with the applicable regulatory and resource agencies.

What Mitigation Is Being Considered for Unavoidable Environmental Effects?

Mitigation for unavoidable effects to environmental resources were considered based on the effects of the Build Alternatives. The proposed conceptual mitigation is discussed by applicable resource in **Chapter 4** and further detailed in the *Conceptual Mitigation Plan* (**Appendix Q**) for the following resources: wetlands; forests; rare, threatened, and endangered species; parkland; cultural resources; noise; air; properties; hazardous materials; topography, geology, soils; groundwater; environmental justice; visual aesthetic; aquatic biota; and unique and sensitive areas. Further mitigation measures will be identified and refined as the Study progresses and in consideration of public, stakeholder, and agency comment.

What Is Section 4(f)?

Section 4(f) of the USDOT Act of 1966, as amended (49 U.S.C. 303(c)) stipulates that the USDOT, including the FHWA, cannot approve the use of land from a publicly-owned park, recreation area, wildlife or waterfowl refuge, or public or private historic site unless the following conditions apply:

- FHWA determines that there is no feasible and prudent avoidance alternative to the use of land from the property, and the action includes all possible planning to minimize harm to the property resulting from such use (23 CFR §774.3(a)(1) and (2)); or
- FHWA determines that the use of the Section 4(f) properties, including any measures to minimize harm committed to by the applicant, will have a *de minimis* impact on the property (23 CFR §774.3(b)).

What Are the Section 4(f) Impacts?

A "use" of (or impact to) Section 4(f) property occurs:

(i) When land is **permanently incorporated** into a transportation facility;
(ii) When there is a **temporary occupancy** of land that is adverse in terms of the statute's preservation purpose as determined by the criteria in 23 CFR §774.13(d); or
(iii) When there is a **constructive use** of a Section 4(f) property as determined by the criteria in 23 CFR §774.15.

3.

A total of 111 Section 4(f) properties were identified within the corridor study boundary including public parks and recreation areas and historic sites. Of the 111 Section 4(f) properties, 68 would have a Section 4(f) use (impact) and 43 would be avoided. Of the 68 Section 4(f) properties that have a use, 36 would result in minor Section 4(f) use, 22 require an evaluation of avoidance alternatives and analysis of least overall harm, and four properties meet the exception criteria. Refer to **Chapter 5, Section 5.5** and **Appendix F** for additional details on the *Draft Section 4(f) Evaluation*.

Table ES- 2: Summary of Effects Comparison of the Alternatives[1]

	Resource	Alt 1 No Build	Alt 5[2]	Alt 8	Alt 9	Alt 9M	Alt 10	Alt 13B	Alt 13C
Environmental	Total Potential Impacts to Section 4(f) Properties including park and historic properties (acres)	0	141.7	146.8	146.8	144.7	149.0	145.5	146.7
	Number of Historic Properties with Adverse Effect[3] [Adverse effect cannot be determined][4]	0	13 [7]	13[7]	13[7]	13[7]	13[7]	13[7]	13[7]
	100-Year Floodplain (acres)	0	114.3	119.5	119.5	116.5	120.0	119.5	119.9
	Unique and Sensitive Areas (acres)	0	395.3	408.2	408.2	401.8	410.8	406.7	408.6
	Sensitive Species Project Review Area (acres)	0	151.7	155.0	155.0	153.7	155.0	155.0	155.0
	Forest canopy (acres)	0	1,434	1,497	1,497	1,477	1,515	1,489	1,503
	Wetlands of Special State Concern	0	0	0	0	0	0	0	0
	Wetlands, Field-Reviewed (acres)	0	15.4	16.3	16.3	16.1	16.5	16.3	16.1
	Wetlands 25-foot buffer (acres)	0	51.2	53.1	53.1	52.7	53.6	53.1	53.5
	Waters of the US (linear feet)	0	153,702	155,922	155,922	155,229	156,948	155,822	156,632
	Tier II Catchments (acres)	0	55.2	55.3	55.3	55.3	55.3	55.3	55.3
	Noise Receptors Impacted[5]	0	3,661	4,470	4,470	4,249	4,581	4,411	4,461
Traffic	System-wide Delay Savings vs. No Build (AM/PM)[6]	0	20%/22%	23%/33%	34%/33%	30%/30%	35%/34%	27%/22%	26%/34%
Engineering	Total Right-of-way Required[7] (acres)	0	284.9	323.5	323.5	313.4	337.3	318.9	329.3
	Number of Properties Directly Affected	0	1,240	1,475	1,475	1,392	1,518	1,447	1,479
	Number of Residential Relocations	0	25	34	34	25	34	34	34
	Number of Business Relocations	0	4	4	4	4	4	4	4
	Width of Pavement on I-495 (feet)	138–146	170–174	194–198	194–198	170-198	194–198	194–198	194–198
	Width of Pavement on I-270 (feet)	228–256	194–198	218–222	218–222	218-222	242–248	202–206	226–230
	Capital Cost Range [Construction & ROW] (billions)	N/A	$7.8– $8.5	$8.7 – $9.6	$8.7 – $9.6	$8.5-$9.4	$9.0 – $10.0	$8.7 - $9.6	$8.8 - $9.7

Notes: [1] Preliminary impacts represented in this table assume total impacts; permanent and temporary impacts will be distinguished in the FEIS.
[2] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.
[3] Refer to Chapter 4, Section 4.7 and Appendix G, Volume 1 for additional details on the effects to historic properties.
[4] Based on current design information, effects cannot be fully determined on these 7 historic properties. MDOT SHA will evaluate these properties further as design advances.
[5] Noise receptors are noise-sensitive land uses which include residences, schools, places of worship, and parks, among other uses. Note that these numbers include receptors that do not have an existing noise wall as well as receptors that have an existing noise wall which is expected to be replaced
[6] Previous versions of this table used a similar metric of Annual Average Hours of Savings per Commuter. System-Wide Delay Savings better reflects benefits to all road users.]
[7] The right-of-way is based on State records research and filled in with county right-of-way, as necessary. With the Section 4(f) properties, some boundaries vary based on the presence of easements and differences in the size and location of historic and park boundaries.

What Permits, Approvals and Authorizations Will Likely Be Required?

In addition to NEPA compliance, many permits, approvals and authorizations are being coordinated concurrently with the NEPA process or would be obtained prior to construction of any improvements. **Table ES- 3** summarizes the Federal, state, and local permits, authorizations and approvals that will likely be required based on the current Study design assumptions and associated impacts. Refer to **Chapter 6, Section 6.5**.

Table ES- 3: Likely Permits and Approvals

	Permit/ Approval	Responsible/Permitting Agency
Concurrent with NEPA or within 90 days from the Record of Decision	National Environmental Policy Act (NEPA) Approval – Record of Decision[1]	Federal Highway Administration
	Section 4(f) Approval	Federal Highway Administration
	Endangered Species Act Consultation	US Fish and Wildlife Service / NOAA-NMFS
	Section 106 Programmatic Agreement	Federal Highway Administration
	Clean Water Act Section 404 and Section 10	US Army Corps of Engineers
	Maryland/Virginia State Waters (Section 401)	US Army Corps of Engineers / Maryland Department of Environment / Virginia Department of Environmental Quality
	Maryland Nontidal Wetlands and Waterways Permit	Maryland Department of Environment
	Virginia Wetland Protection Permit	Virginia Department of Environmental Quality
Prior to Construction	Special Use Permit - Construction in VA and MD	National Park Service
	Capper-Cramton Park Permits	National Capital Planning Commission
	Park Construction Permit - M-NCPPC	Maryland National Capital Park and Planning Commission
	Maryland Reforestation Law Approval	Maryland Department of Natural Resources
	State and County Forest Conservation Easement Revision Approvals	Maryland Department of Natural Resources / Maryland National Capital Park and Planning Commission
	General Permit for Stormwater Associated with Construction Activity - MD	US Environmental Protection Agency / Maryland Department of the Environment
	General Permit for Stormwater Associated with Construction Activity - VA	US Environmental Protection Agency / Virginia Department of Environmental Quality
	Stormwater Management/Erosion and Sediment Control	Maryland Department of Transportation - State Highway Administration Plan Review Division / Maryland Department of the Environment
	Stormwater Management/Erosion and Sediment Control	US Environmental Protection Agency / Maryland Department of the Environment / Virginia Department of Environmental Quality
	Clean Water Act Section 402 (MS4)	Maryland Department of the Environment
	Water Appropriation and Use Permit	Maryland Department of the Environment

Note: [1]The lead agency is responsible for preparing and publishing a single ROD for all Federal agencies with authorization responsibility for the project to support any necessary authorization decisions. The ROD will incorporate the decisions of each such agency, unless an exception to a single ROD is met as set forth in Section XIII or where Federal law provides for the lead agency to issue a combined FEIS/ROD. Memorandum of Understanding Implementing One Federal Decision Under Executive Order 13807, https://www.whitehouse.gov/wp-content/uploads/2018/04/MOU-One-Federal-Decision-m-18-13-Part-2-1.pdf

What is the One Federal Decision Executive Order?

The I-495 & I-270 Managed Lanes Study is following the "One Federal Decision" *Executive Order 13807: Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects*[12] requires Federal agencies to process environmental reviews and authorization decisions for major infrastructure projects as "One Federal Decision (OFD)." The Executive Order 13807 (EO) sets a goal of reducing the average time to complete environmental reviews under the National Environmental Policy Act and authorization decisions for major infrastructure projects to two years from the publication of the Notice of Intent (NOI). The EO also directs that, except under certain circumstances,[13] the Federal lead agency and all Cooperating and Participating Agencies shall "record any individual agency decision in one Record of Decision (ROD)" and prepare a single Environmental Impact Statement (EIS). Provided the EIS includes adequate detail to inform the agency decisions, the EO requires obtaining permits and approvals within 90 days of the issuance of the ROD[14]. The EO also requires major infrastructure projects to be managed under a single permitting timetable covering environmental review and authorizations.

What Are the Next Steps for the Study?

This DEIS has been signed by FHWA and MDOT SHA and distributed to Federal, state, and local agencies, as well as organizations and other interested parties and is available for public review. There will be Public Hearings held during a 90-day review period for the DEIS; the comment deadline is October 8, 2020. During this 90-day review period, the DEIS is available in public locations throughout the study corridors and on the project website https://495-270-p3.com/DEIS/. Comments on the DEIS are considered equally regardless of whether received orally or in writing and may be made by:

- Oral testimony at one of the public hearings in the main hearing room
- Oral testimony to a verbatim recorder at a public hearing in private in a separate room
- Written comments on a comment form at a public hearing
- Letters to Lisa B. Choplin, DBIA, I-495 & I-270 P3 Program Director, I-495 & I-270 P3 Office, 707 North Calvert Street, Mail Stop P-601, Baltimore MD 21202
- DEIS comment form at https://495-270-p3.com/DEIS/
- Email to MLS-NEPA-P3@mdot.maryland .gov

Following the 90-day review period, the MDOT SHA and FHWA will review all comments and respond to all substantive comments received or postmarked by the end of the comment period in the preparation of the FEIS. Comments received or postmarked after that date will be reviewed and considered to the extent practicable. In addition to the disposition of all substantive comments, the FEIS will summarize

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[12] Exec. Order No. 13807, 82 Fed. Reg. 40463 (August 15, 2017), https://www.whitehouse.gov/presidential-actions/presidential-executive-order-establishing-discipline-accountability-environmental-review-permitting-process-infrastructure/

[13] The EO provides that a single ROD shall be issued, "unless the project sponsor requests that agencies issue separate NEPA documents, the NEPA obligations of a cooperating or participating agency have already been satisfied, or the lead Federal agency determines that a single ROD would not best promote completion of the project's environmental review and authorization process."

[14] The lead Federal Agency may extend the 90-day deadline if it determines Federal law prohibits the agency from issuing its approval within 90 days or an extension would better promote completion of the project's environmental review and authorization process or the project sponsors requests a different timeline. Exec. Order No. 13807, 82 Fed. Reg. 40463 (August 15, 2017). https://www.whitehouse.gov/wp-content/uploads/2018/04/MOU-One-Federal-Decision-m-18-13-Part-2-1.pdf

additional and updated information not refined or quantified in the DEIS, identification of the Preferred Alternative and factors that support the selection, and commitments and mitigation measures to be carried forth during final design and construction.

Public-Private Partnership (P3) Program

What Is a P3?

A Public-Private Partnership (P3) is an alternative model for delivery of a capital project. A P3 is a partnership between the public or governmental sector with private entities. The P3 seeks to harness private sector expertise, innovation and funding in order to deliver public infrastructure for the benefit of the public owner and users of the infrastructure. P3s seek to successfully leverage the respective strengths of the public and private sectors to deliver large, complex infrastructure projects in a cost effective and timely fashion. Functions under a P3 agreement may include designing, building, financing, operating, and maintaining a transportation facility.

Why Is a P3 Being Considered for This Study?

There are several reasons for utilizing a P3:

- Private Financing Results in Faster Construction: P3 projects can move forward when the state does not have available funding because the private sector finances the improvements based on future funding or revenue. It would take more than 25 years to fund I-495 & I-270 P3 Program congestion relief improvements relying on state funds and would use all of MDOT's capital expansion budget for this one project.

- Transfer of Risks: The state and the private sector share the risks based on who can best manage each risk to provide the best value to the state.

- Operations and Maintenance: The state can benefit from having the private sector operate the highway and maintain it (for example, pavement repairs, grass mowing) at a more economical cost. Without the P3 Program, it is estimated that MDOT would need to invest $1.7 billion in bridge replacement/rehabilitation and pavement rehabilitation over the next decade simply to just maintain the existing roadways on I-495 and I-270 in Montgomery and Prince George's Counties in a state of good repair, with no congestion relief.

- Limited Government Funding: Projects that include a future revenue source may be constructed with limited or no governmental funding upfront. In fact, the I-495 & I-270 P3 Program has a goal to implement the Program at no net cost to the state.

How Would the Project Be Constructed?

The focus of this DEIS is on addressing transportation needs within the 48-mile Study limits: I-495 from south of the George Washington Memorial Parkway in Fairfax County, Virginia, including improvements to the American Legion Bridge over the Potomac River, to west of MD 5, and along I-270 from I-495 to north of I-370, including the east and west I-270 spurs.

Due to the magnitude of the Study, MDOT SHA would need to construct any Build Alternative in phases. Phase 1 of the P3 Program would include that portion of the MLS along I-495 from the vicinity of the George Washington Memorial Parkway in Virginia, across and including the ALB, to its interchange with I-270 at the West Spur, and I-270 from its interchange with I-495 to its interchange with I-370. A Phase 1

P3 Agreement would also include I-270 up to I-70 which would be advanced through a separate, independent NEPA study.

The Maryland Board of Public Works approved the competitive solicitation process for Phase 1 to move forward for the selection of a Phase Developer to assist MDOT SHA with preliminary development and design activities, in accordance with federal regulations. No commitment will be made by MDOT SHA as to any alternative that is being or may be evaluated through the NEPA process.

It is expected that Phase 1 would be developed and delivered by a Phase 1 Developer, under a Phase 1 P3 Agreement. The southern portion of Phase 1 from I-495 in the vicinity of the George Washington Memorial Parkway to I-270 and I-270 from I-495 to I-370 would be developed, constructed, and delivered first. Additionally, given the magnitude of the improvements, the Phase Developer would be expected to develop and deliver the southern portion of Phase 1 in two or more sections, to be agreed upon with MDOT.

1 PURPOSE AND NEED

The Federal Highway Administration (FHWA), as the Lead Federal Agency, and the Maryland Department of Transportation State Highway Administration (MDOT SHA), as the Local Project Sponsor, have prepared a Draft Environmental Impact Statement (DEIS) under the National Environmental Policy Act (NEPA) for the I-495 & I-270 Managed Lanes Study (Study). The I-495 & I-270 Managed Lanes Study is the first element of the broader I-495 & I-270 Public-Private Partnership (P3) Program.

This chapter presents a summary of the Purpose and Need for the Study, which was developed by FHWA and MDOT SHA in coordination with Cooperating and Participating agencies and the public during the NEPA scoping process. The full Purpose and Need Statement that was concurred upon by the Cooperating Agencies[1] in November 2018 is included in **Appendix A**.

1.1 Overview of Study Corridors

This DEIS evaluates the potential environmental impacts of alternatives that address roadway congestion within the specific Study scope of I-495 from south of the George Washington Memorial Parkway in Fairfax County, Virginia, including improvements to the American Legion Bridge over the Potomac River, to west of MD 5 and along I-270 from I-495 to north of I-370, including the east and west I-270 spurs (**Figure 1-1**). The Study area extends between 0.1 and 1.5 miles along roads that cross I-495 and I-270 and intersect at interchange locations to capture potential modifications needed to tie in with the alternative improvements.

I-495 and I-270 in Maryland are the two most heavily traveled freeways in the National Capital Region, each with an Average Annual Daily Traffic (AADT) volume of up to 260,000 vehicles per day in 2018 (MDOT SHA, 2019). I-495 is the only circumferential route in the region that provides interregional connections to many radial routes in the National Capital Region, such as I-270, US 29 (Colesville Road), I-95, US 50, and MD 295/Baltimore-Washington Parkway (**Figure 1-1**). In addition to heavy commuter traffic demand, I-495 is merged with I-95 in Maryland for 25 miles around the east side of Washington, DC providing connectivity along the East Coast. I-270 is the only freeway link between I-495 and the fast-growing northwest suburbs of Frederick County, Maryland. I-270 is also the predominant route for freight and long-distance travel between the National Capital Region and points west (US Department of Transportation et al., 2009).

The three logical termini for the I-495 and I-270 Managed Lanes Study which reflect the area of influence for traffic and environmental analysis are described as follows.

Western Terminus: on I-495, 0.4 miles south of George Washington Memorial Parkway interchange; allows outer loop mainline improvements that are carried to the George Washington Memorial Parkway to be merged and transitioned into the existing mainline lanes without causing congestion due to lane drops and merges and would include a direct merge into the Virginia Express Lanes. The George Washington Memorial Parkway serves east-west travel along the Potomac River toward Arlington, VA and Washington, DC. The AADT on I-495 at the George Washington Memorial Parkway is over 250,000 vehicles. On I-495 at the George Washington Memorial Parkway, the existing AADT north of the Parkway

[1] NCPC concurred on the Purpose and Need only; M-NCPPC did not concur on Purpose and Need.

is 12 percent less than south of the Parkway. This 12 percent drop in traffic south of George Washington Memorial Parkway is also projected in 2040, indicating that the Parkway is a major traffic generation point.

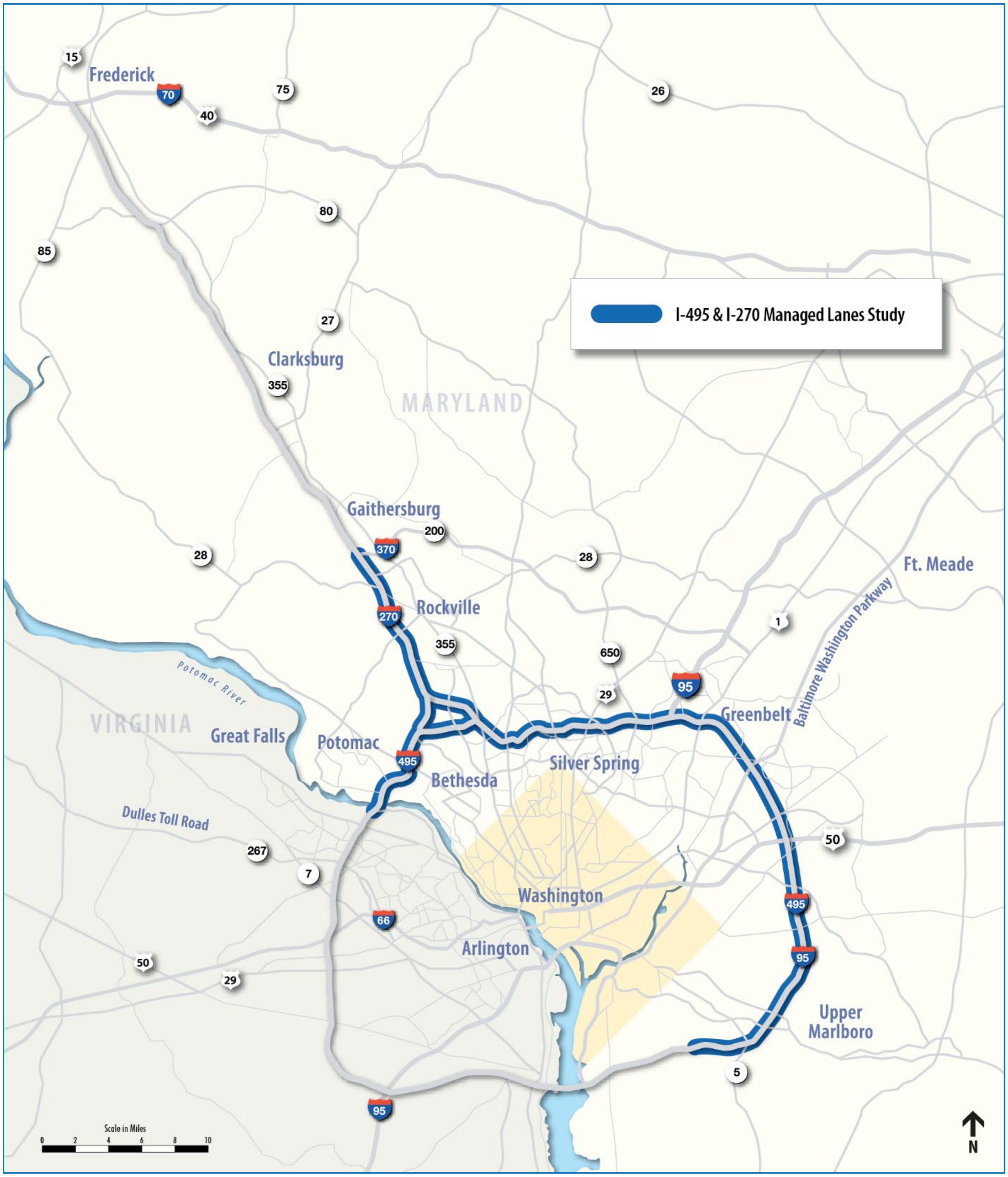
Southern Terminus: on I-495, 1.3 miles west of MD 5; allows inner loop mainline improvements that are carried to MD 5 to be merged into the existing mainline lanes without causing congestion due to lane drops, weaving, and merging. MD 5 (Branch Avenue) is a major traffic generator that carries approximately 150,000 vehicles per day under existing conditions (149,090 AADT in 2016). MD 5 is a regional access-controlled roadway that takes traffic south and east to US 301 and Charles County. On the I-495 inner loop, existing AADT is approximately 12 percent greater north of MD 5 than south of MD 5, indicating that a significant portion of I-495 inner loop traffic goes to MD 5. In 2040, the projected traffic volume (AADT) north of MD 5 would be approximately 15 percent greater than the volume south of MD 5. Similarly, existing AADT is approximately five percent greater on the I-495 outer loop north of MD 5 than the volume south of MD 5. In 2040, the projected I-495 outer loop traffic volume (AADT) north of MD 5 is approximately 11 percent greater than the volume south of MD 5.

Locating the logical terminus approximately 1.3 miles west of the I-495/MD 5 interchange allows any inner loop mainline improvements that are carried to MD 5 to be merged into the existing mainline lanes without causing congestion due to lane drops, weaving, and merging. For interstate operations, ending the improvements west of MD 5 will provide a longer transition area for inner loop traffic to weave between new mainline lanes and the existing Woodrow Wilson Bridge express-local system that starts between MD 414 and MD 210. Terminating new mainline lanes too close to the express-local system could result in concentrated weaving movements which could degrade the mainline traffic operations.

Northern Terminus: on I-270, 0.6 miles north of I-370; allows northbound mainline improvements that are carried to I-370 to be merged and transitioned into the existing general purpose lanes and the high-occupancy vehicle (HOV) lane safely, minimizing congestion due to lane drops and merges. The HOV lane from 0.6 miles north of I-370, will continue to its current terminus at MD 121 (Clarksburg Road), 8 miles north of I-370. I-370 links MD 200 (the Intercounty Connector), a major east-west tolled highway, with I-270. The roadway is a major traffic generator that carries over 100,000 vehicles per day under existing conditions (102,700 AADT in 2016). In the year 2040, traffic volumes on I-370 are projected to increase to approximately 120,000 vehicles per day. The average annual daily traffic volume on I-270 north of I-370 and MD 117 is approximately 10 percent less than the volume south of I-370 in existing conditions, indicating that a significant portion of traffic on I-270 comes from and goes to I-370. In the year 2040, the projected traffic volume on I-270 north of I-370 and MD 117 is approximately 16 percent less than the volume on I-270 south of I-370. Locating the logical terminus approximately 0.6 miles north of I-270/I-370 interchange allows any northbound mainline improvements that are carried to I-370 to be merged and transitioned into the existing general-purpose lanes and the high occupancy vehicle (HOV) lane safely, minimizing congestion due to lane drops and merges.

The traffic modeling and analysis has encompassed the next interchange beyond these three limits as the area of traffic influence. Furthermore, the logical termini for the area of environmental review and analysis area have been extended beyond these intersecting roadways to account for the necessary distance for the mainline improvements to tie into the existing roadway operations.

Figure 1-1: I-495 & I-270 Managed Lanes Study Corridors



1.2 Study Purpose and Need

The Study Purpose and Need were developed through a comprehensive process that included the examination of past studies, a review of existing regional plans, and an analysis of the environmental and socioeconomic conditions of the region. A summary of the Purpose and Need Statement is included in this DEIS chapter. This DEIS reflects the latest data, however, additional information may be found in the full Purpose and Need Statement (as concurred upon in November 2018) in **Appendix A**.

The Purpose of the Study is to develop a travel demand management solution(s) that addresses congestion, improves trip reliability on I-495 and I-270 within the study limits and enhances existing and planned multimodal mobility and connectivity.

The needs for the Study are:

- Accommodate Existing Traffic and Long-Term Traffic Growth
- Enhance Trip Reliability
- Provide Additional Roadway Travel Choices
- Improve Movement of Goods and Services
- Accommodate Homeland Security.

1.3 Accommodate Existing Traffic and Long-Term Traffic Growth

The state of Maryland experiences the second longest commuting times in the nation, according to 2015 US Census American Community Survey data. The National Capital Region is the most congested region in the nation based on annual delay and congestion per auto commuter. Specifically, I-495 and I-270 in Maryland each had an AADT volume up to 260,000 vehicles per day in 2018 (MDOT SHA, 2019).

1.3.1 Population and Employment Growth

I-495 connects key employment centers within the study area, many of which are undergoing redevelopment as multi-use activity centers with mixed land uses, including residential and retail activity. Bethesda, Rock Spring Technology Park, Silver Spring, Wheaton, College Park, Greenbelt, New Carrollton, Largo, and Suitland are all points of origin and destinations for large numbers of travelers. This creates travel demand during a broad range of time during the day and throughout the week as demonstrated by the fairly even traffic directional splits during the peak periods.

The I-270 corridor provides an essential connection between the National Capital Region, central and western Maryland, and longer-distance trips to the Midwestern US, through use of I-70 and I-68. It is an important corridor for both local and long-distance trips. The area up to I-370 includes residential, retail/commercial, and growing mixed-use development including Downtown Crown in Gaithersburg. Major government and corporate employment centers such as National Institute of Standards and Technology (NIST) and pharmaceutical corporations are spread throughout Montgomery County generating travel in both directions of I-270 during peak travel periods. However, there is a clear directional split in traffic on I-270 during the morning and afternoon/evening weekday commutes. I-270 is the primary route from the population centers around the National Capital Region to many recreational and tourism points of interest to the northwest including Monocacy National Battlefield, C&O Canal National Historical Park, Harpers Ferry National Historical Park, and Antietam National Battlefield.

Traffic growth along I-495 and I-270 is related in part to increased regional population. A growing population results in the need for additional mobility to intended destinations such as work, school, sites of commerce, and recreational/tourism points of interest. The population in Montgomery and Prince George's Counties have increased approximately 14.6 and 20.1 percent, respectively, between 2000 and 2020 (**Table 1-1**). The Metropolitan Washington Council of Governments (MWCOG) estimates that between 2020 and 2045, the population in Montgomery County and Prince George's County will increase approximately 16.3 percent and 7.9 percent, respectively (**Table 1-1**). According to MWCOG 2000 and 2020 data, employment in Montgomery and Prince George's Counties has increased between 14.5 percent and 3.3 percent, respectively (**Table 1-2**). The MWCOG estimates that between 2020 and 2045, employment in Montgomery County and Prince George's County will increase approximately 24.9 percent and 15.2 percent, respectively (**Table 1-2**).

Table 1-1: Regional Population Growth

Geography	2000	2020	% Increase Since 2000	2045 Forecast	Forecasted % Increase 2020 to 2045
Montgomery County	875,672	1,052,000	20.1%	1,223,300	16.3%
Prince George's County	805,723	923,100	14.6%	995,900	7.9%
Inner Washington, DC Suburbs[1]	390,386	529,400	35.6%	681,500	28.7%
Outer Washington, DC Suburbs[2]	891,273	1,093,000	22.6%	1,204,700	10.2%
MWCOG Planning Area Counties Total	4,385,759	5,690,000	29.7%	6,925,700	21.7%

Sources: MWCOG (2006; 2018)

[1] As defined by MWCOG and includes Calvert, Charles, and Frederick Counties.

[2] As defined by MWCOG and includes Anne Arundel, Carroll, and Howard Counties.

Table 1-2: Regional Employment Growth

Geography	2000	2020	% Increase Since 2000	2045 Forecast	Forecasted % Increase 2020 to 2045
Montgomery County	474,602	543,500	14.5%	678,800	24.9%
Prince George's County	337,976	349,000	3.3%	402,100	15.2%
Inner Washington, DC Suburbs[1]	161,003	201,100	24.9%	251,300	25.0%
Outer Washington, DC Suburbs[2]	525,294	649,200	23.6%	789,700	21.6%
MWCOG Planning Area Counties Total	2,791,859	3,360,600	20.4%	4,273,800	27.2%

Sources: MWCOG (2006; 2018)

[1] Includes Calvert, Charles, and Frederick Counties.

[2] Includes Anne Arundel, Carrol, and Howard Counties.

1.3.2 Traffic Growth

The *2018 Maryland State Highway Mobility Report* (MDOT SHA, 2018)[2] documents substantial traffic growth in the National Capital Region as a result of increasing population and employment levels. The employment and population growth is occurring not only in Washington, DC, but also in the near and far suburbs of Washington, DC, creating demand for suburb-to-suburb travel in the region, as well as suburb to DC travel. Nearly 260,000 vehicles commute daily from Maryland into Washington, DC and annual travel increased by 195 million vehicle miles traveled (VMT) from 2016 to 2017 in both Montgomery and Prince George's Counties, the most of any Maryland counties (MDOT SHA, 2018). Both of these statistics show the large movement of people into and around the National Capital Region at peak periods and the movement of goods throughout the day. All of this movement is focused around the major interstates. In addition, the top three highest volume roadway sections in Maryland based on an average daily traffic (ADT) are contained within the study limits. These locations include I-270 from the I-270 Split to MD 117, I-495 from the I-270 East Spur to I-95, and I-495 from the Virginia State Line to the I-270 West Spur. Refer to **Chapter 3, Table 3-1** for existing ADTs in the study corridors.

The high demand results from commuter, commercial, and recreational use of the study corridors and has created congestion along the roadways. The congestion occurs during peak travel periods when demand exceeds roadway capacity. Along I-495, these peak travel periods occur at various times throughout the day, not just during the typical AM and PM peak periods, for as long as 10 hours per day. This type of recurring congestion makes roadways in the study corridors susceptible to exponential increases in delay, as the systems have a fixed capacity base (Cambridge Systematics, Inc., 2005). This exponential increase in delay occurs after a traffic queue has formed and new vehicles arrive, thereby increasing the delay for those vehicles arriving behind them (Cambridge Systematics, Inc., 2005).

Additionally, as the congestion increases, the speeds decrease and the roadways in the study corridors become more susceptible to traffic incidents, such as vehicle crashes which cause non-recurring

[2] The Purpose and Need Statement in Appendix A of this DEIS was finalized in November 2018 based on the 2016 Mobility Report. The latest numbers from the 2018 Mobility Report have been included in this DEIS chapter.

congestion. Crashes are unpredictable and can result from decreased vehicle spacing (rear-end collisions) and weaving and merging maneuvers (sideswipes) to change lanes. Heavily trafficked areas and construction zones are especially prone to these types of incidents (National Capital Region Transportation Planning Board, 2016d). After a crash occurs, it produces stop-and-go traffic movements and can result in lane closures on these capacity-limited systems. These non-recurring delays make the highway systems unreliable, thus negatively affecting travel times and speeds. (This diminished reliability as a result of traffic growth is interrelated to the another need element, as described in **Section 1.4**.)

Long-term traffic management options are needed to address the existing and future recurring congestion along the study corridors. In the National Capital Region, as well as across the country, the addition of general purpose roadway capacity alone cannot keep up with the growing demand for mobility due to the expanding populations and growth in and around the cities. Options to address the growing traffic demand and congestion in the region have been the subject of many prior studies; refer to **Appendix A, Section 2.2.1**. While some of those strategies are being implemented, for example I-270 Innovative Congestion Management (ICM) Contract and the Purple Line, severe congestion on I-495 and I-270 adversely affects the regional and local roadway network, especially in and around the interchanges and arterial roads in the study area. The congestion on these corridors also has negative effects on access to and usage of other transportation modes. Besides enhanced performance on I-495 and I-270 themselves, improvements to provide congestion relief on these facilities will also enhance existing and proposed multimodal transportation services by improving connectivity and mobility through enhancing trip reliability and providing additional travel choices for efficient travel during times of extensive congestion. Improved direct and indirect connections to park and ride lots, Metrorail, bus and other transit facilities are anticipated to occur as a result of addressing congestion on these regional roadways, thus providing a system of systems approach to addressing overall transportation needs in the National Capital Region.

Traffic management strategies are one option in the transportation “tool-kit” that have been identified to address the growing congestion. Managed lanes would maintain traffic operations at a relatively free-flow condition with little congestion because the number of vehicles entering the lanes is controlled. Management strategies were evaluated in several prior studies for these corridors: Capital Beltway Study, I-270 Multi-modal Corridor Study, and the West Side Mobility Study. The management strategies previously evaluated in these prior studies include HOV, high-occupancy toll (HOT), or express toll lanes (ETLs).

1.4 Enhance Trip Reliability

Congestion on I-495 and I-270 results in unpredictable travel times. Travelers and freight carriers place a high value on reaching their destinations in a timely and safe manner, and in recent years, the study corridors have become so unreliable that uncertain travel times are experienced daily. More dependable travel times are needed to ensure trip reliability.

MDOT SHA uses the Travel Time Index[3] (TTI) as one of the primary measures of congestion on freeways/expressways. The 2018 Mobility Report identifies the top 15 congested segments during the AM peak hour and the PM peak hour in Maryland based on TTI data from the year 2017. Five of the top 15 most congested segments in Maryland during the AM peak are located within the study corridors on I-495 , as shown in **Table 1-3**. Nine of the most congested segments in Maryland during the PM peak are located within the study limits, as shown in **Table 1-4**. In 2040, travel times along the study corridors are projected to increase and users would likely have to increase their planned travel time to reach their intended destinations. In addition, increased amounts of congestion will likely decrease vehicle spacing along the roadways, thereby increasing the potential for congestion-related crashes (rear-end and sideswipe collisions). When these occur, traffic incidents and non-recurring congestion will further degrade the performance and reliability of I-495 and I-270, potentially causing delay for over 300,000 commuters each weekday by 2040 and increasing travel costs.

Table 1-3: 2017 and Projected 2040 No Build TTI for Most Congested Segments in AM Peak

Road	Location	Direction (Loop)	2017 TTI (MD Rank)	Projected 2040 TTI	Forecasted % Increase
I-495	MD 650 to MD 193	Outer	5.1 (1)	6.2	21%
I-495	at MD 650	Outer	4.6 (2)	5.3	16%
I-495	MD 193 to US 29	Outer	4.1 (3)	4.7	15%
I-495	I-95 to Prince George's County Line	Outer	3.6 (5)	5.9	63%
I-495	US 29 to MD 97	Outer	2.9 (9)	3.4	16%

Source: MDOT SHA (2018)
Note: MDOT SHA defines the various levels of congestion in four categories[4] based on TTI.

Table 1-4: 2017 and Projected 2040 No Build TTI for Most Congested Segments in PM Peak

Road	Location	Direction (Loop)	2017 TTI (MD Rank)	Projected 2040 TTI	Forecasted % Increase
I-495	at Cabin John Pkwy	Inner	4.5 (1)	6.5	45%
I-495	Clara Barton Pkwy to Cabin John Pkwy	Inner	3.8 (6)	5.9	55%
I-270	I-270 Split to Democracy Blvd	South	3.5 (7)	3.5	0%
I-495	MD 355 to MD 185	Inner	3.4 (9)	4.9	44%
I-495	at MD 185	Inner	3.4 (10)	4.4	29%
I-495	at MD 355	Inner	3.3 (11)	6.8	106%
I-495	MD 190 to I-270 West Spur	Inner	3.3 (12)	4.5	36%
I-495	at MD 190	Outer	3.2 (14)	3.4	6%
I-495	MD 190 to Clara Barton Pkwy	Outer	3.1 (15)	3.2	5%

Source: MDOT SHA (2018)
Note: MDOT SHA defines the various levels of congestion in four categories[4] based on TTI.

Overall, this TTI data shows that users in the study corridors need an option for a reliable trip when the general purpose lanes are congested due to recurring or non-recurring congestion (such as incidents,

[3] The TTI compares the 50th percentile travel time of a trip on a segment of freeway/expressway for a particular hour to the travel time of a trip during off peak (free-flow or uncongested) conditions. The higher the TTI, for a given hour of the day, the longer the travel times (MDOT SHA, 2018). Free Free-flow conditions equate to TTI 1.0, and a TTI of 2.0 indicates a trip takes twice as long as free free-flow conditions, and greater than 2.0 indicated severe congestion.
[4] These four categories are: Uncongested (TTI < 1.15); Moderate Congestion (1.15 < TTI < 1.3); Heavy Congestion (1.3 < TTI < 2.0); or Severe Congestion (TTI greater than 2.0).

weather, and disabled vehicles). Managed lanes are an option to provide users with a more reliable travel time for their trip. Managed lanes are designed to operate at an acceptable level of service even when the adjacent general purpose lanes are congested. Because they are managed to control the number of vehicles using the lane to keep them flowing, managed lanes provide users with a more reliable option to reach their destination(s).

1.5 Provide Additional Roadway Travel Choices

Travelers on I-495 and I-270 do not have free-flowing travel options in the study corridors during peak periods or during the high incidents of vehicle breakdowns or accidents which exacerbate congestion and delays. Other than on I-270 where there are some HOV lanes, existing low-occupancy vehicle, buses, carpools, and vanpools, and trucks are limited to general purpose lanes along these roadways. Users needing to travel during peak periods, which experience recurring delays, utilize a variety of methods seeking a less congested option. Users attempt to bypass high volume ramps and locations by using arterial streets for all or a portion of their travel. Other users adjust their travel schedule to avoid those timeframes with typical delays. In addition, other than choosing alternate non-freeway routes (local and arterial roadways), no options exist to avoid non-recurring delays, such as during crashes, which close travel lanes or substantially slow travel. Additional roadway management options are needed to improve travel choice for time-sensitive trips, provide opportunities to bypass delays, and manage demand, while improving reliability and maintaining the existing number of general purpose lanes in the study corridors (**Appendix A, Section 3.6**).

Managed lanes are an option to provide drivers with a choice pay for a less congested trip or to carpool because they are managed to control the number of vehicles using the lanes. Drivers adjust their travel behavior in order to take advantage of the management tool for those managed lanes if their particular trip purpose warrants a relatively free-flow condition. The management strategies could include HOV, HOT, or ETLs. Managed lanes can also encourage and support reliable, more efficient transit service such as express and commuter bus routes. Optimizing free-flow conditions has the potential to increase overall mobility by making transit usage on those lanes faster and more effective. Accommodating transit usage on the managed lanes, coupled with enhancing connectivity through reduced congestion on the study corridors, presents the opportunity to incorporate multimodal solutions to the identified transportation needs.

1.6 Accommodate Homeland Security[5]

The National Capital Region is the nation's main hub of government, military, and other facilities related to homeland security, such as US Customs and Border Patrol, Federal Emergency Management Agency, and Transportation Security Administration, refer to **Table 3-8 in Appendix A** for additional details. These agencies and facilities rely on quick, unobstructed roadway access during a homeland security event. During a homeland security event, the government facilities along the I-495 and I-270 study corridors, as well as beyond the limits of the study corridors into the Baltimore Metropolitan Area and Northern Virginia, may be required to utilize I-495 and I-270. Existing congestion would be exacerbated in the event of an emergency evacuation and/or homeland security event in the National Capital Region. Per the FHWA

[5] Homeland Security is defined by the National Strategy for Homeland Security as "a concerted national effort to prevent terrorist attacks within the United States, reduce America's vulnerability to terrorism, and minimize the damage and recover from attacks that do occur." 2017 Edition – Revision 2, issued October 16, 2017 https://www.dhs.gov/sites/default/files/publications/18_0116_MGMT_DHS-Lexicon.pdf

study, *Highway Evacuations in Selected Metropolitan Areas: Assessment of Impediments*, a primary impediment to effective large-scale evacuations in the National Capital Region is roadway capacity (FHWA, 2010).

I-495 and I-270 are primary connections to and from densely populated communities in the National Capital Region, and the daily high travel demand on these highways results in severe congestion. Mobility and access for emergency response vehicles are limited by the traffic conditions on these highways, where high vehicle volumes may reduce the ability for emergency response vehicles to navigate and pass through congestion. This may result in longer response times. A study based on surveys from Emergency Medical Services (EMS) first responders, *Emergency Medical Service Providers' Experiences with Traffic Congestion*, supports this idea. The EMS study results indicate that traffic congestion is more often experienced on interstates and national highways than city streets, and that traffic congestion, on average, contributes to an extra ten minutes in emergency response time (Griffin and McGwin, 2013).

Additional roadway capacity would assist in improving emergency response access and accommodating a population evacuation should an event related to homeland security occur.

1.7 Improve Movement of Goods and Services

The transportation connections that I-495 and I-270 provide are essential to the productivity of the National Capital Region's economy. The study corridors allow the movement of goods and services, including freight and commuting employees, throughout the region. Existing congestion along both corridors increases the cost of doing business due to longer travel times and unreliable trips. The effects of this congestion on the movement of goods and services is a detriment to the health of the local, regional, and national economy. Efficient and reliable highway movement is necessary to accommodate passenger and freight travel that move goods and services through the region.

1.7.1 Movement of Freight Goods

Freight-dependent industries, including goods transportation services, raw materials/intermediate products transportation services, and retail/consumer outlets, account for 19 percent of the National Capital Region's Gross Domestic Product (GDP), which totaled $464 billion in 2013 (National Capital Region Transportation Planning Board, 2016c). Among these industries within the National Capital Region, the truck transportation mode accounts for 86 percent of the total weight and 79 percent of the total value of freight moved (National Capital Region Transportation Planning Board, 2016c).[6] Reliable travel times are critical to the movement of freight trucks and, therefore, the economy of the National Capital Region.

Freight trucks contribute to daily traffic flow conditions along I-495 and I-270. As shown in **Figure 1-2,** the study corridors experience the highest AADT volumes of freight trucks and greater percentages of freight trucks relative to other vehicles in the Freight-Significant Network.[7,8] Based on annual average data, both

[6] The freight weight and value percentages presented here are based on the National Capital Region Transportation Planning Board's *National Capital Region Freight Plan* (July 2016). The most recently available freight demand analysis data used in the 2016 *Freight Plan* is from 2007. See page 45 of the 2016 *Freight Plan* for additional information.

[7] Based on the National Capital Region Transportation Planning Board's *National Capital Region Freight Plan* (July 2016). The most recently available freight demand analysis data used in the 2016 *Freight Plan* is from 2007. See page 45 of the 2016 *Freight Plan* for additional information.

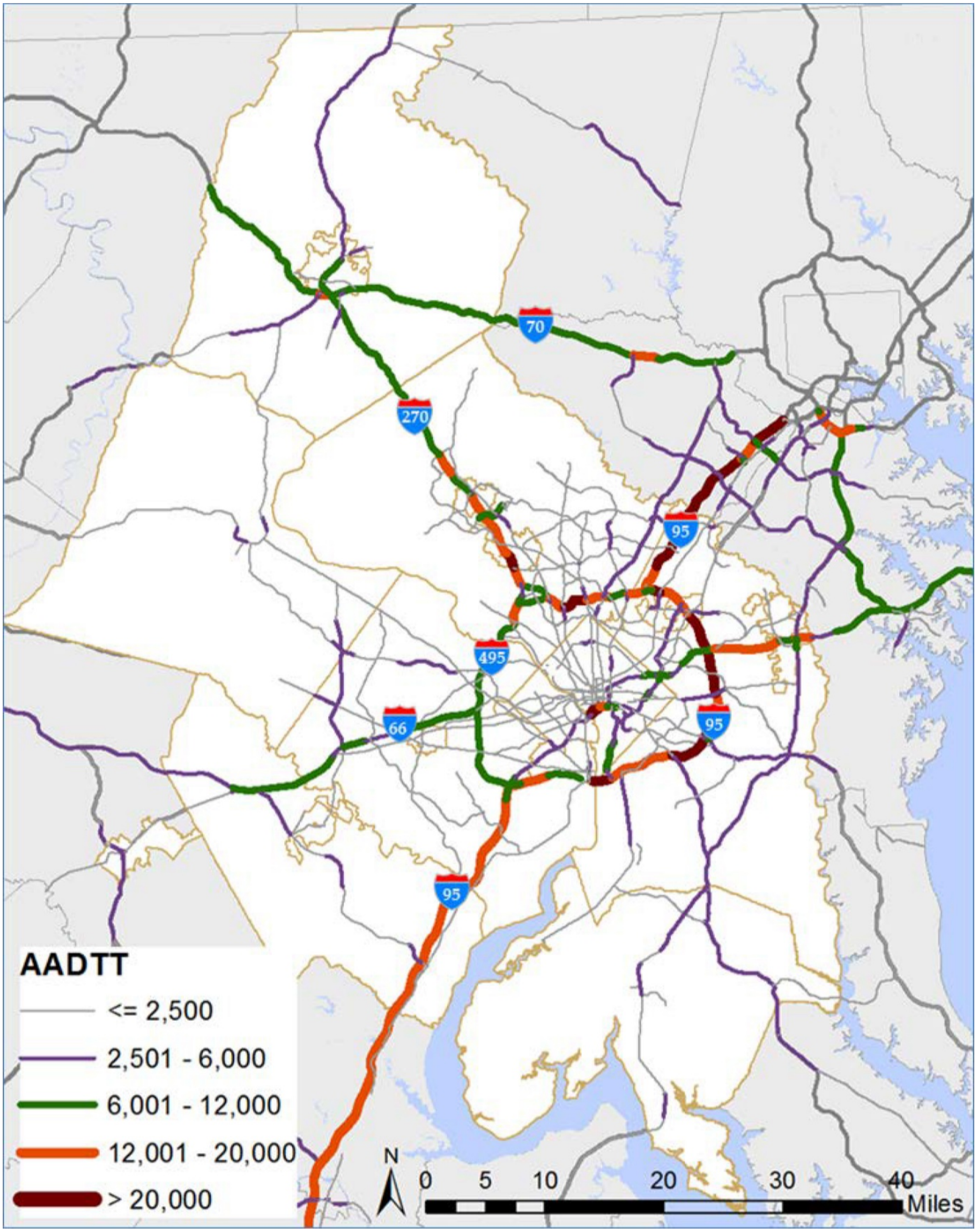
[8] Commercial traffic is not allowed on the National Park Service Parkways.

the I-495 study corridor and I-270 study corridor serve over 20,000 trucks per day, respectively. The demand for freight increases with population size. Each person in the United States generates demand for more than 60 tons of freight per year (MWCOG, 2016a), and with each new resident added, the demand for consumer goods increases. Therefore, as the population increases in the region, so does a corresponding demand for freight transportation. Refer to **Appendix A, Section 3.9** for additional details.

1.7.2 Movement of Commuting Employees

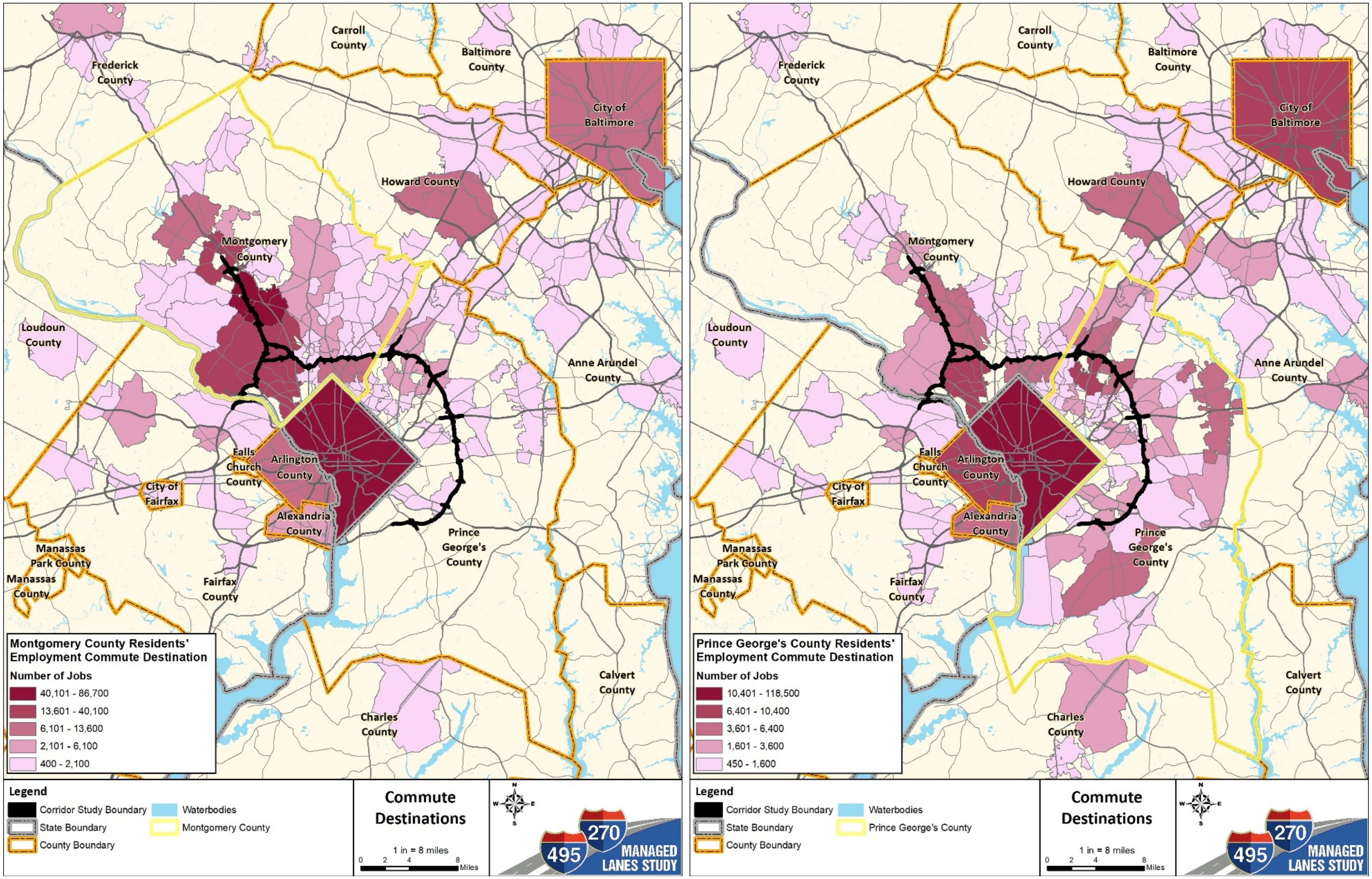
Thousands of employers in the National Capital Region depend on the study corridors for employee commuting and delivery access. As illustrated in **Figure 1-3**, approximately 54 percent of residents in Montgomery County and 56 percent of residents in Prince George's County travel ten or more miles from their homes for work with employment destinations and workers' home destinations densely clustered along the I-495 and I-270 study corridors (MD Maryland Department of Labor, Licensing, & Regulation, 2018). The ability to move freight and commuting employees through the study corridors will increasingly depend on the performance of the existing travel lanes on I-495 and I-270. Travelers, commuting employees, and freight trucks are especially sensitive to non-recurring delays (unanticipated disruptions), which are indicative of poor reliability, as they disrupt scheduled activities and manufacturing/distribution activities (TPB, 2016d). Refer to **Appendix A, Section 3.10** for additional details.

Figure 1-2: Average Annual Daily Truck Traffic

1. 

Source: National Capital Region Freight Plan, page 31. National Capital Region Transportation Planning Board, 2016.

Figure 1-3: Residents' Employment Commute Destinations in Montgomery and Prince George's Counties



Source: U.S. Census Bureau, Center for Economic Studies, OnTheMap (https://onthemap.ces.census.gov)

1.8 Other Goals and Objectives

1.8.1 Incorporate Alternative Funding Sources to Achieve Financial Viability

The State of Maryland is committed to provide timely transportation improvements that can accommodate existing and long-term traffic growth. Typical roadway infrastructure improvements are funded through use of Maryland's Transportation Trust Fund. The Transportation Trust Fund is primarily comprised of revenue from the gas tax and motor vehicle registration and titling fees. All funds dedicated to MDOT are deposited in the Transportation Trust Fund, and disbursements for all programs and projects are made from the Transportation Trust Fund. Revenues are not earmarked for specific programs.

However, the State's traditional funding sources, including the Maryland Transportation Trust Fund, are unable to effectively finance, construct, operate, and maintain highway improvements of the magnitude that are needed to address roadway congestion and enhance trip reliability in these study corridors, due to the fiscal constraints of the program and the state-wide transportation needs. These types of large projects must be financially viable and revenue sources, such as pricing options, that provide adequate funding are needed to support additional roadway capacity and improvements that address roadway congestion and enhance reliability.

Large-scale improvements, such as those being considered with the Study, would require decades to accumulate enough revenue in the State's Transportation Trust Fund to deliver the improvements with traditional funding. The use of alternative funding approaches, such as pricing options, provides needed large-scale improvements decades earlier than would otherwise be realized using traditional funding and allows the project to be fiscally-constrained in the metropolitan transportation plan. This is a critical step in the NEPA decision-making process, as current federal policy restricts issuance of a NEPA decision document unless the project is fiscally-constrained. For large-scale improvements such as those considered in this Study, MDOT SHA will seek to use innovative financing methods such as a P3 in order to design, build, finance, operate, and maintain the proposed infrastructure improvements.

1.8.2 Environmental Responsibility

The area surrounding the study corridors is highly constrained. MDOT SHA will work to avoid and minimize community, wetlands, waterways, cultural, noise, air quality, and parkland impacts, and mitigate for impacts when not avoidable. MDOT SHA will work with our federal, state, and local resource agency partners in a streamlined, collaborative, and cooperative way to meet all regulatory requirements to ensure the protection of significant environmental and community resources. In planning mitigation for a build alternative, MDOT SHA will strive to provide meaningful benefit to resources and improve their values, services, attributes, and functions that may be compromised by a build alternative. MDOT SHA will work in good faith with our regulatory agency partners to plan worthwhile mitigation based on identified priorities that would, at a minimum, bring no net loss to impacted resources with a goal of net benefit. Innovative, creative solutions, including modern environmental site design techniques to mitigate for unavoidable impacts will be identified and included in the Record of Decision (ROD). Commitments in the ROD will also be included in any contract documents regardless of project delivery method, including a Public-Private- Partnership (P3).

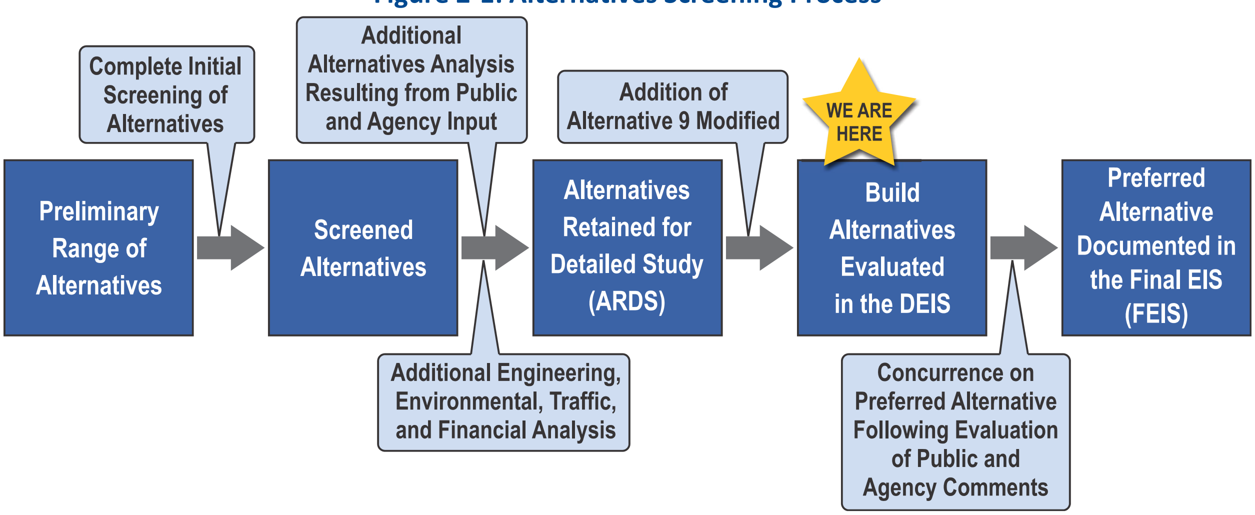
2 ALTERNATIVES DEVELOPMENT

2.1 Overview of Alternatives Development Process

Preparation of an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA) involves identification of a reasonable range of alternatives to carry out the proposed federal action. The Maryland Department of Transportation State Highway Administration (MDOT SHA) analyzed a broad scope of initial alternatives to create a list of alternatives being carried forward for more detailed analysis in the Draft EIS (DEIS). A reasonable range of alternatives are those that meet the Study's Purpose and Need (refer to **Chapter 1** of this DEIS); and include those that are practical or feasible from the technical and economic standpoints and using common sense (Council on Environmental Quality [CEQ], 40 Questions, Response to Question 2a).[1]

The alternatives development and screening is following a five-step process that narrows the Preliminary Range of Alternatives under consideration down to the Preferred Alternative (**Figure 2-1**). The first four steps are presented in this DEIS; the last step will be documented in the Final EIS. As the level of design and analysis detail increased, the number of alternatives being considered decreased. To accommodate this large Study with numerous preliminary alternatives and substantial public and agency interest, the interim step of identifying Screened Alternatives was included in the alternatives screening process. Following the Screened Alternatives and additional analysis, the Alternatives Retained for Detailed Study (ARDS) were selected. After the ARDS were concurred upon, one additional alternative was evaluated and is included in the DEIS. Aside from the No Build Alternative, the alternatives retained for evaluation in this DEIS are referred to as the Build Alternatives.

Figure 2-1: Alternatives Screening Process



A range of 15 Preliminary Alternatives was identified from previous studies and planning documents, input from the public, and federal, state, and local regulatory agencies during the NEPA scoping process. The

[1] Council on Environmental Quality (CEQ), Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act regulations (CEQ, 1986) https://www.energy.gov/nepa/downloads/forty-most-asked-questions-concerning-ceqs-national-environmental-policy-act

Screening of the Preliminary Range of Alternatives was completed by applying screening criteria related to the Study's Purpose and Need to each alternative (refer to **Section 2.2**). A general, qualitative assessment of these criteria was made using readily available information. An alternative was dropped from further consideration only if the available information demonstrated it clearly did not meet the Study's Purpose and Need. Screened Alternatives were identified as those that met the screening criteria or required additional analysis to determine their ability to meet the Purpose and Need. The initial screening of alternatives is documented in *Chapter 4 of the Alternatives Technical Report* (**Appendix B**).

In February 2019, the Screened Alternatives were presented to the public through the website via written documentation and a video. Additional engineering, traffic, financial, and environmental analyses were completed, and used to determine the reasonableness of the Screened Alternatives to be carried forward as the ARDS. The Recommended ARDS included all of the seven Screened Alternatives. They were presented at Spring 2019 Public Workshops and were then further analyzed. At that point, the Federal Highway Administration (FHWA) and MDOT SHA determined that Alternative 5 was not a reasonable alternative because of its deficiencies in addressing existing traffic and long-term traffic growth and trip reliability, as well as concerns with the alternative's financial viability. Consequently, it was determined that Alternative 5 did not meet the Study's Purpose and Need and would not be one of the ARDS. Alternative 5 is included in the comparison of impacts in **Chapters 3** and **4** of this DEIS but is not one of the ARDS or Build Alternatives. The No Build Alternative also does not meet the Study's Purpose and Need but was retained for comparison with the other alternatives in accordance with CEQ's NEPA regulations.

Following the Spring 2019 Public Workshops and agency meetings, several Cooperating and Participating agencies requested that MDOT SHA evaluate an alternative that would provide an alternate route for travelers to use MD 200 (Intercounty Connector) instead of the top side of I-495 between I-270 and I-95 to avoid or reduce impacts to significant, regulated resources and residential relocations. This new alternative (the MD 200 Diversion Alternative) was developed and analyzed with input from the agencies. After evaluation, it was determined that the MD 200 Alternative would not address the Study's Purpose and Need of accommodating long-term traffic growth, enhancing trip reliability or improving the movement of goods and services. A summary of the MD 200 Diversion Alternative analysis is included in **Section 2.5.3** of this chapter and documented in *Chapter 6, Section 4 of the Alternatives Technical Report* (**Appendix B**).

The results of the screening of alternatives and the rationale for the identification of the ARDS are summarized in **Sections 2.5** and **2.6** of this chapter and documented in *Chapter 6* of the *Alternatives Technical Report* (**Appendix B**). Following the cooperating agencies' concurrence[2] on the ARDS, MDOT SHA and FHWA evaluated another additional alternative, called Alternative 9 Modified (Alternative 9M), in response to public and agency input. Alternative 9M consists of a blend of Alternatives 5 and 9 with the primary difference on the top side of I-495 between I-270 and I-95 being the addition of one managed lane per direction instead of two managed lanes. Alternative 9M was evaluated and determined to be a reasonable alternative, and thus is included as a Build Alternative in this DEIS. A summary of the Alternative 9M analysis is included in **Section 2.6.4** of this chapter and is documented in *Chapter 6, Section 5 of the Alternatives Technical Report* (**Appendix B**).

[2] NCPC abstained from concurring on the ARDS; M-NCPPC did not concur on the ARDS.

This DEIS presents the additional analysis and comparison of impacts between the Build Alternatives (Alternatives 8, 9, 9M, 10, 13B, 13C) and the No Build Alternative in **Chapters 3** and **4**, plus Alternative 5 for comparison purposes.

2.2 Screening Criteria

The screening of the Preliminary Range of Alternatives involved application of 15 metrics using a "high, medium, low" or "yes and no" approach, which is further defined for each criterion in this section. The evaluation of the Screened Alternatives assessed each alternative under six major elements related to the Study's Purpose and Need including preliminary engineering, traffic, financial viability, and environmental impacts. The screening criteria for the Screened Alternatives were the same used for the initial screening, but were refined by additional data to further differentiate between an alternative's ability to meet the Study's Purpose and Need. A summary of the screening criteria is presented in this section based on how it was defined in the initial screening step for the Screened Alternatives and then refined for the ARDS. Refer to *Chapter 4, Section 3* and *Chapter 6, Section 1 of the Alternatives Technical Report* (**Appendix B**) for the details on these screening criteria.

2.2.1 Engineering Considerations

a. Existing Traffic and Long-Term Traffic Growth

Initial Screening Criterion: This criterion evaluated whether the alternative addressed existing traffic and long-term traffic growth. A response of "high" indicated the alternative relieved existing and long-term traffic congestion by reducing average travel times and volume-to-capacity (V/C) ratios throughout the study area during all peak hours in the existing and future design years (2017 and 2040). During the initial screening stage, preliminary traffic analyses were performed using available traffic data (including traffic count volumes and existing speeds) and planning-level tools, such as Highway Capacity Software (HCS), to evaluate alternatives, when applicable. In some cases, the preliminary traffic analyses were sufficient to determine that an alternative would not effectively address existing traffic and long-term traffic growth. These alternatives were given a response of "low." However, for other alternatives, additional analysis was needed to determine the projected impacts on existing traffic and long-term traffic growth including development of traffic forecasts and traffic simulation models to evaluate additional metrics, as described in the next section.

Refined Screening Criterion for ARDS: This screening criterion was refined because additional analysis was completed to further determine an alternative's ability to meet the Study's Purpose and Need. Three metrics were identified for this refined screening criterion based on the traffic analysis: 1) system-wide delay, 2) corridor travel times and speeds, and 3) density and level of service[3] (LOS). This additional traffic analysis included projecting future traffic volumes for a four-hour AM peak period (6:00 AM to 10:00 AM) and PM peak period (3:00 PM to 7:00 PM) in the design year of 2040 using the Metropolitan Washington Council of Governments (MWCOG) regional forecasting model and followed by a VISSIM traffic flow simulation model.

[3] Level of Service (LOS) is a letter grade assigned to a section of roadway that measures the quality of traffic flow, ranging from LOS A to LOS F. LOS A represents optimal, free-flow conditions, while LOS F represents failing conditions where demand exceeds capacity.

b. Trip Reliability

Initial Screening Criterion: The Planning Time Index (PTI) was used to evaluate whether an alternative enhanced trip reliability. PTI reflects the 95th percentile travel time for a section of roadway and represents the total time motorists should allow to ensure they arrive at their destination on-time. Travelers need more dependable and predictable travel times to ensure trip reliability. For example, a commuter would like to know that their six-mile commute from Point A to Point B along I-495 would routinely take the same amount of time regardless of the day of the week or time of day of the trip. Many factors cause variability in travel time, such as incidents, weather, surges in demand due to special events, time of year, and capacity reductions due to work zones, which makes it difficult for users to predict future trip reliability. However, trip reliability can be enhanced by providing additional capacity and/or managing demand on the system. A response of “high” indicates a more predictable travel time is provided by that alternative.

Refined Screening Criterion for ARDS: This screening criterion was refined because additional analysis was completed to further determine an alternative’s ability to meet the Study’s Purpose and Need. Non-recurring events that affect PTI, such as incidents, weather, increased demand for special events, and reduced capacity due to work zones, make it difficult to predict future travel times and calculate a future PTI value. Although PTI cannot be calculated directly for future travel times, a similar metric known as Travel Time Index (TTI), a metric used to quantify congestion levels, was used as a proxy to help quantify the future reliability of the network. TTI is defined as the average (50th percentile) travel time on a segment of freeway/expressway for a particular hour compared to the travel time of the same trip during free-flow or uncongested conditions. The higher the TTI, the longer the travel times. Most roadway segments that have a high TTI value also experience high PTI values because they are more likely to be impacted by minor incidents. Roadways with lower TTI values have some reserve capacity to absorb the disruption caused by non-recurring congestion and are typically more reliable.

c. Additional Roadway Travel Choice

Initial Screening Criterion: This criterion was used to assess whether the alternative provided an additional roadway travel choice, other than the current congested general purpose (GP) lanes, while retaining the existing GP lanes. A “yes” indicated the alternative would provide travelers with an option for a less congested trip through a roadway management strategy. A “no” indicated the alternative would not provide roadway travelers with an option for a less congested trip.

Refined Screening Criterion for ARDS: The detailed analysis did not change the yes/no response to this screening criterion. A “yes” response indicated an alternative’s ability to meet this need.

d. Ease of Usage for Travelers

Initial Screening Criterion: Ease of usage for travelers was indicated by factors such as safety, enforcement, signing, and decision points/access. This criterion evaluated whether implementation of the alternative would likely require complex operating configurations that could lead to driver confusion. Alternatives with “high” ease of usage enable efficient and safe operations by allowing one type of lane operation in a lane (e.g. High-Occupancy Toll (HOT) or GP).

Refined Screening Criterion for ARDS: The detailed analysis did not change the high/medium/low response to this screening criterion.

2.2.2 Homeland Security

Initial Screening Criterion: Quick, unobstructed roadway access is needed during a homeland security event that causes populations to evacuate. Alternatives with additional capacity and ability to control access would more readily accommodate a population evacuation and improve emergency response. With a response of "yes" or "no", each alternative was assessed considering whether the alternative would provide additional capacity to assist in accommodating population evacuation.

Refined Screening Criterion for ARDS: The detailed analysis did not change the yes/no response to this screening criterion. A "yes" response indicated an alternative's ability to meet this need.

2.2.3 Movement of Goods and Services

Initial Screening Criterion: Efficient and reliable highway movements are necessary to accommodate passenger and freight travel and moving goods and services through the region. This criterion indicated whether the alternative would improve reliability for movement of goods and services. With a response of "high, medium, or low," the alternative was evaluated by how well it would enhance the movement of freight, services, and commuting employees by providing a more reliable trip based on the ability of the alternative to enhance trip reliability as described in **Section 2.2.1**.

Refined Screening Criterion for ARDS: This screening criterion was refined because additional analysis was completed to further determine an alternative's ability to meet the Study's Purpose and Need. This criterion was closely tied to TTI, vehicle throughput, and effects on the local roadway network. For each of the Screened Alternatives, the metric of vehicle throughput was calculated to quantify how efficiently goods and services could be moved through the study corridors. Throughput includes all vehicles traveling in both directions on a roadway including in High-Occupancy Vehicle (HOV) lanes, where provided. Throughput represents the number of vehicles and/or people that pass by a given point in the roadway network in a set amount of time. Throughput quantifies the efficiency of the roadway network in getting people, goods, and services to their destinations. Results were reported for four locations in the study area in terms of percent increase in vehicle throughput for each Screened Alternative compared to the No Build conditions, rounded to the nearest five percent. Higher values indicate more efficient movement of goods and services. Ratings of "high, medium, or low" were given for alternatives based on the anticipated benefit compared to the No Build.

The traffic analysis also included the effect each alternative would have on traffic operations on the surrounding local road network. The projected reduction in delay on the local road network was collected from the MWCOG model. Values were presented in terms of total vehicle hours of delay each day on all arterials in Montgomery County, Maryland; Prince George's County, Maryland; and Washington, DC. Other regions in Maryland and Virginia showed negligible change in the local delay. Lower values are better, representing less delay for local travelers. These numbers were also converted to the percent reduction in delay versus the No Build condition to help compare the relative merit of each of the Screened Alternatives. Higher values are better, reflecting greater benefit.

2.2.4 Multimodal Connectivity

Initial Screening Criterion: This criterion determined whether the alternative would enhance connectivity to and between existing transit facilities near the study area. This criterion also considered whether the alternative could enhance access to existing and proposed transit facilities and accommodate reliable, more efficient transit service through a “high, medium, or low” response. A rating of “high” would both enhance connectivity to and between existing transit facilities near the corridor and provide opportunities for new or modified transit service. A “medium” rating would provide for one or the other and a “low” would minimally or not provide for either.

Refined Screening Criterion for ARDS: The detailed analysis did not change the high, medium, or low response to this screening criterion.

2.2.5 Financial Viability

Initial Screening Criterion: Additional capacity and improvements to reduce congestion and enhance reliability must be financially viable. This criterion considered if the alternative would provide a revenue source from pricing options, tolling, or fares through a “yes or no” response.

Refined Screening Criterion for ARDS: Detailed financial analysis results for the Screened Alternatives was not available during the development of the Draft ARDS paper in Spring 2019. Financial viability was originally based on preliminary capital cost estimates[4] and were used as a proxy for overall program costs. In general, the more significant the initial build cost, the higher the long-term operations and maintenance costs that are needed to maintain the infrastructure. However, other data was used as a proxy to allow a comparison of the Screened Alternatives to identify those that would have a greater or lesser likelihood of being financially viable. Potential traffic volume, or annual daily traffic (ADT) in the managed lanes[5], where provided, could roughly equate to revenue. The higher the traffic volume or ADT that is in the managed lanes, the more travelers that would be paying tolls, and therefore, the greater the potential revenue. Following this approach, alternatives with more managed lanes would result in higher revenue and those with only toll users (Express Toll Lanes) would have higher revenue than those with a mix of tolled and non-tolled users (High-Occupancy Toll Lanes).

In June 2019, additional financial analyses were completed for all the ARDS to assess the potential of each alternative to be financially viable. This analysis considered the preliminary capital costs, initial revenue projections, and preliminary operations and maintenance costs. Estimates were developed for net cashflows to the state from delivery as a toll revenue concession (costs and revenues adjusted for inflation and financing modeled based on market precedents for similar transactions) over the course of a 50-year Public-Private Partnership (P3) agreement to indicate the comparative financial viability of each of the recommended ARDS.

2.2.6 Environmental

Initial Screening Criterion: While MDOT SHA acknowledged that the Preliminary Range of Alternatives could have had a varying degree of potential environmental impacts, it was not a differentiating factor during the initial screening. The environmental screening criterion used during the initial screening considered whether the Preliminary Alternatives would require additional right-of-way or impact parkland, historic resources, and/or wetlands and waterways, with a “yes” or “no” response. Because the

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[4] The preliminary cost estimates were prepared in accordance with the MDOT SHA 2017 *Highway Construction Cost Estimating Manual* at a planning level using the major quantities method of estimation. Where available, quantities for roadway work were obtained with appropriate contingencies added based on the level of uncertainty.

[5] Managed lanes are highway facilities that use strategies, such as lane-use restrictions or congestion pricing, to optimize the number of vehicles that can travel the highway to maintain free-flowing speeds.

alternatives are located along the existing I-495 and I-270 corridors within highly urban and environmentally constrained areas, the answer was "yes" for each alternative aside from the No Build. Therefore, as the main purpose of the initial screening was to determine whether the Preliminary Alternatives met the transportation Purpose and Need, the consideration of the potential for varying degrees of environmental impacts was not a differentiator in whether an alternative should be retained or dismissed.

Refined Screening Criterion for ARDS: In support of the detailed analysis for the Screened Alternatives, existing environmental conditions were further identified through an inventory of readily available public records and resource data, field identifications, and agency consultation. Environmental conditions and a preliminary assessment of impacts that could result from the Screened Alternatives were quantified and documented by resource type including right-of-way and properties, parks and recreation area, historic properties, 100-year floodplains, unique and sensitive areas and habitat, forest canopy, wetlands, waters, and noise receptors.

2.3 Regional Transportation Planning

The initial screening of alternatives considered the initiatives and projects outlined in Visualize2045 Plan, the latest financially Constrained Long-Range Plan (CLRP) that was approved by the National Capital Region Transportation Planning Board on October 17, 2018. The Visualize2045 Plan identified Seven Aspirational Initiatives for a Better Future. One of the seven initiatives is "Expand Express Highway Network," which includes congestion-free toll roads, building on an emerging toll road network and new opportunities for transit for express buses to travel in the toll lanes. For more information on this initiative refer to:
http://mwcog.maps.arcgis.com/apps/Cascade/index.html?appid=debc2550777b4cc2bae2364c7712a151

Three specific, financially constrained projects in the Visualize2045 Plan that relate to this Study are:

- CLRP-constrained element ID-1182: I-95/I-495 component of Traffic Relief Plan to include two managed lanes in each direction, between the Baltimore Washington Parkway and the Virginia State Line/Potomac River at the Woodrow Wilson Bridge.

  http://www1.mwcog.org/clrp/projects/clrp-report.asp?PROJECT_ID=1182

- CLRP-constrained element ID-3281: I-95/I-495 component of Traffic Relief Plan to include two managed lanes in each direction, between the Baltimore Washington Parkway and the Virginia State Line/Potomac River at the American Legion Bridge.

  http://www1.mwcog.org/clrp/projects/clrp-report.asp?PROJECT_ID=3281

- CLRP-constrained element ID-1186: I-270 component of Traffic Relief Plan, to include two managed lanes in each direction, between I-495 and I-70/US 40.

  http://www1.mwcog.org/clrp/projects/clrp-report.asp?PROJECT_ID=1186

Whether an alternative was consistent with the Visualize2045 Plan was considered in the initial screening process but was not a determining factor on whether the alternative should be retained or dismissed.

2.4 Preliminary Range of Alternatives

The Preliminary Range of Alternatives was identified from previous studies and planning documents, based on proposed engineering improvements, and reflects input received from the public and federal, state, and local regulatory agencies during the NEPA scoping process. The Preliminary Range of

Alternatives included the No Build Alternative as well as alternatives that included elements such as transportation systems management (TSM)[6]/ transportation demand management (TDM),[7] additional general purpose (GP) lanes, High-Occupancy Vehicle (HOV) lanes, priced managed lanes, collector-distributor (C-D) lanes, contraflow lanes, reversible lanes, and transit. Stand-alone transit alternatives considered three transit modes: heavy rail, light rail, and bus. Additionally, options were identified for alternatives that could be applied to either I-495 or I-270 as well as different transit modes. Some of the alternatives have lettered options which reflect whether the options are exclusively applicable to I-495 or I-270 or are related to a specific transit mode. The Preliminary Range of Alternatives were:

- Alternative 1: No Build
- Alternative 2: Transportation Systems Management)/Transportation Demand Management (TSM/TDM)
- Alternative 3: Add one GP Lane in each direction on I-495 and I-270
- Alternative 4: Add one HOV lane in each direction on I-495 and retain existing HOV lane in each direction on I-270
- Alternative 5: Add one priced managed lane in each direction on I-495 and convert one existing HOV lane in each direction to a priced managed lane on I-270
- Alternative 6: Add two GP lanes in each direction on I-495 and I-270
- Alternative 7: Add two HOV lanes in each direction on I-495 and retain one existing HOV lane and add one HOV lane in each direction on I-270
- Alternative 8: Add two priced managed lanes in each direction on I-495 and add one priced managed lane in each direction and retain one existing HOV lane in each direction on I-270
- Alternative 9: Add two priced managed lanes in each direction on I-495 and convert one existing HOV lane to a priced managed lane and add one priced managed lane in each direction on I-270
- Alternative 10: Add two priced managed lanes in each direction on I-495 and on I-270 and retain one existing HOV lane in each direction on I-270 only
- Alternative 11: Physically separate traffic using C-D lanes, adding two GP lanes in each direction on I-495
- Alternative 12A: Convert existing GP lane on I-495 to contraflow lane during peak periods
- Alternative 12B: Convert existing HOV lane on I-270 to contraflow lane during peak periods
- Alternative 13A: Add two priced managed reversible lanes on I-495

What are Managed Lanes?

Managed lanes are highway facilities that use strategies, such as lane-use restrictions or congestion pricing, to optimize the number of vehicles that can travel the highway to maintain free-flowing speeds. Managed lanes are designed to improve highway operations and provide the driving public, as well as transit riders, with reduced congestion and improved trip reliability. Managed lanes operate at an acceptable level of service even when the adjacent general purpose lanes are congested because they are managed to control the number of vehicles using the lane to keep them flowing. Managed lanes provide users with a more reliable option to reach their destination(s). Managed Lanes may include but are not limited to: High Occupancy Vehicles (HOV) lanes, High Occupancy Toll (HOT) lanes, Express Toll Lanes (ETL), and bus-only lanes.

[6] TSM are actions that improve the operation and coordination of transportation services and facilities.

[7] TDM is a variety of strategies, techniques, or incentives aimed at providing the most efficient and effective use of existing transportation services and facilities (e.g., rideshare and telecommuting promotion, managed lanes, preferential parking, road pricing, etc.)

- Alternative 13B: Convert existing HOV lanes to two priced managed reversible lanes on I-270
- Alternative 13C: Add two priced managed reversible lanes and retain one existing HOV lane in each direction on I-270
- Alternative 14A: Heavy Rail[8] transit
- Alternative 14B: Light Rail[9] transit
- Alternative 14C: Fixed guideway Bus Rapid Transit (BRT)[10] off alignment of existing roadway
- Alternative 15: Add one dedicated bus lane on I-495 and I-270

Refer to the *Alternatives Technical Report* (**Appendix B, Section 4.4**) for additional details on the Preliminary Range of Alternatives.

2.5 Screened Alternatives

Modifications to the Preliminary Range of Alternatives were made in response to public and agency input received during and after the Alternatives Public Workshops held July 17, 18, 24 and 25, 2018. In response to public and agency comments to retain alternatives that maintain the HOV lanes on I-270, MDOT SHA defined priced managed lanes as High-Occupancy Toll (HOT) lanes or Express Toll Lanes (ETLs) and the descriptions of the alternatives were modified accordingly. For alternatives that would retain the existing HOV lanes on I-270, the added priced managed lanes were defined as ETL, where all vehicles in the ETL would be tolled. For alternatives that would involve the conversion of the existing HOV lanes on I-270, the priced managed lanes were defined as HOT lanes. For purposes of the alternatives evaluated in this Study, the existing HOV 2+ lanes on I-270 would be converted to HOT lanes, which could include the following potential operational structure:

What Managed Lane Strategies Are Being Considered for This Study?

Throughout the development of the alternatives for the Study, several operational strategies were identified to manage travel demand in the managed lanes. These definitions include:

- **High-Occupancy Toll (HOT) lanes**: High-Occupancy Vehicle (HOV) facilities that allow lower-occupancy vehicles, such as solo drivers, to use the facilities in return for toll payments, which could vary by time of day or level of congestion; may also charge lower-occupancy HOVs.[11]
- **Express Toll Lanes (ETLs)**: dedicated managed lanes within highway rights-of-way that motorists may use by paying a variably priced toll.[12]
- **HOV Lanes**: any preferential lane designated for exclusive use by vehicles with two or more occupants for all or part of a day, including a designated lane on a freeway, other highway or a street, or independent roadway on a separate right-of-way.[13]
- **Reversible Lanes**: facilities in which the direction of traffic flow can be changed at different times of the day to match peak direction of travel, typically inbound in the morning and outbound in the afternoon.

[8] Heavy Rail is a mode of transit service (also called metro, subway, rapid transit, or rapid rail) operating on an electric railway with the capacity for a heavy volume of traffic. It is characterized by high speed and rapid acceleration passenger rail cars operating singly or in multi-car trains on fixed rails.

[9] Light Rail is a mode of transit service (also called streetcar, tramway, or trolley) operating passenger rail cars singly (or in short trains) on fixed rails. Light rail vehicles are typically driven electrically with power being drawn from an overhead electric line via a trolley or a pantograph and driven by an operator on board the vehicle.

[10] Bus Rapid Transit is a high-quality bus-based transit system that delivers fast and efficient service that may include dedicated lanes, busways, traffic signal priority, off-board fare collection, elevated platforms, and enhanced stations.

[11] *National Cooperative Highway Research Program, Research Report 835, Guidelines for Implementing Managed Lanes*. Transportation Research Board. 2016

[12] https://www.fhwa.dot.gov/ipd/tolling_and_pricing/defined/demand_mgmt_tool.aspx

[13] https://ops.fhwa.dot.gov/freewaymgmt/hovguidance/glossary.htm

1. Qualifying or eligible HOVs may use the managed lanes for free under 23 USC 166 authority. The current thinking at the time of the DEIS publication is that vehicles with three or more occupants (HOV 3+) would be eligible for the HOV status.

2. All other lower-occupancy vehicles (two-occupant and single occupant vehicles [SOV]) may be tolled at the full toll rate.

Additional details on the toll regulations are provided in **Section 2.7.5**.

The Preliminary Range of Alternatives were evaluated by applying the screening criteria established from the Study's Purpose and Need, using a general, qualitative assessment (as described in **Section 2.2** of this chapter). As a result of the initial screening, seven alternatives were recommended to be advanced for further detailed analysis and 13 alternatives were dropped from further consideration. The Screened Alternatives retained for further consideration are described in **Section 2.5.1** and the alternatives dropped from further consideration are identified in **Section 2.5.2**. Additional alternatives analysis is presented in **Section 2.5.3**. Refer to *Chapter 4, Section 4 of the Alternatives Technical Report* (**Appendix B**) for additional details on the Screened Alternatives, including typical sections of the alternatives.

2.5.1 Alternatives Retained for Further Consideration

Alternatives 1, 5, 8, 9, 10, 13B, and 13C were recommended for further analysis and environmental evaluation as the Screened Alternatives:

- Alternative 1: No Build – Though this alternative does not meet the Study's Purpose and Need, consistent with NEPA requirements, it was carried forward for further evaluation to serve as a base case for comparing the other alternatives
- Alternative 5: One HOT Managed Lane Network
- Alternative 8: Two ETL Managed Lanes Network on I-495 and one ETL and one HOV Lane Network on I-270
- Alternative 9: Two HOT Managed Lanes Network
- Alternative 10: Two ETL Managed Lanes Network on I-495 and I-270 and Retain one HOV Lane on I-270 only
- Alternative 13B: Two HOT Managed Lanes Network on I-495 and two Reversible HOT Managed Lanes Network on I-270
- Alternative 13C: Two ETL Managed Lanes Network on I-495 and two Reversible ETL Managed Lanes Network on I-270, and retain one HOV Lane on I-270 only

Screened Alternatives 8, 10, and 13C would retain the existing HOV lanes on I-270 and Screened Alternatives 5, 9, and 13B would involve the conversion of the existing HOV lanes on I-270 to HOT lanes. Following the additional engineering, traffic, financial and environmental analysis, all seven Screened Alternatives were recommended to be carried forward as the Alternatives Retained for Detailed Study (ARDS).

2.5.2 Alternatives Dropped from Further Consideration

Alternatives 2, 3, 4, 6, 7, 11, 12A, 12B, 13A, 14A, 14B, 14C, and 15 were dropped from further consideration during the initial alternatives screening because they did not meet the screening criteria established by the Study's Purpose and Need:

a. Alternative 2: TSM/TDM

Alternative 2, the Transportation System Management and Transportation Demand Management (TSM/TDM) alternative would improve the operations of the existing transportation system. Benefits of these types of solutions optimize the existing system, but do not support long-term traffic growth. For example, solutions of this type are currently under construction on I-270, expected to be completed by 2021, to provide traffic operational benefits in the near term. However, detailed modeling of the I-270 improvements also indicated that, as traffic continues to increase, the traffic operations are expected to return to existing levels of congestion by 2040. These types of improvements would not enhance trip reliability, would not provide an additional travel choice, would not accommodate the capacity needed during a Homeland Security event or improve the movement of goods and services, nor would they provide a revenue source. However, elements of the TSM/TDM Alternative will be included in the Build Alternatives as presented in the inset above.

Will TSM and TDM Elements Be Considered in The Build Alternatives?

TSM/TDM elements are included in the Build Alternatives for further study. These include:

- Maintaining the adaptive ramp metering being implemented on the interchange entrance ramps along I-270 as part of MDOT SHA's on-going I-270 Innovative Congestion Management project.
- Changes at interchange ramp terminals and intersecting roadways to optimize lane configurations and traffic signal timing to provide adequate traffic flow along the crossroads.
- Enhancements to acceleration and deceleration lanes to meet American Association of State Highway and Transportation Officials (AASHTO) design guidelines.

b. Alternatives 4 & 7: HOV Lanes

Alternatives 4 and 7 featured HOV lanes, which are only open to vehicles with a minimum number of occupants. A one- or two-lane HOV network would likely be underutilized due to not having enough HOV-eligible vehicles to fill the lanes, leading to more violators and the need for additional enforcement. The performance of the existing HOV system on I-270 was reviewed to help evaluate the potential advantages and disadvantages of Alternatives 4 and 7. The data showed that the current lanes are not being utilized to their maximum potential to relieve congestion, only about 75 percent of HOV-eligible vehicles use the HOV lane (i.e., a significant portion of HOV-eligible vehicles choose to travel in the GP lanes), and the HOV violation rate is high. Refer to the *Chapter 4, Section 4 of Alternatives Technical Report* (**Appendix B**) for additional details. These alternatives were dropped from further consideration because they would not support long-term traffic growth, would not ensure reliable trips on I-495 and I-270, and would not provide a revenue source. Even if MDOT SHA could fund this construction, it would take one to two decades of fully dedicating its entire statewide budget to deliver these alternatives.

c. Alternatives 3 & 6: GP Lanes

GP lanes are the lanes on a freeway that are open to all motor vehicles without tolls. Alternatives 3 and 6 only provided additional GP lanes and were dropped from further consideration. Alternative 3 was dropped because adding one GP lane in each direction would not meet the long-term traffic demand. Adding two GP lanes in each direction, Alternative 6, would not provide a reliable trip because there would be no ability to manage the long-term demand to ensure it would not exceed the new capacity and result in breakdown conditions. Without the ability to manage the lanes, an additional travel choice would not be provided. Additionally, GP lanes would not provide a revenue source and, similar to HOV lanes, they could not be delivered by MDOT SHA for more than one or two decades.

Additional analysis was completed on Alternative 6 to further evaluate if this alternative would address long-term traffic growth. Regional 2040 forecasts were developed using the MWCOG model and analyzed using VISSIM models, the same methodology that was used to evaluate traffic operations for each of the Screened Alternatives. The results of the Alternative 6 modeling indicated that latent demand, meaning trips from other routes, times and modes, would be expected to fill the GP lanes by 2040, resulting in worse traffic operations than all of the Screened Alternatives in several metrics, including network-wide delay and average travel time. Therefore, Alternative 6 would not address long-term traffic growth, and it remained on the list of alternatives dropped from further consideration following this analysis.

d. Alternative 11: Collector-Distributor Lanes on I-495

Alternative 11 consists of physically separating local and long-distance traffic with the use of C-D lanes on I-495 only. The C-D lanes would separate local traffic entering/exiting at the interchanges from the long-distance or express lanes and helps reduce the number of conflicts on the highway. Collector-distributor lanes work well on highways where there is a substantial volume of long-distance trips that could benefit from being separated from local trips. This type of system would not be favorable for the travel along I-495 because it includes a mix of long, medium, and short-distance trips. Additionally, due to the high volume of traffic entering and exiting I-495 at the interchanges and the short distance between many other interchanges, it would likely cause more congestion in the local lanes. Additionally, this type of system on I-495 would require more widening to construct and would not provide an additional travel choice nor a revenue source for the improvement.

e. Alternatives 12A, 12B & 13A: Contraflow Lanes and Reversible Lanes on I-495

Alternative 12A included contraflow lanes on I-495, which are access-restricted lanes operating on the opposite side of the median barrier, in the opposite direction of the flow of traffic. They are used to support heavy traffic in the peak direction of travel and are separated from opposing traffic by a movable barrier. Reversible Lanes (Alternative 13A) are designed to change the direction of traffic flow at different times of the day to match the peak direction of travel. These types of alternatives are more effective where there is a significant directional split in traffic. For example, when the majority of traffic is moving in one direction in the morning and in the opposite direction in the afternoon. On I-495, traffic is fairly evenly split by direction and peak period, so contraflow and reversible lanes would not provide additional capacity in the opposite direction of the contraflow or reversible lane, and therefore, Alternatives 12A and 13A would not address long-term traffic growth in both directions simultaneously on I-495. Additionally, these alternatives would not provide the capacity needed during a Homeland Security event, improve freight travel, or provide a revenue source.

Like I-495, contraflow lanes could be added on I-270, but Alternative 12B was dropped from further consideration because adding contraflow lanes on I-270 would mean that one lane would need to be removed in the off-peak direction (for example, removing a lane in the northbound direction during the morning peak period). Consequently, traffic would be required to cross over the highway median, which means that non-HOV users would have to merge into/across the existing HOV lane to enter and exit the contraflow lane, potentially impacting the operations and enforcement of these lanes approaching the contraflow access points.

Additionally, a movable barrier would be needed to separate opposing traffic and shifting the barriers for more than 10 miles of highway would take hours to complete, thus reducing the roadway capacity during these times. Furthermore, there are significant long-term operational and maintenance expenses associated with a movable barrier system. Therefore, Alternative 12B was dropped from further consideration because it would only provide capacity in one direction, would not provide the capacity needed during a Homeland Security event, would not improve freight travel, and would not include a revenue source for development of the improvements.

Alternative 13A considers adding two priced managed (as either HOT or ETL), reversible lanes on I-495. As noted above, the directional traffic is fairly evenly split on I-495 and there is no clear “off-peak” direction. Therefore, reversible lanes along I-495 would not address long-term traffic growth in the off-peak direction because additional capacity is needed in both directions during the peak periods on I-495. Alternative 13A would provide a reliable trip, but only in the peak direction. Therefore, the direction of traffic that is not benefitting from the reversible lanes would experience the same congestion as the No Build Alternative, and there would be no improvement in trip reliability in that direction.

f. Alternatives 14A, 14B, 14C, and 15: Transit-Only Alternatives

Transit-only alternatives (Alternatives 14A, 14B, 14C, and 15) which would include heavy rail, light rail, bus rapid transit, and dedicated bus-only managed lanes without additional highway capacity were dropped from further consideration. Transit alone would not meet this Study’s Purpose and Need to address the existing and long-term traffic growth in the study corridors. This section explains why the various transit-only alternatives do not meet this Study’s Purpose and Need, how transit is currently being considered in the National Capital Region and how it continues to be a key strategy to addressing the region’s various transportation needs outside of this Study. The 2002 *Capital Beltway / Purple Line Study* (2002 Study), initiated by MDOT SHA and the Maryland Department of Transportation Maryland Transit Administration (MDOT MTA), concluded “Congestion on the Beltway itself as well as demand on the other transportation facilities is so great that no single highway or transit improvement will provide significant relief to the long-term demand.” The 2002 Study recommended that highway and transit alternatives be studied separately because transit operates more efficiently if it serves areas where people live and work. The 2002 Study also concluded that fixed guideway transit was not recommended along the Capital Beltway right-of-way itself. Although a beltway transit corridor would take advantage of existing transportation right-of-way where available, it would not effectively connect activity centers. Adding that people do not live and work “on the Beltway,” transit would better serve patrons by more directly connecting activity center locations.

Alternative 14A: Heavy Rail Transit

Alternative 14A considers heavy rail transit parallel to the existing I-495 and I-270 right-of-way. Consideration of heavy rail or light rail transit to circle Washington, DC began in the 1990s. The 2002 Study recommended the “inner Purple Line” (inside the Beltway) as the priority transit corridor, rather than within the right-of-way of I-495 or outside the Beltway. The 2002 Study did not recommend a transit mode, but rather recommended that additional detailed transit planning studies be performed. Other segments, between I-270/Rock Spring Technology Park and New Carrollton and between New Carrollton and Suitland/Branch Avenue, were projected to have lower daily transit demand and were recommended to be implemented at a later time when conditions change, and the corridors are more attractive for improvements to transit service.

Heavy rail was considered in the 2008 *Purple Line Alternatives Analysis/DEIS* but was dropped from further consideration due to prohibitive capital costs; desired operational conditions that could not be met without traversing through communities; not meeting the goal of cost-effective transit alternative that is rapid, reliable, and environmentally friendly; and the availability of other viable alternatives.

Communities along the I-270 corridor are currently served by the Washington Metropolitan Area Transit Authority (WMATA) Metro Red Line and the Maryland Area Regional Commuter (MARC) Brunswick Line. The Red Line Metro alignment follows MD 355 with five stations north of I-495. The Red Line also crosses I-495 at MD 97 with three stations north of I-495. The MARC Brunswick line includes five stations north of I-495 within the study corridors and continues north into West Virginia. The MARC Brunswick Line is generally parallel to MD 355 to the east.

State planned, heavy rail improvements do not include new heavy rail service, but rather focus on maintenance of existing systems and improvements to the capacity of existing heavy rail service. The 2016 CLRP Amendment document was approved by the National Capital Region TPB at the MWCOG in November 2016, and in the list of major transit projects included, “MARC – Increased trip capacity and frequency along all commuter lines, 2029”, (page 24). The Visualize2045 and the FY 2019-2024 Transportation Improvement Program (TIP), approved on October 17, 2018, identifies heavy rail maintenance projects in the Financially Constrained plan including track improvements and overhaul and replacement of rolling stock[14]. The MARC Growth and Investment Plan also identified a phased implementation of improvements to the Brunswick Line through 2035, including additional daily seats, and rail service improvements such as reduced headways, expanded service during peak and off-peak periods, extension to northern Virginia, and weekend service.

Heavy rail commuting options currently exist in the I-270 corridor via the WMATA Metro Red Line and the MARC Brunswick Line and current planning documents do not include new heavy rail service. Alternative 14A was dropped from further consideration because it would not address existing and long-term traffic growth, would not provide an additional roadway travel choice, or improve trip reliability along I-495 or I-270.

Alternative 14B: Light Rail Transit

While Alternative 14B may enhance trip reliability for existing and future transit commuters, overall, it would not improve trip reliability along I-495 and I-270, would not address existing and long-term traffic growth and would not provide an additional roadway travel choice. Also, the Purple Line light rail is under construction with service anticipated to begin in 2022 and other planned transit studies are already underway in the vicinity of the study corridors. For these reasons, Alternative 14B was dropped from further consideration.

[14] Rolling stock is defined in the Buy America regulations (49 CFR Part 661.3) as: "transit vehicles such as buses, vans, cars, railcars, locomotives, trolley cars and buses, and ferry boats, as well as vehicles used for support services."

The 2002 Study considered both highway and transit; the light rail alignment which was recommended from the Study extends from Bethesda to New Carrollton (the Purple Line). As noted above, the 2002 Study determined both highway improvements and transit were needed. The transit alternative, the Purple Line, moved forward into planning and design and is currently under construction. The FEIS and Draft Section 4(f) Evaluation was signed in 2013 and a Record of Decision (ROD) was issued in 2014. The 16-mile, two-track light rail system is scheduled to begin in operation in 2022. The Purple Line project is addressing the transit demand for a transit alignment inside the Beltway as identified as the transit priority corridor in the 2002 Study.

The transportation analysis completed in support of the Purple Line FEIS used the 2040 MWCOG travel demand model and compared the No Build Alternative with the Purple Line alternative's regional daily vehicle trips. Under the Purple Line Preferred Alternative in 2040, the number of daily vehicle trips would be 16,790 less (0.06 percent) on a regional basis relative to the No Build Alternative.[15]

The Purple Line FEIS and Purple Line Travel Forecasts Results Report also evaluated the impact of transit alternatives on overall automobile usage by presenting the vehicle miles travel (VMT)[16] in the region. In 2040, under the Purple Line Preferred Alternative, 129,828 less vehicle miles (0.07 percent) would be traveled each day in the region versus the 2040 No Build Alternative.[17] The Purple Line is planned to provide additional transportation options connecting activity centers and mobility improvements to the region; however, these improvements may not be evident on the Beltway itself, but on parallel arterials and local streets where trips can be diverted back to major roads.

As previously stated, congestion on I-495 and the demand for other transportation is so great that both transit and roadway improvements are needed to address congestion in the region (2002 Study).

Alternative 14C: Fixed Guideway Bus Rapid Transit (Off Alignment)

This alternative considered a fixed guideway BRT along a new alignment separate from existing roadways. Consideration of this alternative was informed in part by the recent analysis concerning a proposed regional network of BRT routes across the region. The Visualize2045 and the FY 2019-2024 TIP identifies several BRT projects in the Financially Constrained plan approved on October 17, 2018.

- Randolph Road BRT: US 29 to MD 355
- North Bethesda BRT: Montgomery Mall Transit Center to White Flint Metrorail Station
- MD 355/Rockville Pike BRT: Bethesda to Clarksburg
- MD 650/New Hampshire Avenue BRT: Colesville Park-and-Ride to Eastern Avenue
- MD 586/Veirs Mill Road BRT: MD 355/Rockville Pike to MD 97/Georgia Avenue

A 2017 study by the National Capital Region TPB, Long-Range Plan Task Force, titled, *An Assessment of Regional Initiatives for the National Capital Region - Draft Technical Report on Phase II of the TPB Long-Range Plan Task Force,* studied a series of regional transportation initiatives compared to the baseline of the CLRP. One of the initiatives studied was a regionwide system of BRT and transitway networks (known

[15] *Purple Line FEIS and Draft Section 4(f) Evaluation* and *Purple Line Travel Forecasts Results Report*, 2013

[16] Vehicles miles traveled (VMT) represents the total miles traveled during all of the vehicle trips in the region, without regard to the number of passengers in a vehicle, Purple Line FEIS, page 3-12.

[17] Purple Line FEIS, page 3-12 and Purple Line Travel Forecasts Results Report, 2013

as *Initiative 4: Regionwide Bus Rapid Transit and Transitways*). This included new BRT facilities in Montgomery and Prince George's Counties in Maryland, Northern Virginia, Washington, DC, and a transitway from Branch Avenue to Waldorf, MD. These lines are in addition to those already in the CLRP.

This study showed that an extensive, regionwide network of BRT and transitway facilities would result in a one percent reduction in average travel times for transit, HOV and SOV commute trips relative to the 2040 CLRP scenario. Daily vehicle hours of delay would be reduced by two percent, and transit commute mode share would increase four percent. Daily VMT and daily VMT per capita would be reduced by less than one percent. The share of passenger miles on reliable modes would increase by six percent.

Given the modest improvements to travel times and vehicle hours of delay expected from an extensive regionwide network of BRT and transitways, dedicated BRT facilities in the proximity of only I-495 and I-270 would not achieve the Study's Purpose and Need as it would not address existing and long-term traffic growth, would not enhance trip reliability along I-495 or I-270, and based on the 2017 previous study mentioned above that concluded a regional network of BRT and transitway facilities would not substantially improve traffic conditions over the No Build, Alternative 14C was dropped from further consideration.

Alternative 15: Dedicated Bus Managed Lane Network on I-495 and I-270

This alternative assumed that buses would operate in a managed, dedicated bus lane on I-495 and I-270 between existing park-and-ride facilities and new connections at specified locations. This bus lane would include constructing a new travel lane and retaining the existing GP lanes in each direction. The bus lane could accommodate all bus travel, including express bus service, commuter buses, WMATA local buses, over-the-road coach buses, tourist buses, and inter-city buses.

With this alternative, transit service would be enhanced by the increased roadway capacity along I-495 and I-270 and would experience the same increased speeds and reliable travel as other managed lane users. A dedicated, managed bus lane would result in higher operating speeds than a bus traveling in a GP lane and could operate during peak periods only or all day. However, Alternative 15 does not meet the Study's Purpose and Need as it would not accommodate the existing and projected automobile traffic.

What Transit Components Are Included in the Build Alternatives?

Opportunities to accommodate existing and planned multimodal mobility and connectivity are included with each Build Alternative including:

- Allowing free bus usage in the managed lanes to provide an increase in speed of travel, assurance of a reliable trip, and connection to local bus service/systems on arterials that directly connect to activity and economic centers.
- Accommodating direct and indirect connections to existing transit stations and planned Transit-Oriented Development at the Silver Spring Metro/MARC (US 29), Shady Grove Metro (I-370), Twinbrook Metro (Wootton Parkway), Montgomery Mall Transit Center (Westlake Terrace), Medical Center Metro (MD 187 and MD 185), Kensington MARC (MD 185), Greenbelt Metro/MARC (Cherrywood Lane), New Carrollton Metro/MARC/Amtrak (US 50), Largo Town Center (MD 202 and MD 214), and Branch Avenue Metro (MD 5).

A *Managed Lanes Transit Work Group*, with representatives from MDOT SHA, MDOT MTA, FHWA, FTA, WMATA and local transit service providers, meets monthly to explore how managed lanes on I-495 and I-270 will complement and benefit local transit service in Anne Arundel, Frederick, Howard, Montgomery and Prince George's Counties and Washington, DC.

Also, a dedicated bus lane would be underutilized if it is used for buses only leaving unused available capacity in this lane for other vehicles. Under this alternative, fares would be collected, but additional analysis would be needed to determine financial feasibility based on ridership and operations and maintenance costs because typically transit fares are used to cover a portion of the operating costs of the service. Therefore, as a standalone alternative, Alternative 15 was dropped from further consideration. However, as described in the insert, buses would be allowed to use the managed lanes for free under other alternatives and transit components are included in each of the Build Alternatives.

2.5.3 Additional Alternatives Analysis

Following the Spring 2019 Public Workshops, additional analysis was completed on the Screened Alternatives and a new alternative, called the MD 200 Diversion Alternative, was considered. Based on the results of this evaluation, MDOT SHA determined that the MD 200 Diversion Alternative did not meet the Study's Purpose and Need. In addition, FHWA and MDOT SHA determined that Alternative 5 did not meet the Study's Purpose and Need. Details for these alternatives and the rationale for not carrying them forward as ARDS are presented below. The remaining Screened Alternatives (8, 9, 10, 13B, and 13C) were retained as ARDS as well as Alternative 1 (No Build) for comparison purposes per NEPA requirements.

a. Further Consideration of Alternative 5

Alternative 5 consists of adding one HOT managed lane in each direction on I-495 and converting the one existing HOV lane in each direction to a HOT managed lane on I-270. Based on additional analysis, FHWA and MDOT SHA found that Alternative 5 would fail in certain aspects and in others would perform so poorly in addressing the Study's Purpose and Need that it was not a reasonable or feasible alternative. During the alternatives screening process, Alternative 5 was rated "low" for system-wide delay, TTI in the GP lanes, density, LOS, and vehicle-throughput. In addition, Alternative 5 was determined to not be financially viable. However, Alternative 5 was evaluated to the same level as other ARDS and is included in the DEIS as a useful means of comparison to the Build and No Build Alternatives. As Alternative 5 would have some reduction in environmental impacts, a full comparison addresses agency and public comments to better understand the potential differences between a one-lane and two-lane alternative.

The following summarizes the key findings concerning the inability of Alternative 5 to meet the project Purpose and Need[18]:

Accommodate Existing and Long-Term Traffic Growth (Metrics used: system-wide delay, corridor travel times and speeds and density and LOS)

- Alternative 5 would achieve the lowest percentage of improvement to system wide delay compared to the No Build Alternative for the morning peak period and would tie for the lowest afternoon peak period compared to the ARDS.
- Alternative 5 would have the lowest average travel speed in the general purpose lanes compared to the ARDS
- Alternative 5 would have the highest percentage of lane miles failing and operating at a level of service "F" in both peak periods compared to the ARDS.

[18] DEIS Chapters 2 and 3 and Appendices B (*Alternatives Technical Report*) and C (*Traffic Technical Report*)

Enhance Trip Reliability (Metric used: TTI)

- Alternative 5 would have the highest number of "heavy congestion" and "severe congestion" corridor segments in the GP lanes for both peak periods compared to all the ARDS.

Improve the Movement of Goods and Services (Metrics used: vehicle throughput and effect on local roadway network)

- Alternative 5 is the only alternative that does not demonstrate a significant increase in vehicle throughput during the AM peak period and has minimal increase in throughput at key locations during the PM peak period.
- Alternative 5, would provide no additional throughput on I-495 at MD 5 during the AM peak period compared to the No Build Alternative and would provide the smallest throughput benefit at the other three key locations studied (I-495 at American Legion Bridge, I-495 west of I-95 and I-270 at Montrose Road).
- Alternative 5 would achieve approximately half the benefits compared to the ARDS for effects to local roadway network with a reduction of approximately 3 percent in daily delay versus the No Build Alternative.

Additionally, slow-moving vehicles on a one-lane facility could cause slower speeds for vehicles traveling behind them. In practice, single-lane systems are estimated to perform even worse than VISSIM simulation models indicate, particularly for congestion and reliability metrics, because the models do not capture the impacts of these slow-moving vehicles. Therefore, the traffic results for corridor travel time and speeds, as well as TTI, may slightly overestimate the benefits of a one-lane HOT/ETL, such as Alternative 5, compared to the No Build.

In addition to failing to adequately meet the Study's Purpose and Need, Alternative 5 would not be considered a practicable alternative in the context of the US Army Corps of Engineers' permitting requirements. This conclusion is based on an accumulation of factors including, but not limited to, the minimal likelihood of Alternative 5 being financially viable, the marginal difference in resource impacts between building a one-lane and two-lane facility, and the estimated relative high cost of building a one-lane facility. Specifically, Alternative 5 is not a practicable alternative because:

- It would not likely achieve a return on investment that would attract the private sector interest needed for a P3. The estimated revenue shortfall of Alternative 5 would be the largest of all ARDS because it would provide half of the capacity of the two-lane alternatives and could provide even less capacity because of traffic performance issues. This preliminary assessment of financial viability indicates that Alternative 5 would likely not attract a P3 investor.
- It provides only a marginal benefit for the avoidance of sensitive water resources when compared to the ARDS. The difference in impacts between Alternative 5 and the widest Limit of Disturbance[19] (LOD) Alternatives (9 and 10) is 1.1 acres of wetlands and 2,222 linear feet of stream impacts across the entirety of the 48-mile study limits. Given this marginal difference, the ability to mitigate impacts to water resources would be equal among all Build Alternatives including

[19] A limit of disturbance (LOD) is the proposed boundary within which all construction, construction access, staging, materials storage, grading, clearing, erosion and sediment control, landscaping, drainage, stormwater management, noise barrier replacement/construction, and related activities would occur.

Alternative 5. The potential for avoidance of certain resources would not be anywhere near equivalent to the likely loss of revenue compared to building a two-lane alternative.

- The $7.8 - $8.5 billion estimated construction cost of Alternative 5 represents up to 90 percent of the cost of the two-lane ARDS. The extremely close estimated construction budget results from the one-lane option requiring virtually the same amount of right-of-way and property needed for developing the expanded roadway as with two-lane alternatives. In the context of a project with such a large expected private sector investment, the incremental difference in overall cost would not prove economical. For a potential fractional cost savings, Alternative 5 only provides half of the capacity and reduces the likelihood of a project of this magnitude being financially viable.

For all these reasons, Alternative 5 would not adequately address the project Purpose and Need and does not qualify as a reasonable and a practicable alternative. It was not carried forward for further study in the DEIS, but is included for impact comparison purposes only, as appropriate.

b. Consideration of the MD 200 Diversion Alternative

Following the Spring 2019 Public Workshops and agency meetings, a few Cooperating and Participating Agencies requested that MDOT SHA evaluate an alternative that would encourage travelers to use MD 200 (Intercounty Connector) instead of the top side of I-495 between I-270 and I-95 to avoid or reduce impacts to significant, regulated resources and residential relocations in this area. In compliance with Section 4(f) of the US Department of Transportation Act of 1966, the alternative was also evaluated to determine if it could be a feasible and prudent alternative that would provide the least overall harm to park resources along the top side of I-495 including: Rock Creek Stream Valley Park, Sligo Creek Stream Valley Park, Northwest Branch Stream Valley Park, and other smaller parks (Refer to *Chapter 5* and *Appendix F*, *Draft Section 4(f) Evaluation*).

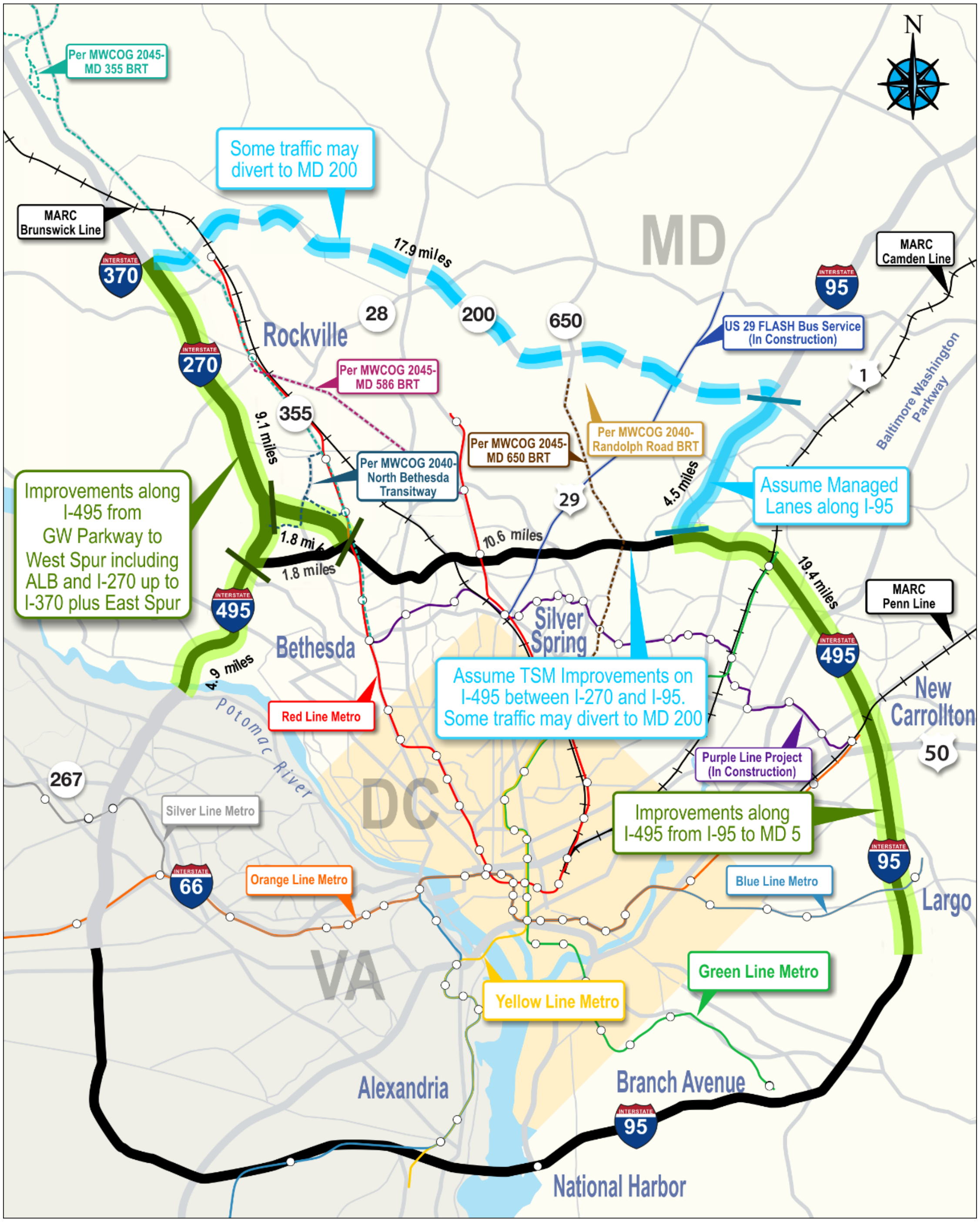
The purpose of this analysis was to evaluate the MD 200 Diversion Alternative to the same level of detail as the Screened Alternatives to determine if it would meet the Purpose and Need of the Study, and thus be considered a reasonable alternative to be carried forward for detailed study in the DEIS.

As shown in **Figure 2-2**, the MD 200 Diversion Alternative would include the following elements:

- No widening or capacity improvements along I-495 between the I-270 West Spur and I-95.
- Consideration of TSM/TDM improvements along I-495 between the I-270 East Spur and I-95.
- Two HOT managed lanes[20] added in each direction on I-495 between the study limits south of George Washington Memorial Parkway and the I-270 West Spur, including the American Legion Bridge. (Similar to Alternative 9)
- Conversion of the one existing HOV lane in each direction to a HOT managed lane on I-270 and the West Spur, and the addition of one HOT managed lane in each direction on I-270, resulting in a two-lane managed lanes network. (Similar to Alternative 9)
- Two HOT managed lanes[20] added in each direction on I-495 between I-95 and the study limits west of MD 5. (Similar to Alternative 9)
- Two managed lanes added in each direction on I-95 between MD 200 and I-495.

[20] For the purposes of the traffic, environmental or financial analysis, the tolling operation whether HOT lanes or ETLs, would not be a differentiating factor.

Figure 2-2: MD 200 Diversion Alternative



Note: The proposed BRT Lines on the map were included in the 2045 MWCOG model. The traffic analysis in support of the MD 200 Diversion Alternative and ARDS was based on the 2040 MWCOG model.

There are several diversion routes that occur in this alternative. Southbound traffic on I-95, coming from north of MD 200, that is destined for points west and south of the I-495 and I-270 West Spur interchange would use MD 200 and I-270 instead of I-95 and I-495. The same diversion route could occur in the opposite direction heading from Virginia to points north of I-95. This diversion route would be 10.1 miles longer than using I-495. Westbound traffic on I-495, coming from points east of the I-95 and I-495 interchange that is destined for points south of the I-495 and I-270 West Spur interchange would use I-95, MD 200, and I-270 instead of the top side of I-495. The same full diversion route could occur in the opposite direction heading from Virginia to points east of I-95. This full diversion would be 19.1 miles longer than using I-495.

In the near term, the premise of this alternative has merit due to the currently available capacity on MD 200, a Maryland Transportation Authority (MDTA) facility. As such, MDOT SHA is working with MDTA to encourage through traffic from points north on I-95 that is destined for the American Legion Bridge or beyond (and the reverse movement) to utilize MD 200 to take advantage of the near term spare capacity and potentially provide some relief to the top side of I-495. In an attempt to divert some of this traffic, MDOT SHA has proposed to MDTA to provide travel times for I-495 and MD 200 through the use of the existing dynamic messaging signs as in the sample shown in **Figure 2-3**. If the travel times show the trip is shorter on MD 200 and the toll is amenable to travelers, then they may choose to divert to MD 200.

Figure 2-3: Sample Travel Times on Dynamic Message Sign

However, in addressing the Study's Purpose and Need, the MD 200 Diversion Alternative must also accommodate long-term traffic growth, enhance trip reliability, and improve the movement of goods and services. In the design year of 2040, the traffic analysis results indicated that the MD 200 Diversion Alternative would perform worse than most of the Screened Alternatives in many metrics used to evaluate the reasonableness of the alternatives. The following summarizes the results of these metrics:

- For **system-wide delay**, along I-495 and I-270, the alternative would perform the worst of all Screened Alternatives and would only save 3 to 7 percent in delay compared to the No Build Alternative (with 20 to 35 percent reduction in delay for the Screened Alternatives.
- For **corridor travel time and speed**, the alternative would have the lowest average speed compared to the Screened Alternatives. Additionally, there would be a 15 percent decrease in speed along the I-495 Inner Loop during the morning peak period compared to the No Build, and the HOT lanes on the I-495 Inner Loop would not achieve the federally-mandated average speed of 45 miles per hour for HOT lanes.

- For **density and LOS**, the alternative would have the highest number of lane miles operating at LOS F and the highest percentage of failing lane-miles amongst the Screened Alternatives.
- For **travel time index (TTI),** the average TTI on the GP lanes within the study area would be 1.6, which is the second worst of the Screened Alternatives. Two segments of the I-495 Inner Loop would be projected to have TTI values that exceed 2.0 during the PM peak period and therefore would be considered "severe" congestion based on MDOT SHA criteria.
- For **vehicle throughput**, the alternative would have similar average throughput to Alternative 5, which was not advanced as an ARDS. Additionally, the top side of I-495 would perform worse than the No Build Alternative in the morning peak period and would have approximately half of the throughput benefit of the retained alternatives across the American Legion Bridge (15 percent with the MD 200 Diversion Alternative compared to 35 percent in the PM peak under Alternatives 9 and 10).
- For the **effect on the local roadway network**, the MD 200 Diversion Alternative would be projected to reduce delay on north-south arterials due to the additional proposed widening along I-95, particularly in Prince George's County. However, it would reduce the benefit on east-west arterials in Montgomery County and the District of Columbia compared to the Screened Alternatives.

Regarding environmental impacts, the MD 200 Diversion Alternative would include the No Build Alternative on the topside of I-495. Therefore, it would avoid environmental resources and property relocations within this area. However, it would include improvements to I-95, which would add to the overall potential environmental impacts for this alternative. While the MD 200 Diversion Alternative would avoid the use of important resources along the topside of I-495, it would still impact significant environmental resources in other areas and would not address the significant congestion issues, despite the cost of approximately $7.2 to $7.9 billion (**Table 2-1**).

For financial viability, the MD 200 Diversion Alternative would require a subsidy of public funding, which means that even with the toll revenues, the State would have to pay approximately $310 million.

Overall, the operational analyses show that a continuous, unbroken network of managed lanes along I-495 is necessary to meet the Study's Purpose and Need (specifically accommodating long-term traffic growth and enhancing trip reliability) and for the project to be financially viable. The section of I-495 between the I-270 East Spur and I-95 carries the second highest ADT volume in Maryland and the Outer Loop from I-95 to US 29 was ranked the #1 most congested freeway section in Maryland during the AM peak. In addition, the section of I-495 Inner Loop from the I-270 East Spur to MD 97 was ranked the third most congested freeway section in Maryland during the PM peak on an average weekday in 2017. Finally, the top three most unreliable freeway segments in Maryland during the AM peak are all located on the I-495 Outer Loop between I-95 and MD 193 and during the PM peak, the I-495 Inner Loop at MD 355 ranks as the sixth most unreliable freeway segment in Maryland.

Table 2-1: PRELIMINARY Effects Comparison of the Screened Alternatives (JUNE 2019 IMPACTS) and the MD 200 Diversion Alternative[1]

	Resource[2,3]	Alternative 1 No Build	Alternative 5[4]	Alternative 8	Alternative 9	Alternative 10	Alternative 13B	Alternative 13C	MD 200 Diversion Alt[4]
Environmental[5]	Number of Parks	0	46	47	47	47	47	47	35
	Potential Use of Section 4(f) Properties[6] {Potential Use of Historic BW Parkway in acres}	0	170 {63}	176 {63}	176 {63}	177 {63}	175 {63}	177 {63}	136 {63}
	Number of Known Previously Recorded National Register Historic Properties	0	20	21	21	21	21	21	12
	100-Year Floodplain (acres)	0	123	127	127	128	127	127	80
	Unique and Sensitive Areas (acres)	0	404	414	414	417	414	416	405
	Sensitive Species Project Review Area (acres)	0	150	153	153	153	153	153	271
	Forest canopy (acres)	0	1,452	1,507	1,507	1,519	1,507	1,514	1,258
	Wetlands of Special State Concern (acres)	0	0	0	0	0	0	0	0
	Wetlands – Field Reviewed (acres)	0	18	19	19	19	19	19	18
	Waters of the US (linear feet)	0	147,468	150,049	150,049	150,658	150,074	150,285	121,097
	Tier II Catchments (acres)	0	54	54	54	54	54	54	54
	Noise Receptors Impacted[7]	0	3,661	4,470	4,470	4,581	4,411	4,461	Not Avail
Engineering[5]	Total Right-of-way Required (acres)	0	301	335	335	344	335	341	273
	Number of Properties Directly Affected	0	1,222	1,445	1,445	1,485	1,446	1,462	1,076
	Number of Residential Displacements	0	25	34	34	34	34	34	0
	Number of Business Displacements	0	4	4	4	4	4	4	1
	Width of Pavement on I-495 (feet)	138–146	170–174	194–198	194–198	194–198	194–198	194–198	194–198
	Width of Pavement on I-270 (feet)	228–256	194–198	218–222	218–222	242–248	202–206	226–230	218–222
	Width of Pavement on I-95 (feet)	144	N/A	N/A	N/A	N/A	N/A	N/A	196
	Capital Costs (billions)	N/A	$7.7 – $8.6	$8.7 – $9.6	$8.7 – $9.6	$9.0 – $10.0	$8.6 – $9.5	$8.9 – $9.9	$7.2 - $7.9

Notes: [1] Preliminary impacts represented in this table assume total impacts; temporary and permanent impacts will be differentiated in the FEIS.

[2] Annual Average Hours of Savings per Commuter is included as a comparison item in the *Alternatives Technical Report* (**Appendix B**, Table 6-14 and Table 6-17). It was removed from this table in the DEIS because it was not a metric used in assessing the Screened Alternatives.

[3] All of the alternatives follow the existing highways; therefore, the quantity of impacts is similar.

[4] MDOT SHA and FHWA determined Alternative 5 and the MD 200 Diversion Alternative are not reasonable alternatives and were not advanced as ARDS.

[5] Detailed analyses, including further avoidance, minimization and private sector incentives, will be prioritized to reduce the property and environmental impacts.

[6] Potential Use of Section 4(f) Properties includes total acres of potential impacts to parks and known historic properties and did not reflect additional avoidance and minimizations efforts coordinated with the resource agencies after the preparation of this table.

[7] Noise receptors are noise-sensitive land uses which include residences, schools, places of worship, and parks, among others. Noise analysis along the I-95 portion of the MD 200 Diversion Alternative was not completed.

FHWA and MDOT SHA would not retain an alternative (MD 200 Diversion Alternative) for detailed study that would not address the worst traffic deficiencies in Maryland, nor meet the Study's Purpose and Need. Based on the results, the MD 200 Diversion Alternative was not carried forward for detailed study as it does not meet the Study's Purpose and Need. Refer to the MD 200 Diversion Alternative Analysis Results Paper as *Appendix A* to the *Alternatives Technical Report* (**Appendix B**) for additional details.

2.6 Alternatives Retained and Evaluated in this Document

After applying the refined screening criteria based on additional engineering, traffic, financial, and environmental analysis, all the Screened Alternatives except Alternative 5 met the Study's Purpose and Need. The No Build Alternative does not meet the Study's Purpose and Need but is retained for comparison with other alternatives in accordance with the regulations for implementing NEPA (40 CFR §1502.14(d)). The remaining alternatives (Alternatives 1, 8, 9, 10, 13B, and 13C) were concurred upon by the Cooperating Agencies[21] as the ARDS. Following this concurrence step, MDOT SHA and FHWA evaluated another additional alternative, called Alternative 9M, in response to public and agency comments. Alternative 9M was evaluated and determined to be a reasonable alternative, and thus is included in addition to the ARDS for further evaluation in this DEIS.

Excluding the No Build Alternative, the five ARDS (8, 9, 10, 13B, and 13C) and Alternative 9M are referred to as the Build Alternatives. These six Build Alternatives and the No Build Alternative are evaluated in this DEIS (**Table 2-2**). Each discussion of the Build Alternatives and the No Build Alternative includes a description of the alternative and typical section. Refer to *Chapter 6, Sections 3* and *5* of the *Alternatives Technical Report* (**Appendix B**) for additional details. The traffic operational analysis is presented in **Chapter 3** of this DEIS. The environmental analysis of the Build Alternatives is presented in **Chapter 4**. Alternative 5 is included in this DEIS for comparison purposes only.

Table 2-2: Alternatives Evaluated in the DEIS

Alternative	Description
Alternative 1	No Build
Alternative 8	Two-Lane, ETL Managed Lanes Network on I-495 and One-Lane ETL Managed Lane and One-Lane HOV Lane on I-270
Alternative 9	Two-Lane, HOT Managed Lanes Network on both I-495 and I-270
Alternative 9M	Two-Lane, HOT Managed Lanes Network on west and east side of I-495 and on I-270; One-Lane HOT Lane on top side of I-495
Alternative 10	Two-Lane, ETL Managed Lanes Network on I-495 and I-270 plus One-Lane HOV Lane on I-270 only
Alternative 13B	Two-Lane, HOT Managed Lanes Network on I-495; HOT Managed, Reversible Lane Network on I-270
Alternative 13C	Two-Lane, ETL Managed Lanes Network on I-495, ETL Managed, Reversible Lane Network and One-Lane HOV Lane on I-270

[21] NCPC abstained from concurring on the ARDS; M-NCPPC did not concur on the ARDS.

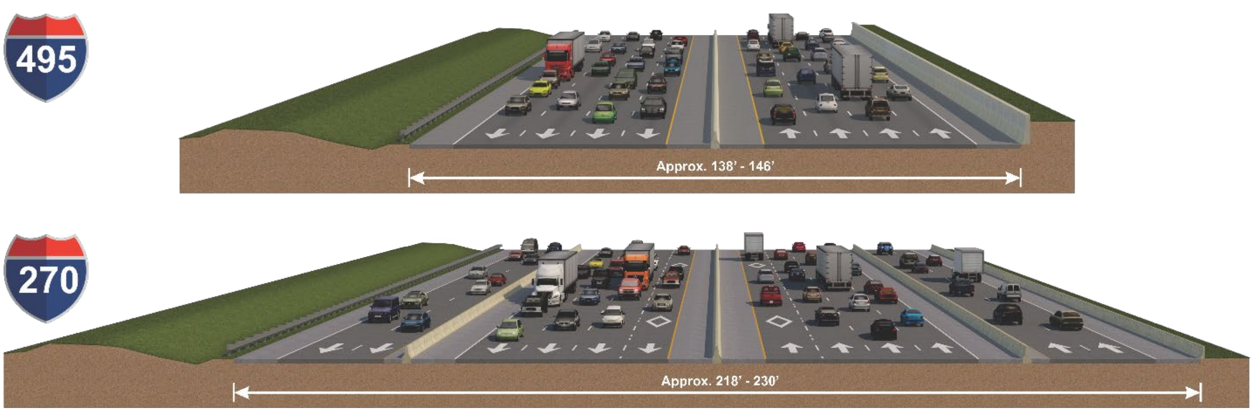
2.6.1 Alternative 1

The No Build Alternative, often called the base case, includes all other projects in Visualize2045 adopted by the MWCOG, TPB in 2018, except improvements considered under this Study (**Figure 2-4**). The No Build Alternative includes other projects programmed in the CLRP. Specifically, the CLRP reflects the extension of the I-495 express lanes in Virginia from the Dulles Toll Road interchange to the American Legion Bridge. The No Build Alternative also includes the I-270 Innovative Congestion Management Contract Project, which is providing a series of projects to improve mobility and safety at key points along I-270 targeted to reduce congestion at key bottlenecks along the corridor. All improvements are being implemented within the existing roadway right-of-way and are anticipated to be completed by 2021. While these improvements will improve mobility and safety, they will not address the long-term capacity need for the I-270 corridor.

The CLRP also includes transit improvement projects including the Purple Line, improvements to MARC, and the construction of a BRT network. The MDOT MTA and Montgomery County have BRT studies underway to provide additional travel choices and relieve congestion on the adjacent roadway networks.

Routine maintenance and safety improvements along I-495 and I-270 are included in the No Build Alternative. However, it does not include new capacity improvements to I-495 and I-270. Alternative 1 does not meet the Study's Purpose and Need and is only retained for the purposes of comparison with the Build Alternatives in accordance with the regulations for implementing NEPA (40 CFR §1502.14(d)).

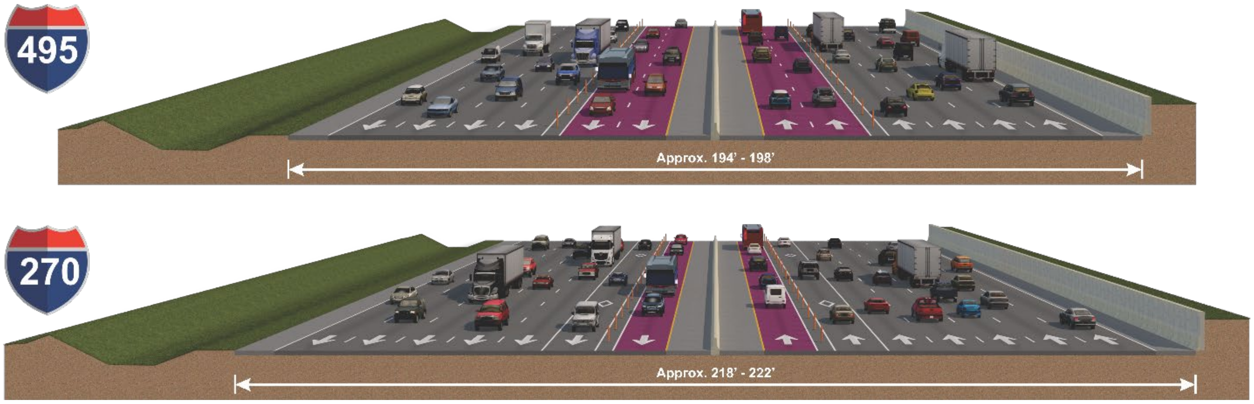
Figure 2-4: Alternative 1 (No Build) Typical Sections



2.6.2 Alternative 8

Alternative 8 consists of adding two ETL managed lanes in each direction on I-495, retaining one existing HOV lane in each direction on I-270 and the I-270 East and West Spurs, and adding one ETL managed lane in each direction on I-270 and the I-270 East and West Spurs (**Figure 2-5**). The managed lanes would be separated from the GP and HOV lanes using pylons (i.e., flexible delineators or tubular markers) placed within a four-foot buffer. Transit buses would be permitted to use the managed lanes for free.

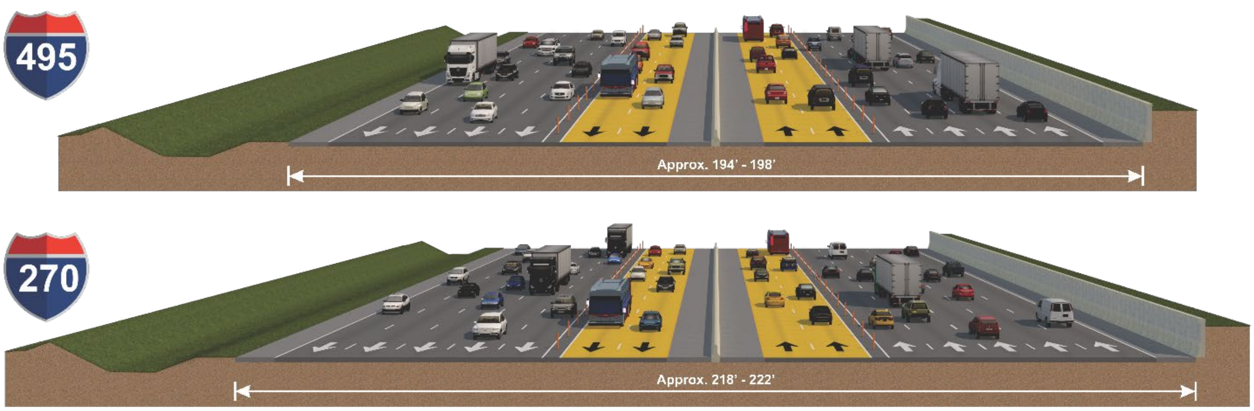
Figure 2-5: Alternative 8 Typical Sections



2.6.3 Alternative 9

Alternative 9 consists of adding two HOT managed lanes in each direction on I-495, converting the one existing HOV lane in each direction to a HOT managed lane on I-270 and the I-270 East and West Spurs, and adding one HOT managed lane in each direction on I-270 and the I-270 East and West Spurs, resulting in a two-lane, managed lanes network on both highways (**Figure 2-6**). The managed lanes would be separated from the GP lanes using pylons placed within a four-foot buffer. Transit buses would be permitted to use the managed lanes for free.

Figure 2-6: Alternative 9 Typical Sections

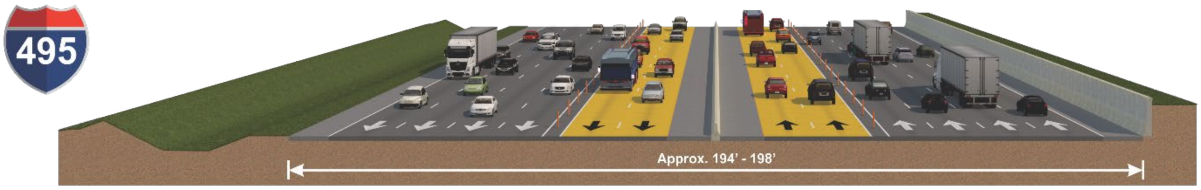


2.6.4 Alternative 9M

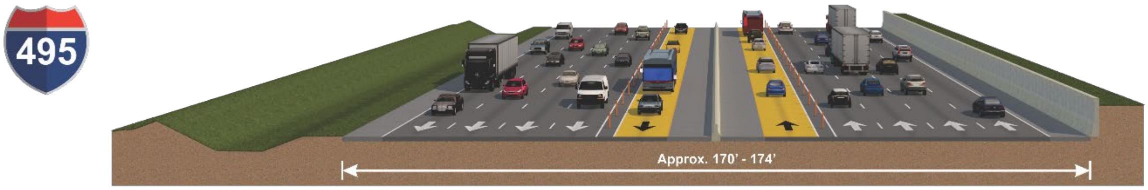
MDOT SHA and FHWA evaluated an additional alternative for the Study called Alternative 9M in response to public and agency comments. Alternative 9M would consist of a blend of Alternative 5 and Alternative 9 in an effort to avoid or reduce impacts to sensitive environmental resources and property relocations on the top side of I-495. An evaluation was completed to determine if the alternative, which includes a reduction of lanes on the top side of I-495, would sufficiently meet the Study's Purpose and Need. The results of the evaluation indicate that Alternative 9M meets the Study's Purpose and Need, and therefore is included as a reasonable alternative in this DEIS. Alternative 9M, shown in **Figure 2-7** and **Figure 2-8**, would consist of the following:

Figure 2-7: Alternative 9M Typical Sections

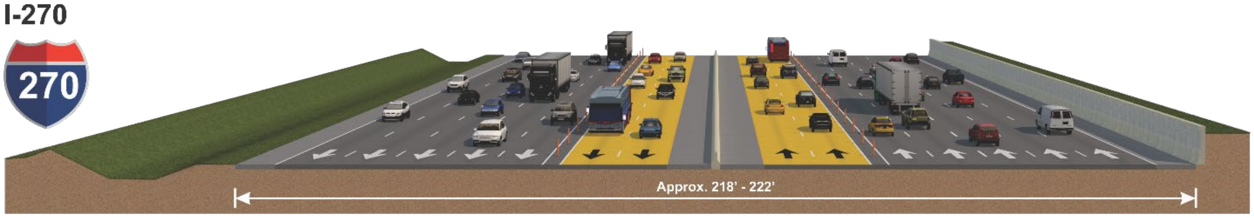
I-495 from south of the ALB to I-270 West Spur and I-495 from I-95 to west of MD 5



I-495 from I-270 West Spur to I-95



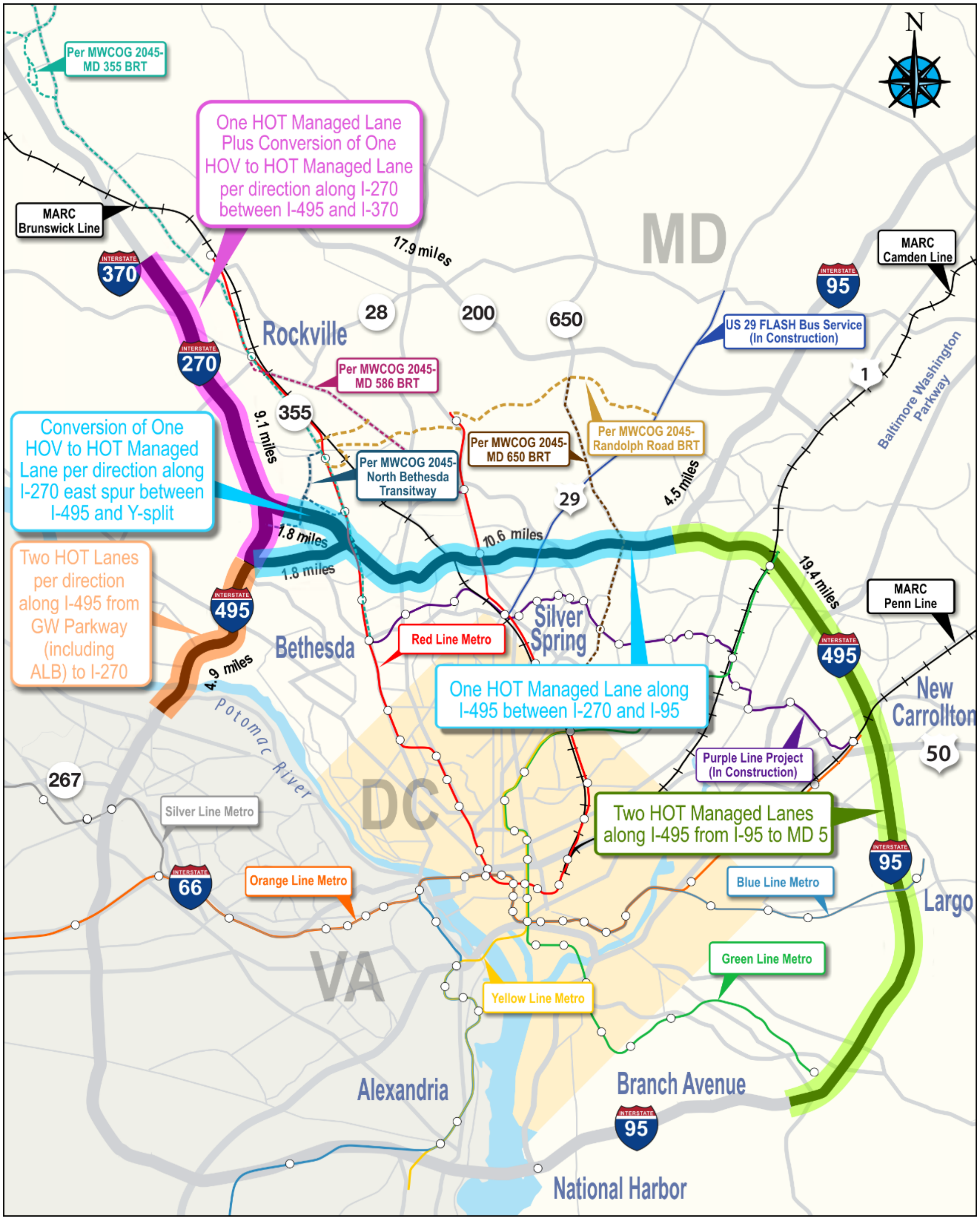
I-270



- Addition of two HOT managed lanes added in each direction on I-495 on the west side between the study limits south of the George Washington Memorial Parkway and the I-270 West Spur, including the American Legion Bridge. (Similar to Alternative 9, shown in orange on **Figure 2-8**).
- Conversion of the one existing HOV lane in each direction to a HOT managed lane on I-270 and the I-270 West Spur, and the addition of one HOT managed lane in each direction on I-270 and the I-270 West Spur, resulting in a two-lane managed lanes network. (Similar to Alternative 9, shown in purple on **Figure 2-8**).
- Conversion of the one existing HOV lane in each direction to a HOT managed lane on the I-270 East Spur. (Similar to Alternative 5, shown in blue on **Figure 2-8**).
- Addition of one HOT managed lane in each direction on I-495 between the I-270 West Spur and I-95. (Similar to Alternative 5, shown in blue on **Figure 2-8**).
- Addition of two HOT managed lanes added in each direction on I-495 on the east side between I-95 and the study limits west of MD 5. (Similar to Alternative 9, shown in green on **Figure 2-8**).

The build elements, including managed lane access locations and interchange improvements, would be the same as they were for Alternatives 5 and 9, where the typical section is consistent with each of those alternatives, and transit buses would be permitted to use the managed lanes for free; however, the managed lanes would need to transition from one to two lanes in each direction and vice versa. These transitions are described below and are shown in *Chapter 6, Section 5* of the *Alternatives Technical Report* (**Appendix B**).

Figure 2-8: Alternative 9 Modified



- At the I-270 West Spur interchange, one northbound managed lane would continue along I-495 to the east and two northbound managed lanes would continue north on the I-270 West Spur. Two southbound managed lanes would come from the I-270 West Spur to join one southbound managed lane from I-495.

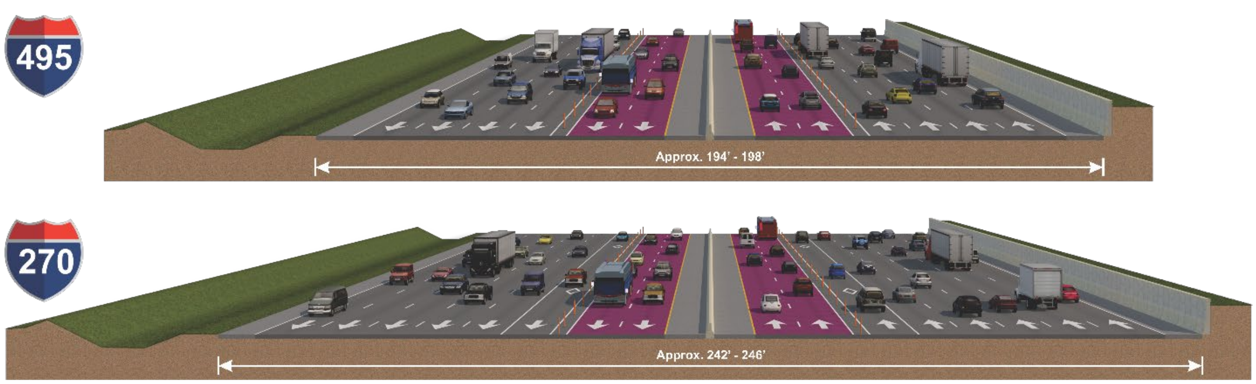
- At the I-270 Y-split, one northbound managed lane would come from the East Spur to join two northbound managed lanes from the West Spur. The three southbound managed lanes on I-270 would split so that one managed lane would go to the East Spur and two would go to the West Spur.
- At the I-95 interchange on I-495, the southbound I-95 managed lane ramp would join with one eastbound managed lane from I-495 to the west and would continue eastbound as two managed lanes. The two westbound managed lanes on I-495 east of the interchange would split so that one lane would exit to I-95 northbound and one managed lane would continue westbound on I-495.

Refer to *Appendix B* to the *Alternatives Technical Report* (**Appendix B**) for a summary of the Alternative 9M analysis and results.

2.6.5 Alternative 10

Alternative 10 consists of adding two ETL managed lanes in each direction on I-495, retaining one existing HOV lane per direction on I-270 and the I-270 East and West Spurs, and adding two ETL managed lanes in each direction on I-270 and the I-270 East and West Spurs (**Figure 2-9**). The managed lanes would be separated from the GP and HOV lanes using pylons placed within a four-foot buffer. Transit buses would be permitted to use the managed lanes for free.

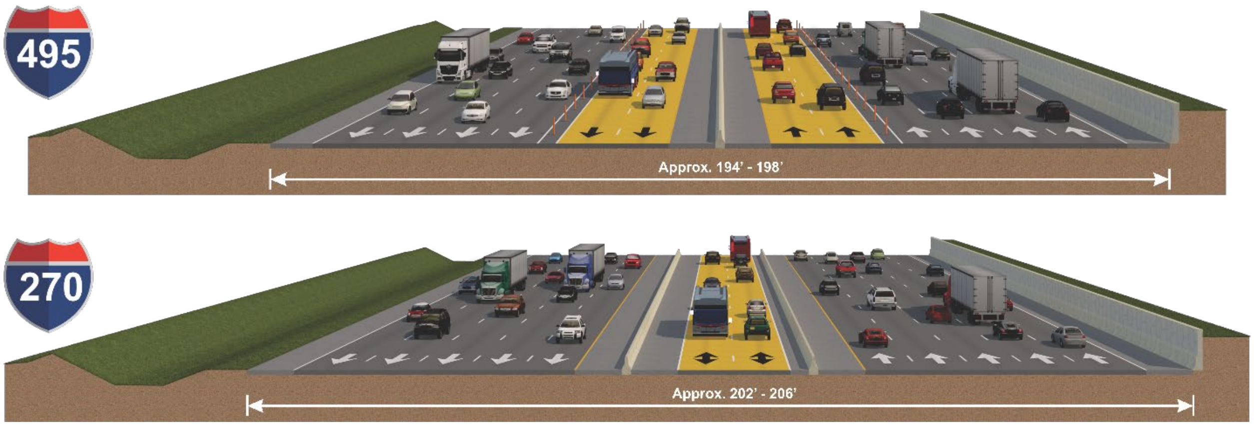
Figure 2-9: Alternative 10 Typical Sections



2.6.6 Alternative 13B

Alternative 13B would provide a two-lane, HOT managed lanes network on I-495 similar to Alternative 9. This alternative would also convert the existing HOV lanes on I-270 and the I-270 East and West Spurs to two HOT managed reversible lanes while maintaining the existing GP lanes (**Figure 2-10**). The managed lanes on I-495 would be separated from the GP lanes using pylons placed within a four-foot buffer and the managed reversible lanes on I-270 would be separated from the GP lanes using concrete barriers. Transit buses would be permitted to use the managed lanes for free.

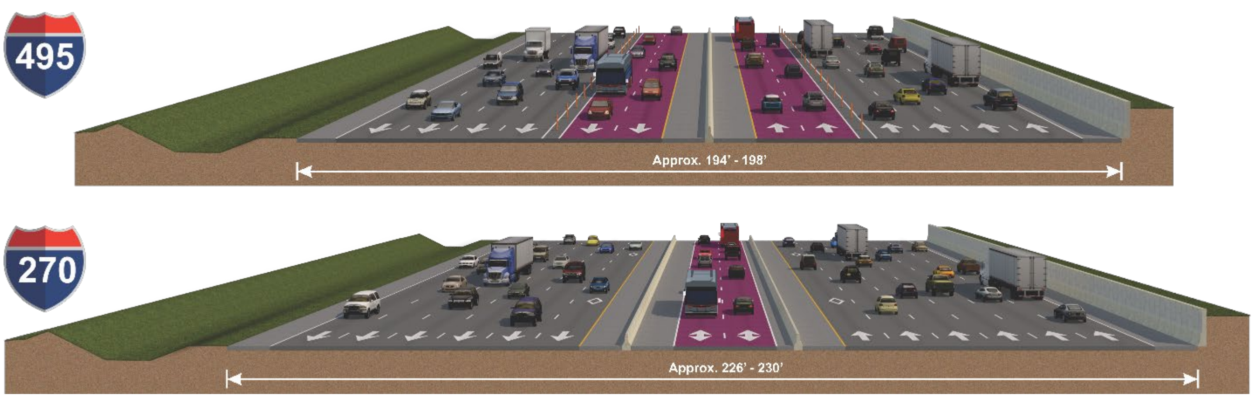
Figure 2-10: Alternative 13B Typical Sections



2.6.7 Alternative 13C

Alternative 13C would provide a two-lane, ETL managed lanes network on I-495 similar to Alternatives 8 and 10 (**Figure 2-11**). It would also retain the existing HOV lanes in both directions and add two ETL managed, reversible lanes on I-270 and the I-270 East and West Spurs. The managed lanes on I-495 would be separated from the GP lanes using pylons placed within a four-foot buffer and the managed reversible lanes on I-270 would be separated from the GP and HOV lanes using concrete barriers. Transit buses would be permitted to use the managed lanes for free.

Figure 2-11: Alternative 13C Typical Sections



The comparison of the impacts for the No Build Alternative, Build Alternatives, and Alternative 5 (for comparison purposes) is presented in **Table 2-3**.

Table 2-3: Summary of Effects Comparison of the Build Alternatives[1]

	Resource	Alternative 1 No Build	Alt 5[2]	Alt 8	Alt 9	Alt 9M	Alt 10	Alt 13B	Alt 13C
Environmental	Total Potential Impacts to Section 4(f) Properties including park and historic properties (acres)	0	141.7	146.8	146.8	144.7	149.0	145.5	146.7
	Number of Historic Properties with Adverse Effect[3] [Adverse effect cannot be determined[4]]	0	13[7]	13[7]	13[7]	13[7}	13[7]	13[7]	13[7]
	100-Year Floodplain (acres)	0	114.3	119.5	119.5	116.5	120.0	119.5	119.9
	Unique and Sensitive Areas (acres)	0	395.3	408.2	408.2	401.8	410.8	406.7	408.6
	Sensitive Species Project Review Area (acres)	0	151.7	155.0	155.0	153.7	155.0	155.0	155.0
	Forest canopy (acres)	0	1,434	1,497	1,497	1,477	1,515	1,489	1,503
	Wetlands of Special State Concern	0	0	0	0	0	0	0	0
	Wetlands – Field Reviewed (acres)	0	15.4	16.3	16.3	16.1	16.5	16.3	16.5
	Wetland 25-foot buffer (acres)	0	51.2	53.1	53.1	52.7	53.6	53.1	53.5
	Waters of the US (linear feet)	0	153,702	155,922	155,922	155,229	156,984	155,822	156,632
	Tier II Catchments (acres)	0	55.2	55.3	55.3	55.3	55.3	55.3	55.3
	Noise Receptors[5] Impacted	0	3,661	4,470	4,470	4,249	4,581	4,411	4,461
Traffic	System-Wide Delay Savings vs. No Build (AM/PM)[6]	0	20%/22%	23%/33%	34%/33%	30%/30%	35%/34%	27%/22%	26%/34%
Engineering	Total Right-of-way Required[7] (acres)	0	284.9	323.5	323.5	313.4	337.3	318.9	329.3
	Number of Properties Directly Affected	0	1,240	1,475	1,475	1,392	1,518	1,447	1,479
	Number of Residential Relocations	0	25	34	34	25	34	34	34
	Number of Business Relocations	0	4	4	4	4	4	4	4
	Width of Pavement on I-495 (feet)	138–146	170–174	194–198	194–198	170- 198	194–198	194–198	194–198
	Width of Pavement on I-270 (feet)	228–256	194–198	218–222	218–222	218-222	242–248	202–206	226–230
	Capital Cost Range [Construction & ROW] (billions)	N/A	$7.8–$8.5	$8.7 – $9.6	$8.7 – $9.6	$8.5 - $9.4	$9.0 – $10.0	$8.7 - $9.6	$8.8 - $9.7

Notes: [1] Preliminary impacts represented in this table assume total impacts; permanent and temporary impacts will be distinguished in the FEIS.
[2] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.
[3] Refer to Chapter 4, Section 4.7 and Appendix G, Volume 1 for additional details on the effects to historic properties.
[4] Based on current design information, effects cannot be fully determined on these seven historic properties. MDOT SHA will evaluate these properties further as design advances.
[5] Noise receptors are noise-sensitive land uses which include residences, schools, places of worship, and parks, among other uses. Note that these numbers include receptors that do not have an existing noise wall as well as receptors that have an existing noise wall which is expected to be replaced.
[6] Previous versions of this table used a similar metric of Annual Average Hours of Savings per Commuter. System-Wide Delay Savings better reflects benefits to all road users.
[7] The right-of-way is based on state records research and filled in with county right-of-way, as necessary. With the Section 4(f) properties, some boundaries vary based on the presence of easements and differences in the size and location of historic and park boundaries.

2.7 Common Elements Among the Build Alternatives

The Build Alternatives have many elements that are the same or similar among them. These elements are described in detail in this section including, Interchanges and Managed Lanes Access; Stormwater Management Considerations; Construction and Short-term Effects; Limits of Disturbance; Tolling; Transit-Related Elements; Pedestrian and Bicycle Considerations; and Construction Phasing.

2.7.1 Interchanges and Managed Lanes Access

There are 34 existing interchanges within the study limits. For each Build Alternative, all interchanges would be modified as needed to accommodate the mainline widening of I-495 and I-270. The concurrent-flow managed lanes would be separated from the GP lanes by a buffer and delineators and reversible managed lanes would be separated from the GP lanes by concrete barriers as shown in the typical section figures for the Build Alternatives (**Figure 2-5** through **Figure 2-7** and **Figure 2-9** through **Figure 2-11**). Access to/from the managed lanes would be provided via direct access ramps at select existing interchanges (**Figure 2-12**), direct access ramps at two new interchanges, at-grade auxiliary lanes where ingress to the managed lanes from the GP lanes or egress from the managed lanes to the GP lanes would be provided (**Figure 2-13**), and at the end points of the Study. The specific number of lanes and ramp configurations at the I-495 and I-270 interface interchanges and the I-270 Y-split are shown for each Build Alternative in *Chapter 5, Section 3* of the *Alternatives Technical Report* (**Appendix B**).

Figure 2-12: Example Direct Access Interchange

The preliminary direct access locations were identified using the following considerations:

- Providing system-to-system connections between major interstates and freeways (e.g., I-495/I-95, I-495/I-270 spurs, I-495/US 50)
- Providing access at interchanges with high traffic demand (e.g., US 29, MD 5)

- Providing access throughout the study area for reasonable access to the managed lanes (e.g., MD 187, Ritchie Marlboro Road)
- Providing access in consideration of land use and at major transit facilities (e.g., Cherrywood Lane at Greenbelt Metro, Pennsy Drive at New Carrollton Metro)
- Potential community, property, and environmental impacts resulting from providing access.

Figure 2-13: Example At-Grade Access Slip Ramp Configuration

In total, access to and from the managed lanes is proposed at 27 locations (19 existing interchanges, three new interchanges, and five at-grade locations), as well as at the start of the system along the I-495 inner loop west of MD 5 and southbound I-270 north of I-370. The proposed interchange locations in need of modifications to accommodate the widened mainline and managed lane access locations are listed in **Table 2-4** and shown in **Figure 2-14** and would be the same for all of the Build Alternatives. Refer to *Chapter 5, Section 3* of the *Alternatives Technical Report* (**Appendix B**) for additional details.

Table 2-4: Proposed Interchange Modifications and Managed Lanes Access Locations[22]

Location	Modification
Interface with Virginia I-495 HOT Lanes north of Clara Barton Parkway (see location 'G' on **Figure 2-14**)	• Exchange ramps between Virginia and Maryland managed lanes
I-495/George Washington Memorial Parkway Interchange (see location 'F' on **Figure 2-14**)	• Managed lanes direct access to managed lanes in Maryland • Adjusted interchange ramps to accommodate widened mainline

[22] The proposed managed lanes access points are based on preliminary traffic and revenue analyses and agencies' input. The locations may change based on public and agencies' comments on the DEIS and as more detailed analyses are completed, and the Interstate Access Point Approval request is reviewed by FHWA.

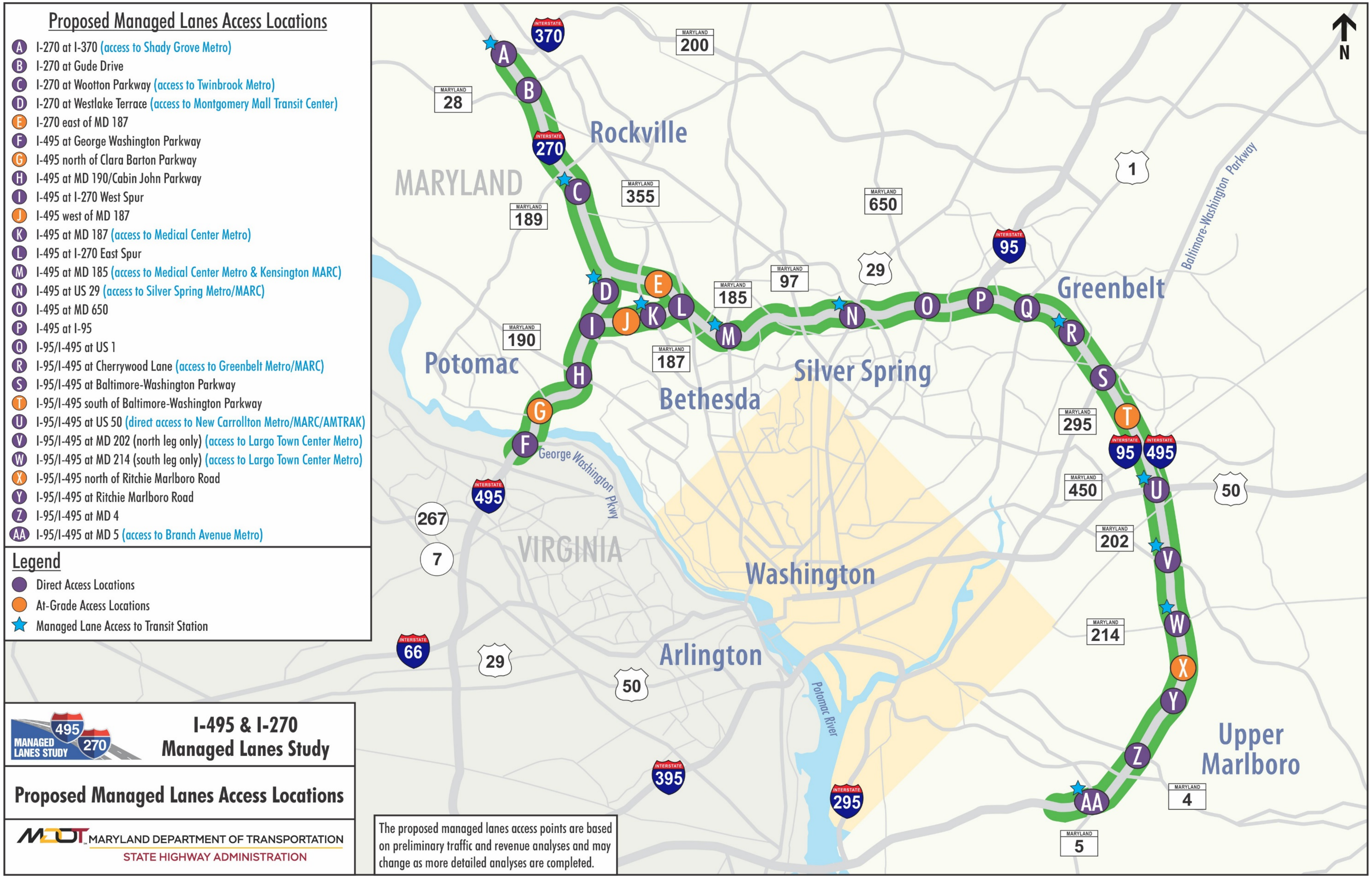
Location	Modification
I-495/MD 190/Cabin John Parkway Interchange (see location 'H' on **Figure 2-14**)	• Managed lanes direct access interchange • Adjusted interchange ramps to accommodate widened mainline
I-495/I-270 West Spur Interchange (see location 'I' on **Figure 2-14**)	• Managed lanes direct access interchange • Reconstructed interchange to accommodate managed lanes
At-grade auxiliary lanes along I-495 between I-270 West Spur and MD 187[23] (see location 'J' on **Figure 2-14**)	• Managed lanes at-grade access
I-495/MD 187 Interchange (see location 'K' on **Figure 2-14**)	• Managed lanes direct access interchange • Reconfigured interchange ramps to accommodate widened mainline
I-495/I-270 East Spur/MD 355 Interchange (see location 'L' on **Figure 2-14**)	• Managed lanes direct access interchange • Reconstructed interchange to accommodate managed lanes
I-495/MD 185 Interchange[23] (see location 'M' on **Figure 2-14**)	• Managed lanes direct access interchange • Adjusted interchange ramps to accommodate widened mainline
I-495/MD 97 Interchange	• Reconfigured interchange to accommodate widened mainline
I-495/US 29 Interchange (see location 'N' on **Figure 2-14**)	• Managed lanes direct access interchange • Reconfigured interchange ramps to accommodate widened mainline
I-495/MD 193 Interchange	• Reconfigured interchange to accommodate widened mainline
I-495/MD 650 Interchange[23] (see location 'O' on **Figure 2-14**)	• Managed lanes direct access interchange • Reconfigured interchange to accommodate widened mainline
I-495/ I-95 Interchange (see location 'P' on **Figure 2-14**)	• Managed lanes direct access interchange • Adjusted interchange ramps to accommodate widened mainline
I-495/US 1 Interchange[23] (see location 'Q' on **Figure 2-14**)	• Managed lanes direct access interchange • Adjusted interchange ramps to accommodate widened mainline
I-495/Greenbelt Metro Interchange	• Adjusted interchange ramps to accommodate widened mainline • Added ramps to provide full interchange
I-495/Cherrywood Lane Interchange *(new interchange)* (see location 'R' on **Figure 2-14**)	• New interchange for managed lanes direct access only
I-495/MD 201 Interchange	• Adjusted interchange ramps to accommodate widened mainline
I-495/Baltimore-Washington Parkway Interchange (see location 'S' on **Figure 2-14**)	• Managed lanes direct access interchange • Adjusted interchange ramps to accommodate widened mainline
At-grade slip ramps along I-495 between the Baltimore-Washington Parkway and MD 450[23] (see location 'T' on **Figure 2-14**)	• Managed lanes at-grade access
I-495/MD 450 Interchange	• Adjusted interchange ramps to accommodate I-495 widened mainline
I-495/US 50 Interchange (see location 'U' on **Figure 2-14**)	• Managed lanes direct access interchange • Adjusted interchange ramps to accommodate widened mainline
I-495/MD 202 Interchange[23] (see location 'V' on **Figure 2-14**)	• Managed lanes direct access interchange to/from north only • Adjusted interchange ramps to accommodate widened mainline
I-495/Arena Drive Interchange	• Adjusted interchange ramps to accommodate widened mainline

[23] These locations were not included in the initial identification of proposed managed lane access points and therefore was not included in the traffic, noise, and air quality analyses for the DEIS. The traffic, noise, and air quality analyses will be updated for the FEIS to include this access point.

Location	Modification
I-495/MD 214 Interchange[23] (see location 'W' on **Figure 2-14**)	• Managed lanes direct access interchange to/from south only • Adjusted interchange ramps to accommodate widened mainline
At-grade slip ramps along I-495 between MD 214 and Ritchie Marlboro Road[23] (see location 'X' on **Figure 2-14**)	• Managed lanes at-grade access
I-495/Ritchie Marlboro Interchange (see location 'Y' on **Figure 2-14**)	• Managed lanes direct access interchange • Adjusted interchange ramps to accommodate widened mainline
I-495/MD 4 Interchange[23] (see location 'Z' on **Figure 2-14**)	• Managed lanes direct access interchange • Reconfigured interchange ramps to accommodate widened mainline
I-495/MD 337/Suitland Road Interchange	• Adjusted interchange ramps to accommodate widened mainline
I-495/MD 5 Interchange (see location 'AA' on **Figure 2-14**)	• Managed lanes direct access interchange • Adjusted interchange ramps to accommodate widened mainline
I-270 West Spur/Democracy Boulevard Interchange	• Adjusted interchange ramps to accommodate widened mainline
I-270 West Spur/Westlake Terrace Interchange (see location 'D' on **Figure 2-14**)	• Repurposed existing HOV only ramps to/from north to managed lanes direct access ramps • Added managed lanes direct access ramps to/from south
I-270 Y-Split Interchange	• Reconstructed interchange to accommodate managed lanes
I-270/Montrose Road Interchange[24]	• Adjusted interchange ramps to accommodate widened mainline
I-270/Wootton Parkway Interchange *(new interchange)*[23] (see location 'C' on **Figure 2-14**)	• New interchange for managed lanes direct access only
I-270/MD 189 Interchange	• Adjusted interchange ramps to accommodate widened mainline
I-270/MD 28 Interchange	• Adjusted interchange ramps to accommodate widened mainline
I-270/Gude Drive Interchange *(new interchange)* (see location 'B' on **Figure 2-14**)	• New interchange for managed lanes direct access only
I-270/Shady Grove Road Interchange	• Adjusted interchange ramps to accommodate widened mainline
I-270/I-370 Interchange (see location 'A' on **Figure 2-14**)	• Managed lanes direct access interchange (to/from south only) • Adjusted interchange ramps to accommodate widened mainline
At-grade auxiliary lanes along I-270 East Spur north of I-495 [23] (see location 'E' on **Figure 2-14**)	• Managed lanes at-grade access
I-270 East Spur/MD 187/Rockledge Drive Interchange	• Adjusted interchange ramps to accommodate widened mainline

[24] This location was included as a direct access interchange in the initial identification of proposed managed lane access points and was included in the traffic, noise, and air quality analyses for the DEIS. The traffic, noise, and air quality analyses will be updated for the FEIS to reflect changes in access point locations.

Figure 2-14: Proposed Managed Lanes Access Locations



2.7.2 Stormwater Management Consideration

a. Introduction

A planning-level, conceptual identification of stormwater management (SWM) needs was considered throughout the study corridor when establishing the LODs. The Maryland *Stormwater Management Act of 2007* emphasizes Environmental Site Design (ESD)[25] and consideration of SWM early in the planning stage of a project to better balance transportation needs, right-of-way considerations, and the requirements of the SWM Act of 2007.

The study corridors are extremely developed with numerous natural, cultural, and socioeconomic resources. The existing roadways are generally an open section (i.e., no curb or barrier) with the majority of the cross slopes superelevated. The density of development adjacent to the study corridors, combined with numerous sensitive areas, complicate finding suitable SWM site locations. However, SHA MDOT will assure SWM water quality requirements and treatment will be provided to the maximum extent practicable at on-site locations and, as required under the SWM Act, will improve current conditions.

b. Methodology and Assumptions

The 2000 Maryland Stormwater Design Manual (Rev. May 2009) requires all projects to provide Water Quality Volume (WQv), Channel Protection Volume (Cpv), Recharge Volume (Rev), and Overbank Protection Volume or Quantity management (Qp). In addition, the project will need to meet the county requirements within their jurisdiction limits. Montgomery County requires a Qp of 10-year management and Prince George's County requires a Qp of 100-year management. All new impervious area and a minimum of 50 percent of reconstructed impervious area will require treatment. Reconstructed impervious area is defined as existing impervious area that is removed, exposing bare earth, before being repaved or repurposed. In order to calculate both the total new and reconstructed impervious area, the study corridor was divided into sections including the mainline through the interchanges and the mainline between the interchanges. Existing study points (where water leaves the state right-of-way) were identified in each section and field investigated to determine existing conditions. SWM requirements or impervious area requiring treatment were determined for each Build Alternative and preliminary SWM facility locations were identified. An evaluation of potential water quality loss and major culvert crossings was also conducted.

For this analysis, the new impervious area was quantified by assuming all shoulders and 25 percent of the existing lanes would need to be reconstructed. For each Build Alternative, there would be locations where the existing pavement could be removed and a SWM credit considered when an existing interchange was reconfigured that resulted in a ramp removal or relocation. Pavement removal along the mainline was only considered for SWM credit if the width of removal was greater than 10 feet. Some of the areas of potential pavement removal are shown on the *Environmental Resource Mapping* in **Appendix D** (e.g., at the I-495 interchange at US 29 on map 70 of Appendix D).

[25] Title 4, Subtitle 201.1(B) of the Stormwater Management Act of 2007 defines ESD as "...using small-scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources." Under this definition, ESD includes: optimizing conservation of natural features (e.g., drainage patterns, soil, vegetation); minimizing impervious surfaces (e.g., pavement, concrete channels, roofs); slowing down runoff to maintain discharge timing and to increase infiltration and evapotranspiration; or using other nonstructural practices or innovative technologies approved by the Maryland Department of Environment (MDE).

c. Major Culvert Crossings

All major culverts, defined as culverts 36 inches in diameter or greater with a drainage area greater than 25 acres, were identified and analyzed to determine if the existing culvert crossings needed additional capacity in the proposed conditions. Major culverts were identified by desktop analysis using the MDOT SHA large and small structure database, LiDAR topographic data and one-foot contours, the MDOT SHA National Pollutant Discharge Elimination System (NPDES) database, and the study point field evaluations for this Study.

If an existing culvert crossing needed additional capacity in the proposed conditions, then an auxiliary culvert was proposed to increase the capacity of the culvert crossing. Two sizes of auxiliary culverts were proposed: 48-inch and 60-inch. It was assumed that the auxiliary pipes could be installed using trenchless technologies (installing the culvert underground without disturbing the existing road) so as not to disrupt traffic traveling on the existing road. Existing culverts were extended so that the proposed outfall structure could be tied into the proposed grading limits for each Build Alternative.

d. Assumed Stormwater Management Provided by Build Alternative

Five types of SWM facilities were identified in the analysis for this Study: quantity ponds, ESD ponds, swales, quantity vaults, and water quality vaults. The proposed, preliminary large surface SWM features are shown on the *Environmental Resource Mapping* (**Appendix D**).

The quantity requirements for each Build Alternative must be met for each drainage section. The ESD requirements must be maximized; however, any deficit within a given drainage segment could be met utilizing compensatory stormwater management within the same watershed as defined by the MDOT SHA Sediment and Stormwater Guidelines and Procedures (SSGP), Section 5.5. Compensatory stormwater management is anticipated to be provided primarily through the use of a project-specific Water Quality Bank which is to be developed through a variety of means including but not limited to the transfer of excess water quality credits from other MDOT programs (e.g. the TMDL program), through offsite stormwater retrofitting or by other means for stormwater pavement removal or generation of water quality credits as provided in applicable sections of the SSGP. **Table 2-5** summarizes the required quantity, provided quantity, ESD surface areas for each Build Alternative and Alternative 5 (for comparison purposes), and the resulting compensatory stormwater management mitigation requirement.

Table 2-5: Stormwater Management per Build Alternative

Build Alternative	Required Quantity surface area (ac)	Provided Quantity surface area (ac)	Required ESD surface area (ac)	Provided ESD surface area (ac)	Impervious Area Requiring Offsite Treatment (ac)
5[1]	70	74	245	173	181
8/9	96	101	301	153	372
9M	89	94	288	160	321
10[2]	105	108	319	145	434
13B[2]	91	96	288	152	342
13C[2]	98	102	305	148	392

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.
[2] Alternatives 10, 13B and 13C differ only along the I-270 section. The I-495 section is the same for Alternatives 8, 9, 10, 13B, and 13C. Offsite requirements are based on the engineering design as of January 2020.

Due to the large amount of impervious area requiring treatment for each Build Alternative and existing site constraints, ESD could not be met for the Build Alternatives within the study area. Consequently, compensatory stormwater management treatment may be required to offset the ESD deficit, as shown in **Table 2-5**. It is important to consider that the methodology used to determine the conceptual SWM requirements for the Study was based on surface area requirements and was developed to support overall costs and determine right-of-way needs. Several innovative SWM technologies exist that were not considered for this Study. Utilizing these innovative technologies could prove beneficial in reducing the amount of compensatory stormwater management needed to meet the SWM requirements for the Build Alternatives. A detailed SWM analysis will be performed for the Selected Alternative during final design to determine required and provided stormwater management volumes. This more detailed analysis could result in reduced compensatory stormwater management requirements.

2.7.3 Construction and Short-term Effects

Any of the Build Alternatives will require extensive construction work within a heavily developed area constrained by existing development and environmental resources. A detailed analysis was completed to assess constructability requirements in the context of existing constraints and to identify appropriate adjustments to the LODs and cost estimates. Incorporation of the results of this constructability analysis allows for a fuller picture of potential project effects. An overview of the analysis is provided below.

a. Constructability Considerations

The constructability analysis was based on assumptions and conceptual ideas about construction phasing, methodology, and general sequence of how the work may proceed. These include:

- Construction sequencing to construct the proposed work in a manner that limits the total number of phases and accommodates reasonable and feasible construction methods.
- Maintenance of traffic to maintain the existing number of mainline travel lanes during peak periods, maintain traffic on cross roads, and maintain existing interchange ramp movements. Temporary off-peak lane closures were assumed.
- Construction access and staging to ensure that the LOD allows for storage of construction equipment and materials and construction access to/from the site.
- The ability of regional construction suppliers and contractors to meet the scheduled demand for resources given the scope of this project and the many other large concurrent projects proposed within the region.

b. Elements Included in the Constructability Analysis

The constructability analysis included potential approaches to complete the proposed work, including:

- Mainline widening to accommodate the managed lanes.
- Interchange reconstruction to accommodate mainline widening and direct access for the managed lanes, including new or reconstructed bridges and ramp structures within the existing interchange areas.
- Mainline bridges and overpass reconstruction to accommodate the widened mainline.
- Work at challenging locations such as reconstruction of the American Legion Bridge and the bridges over the C&O Canal and Clara Barton Parkway; widening adjacent to Thomas Branch, Rock Creek, and Southwest Branch; and reconstruction of the bridges over Northwest Branch. The

constructability analysis included coordination with the regulatory agencies at the properties or resources under their jurisdiction. This included National Park Service, Maryland-National Capital Park and Planning Commission, United States Army Corps of Engineers, Maryland Department of the Environment, and Maryland Department of Natural Resources.

- Minimization of impacts at residential and commercial properties, Section 4(f) and Section 106 resources, and at all wetlands and waters to the greatest extent practicable.
- Drainage outfall stabilization and cross culvert reconstruction to accommodate roadway drainage, including MD Code 378[26] compliance.
- Minimization of railroad and WMATA Metro line impacts.
- Avoidance and minimization of utility impacts where feasible and accommodation of utility relocations where impacts may be unavoidable.
- Retaining wall construction approaches in cut and fill sections.

The LODs of the Build Alternatives account for areas needed for construction. The assumed areas for construction staging, materials storage, and access needs at specific locations are identified on the *Environmental Resource Mapping* (**Appendix D**). The quantified impacts presented in this DEIS are assumed for the purpose of this analysis to be permanent or long-term effects. As design is advanced on the Preferred Alternative, the long-term effects will be refined and short-term, construction related effects will be quantified and documented in the FEIS. Short-term, construction related work would include construction staging, material and equipment storage, construction easements, and other areas needed to support the construction, but not part of the long-term improvements.

2.7.4 Limits of Disturbance

A limit of disturbance (LOD)is the proposed boundary within which all construction, construction access, staging, materials storage, grading, clearing, erosion and sediment control, landscaping, drainage, stormwater management, noise barrier replacement/construction, and related activities would occur. The LOD for each alternative was determined from the proposed roadway typical sections, interchange configuration, and roadside design elements. The LODs were used to calculate the impacts of the Build Alternatives. The LODs for all the Build Alternatives include the following elements:

- On-site stormwater management, including swales, ponds and large facilities along the roadside and within interchanges
- Profile adjustments and roadway shifts for roads that cross over I-495 and I-270 due to mainline widening
- Area assumed for noise barriers
- Area assumed for reconstruction of I-495 and I-270 mainline and interchange ramp bridges over water and roadways
- Full replacement of the American Legion Bridge as further confirmed by the "Capital Beltway

Is the Replacement of the American Legion Bridge Part of the Managed Lanes Study?

Yes, all Build Alternatives include the full replacement of the American Legion Bridge with a new, wider bridge on existing alignment (not widening of the existing bridge). The existing bridge is nearly 60 years old and would need to be replaced regardless of this Study. The new bridge would be constructed in phases to maintain the same number of existing lanes at all times, and therefore the new bridge will be replaced in the same existing location.

[26] Plans must be submitted to the local Soil Conservation District for approval and prepared in accordance with MD 378: USDA Natural Resources Conservative Service Maryland Pond Code 378, January 2000.

Accord" announced in November 2019 by Governor Hogan of Maryland and Governor Northam of Virginia[27]

- Area assumed for utility relocations
- Area for interchange ramp relocation, reconfiguration, and tie-ins due to mainline widening
- Avoidance and impact minimization of adjacent land uses such as: streams, wetlands, historic properties, parks, and private properties
- Direct access ramps and at-grade auxiliary lanes for access to the managed lanes.

Refer to *Chapter 5, Section 2* of the *Alternatives Technical Report* (**Appendix B**) for additional details.

2.7.5 Tolling

All Build Alternatives include tolling through either HOT lanes or ETLs. This section describes the federal regulations that allow tolling of the interstate; a description of the toll rate ranges and how they would be set; information on toll collection methods and the associated physical impacts; and an explanation of dynamic tolling.

a. Federal Legislation

Tolling on federal-aid Highways including interstates is generally prohibited Under Title 23 of the US Code; however; there are two statutes (Title 23 USC Section 129 and Title 23 USC Section 166) that allow for tolling.

- **Title 23, Section 129** provides broad authority for states to implement tolling on Federal-aid highways in conjunction with new construction or other improvements to those highways or interstates, provided the number of toll-free lanes is not reduced and that the State DOT ensures compliance with certain federal requirements governing the use of toll receipts.

  Under this regulation, the Build Alternatives that include the addition of ETLs (Alternatives 8, 10, and 13C) fall within the parameters that would allow implementation of tolls on those new lanes along I-495 and I-270. In these Build Alternatives, the existing HOV lanes along I-270 would continue to operate as free HOV lanes. MDTA would determine the toll pricing structure for the ETLs (see **Section 2.7.5b**).

- **Title 23, Section 166** also grants authority for states to either convert existing HOV lanes or construct new HOV lanes and implement tolling under a HOT Lane approach. In the HOT lanes, vehicles that meet the state-defined minimum number of occupants qualify as HOV-eligible (or qualifying HOVs) and could travel in the HOT lanes for free. In this Study, three or more occupants in a vehicle would qualify as an HOV-eligible vehicle. Available capacity in those lanes that is not used by the HOV-eligible vehicles could be used by vehicles with a lower occupancy level, e.g. vehicles with two occupants or SOV; these vehicles would pay a toll for the ability to use the available capacity. MDTA would determine the toll pricing structure for vehicles subject to a toll.

  Under this statute, the Build Alternatives that include HOT lanes (Alternatives 9, 9M, and 13B) would fall within the parameters that would allow implementation of HOT lanes along I-495 and

[27] http://www.mdot.maryland.gov/News/Releases2019/2019_November_12_Capital_Beltway_Accord_Release.html

conversion of HOV to HOT on I-270, if the definition of MDOT SHA's HOT lanes does not include a toll for defined HOV-eligible vehicles.

Additionally, Section 166 authorizing HOV/HOT conversions requires that certain performance metrics are met such as maintenance of a minimum average travel speed of 45 miles per hour in those lanes consistent with MDOT's goal of improving the flow of traffic through the corridor.

All of the Build Alternatives would include dynamic tolling for the managed lanes (HOT or ETL) for the full length of the Study. It is anticipated that the lanes would be designed, built, and operated by a Developer through a P3 over a yet-to-be-determined period of time. However, the MDOT SHA would continue to own the GP and managed lanes on I-495 and I-270 and ensure the highway meets their intended transportation function.

Tolling the newly constructed managed lanes is the only viable option for funding these congestion management improvements. However, even with tolling, the state lacks the available debt capacity and capital funding necessary to deliver improvements of this magnitude. As such, following a competitive solicitation process, the selected P3 Phase Developer will leverage the anticipated toll funds through a carefully structured project debt and equity approach that will optimize the funding availability to provide the much-needed traffic relief; repave roads and replace bridges; and operate and maintain the managed lanes during the term of the Developer's Agreement.

b. Toll Rate Ranges

The toll rate ranges will be set as required by the Code of Maryland Regulations (COMAR) 11.07.05 – Public Notice of Toll Schedule Revisions, including public input. The toll rate range would include an upper limit on the toll rate per mile. At the time of the DEIS publication, it is anticipated that the toll rate range setting process and public hearings could occur in 2021. The following steps summarize the process:

- A traffic and revenue study will be completed to develop a recommended range of toll rates to manage the traffic and ensure the facilities can meet the necessary traffic performance requirements. It is anticipated the toll rate range would be broad enough to suffice for many years.
- The recommended toll rate range will be presented to the MDTA Board Members for review and approval to be released for public comment.
- MDTA will hold a 60-day public comment period that will include public hearings in each county affected by the toll rates.
- The public comments will be summarized for the MDTA Board Members, which could include proposed revisions to the toll rate range.
- The MDTA Board Members will approve the toll rate range that would be used in the managed lanes.
- If the toll rate range is approved through this State-legislated public process by the time the FEIS or ROD are published, the approved toll rate range will be included.
- Once the managed lanes are opened, the toll rates will be adjusted dynamically within the approved MDTA toll rate range to ensure the traffic and lane performance requirements are achieved and comply with operational requirements defined in the Developer Agreement, such as minimum average operating speeds.

- If the toll rate range needs to be modified to maintain the traffic performance requirements, the same process listed above would be followed.

This DEIS does not include a recommendation for the toll rate ranges to be set for users of the managed lanes. Additionally, it is not intended that the FEIS or ROD would stipulate or affect the managed lanes toll rate ranges, as that process is part of COMAR described above. Regardless, it is appropriate for the purposes of this Study to make assumptions about potential toll rates to moderate the traffic and evaluate the financial viability of the Build Alternatives. The toll rates would be established to achieve the following goals:

- Manage traffic demand and congestion on the I-270 and I-495
- Ensure a minimum average operating speed of 45 miles per hour (mph) within the overall managed lanes system
- Ensure maximum volumes are not exceeded in the managed lanes

For planning purposes only and to meet these goals, this Study determined the estimated opening year (2025) average weekday toll rates per mile (in 2020 dollars) per alternative for all time periods for passenger cars paying the electronic toll collection (ETC) class and payment type. The analysis split an average weekday into 13 time periods. Commercial vehicles were considered in the analysis at proportionally higher toll rates relative to their number of axles. It was assumed that ETC would include E-ZPass transponder and video toll collection. Driver sensitivity to different toll rates was estimated by considering several factors including potential travel times on the managed lanes and general purpose lanes, driver's value of time, and travel time reliability. These average daily toll rates were calculated by dividing the total passenger car ETC revenue for all time periods by the total passenger car ETC vehicle miles traveled for all time periods[28]:

- Alternative 8: $0.70/mile
- Alternative 9: $0.69/mile
- Alternative 9M: $0.77/mile
- Alternative 10: $0.68/mile
- Alternative 13B: $0.73/mile
- Alternative 13C: $0.71/mile

As described above, the toll rate ranges will ultimately be set by the MDTA Board after public review and comment; however, it is not anticipated that the environmental and community impacts would be substantially different once this toll rate range is approved because the modeling process for estimating potential planning-level toll rates is similar to the modeling process to support analysis of toll rate ranges that will be presented to MDTA for consideration by the Board.

c. Toll Collection and Toll Impacts

The tolls would be collected electronically in the managed lanes at highway speeds, with no toll plazas, no toll booths, and no cash payments for all Build Alternatives. Typical methods for electronic toll collection include E-ZPass transponders and video tolling, which are currently utilized on MD 200 and the

[28] Although Alternative 5 was not determined to be a reasonable alternative, the average daily toll rate of $0.97/mile is included in the DEIS for comparison purposes only.

I-95 ETLs north of Baltimore. Video toll collection would allow a vehicle to use the managed lanes without a transponder and receive a Notice of Toll Due in the mail from the MDTA.

A switchable E-ZPass Flex transponder would be required for HOVs in Build Alternatives with HOT lanes. An HOV-eligible user could then use the additional switchable feature to make declarations regarding their HOV status and travel toll-free if they meet the occupancy requirements. The current thinking at the time of the DEIS publication is that vehicles with three or more occupants (HOV 3+) would be eligible for HOV status.

The Virginia Express Lanes on I-495 would merge directly into the Maryland managed lanes and vice versa, and the system operating rules are being determined in collaboration with the Virginia Department of Transportation (VDOT) and FHWA. Based on coordination with VDOT, it is unlikely that the business rules between the VDOT and MDOT managed lane systems will be the same. Exchange ramps are being proposed near the state line to facilitate vehicles entering and exiting the managed lanes between the systems.

While the managed lanes would not include toll plazas or toll barriers, variable message toll signing would be installed to advise motorists of the toll pricing required to manage the traffic. The variable message toll signing will generally be installed within the proposed right-of-way; however, determination of final locations would be completed during final design. Tolls were considered when addressing environmental justice and community impacts. Refer to **Chapter 4, Section 21** of this DEIS for additional details.

d. Dynamic Tolling

Once the managed lanes are opened, the toll rates will be adjusted dynamically within the approved toll rate range. They would operate under a dynamic tolling approach where the toll rates would change in response to real-time variations in traffic conditions such as travel speeds, traffic density and traffic volumes. There will be minimum traffic performance requirements associated with these variables, such as maintaining a minimum average operating speed of 45 mph on the managed lanes. The traffic performance requirements would be incorporated into a tolling algorithm and would help to set the toll rates within the approved toll rate range to manage the congestion in the managed lanes. During congested times of the day, the toll rates could change every five to 15 minutes depending on the traffic and algorithm parameters being measured. Through this approach, traffic flow would be managed, congestion would be reduced, and a minimum average operating speed of 45 mph would be maintained in the managed lanes.

The benefits of effective congestion management are:

- Reliable travel times and minimum average operating speeds for persons using the managed lanes (motorists and users of public transit on the facility)
- Improved travel times for persons using the GP lanes adjacent to the managed lanes
- Minimized start-and-stop driving conditions in a congested environment which could result in reduced crash rates
- Minimization of environmental and social impacts associated with congestion

2.7.6 Transit-Related Elements

The Study is addressing transit-related elements by providing access/connectivity and enhancing mobility for transit vehicles and passengers. Additionally, MDOT SHA's I-495 & I-270 P3 Program Office will address the State BPW conditions for regional transit service improvements as described below and has prepared the Transit Service Coordination Report as the initial product from the I-495 & I-270 Managed Lanes Transit Work Group to assist affected counties and transit providers in prioritizing capital and operating investments.

a. Enhanced Transit Mobility and Connectivity

A key element of this Study's Purpose and Need includes enhancing existing and planned multimodal mobility and connectivity. In furtherance of this key consideration and to address public and agency comments received to-date, MDOT SHA has identified opportunities to enhance transit mobility and connectivity within the Build Alternatives. These include the following elements:

- Allowing bus transit usage of the managed lanes for free to provide an increase in speed of travel, assurance of a reliable trip, and connection to local bus service/systems on arterials that directly connect to activity and economic centers.
- Accommodating direct and indirect connections from the proposed managed lanes to existing transit stations and planned Transit Oriented Development at the Shady Grove Metro (I-370), Twinbrook Metro (Wootton Parkway), Montgomery Mall Transit Center (Westlake Terrace), Medical Center Metro (MD 187 and MD 185), Kensington MARC (MD 185), Silver Spring Metro and MARC (US 29), Greenbelt Metro and MARC (Cherrywood Lane), New Carrollton Metro, MARC, and Amtrak (US 50), Largo Town Center Metro (MD 202 and MD 214), and Branch Avenue Metro (MD 5).

Will Transit Riders Benefit from Managed Lanes?

Yes, transit riders and transit service will experience the following benefits:

- Buses and transit riders using these highways will have reduced travel times because buses can use the Managed Lanes.
- Enhanced transit mobility and connectivity to existing and planned transit facilities.
- Improved highway system will provide less-congested and more reliable routes for bus service.
- Direct and indirect access to existing transit stations and transit-oriented developments will be included at Greenbelt, New Carrollton, Branch Avenue, Silver Spring, and Shady Grove Metro stations, among others.
- Provides opportunities for planned or modified bus service to connect to underserved suburban to suburban transit markets.
- Provides opportunities for new express bus service in National Capital Region, such as between Bethesda and Tysons.

MDOT SHA is also committed to working with WMATA to consider the results of the Washington Area Bus Transformation Study. A Strategy and Action Plan[29] was developed in December 2019 and outlines 26 recommendations with a clear approach to implementing the recommendations. While the planning phase of the Bus Transformation Study is complete, initial results of a public survey[30] conducted between September and November 2018 identified several barriers to bus ridership, including:

- Doesn't come frequently enough
- Too slow

[29] https://bustransformationproject.com/wp-content/uploads/2019/12/Action-Plan-2019-12-06-SECURE.pdf?x27033
[30] https://bustransformationproject.com/resources/public-survey-results/

- Doesn't go where I need to go
- No direct service/I would have to transfer
- Doesn't run at the hours I need to use it
- Doesn't reliably get me to my destination on time.

The opportunity to use the proposed managed lanes, for any of the Build Alternatives, could address some or all of these identified barriers.

b. State BPW & Regional Transit Services

On June 5, 2019, the BPW took its first action with respect to the use of a P3 for delivery of the project. Subsequently, on January 8, 2020, the BPW approved an Amendment to the initial approval, which states:

"The Reporting Agencies (MDOT SHA) will develop memoranda of understanding with the affected Counties defining regional transit service improvements to be provided as part of the P3 Agreements. Terms of the agreements will be provided to the BPW concurrently with the P3 Agreements. Furthermore, the Reporting Agencies will develop the transit service improvements collaboratively with the affected Counties.

Specific transit investment will be provided as part of the P3 agreements. This will ensure these regional transit service improvements are provided at defined and predictable times. By including the regional transit service improvements in the P3 agreements, the affected Counties will be guaranteed the transit service improvements. This approach will fully honor the BPW request from June 5, 2019. The memoranda of understanding between MDOT and the affected Counties defining transit service improvements to be developed as part of the P3 Agreements will be provided to the BPW as part of the request for approval of the P3 Agreements to clearly show that the Reporting Agencies have complied with this BPW condition."

c. Transit Work Group and Transit Service Coordination Report

The MDOT Secretary convened the I-495 & I-270 Managed Lanes Transit Work Group in May 2019 to seek input on existing transit services and help identify feasible opportunities for transit to use the managed lanes. Eight meetings were held with transit and planning representatives who were both directly and indirectly affected by the P3 Program, including Montgomery, Prince George's, Frederick, Howard, Anne Arundel and Charles counties, as well as MDOT MTA commuter bus and MARC and WMATA, MDOT Secretary's Office of Planning and Capital Programming, MDOT SHA, FHWA, Federal Transit Administration (FTA) and the MWCOG.

The Transit Service Coordination Report is the result of coordination between MDOT, local governments, and the transit providers through the I-495 & I-270 Managed Lanes Transit Work Group. The purpose of the report was to inform the development of the I-495 & I-270 P3 Program and assist the affected counties and transit providers in prioritizing capital and operating investments. The report was made available to the public in June 2020 on the P3 Program website (https://495-270-p3.com/transit-benefits/) and it summarizes the following work efforts:

- Analyzing existing and potential transit markets
- Suggesting short-term review of existing transit services to maximize benefits
- Identifying where long-term transit service options may be feasible

- Identifying key managed lane access points beneficial to transit
- Analyzing existing and potential carpool and vanpool markets and strategies
- Documenting Maryland's investment in transit throughout the service corridor

The report is being used to inform affected counties and transit providers about the significant transit opportunities offered by managed lanes such as strategies to maximize the benefits of reliability and speed; provide a basis for the evaluation and prioritization of future capital and operating needs in the service area; and initiate discussions about ways to incorporate regional transit services into the P3 Program. The options considered were broad, and in many cases a significant investment would be needed to implement them. Further discussion will be held to establish priorities, identify and develop specific regional transit service improvements to be considered as part of the memorandum of understandings, and determine appropriate long-term funding strategies.

2.7.7 Pedestrian and Bicycle Considerations

Existing sidewalks, shared use paths, bikeable shoulders, and bikeways impacted by the proposed improvements and widening would be replaced in kind. Many such facilities exist along cross roads or as separate facilities that cross over or under I-495 and I-270. Coordination with the local agencies having jurisdiction over these facilities, including identification of master planned facilities for potential inclusion in the concept design for this Study, is ongoing. As part of the "Capital Beltway Accord"[27], the new American Legion Bridge would include new pedestrian and bicycle access to connect trails on both side of the Potomac River. The proposed improvements are anticipated to include a shared use path along the south side of the American Legion Bridge with a potential connection to the C&O Canal, pending further discussions with the National Park Service. The path could connect to the planned Fairfax County trail system and the Montgomery County Master Plan system. Additional new facilities or upgrades may be provided along the corridor in accordance with MDOT SHA or local agency design requirements as further coordination efforts occur.

2.7.8 Construction Phasing

This Study is the first element of the broader I-495 & I-270 P3 Program. The alternatives that are described in this chapter of the DEIS are focused on addressing the transportation needs within the 48-mile study limits only.

Due to the magnitude of the Study, MDOT SHA intends to construct the improvements in phases, if a Build Alternative is selected. Per the State Board of Public Works (BPW) and as further defined in MDOT SHA's February 7, 2020 Request for Qualifications (RFQ), Phase 1 of the P3 Program would include selection of a developer for improvements to I-495 from the vicinity of the George Washington Memorial Parkway in Virginia, across and including the American Legion Bridge, to its interchange with I-270 at the West Spur and I-270 from its interchange with I-495 to its interchange with I-70. The length of I-270 from I-370 to I-70, which would be advanced through a separate, independent NEPA study. In the event that HOT or ETL managed lanes are not part of the Preferred Alternative in the Study FEIS or the Selected Alternative in the ROD, the solicitation for Phase 1 will not proceed.

Under a P3 agreement, Phase 1 would be developed and delivered by a Phase Developer that will be selected based on the competitive solicitation process initiated by the RFQ. The southern portion of Phase 1 from I-495 in the vicinity of the George Washington Memorial Parkway to I-270 and I-270 from I-495 to

I-370 shall be developed and delivered first. An environmental decision document under the NEPA will be approved before final design and construction will commence on any portion of Phase 1. This is in addition to any future BPW approvals necessary.

The Phase 1 P3 Agreement would govern the Predevelopment Work for Phase 1 including, but not limited to, items such as preliminary engineering design to reduce impacts and reduce risks; sequencing and scheduling for Phase 1 sections; preparing congestion pricing scenarios; and evaluating debt financing arrangements. The final design and engineering would be completed after the Phase 1 P3 Agreement is approved by the BPW and after the ROD.

Additional improvements will proceed as expeditiously as possible through subsequent P3 solicitation(s).

2.8 Financial Viability

The financial analysis completed for all the Build Alternatives to assess the potential of each to be financially self-sufficient was updated in January 2020. This analysis considered multiple factors including: preliminary capital costs (a high and low range of ±5 percent of the base cost), initial revenue projections, preliminary operations and maintenance costs, and the likely methods for how construction phases would be financed. The key input of interest rates considered a high and low range of ±0.50 percent from the base assumptions. The estimated results for each Build Alternative are summarized below[31] and in **Table 2-6**.

- Alternative 8 cashflow estimates indicate a more positive financial self-sufficient position (requiring no public subsidy) than several other Build Alternatives. Results for the baseline scenario indicated positive excess cashflows of approximately $833 million. Under a lower construction price and lower interest rate scenario, the positive cashflows would be estimated at $2,627 million. Conversely, a higher construction cost and higher interest rate scenario would result in a negative cashflow estimate where the state may be required to provide a subsidy of approximately $584 million.
- Alternative 9 cashflow estimates indicate that it would be the most likely to be financially self-sufficient. In the baseline scenario, positive excess cashflows would be approximately $960 million. Under a lower construction price and lower interest rate scenario, the positive cashflows would be estimated at $2,762 million. Conversely, a higher construction cost and higher interest rate scenario would result in a negative cashflow estimate where the State may be required to provide a subsidy of approximately $482 million (lowest of the potential subsidies estimated from the financial analysis).
- Alternative 9M cashflow estimates would be less likely to be financially self-sufficient than Alternatives 8, 9, and 10 with lower overall revenue potential. In the base case scenario, positive excess cashflows would be approximately $459 million. Under a lower construction price and lower interest rate scenario, the positive excess cashflows would be estimated at $2,190 million, compared to the result for a higher construction price and higher interest rate scenario which

[31] Although Alternative 5 was not determined to be a reasonable alternative, the cashflow estimates are included in the DEIS for comparison purposes. Alternative 5 cashflows would be less likely to be financially self-sufficient than Alternatives 8, 9, 10, and 13C. Results for the baseline scenario indicated positive excess cashflows of approximately $226 million. Under a lower construction price and lower interest rate scenario, the positive cashflows would be estimated at $1,799 million. Conversely, a higher construction cost and higher interest rate scenario would result in a negative cashflow estimate where the state may be required to provide a subsidy of approximately $907 million.

indicate negative cashflows where the State may be required to provide a subsidy of approximately $827 million.

- Alternative 10 cashflow estimates indicate a more positive financial self-sufficient position requiring no public subsidy than several other Build Alternatives. Results for the baseline scenario indicated positive excess cashflows of approximately $866 million. Under a lower construction price and lower interest rate scenario, the positive cashflows would be estimated at $2,711 million. Conversely, a higher construction cost and higher interest rate scenario would result in a negative cashflow estimate where the state may be required to provide a subsidy of approximately $604 million.
- Alternative 13B cashflow estimates indicate that it would be the least likely to be financially self-sufficient among the Build Alternatives. Results for the baseline scenario indicated positive excess cashflows of approximately $196 million. Under a lower construction price and lower interest rate scenario, the positive cashflows would be estimated at $1,907 million. Conversely, a higher construction cost and higher interest rate scenario would result in a negative cashflow estimate where the state may be required to provide a subsidy of approximately $1,088.
- Alternative 13C cashflow estimates would be less likely to be financially self-sufficient than Alternatives 8, 9, and 10. In the base case scenario, positive excess cashflows would be approximately $328 million. Under a lower construction price and lower interest rate scenario, the positive excess cashflows would be estimated at $2,065 million, compared to the result for a higher construction price and higher interest rate scenario which indicate negative cashflows where the State may be required to provide a subsidy of approximately $998 million.

If a state subsidy is required, it would typically be paid to the developer at the beginning of the contract, whereas if positive excess cashflows are anticipated, they could be paid to the State at the beginning of the contract and/or as revenue sharing payments to the State during the operation of the facility.

Table 2-6: Estimated Cashflows for Build Alternatives

Build Alternative	Cash Flow (in millions)		
	Low Capital Cost & Low Interest Rate	Mid Capital Cost & Mid Interest Rate	High Capital Cost & High Interest Rate
Alternative 8	$2,627	$833	- $584
Alternative 9	$2,762	$960	- $482
Alternative 9M	$2,190	$459	- $827
Alternative 10	$2,711	$866	- $604
Alternative 13B	$1,907	$196	- $1,088
Alternative 13C	$2,065	$328	- $998

Notes:

1. The results summarized in this table must be considered in the context presented in DEIS Section 2.8 Financial Viability.
2. The analysis is preliminary because the value of numerous input assumptions used to compute the financial viability of the Build Alternatives could change. A consistent methodology was used to estimate the revenue and consistent financial assumptions were used for all Build Alternatives summarized herein.
3. This analysis considered multiple factors including estimates of: preliminary capital costs (a high and low range of ±5 percent of the base cost), initial revenue projections, preliminary operations and maintenance costs, and the likely methods for how construction phases would be financed.
4. The key input of interest rates considered a high and low range of ±0.50 percent from the base assumptions.
5. Refer to *Chapter 6, Section 2.3* of the *Alternatives Technical Report* (**Appendix B**) for additional information.

The financial analysis is preliminary because the value of numerous input assumptions used to compute the financial viability of the Build Alternatives could change. Key input factors include capital costs, operations and maintenance costs, revenue forecasts, and financing assumptions. However, if any of the inputs change, it is anticipated that the result of the financial analyses would change in a consistent direction for all Build Alternatives. For example, capital costs for all alternatives would generally go up or down proportionally since the same baseline assumptions were used to develop the capital costs. Similarly, a consistent methodology was used to estimate the revenue and consistent financial assumptions were used for all Build Alternatives. Therefore, any changes in the inputs (i.e., interest rates) would be expected to result in a similar comparative difference between the alternatives. The conclusion is that the financial analysis results would likely indicate that Alternative 9 would be the most financially viable. Refer to *Chapter 6, Section 2.3* of the *Alternatives Technical Report* (**Appendix B**) for additional information.

3 TRANSPORTATION AND TRAFFIC

3.1 Introduction

As noted in **Chapter 1**, any proposed action resulting from the Managed Lanes Study (Study) must accommodate existing traffic and long-term traffic growth on I-495 and I-270. In order to properly evaluate how each of the Build Alternatives would address these traffic challenges, it is important to understand the current and projected traffic demands on the transportation network along the study corridors and the surrounding area. This chapter summarizes the Study's traffic analysis methodology and presents an overview of the results from the traffic operational analyses conducted for each of the Build Alternatives and Alternative 5 (for comparison purposes). For additional details, refer to the *Traffic Analysis Technical Report* (**Appendix C**).

The information presented in this chapter was used to help evaluate the Screened and Build Alternatives. Traffic data and findings developed as part of this Study were also used as inputs in the air quality and noise analyses. For additional details on air and noise analyses, refer to **Chapter 4, Section 4.8,** and **Section 4.9**, the *Air Quality Technical Report* (**Appendix I**), and the *Noise Technical Report* (**Appendix J**).

3.1.1 Traffic Analysis Data Collection and Modeling Methodology

To establish baseline conditions, traffic volume and speed data was collected throughout the study corridors. Recent traffic count data was obtained from MDOT SHA's Internet Traffic Monitoring System (I-TMS) and used to determine average daily traffic (ADT) volumes and peak period traffic demands throughout the study corridors for the baseline year of 2017. Hourly speed data along the study corridors was collected from probe data from the Regional Integrated Transportation Information System (RITIS) platform developed by the University of Maryland's Center for Advanced Transportation Technology (CATT) lab. The traffic volume data was input into a VISSIM traffic simulation model and the model was calibrated to match existing speed data within MDOT SHA thresholds. This calibrated model of existing conditions was used as a baseline for future modeling.

MDOT SHA summarizes statewide congestion trends in its annual Maryland State Highway Mobility Report[1]. Congestion patterns within the study corridors were reviewed based on the data from this report, including key parameters of Travel Time Index (TTI) and Planning Time Index (PTI) to identify the poorest performing segments within the study corridors and the most unreliable segments in need of improvements. The volume, speed, and congestion data were used to assist in identifying elements of the Study's Purpose and Need.

Detailed traffic operational analyses were performed for each of the Build Alternatives to evaluate their ability to meet the Study's Purpose and Need in the design year of 2040. The evaluation methodology included a three-step process:

1. First, a regional forecasting model was developed for each of the Build Alternatives. using the Metropolitan Washington Council of Governments Travel Demand Model (MWCOG model), which is the model typically used by MDOT SHA and other transportation agencies to evaluate projects in the Washington, DC metro area. MDOT SHA used the MWCOG model Version 2.3.71, which was a model specifically developed by MWCOG for modeling this Study's alternatives. The prior version of the model, Version 2.3.70 (November 2017), was the most recently adopted model used in the regional air quality conformity analysis, when the traffic modeling for the Study was initiated. Model Version 2.3.71 used for this study included

[1] The latest published version at the time the DEIS was prepared was the *2018 Maryland State Highway Mobility Report*.

revisions to Version 2.3.70 developed by MWCOG to better represent dynamically-priced lanes, but otherwise includes the same base data.

2. Next, the outputs from the MWCOG model were used to develop traffic volume projections for the design year of 2040 for each roadway segment and ramp movement within the study limits for each of the Screened Alternatives during the peak periods. For Alternative 9M, which is a hybrid of Alternative 5 and Alternative 9 that was not one of the original Screened Alternatives, the forecasts were developed using the results from Alternative 5 and Alternative 9 as a base. For additional details, refer to the document titled "Alternative 9 Modified Preliminary Evaluation Memorandum" included in *Appendix B* of the *Alternatives Technical Report* (**Appendix B**).
3. Finally, traffic simulation models for each of the Build Alternatives were developed using VISSIM software to determine the projected operational performance in several key metrics during the AM peak period (6:00 AM to 10:00 AM) and the PM peak period (3:00 PM to 7:00 PM). The metrics were selected to evaluate the effectiveness of each of the Build Alternatives to efficiently move people through the region and to provide benefits to the transportation system.

3.1.2 Traffic Analysis Area

The traffic analysis area for the Study extended beyond the study limits to capture upstream and downstream effects. The VISSIM simulation models prepared for the Study were extended to the following limits (as shown in **Figure 3-1**):

- I-495 from VA 193 in Virginia across the American Legion Bridge and through the state of Maryland around to the Woodrow Wilson Bridge
- I-270 from the I-70 ramp merges to I-495, including the East and West Spurs

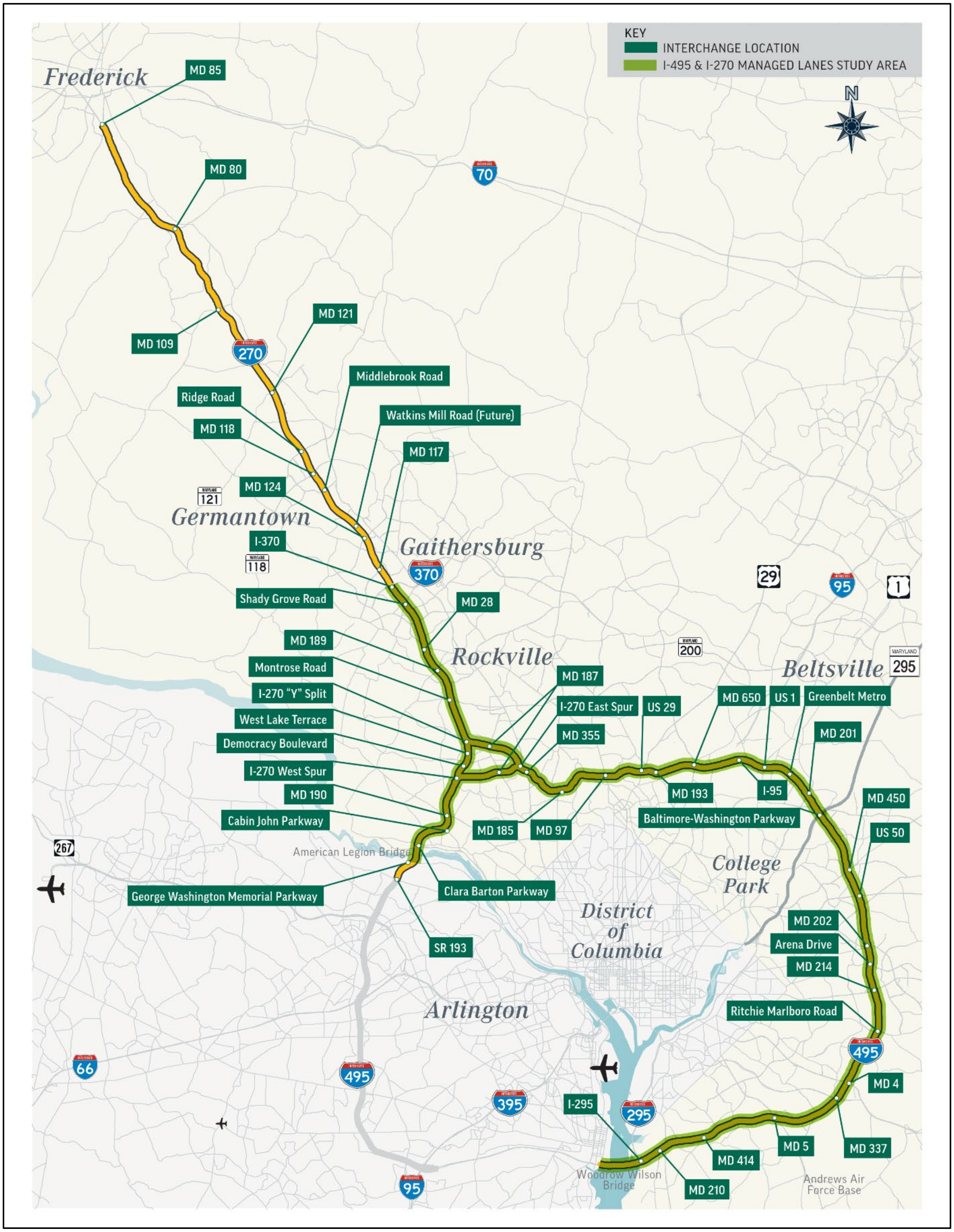
Additionally, the MWCOG model used to develop volume projections for the Study covered the entire National Capital Region of surrounding roadways in 22 jurisdictions, including Montgomery County, Prince George's County, and Frederick County in Maryland, as well as Arlington County and Fairfax County in Virginia, and the District of Columbia.

3.1.3 Traffic Modeling Assumptions

The design year used to evaluate the Build Alternatives in this Draft Environmental Impact Statement (DEIS) is 2040. MDOT SHA assumed a design year of 2040 for all traffic analysis in this document because the latest approved regional forecasting model from MWCOG was for the year 2040 when the Study was initiated. The 2040 forecasts were used to compare alternatives and determine which alternatives would be expected to provide the best operational benefit to meet the Study's Purpose and Need.

In October 2018, a new version of the MWCOG model was approved and released that projected traffic demand out to the year 2045. During development of this DEIS, a sensitivity analysis comparing the 2040 forecasts to the 2045 forecasts was completed and the results are summarized in *Appendix J* of the *Traffic Analysis Technical Report* (**Appendix C**). The sensitivity analysis concluded that the differences in forecast volumes between 2040 and 2045 would be consistent amongst the Build Alternatives, and therefore would not significantly alter the comparison of alternatives presented in this document. The Final EIS (FEIS) will include updated operational analyses for a Preferred Alternative that reflects a design year of 2045 to evaluate how that Alternative would meet the Purpose and Need based on the latest MWCOG model.

Figure 3-1: Limits of VISSIM Model Network and Interchange Locations Included along I-495 and I-270



The traffic projections from the MWCOG model applied traditional forecasting techniques, which do not explicitly account for connected and autonomous vehicles (CAVs). For more information regarding the impact of CAVs on the Study (refer to the *Traffic Analysis Technical Report* (**Appendix C, Section 4.1**)).

The analysis for the design year assumed the completion of several background projects that are included in the region's Constrained Long-Range Plan (CLRP). The impacts of these background projects were assumed as part of the baseline conditions for the design year 2040 No Build condition (Alternative 1), for evaluating all Build Alternatives and Alternative 5 (for comparison purposes). The following roadway projects of regional significance were assumed to be in place in the year 2040 for the purposes of this Study:

- I-270 Innovative Congestion Management (ICM) Improvements
- VDOT I-495 Express Lanes Northern Extension (495 NEXT)
- I-270 at Watkins Mill Road Interchange
- Greenbelt Metro Station Access Improvements

Additionally, the benefits of the following proposed transit projects on the traffic demands for the roadway network within the study corridors are accounted for in the modeling:

- Purple Line Light Rail
- Corridor Cities Transitway (CCT)
- US 29 Bus Rapid Transit (BRT)
- Randolph Road BRT
- North Bethesda Transitway

Were Connected and Automated Vehicles (CAVs) Considered?

Yes, CAVs are an important consideration for all future transportation projects. However, there are currently many unknowns regarding how CAVs will affect traffic:

- Adding CAVs to the traffic stream will likely increase capacity, but the magnitude of the increase is unclear at this time.
- The benefits of more vehicles per lane may be offset by an increased demand in auto trips. This could include trips by people that cannot afford a car but would pay for "mobility as a service" or "deadhead" trips – autonomous vehicles with no passengers traveling empty to their next stop.
- CAVs could impact land use policy by encouraging growth further from urban areas.

Due to these unknowns, it is prudent to use traditional forecasting techniques for current studies, while being cognizant of potential CAV impacts in the future.

Managed lanes work well with CAVs. The managed lanes provide physical separation, new pavement, and clear delineation, which gives CAVs the opportunity to connect with each other, form platoons, and maximize efficiency by operating in a more controlled environment.

Potential roadway or transit improvements on I-270 from north of I-370 to I-70 were not included as part of this Study, as alternatives are currently being developed as part of a separate I-270 Pre-NEPA effort (https://495-270-p3.com/i270-environmental/).

Each of the Build Alternatives studied as part of the traffic analysis for this DEIS included managed lanes. The managed lanes were assumed to be buffer-separated with a physical delineation from the adjacent general purpose (GP) lanes, with access provided via direct connections at key locations. The direct access locations have evolved throughout the Study based on input from the stakeholders and design modifications to avoid or minimize impacts to sensitive resources, while still meeting Purpose and Need (refer to **Chapter 2, Section 2.7.1**).

The operational analysis results presented in this DEIS assume direct access would be provided at the following locations:

- Twelve (12) Interchanges on I-495:
  - George Washington Memorial Parkway
  - Cabin John Parkway / MD 190
  - I-270 West Spur
  - MD 187
  - I-270 East Spur
  - US 29
  - I-95
  - Cherrywood Lane
  - Baltimore-Washington Parkway
  - US 50
  - Ritchie Marlboro Road
  - MD 5
- Four (4) Interchanges on I-270:
  - Westlake Terrace (to and from the north only)
  - Montrose Road
  - Gude Drive (to and from the south only)
  - I-370
- One (1) Set of At-Grade Slip Ramps: North of Clara Barton Parkway

The current design for each of the Build Alternatives (shown in **Appendix D**) include some modifications to the direct access locations and additional direct access locations that were selected after the operational analyses were completed. The latest set of direct access locations, listed in **Chapter 2, Table 2-4** used to determine the limit of disturbance (LOD) for the environmental evaluation in this DEIS. All changes to direct access locations during the Study were applied consistently across all Build Alternatives. Therefore, any changes to direct access assumptions would not result in a relative change in overall operational benefits when comparing alternatives. However, operational analysis of the Preferred Alternative will be updated in the FEIS to reflect the latest direct access assumptions for consistency.

The final toll policies and toll rate ranges for the proposed managed lanes have not yet been determined, but they will be defined following Maryland's legal requirements and include public hearings as described in **Chapter 2, Section 2.7.5**. The managed lanes would operate under a dynamic tolling approach where the toll rates would change in response to real-time variations in traffic conditions. For the purposes of the analysis in the DEIS, the volume in the managed lanes would be set to maintain a minimum average operating speed of at least 45 mph and not exceed 1,600 to 1,700 vehicles per hour per lane in the highest demand section of the managed lanes. The remaining portion of demand for each freeway section would be in the GP lanes. For planning purposes only, the dynamically priced toll rates were retained from the initial MWCOG model runs, as shown in the *Traffic Analysis Technical Report* (**Appendix C**). The dynamic toll rates used by MWCOG for travel demand modeling were developed as "per mile" rates based on an iterative process for each alternative and ranged from $0.20 to $1.36 per mile (in 2016 dollars). The iterative process was designed to estimate appropriate toll values to control the volume of traffic using the managed lanes through a combination of volume to capacity ratios and maintaining a minimum operating speed at or near free-flow conditions. The toll rates produced as part of this MWCOG modeling process were developed by MWCOG staff. MDOT SHA did not perform this step for traffic forecasting and traffic analysis purposes, because the estimated toll values for future-year networks were provided by MWCOG when the model was transmitted to MDOT SHA.

3.2 Existing Conditions

The study limits include many of the most heavily traveled, most congested, and most unreliable roadway segments in Maryland[2]. According to the *2018 Maryland State Highway Mobility Report*, the top three

[2] Segments as defined by *2018 Maryland State Highway Mobility Report*

highest volume roadway sections in Maryland based on average daily traffic (ADT) are contained within the study limits. These locations include I-270 from the I-270 Split to MD 117, I-495 from the I-270 East Spur to I-95, and I-495 from the Virginia State Line to the I-270 West Spur. **Table 3-1** shows the existing (year 2017) ADT for each segment within the study area, which reflects total traffic in both directions.

Table 3-1: Existing Average Daily Traffic (ADT)

Corridor	Segment	Existing Volumes (2017)
I-270 (both directions)	I-370 to MD 28	226,000
	MD 28 to I-270 Spur	259,000
I-495 (both directions)	at American Legion Bridge	243,000
	MD 190 to I-270 Spur	253,000
	Between I-270 Spurs	119,000
	MD 355 to I-95	235,000
	I-95 to US 50	230,000
	US 50 to MD 214	235,000
	MD 214 to MD 4	221,000
	MD 4 to MD 5	198,000

Due to the heavy traffic volumes and insufficient roadway capacity, recurring congestion is prevalent throughout the study corridors under existing conditions. Average speeds during the peak hours drop below 20 mph on I-270 southbound in the morning and on I-270 northbound during the afternoon. On I-495, average speeds are less than 10 mph along the Outer Loop between I-95 and MD 193 during the morning rush hour and approaching the American Legion Bridge during the afternoon peak period. On the I-495 Inner Loop, the average speed from Virginia 193 across the American Legion Bridge through the top side of I-495, and east of I-95 to the MD 214 interchange (a distance of 29 miles) is less than 25 mph throughout the afternoon peak period, with several segments operating at less than 10 mph.

One of the primary measures of congestion on freeways is the Travel Time Index (TTI), which is defined as the ratio of the average (50th percentile) travel time during a particular hour to the travel time during free-flow or uncongested conditions. MDOT SHA defines "congestion" as any roadway segment with a TTI value greater than 1.15, while "severe congestion" is reached when TTI values exceed 2.0. On I-495, the average TTI (in both directions) exceeds 1.15 for 10 hours of the day each weekday (6:00 AM to 10:00 AM and 2:00 PM to 8:00 PM). During those 10 hours, severe congestion (TTI greater than 2.0) is also experienced in at least one segment of I-495. On I-270, the average TTI exceeds 1.15 for more than 7 hours each weekday (6:00 AM to 10:00 AM and 3:00 PM to 7:00 PM). During eight hours each weekday, at least one segment on I-270 experiences severe congestion (TTI greater than 2.0).

The study corridors also include many unreliable segments due to instability and non-recurring congestion caused by incidents, weather, and lane reductions from crashes and work zones. Roadway users have certain expectations of predictability of travel time when they make their trip. When there is a lot of variability in travel time on a given corridor, the highway system is considered unreliable. Trip reliability impacts automobiles, trucks, and buses, and it is critical for transit and freight operations. The measure that MDOT SHA uses to evaluate trip reliability is the Planning Time Index (PTI). PTI is calculated as the ratio of the 95th percentile travel time for a section of roadway compared to the free-flow travel time. Roadway segments with a PTI of less than 1.5 are considered reliable, while segments with a PTI value between 1.5 and 2.5 are considered moderately unreliable, and segments with a PTI value greater than 2.5 are considered highly unreliable.

According to the *2018 Maryland State Highway Mobility Report*, the top three most unreliable segments in Maryland during the AM peak period are all located within the Study limits: I-495 Outer Loop at MD 650, I-495 Outer Loop from MD 650 to MD 193, and I-495 Outer Loop from I-95 to the Prince George's County Line. Additionally, the most unreliable segment in Maryland during the PM peak period is also within the Study limits: I-270 Southbound from the I-270 Split to Democracy Boulevard.

3.3 Future Traffic Conditions and Alternatives Analysis

Traffic volumes throughout the study corridors are projected to continue to grow over the next 20 to 25 years due to expected increases in population and employment in the Washington, DC metropolitan region. **Table 3-2** shows the projected design year 2040 ADT for each segment along I-495 and I-270 within the study limits under the No Build condition, as well as the percent increase in daily traffic volumes. Despite many segments already operating at or near capacity, daily traffic volumes on I-270 and I-495 are projected to increase by 7 to 17 percent between now and the design year 2040 under the No Build condition.

Table 3-2: 2040 No Build Average Daily Traffic (ADT)

Corridor	Segment	Existing (2017)	No Build (2040)	Percent Increase
I-270	I-370 to MD 28	226,000	265,000	17%
	MD 28 to I-270 Spur	259,000	299,000	15%
I-495	at American Legion Bridge	243,000	277,000	14%
	MD 190 to I-270 Spur	253,000	282,000	11%
	Between I-270 Spurs	119,000	127,000	7%
	MD 355 to I-95	235,000	252,000	7%
	I-95 to US 50	230,000	245,000	7%
	US 50 to MD 214	235,000	252,000	7%
	MD 214 to MD 4	221,000	244,000	10%
	MD 4 to MD 5	198,000	218,000	10%

For future traffic conditions, each of the Build Alternatives (and Alternative 5 for comparison purposes) was evaluated and compared to the No Build condition for several key operational metrics, including speed, delay, travel time, level of service, throughput, and the effect on the local network. The results were obtained from the MWCOG model and the VISSIM traffic simulation models and are summarized in the following sections. Additional details are provided in the *Traffic Analysis Technical Report* (**Appendix C**). **Table 3-3** shows the projected design year 2040 ADT for each segment along I-495 and I-270 within the study limits for each of the Build Alternatives and Alternative 5 (for comparison purposes). Build Alternatives that add capacity to I-270 and I-495 would be projected to see an increase in daily traffic volumes served compared to the No Build Alternative.

Table 3-3: 2040 Build Average Daily Traffic (ADT)

Corridor	Segment	Alternative						
		5[1]	8	9	9M	10	13B	13C
I-270	I-370 to MD 28	255,000	279,000	268,000	260,000	283,000	264,000	281,000
	MD 28 to I-270 Spur	286,000	319,000	302,000	288,000	325,000	292,000	320,000
I-495	at American Legion Bridge	298,000	314,000	311,000	300,000	317,000	311,000	313,000
	MD 190 to I-270 Spur	297,000	331,000	321,000	310,000	331,000	316,000	330,000
	Between I-270 Spurs	127,000	145,000	138,000	131,000	145,000	136,000	147,000
	MD 355 to I-95	285,000	309,000	308,000	291,000	308,000	307,000	306,000
	I-95 to US 50	257,000	262,000	268,000	263,000	268,000	262,000	259,000
	US 50 to MD 214	269,000	282,000	286,000	282,000	286,000	281,000	281,000
	MD 214 to MD 4	263,000	275,000	287,000	282,000	287,000	275,000	274,000
	MD 4 to MD 5	233,000	238,000	240,000	239,000	240,000	237,000	237,000

Note: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

3.3.1 Speed

The metric of average speed was calculated from the traffic simulation model output. **Table 3-4** shows the average speed for each of the Build Alternatives and Alternative 5 (for comparison purposes) in the general purpose (GP) lanes of I-495 and I-270 compared to the No Build Alternative during the peak periods in the design year of 2040.

Table 3-4: 2040 Average Speed

Alternative	Average Speed[1] (General Purpose Lanes)
Alternative 1 (No Build)	25 mph
Alternative 5[2]	36 mph
Alternative 8	39 mph
Alternative 9	41 mph
Alternative 9M	38 mph
Alternative 10	40 mph
Alternative 13B	40 mph
Alternative 13C	39 mph

Notes: [1] Reflects weighted average speed on I-270 and I-495 during peak hours; [2] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

Any managed lanes would provide average speeds of at least 45 mph for all Build Alternatives in the simulation model due to the tolling assumptions described in **Section 3.1.3**. However, average speed performance in the GP lanes along I-495 and I-270 during the peak periods would vary between the Alternatives. For this metric, Alternative 9 would perform the best with an average speed of 41 mph in the GP lanes, while Alternative 9M would perform the worst of the Build Alternatives with an average speed of 38 mph in the GP lanes.

Detailed corridor travel speed results by peak hour and direction for the general purpose lanes and the managed lanes are provided in **Table 3-5**. Additional details are provided in the *Traffic Analysis Technical Report* (**Appendix C**).

Table 3-5: 2040 Corridor Travel Speed Results from VISSIM Model

Peak Period	Corridor	Travel Lanes	Alternative							
			1	5[1]	8	9	9M	10	13B	13C
AM Peak	I-495 Outer Loop from MD 5 to George Washington Memorial Parkway	General Purpose	23	31	36	37	35	37	33	32
		HOT/Express Toll Lane	N/A	62	62	62	62	62	62	62
	I-495 Inner Loop from George Washington Memorial Parkway to MD 5	General Purpose	34	38	40	41	39	40	41	41
		HOT/Express Toll Lane	N/A	54	54	54	54	52	54	50
	I-270 Northbound from I-495 to I-370	General Purpose	63	61	61	61	61	61	61	61
		HOT/Express Toll Lane	N/A	63	63	63	64	64	N/A	N/A
	I-270 Southbound from I-370 to I-495	General Purpose	38	37	41	50	47	32	51	25
		HOT/Express Toll Lane	N/A	61	58	59	59	60	61	60
PM Peak	I-495 Outer Loop from MD 5 to George Washington Memorial Parkway	General Purpose	19	46	52	52	51	49	52	50
		HOT/Express Toll Lane	N/A	62	62	62	62	61	62	62
	I-495 Inner Loop from George Washington Memorial Parkway to MD 5	General Purpose	15	26	25	29	25	38	31	37
		HOT/Express Toll Lane	N/A	62	52	55	62	47	55	55
	I-270 Northbound from I-495 to I-370	General Purpose	53	39	51	44	41	35	43	45
		HOT/Express Toll Lane	N/A	53	56	50	51	61	40	58
	I-270 Southbound from I-370 to I-495	General Purpose	50	15	27	41	18	42	21	40
		HOT/Express Toll Lane	N/A	63	60	63	63	64	N/A	N/A

Note: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

3.3.2 Delay

System-wide delay was calculated to determine the average amount of time each vehicle in the traffic simulation model was delayed while trying to reach its destination. Delay can be caused by slow travel due to congestion or vehicles yielding the right-of-way at stop-controlled or signalized intersections. **Table 3-6** shows the projected average delay per vehicle in the network under each Alternative during the 2040 AM peak period and the 2040 PM peak period.

Table 3-6: 2040 System-Wide Delay

Alternative	Average Delay (min/vehicle)		Percent Improvement vs. No Build	
	AM Peak	PM Peak	AM Peak	PM Peak
Alternative 1 (No Build)	8.8	11.8	N/A	N/A
Alternative 5[1]	7.0	9.2	20%	22%
Alternative 8	6.7	7.9	23%	33%
Alternative 9	5.8	7.9	34%	33%
Alternative 9M	6.1	8.2	30%	30%
Alternative 10	5.7	7.7	35%	34%
Alternative 13B	6.4	9.2	27%	22%
Alternative 13C	6.5	7.7	26%	34%

Note: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

The results indicated that all the Build Alternatives studied would be expected to reduce delay compared to the No Build Alternative by at least 22 percent. For this metric, Alternative 10 would perform the best, resulting in the lowest amount of delay per vehicle during the AM peak period and tied with Alternative 13C for the lowest amount of delay per vehicle during the PM peak period. When averaging the percent for the AM and PM peaks, Alternative 13B would perform the worst of the Build Alternatives.

3.3.3 Travel Time

Travel time index (TTI) was calculated for each segment of I-495 and I-270 based on the outputs from the traffic simulation model. TTI quantifies the average travel time and congestion levels during the peak periods. TTI also serves as a proxy for the Planning Time Index (PTI), which is used to estimate reliability, because there is a strong correlation between PTI and TTI. Roadways with a lower TTI have some reserve capacity to absorb the disruption caused by non-recurring congestion (and generally have a lower PTI), while roadways with high TTI values are more likely to be impacted by minor incidents (and generally have a higher PTI). **Table 3-7** shows the weighted average TTI values in the GP lanes for each Build Alternative and Alternative 5 (for comparison purposes) in the design year 2040.

Table 3-7: 2040 Travel Time Index (TTI)

Alternative	Weighted Average TTI[1] (GP Lanes)
Alternative 1 (No Build)	2.28
Alternative 5[2]	1.69
Alternative 8	1.54
Alternative 9	1.40
Alternative 9M	1.58
Alternative 10	1.36
Alternative 13B	1.46
Alternative 13C	1.44

Notes: [1] Reflects weighted average TTI on I-270 and I-495 during peak hours; [2] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

Under the No Build Alternative, the weighted average TTI along I-270 and I-495 during the peak hours is greater than 2.0, which indicates severe congestion per MDOT SHA's thresholds described in **Section 3.2**. All the Build Alternatives studied would be expected to improve the TTI in the GP lanes to below the severe congestion threshold. Additionally, the managed lanes in all of the Build Alternatives would have TTI values in the uncongested range (TTI less than 1.15). For this metric, Alternative 10 would perform the best with an average TTI of 1.36 in the GP lanes, while Alternative 9M would perform the worst of the Build Alternatives with an average TTI of 1.58 in the GP lanes. TTI values broken down by segment are provided in **Table 3-8** and have been color coded based on MDOT SHA's definition of uncongested conditions, moderate congestion, heavy congestion, and severe congestion. Additional details are presented in the *Traffic Analysis Technical Report* (**Appendix C, Section 5.6**).

Table 3-8: 2040 Travel Time Index (TTI) Results for General Purpose Lanes from VISSIM Model

Peak Period	Corridor	Alternative							
		1	5[1]	8	9	9M	10	13B	13C
AM Peak	I-495 Inner Loop from Virginia 193 to I-270	2.1	1.6	1.6	1.3	1.4	1.3	1.8	1.6
	I-495 Outer Loop from I-270 to Virginia 193	1.2	1.7	1.3	1.7	1.7	1.7	1.7	1.6
	I-495 Inner Loop from I-270 to I-95	1.0	1.5	1.2	1.3	1.5	1.2	1.2	1.2
	I-495 Outer Loop from I-95 to I-270	4.3	1.6	1.5	1.6	1.5	1.3	2.1	1.8
	I-495 Inner Loop from I-95 to MD 5	1.8	1.5	1.5	1.4	1.4	1.5	1.3	1.4
	I-495 Outer Loop from MD 5 to I-95	1.5	1.2	1.0	1.0	1.2	1.0	1.0	1.0
	I-270 Northbound from I-495 to I-370	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	I-270 Southbound from I-370 to I-495	1.5	1.5	1.4	1.1	1.2	1.7	1.1	2.2
PM Peak	I-495 Inner Loop from Virginia 193 to I-270	5.5	2.7	4.5	2.6	2.6	1.2	1.6	1.6
	I-495 Outer Loop from I-270 to Virginia 193	2.4	1.4	1.0	1.0	1.0	1.0	1.0	1.0
	I-495 Inner Loop from I-270 to I-95	5.0	3.2	2.5	2.6	3.1	2.4	2.4	2.6
	I-495 Outer Loop from I-95 to I-270	2.7	1.2	1.1	1.1	1.1	1.4	1.1	1.3
	I-495 Inner Loop from I-95 to MD 5	1.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	I-495 Outer Loop from MD 5 to I-95	2.5	1.2	1.0	1.0	1.1	1.0	1.0	1.0
	I-270 Northbound from I-495 to I-370	1.0	1.4	1.1	1.3	1.3	1.6	1.3	1.2
	I-270 Southbound from I-370 to I-495	1.1	3.7	2.0	1.3	3.1	1.3	2.6	1.4

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2] MDOT SHA defines various levels of congestion based on TTI: Uncongested (green) – TTI ≤ 1.15; Moderate Congestion (yellow) – 1.15 < TTI ≤ 1.3; Heavy Congestion (orange) – 1.3 < TTI < 2.0; Severe Congestion (red) – TTI ≥ 2. [3] This table summarizes TTI in the GP lanes. All HOT/Express Toll Lanes would have TTI values in the uncongested range (TTI less than 1.15).

3.3.4 Level of Service

Level of Service (LOS) is a letter grade assigned to a section of roadway that measures the quality of traffic flow, ranging from LOS A to LOS F. LOS A represents optimal, free-flow conditions, while LOS F represents failing conditions where demand exceeds capacity. For freeway segments, the *Highway Capacity Manual* assigns LOS grades based on density. Urban freeway segments reach failing (LOS F) conditions when the density exceeds 45 passenger cars per mile per lane (pc/mi/ln). The percentage of lane-miles projected to operate at LOS F during the peak periods in the design year of 2040 was calculated from the traffic simulation model output for each Alternative. The results are shown in **Table 3-9**.

Table 3-9: 2040 Percent of Lane-Miles Operating at LOS F

Alternative	Percent of Lane-Miles Operating at LOS F		
	AM Peak	PM Peak	Average
Alternative 1 (No Build)	28%	53%	41%
Alternative 5[1]	21%	20%	20%
Alternative 8	14%	14%	14%
Alternative 9	12%	12%	12%
Alternative 9M	15%	15%	15%
Alternative 10	15%	14%	14%
Alternative 13B	14%	12%	13%
Alternative 13C	18%	12%	15%

Note: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

The results indicated that each of the Build Alternatives is effective at reducing the number of failing segments within the study corridors, but that some LOS F segments would remain in the GP lanes on I-495 and I-270 under all Build Alternatives. For this metric, Alternative 9 would perform the best, with only 12 percent of the lane-miles projected to operate at LOS F during both the AM peak period and the PM peak period in 2040. Alternatives 9M and 13C would perform the worst of the Build Alternatives, with an average of 15 percent of the freeway lane-miles operating at LOS F during the peak periods.

3.3.5 Throughput

The metric of vehicle throughput was calculated from the traffic simulation model output to quantify how efficiently goods, services, and people could be moved through the study corridors under each Alternative. Throughput represents the number of vehicles that pass by a given point in the roadway network in a set amount of time. Four key locations were chosen for evaluating throughput during the peak periods: I-495 crossing the American Legion Bridge, I-495 west of I-95, I-495 at MD 5, and I-270 at Montrose Road. These locations cover the four main segments of the study area, separated by major freeway junctions (I-495 at I-95 and I-495 at I-270) and are therefore representative of the entire study area. **Table 3-10** summarizes the average vehicle-throughput at the four key locations for the No Build Alternative, each of the Build Alternatives, and Alternative 5 (for comparison purposes) in terms of vehicles per hour. The values include traffic traveling in both directions and account for vehicles traveling in both the GP lanes and the managed lanes.

Table 3-10: 2040 Vehicle Throughput

Alternative	Average Vehicle Throughput at Four Key Locations[1] (veh/hr)
Alternative 1 (No Build)	15,500
Alternative 5[2]	17,000
Alternative 8	18,800
Alternative 9	19,100
Alternative 9M	17,900
Alternative 10	19,700
Alternative 13B	18,300
Alternative 13C	19,300

Notes: [1] Evaluation locations include I-495 at American Legion Bridge, I-495 west of I-95, I-495 at MD 5, and I-270 at Montrose Road; [2] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

Under No Build conditions, the number of vehicles (and people) that can travel through the system during the peak period is constrained by congestion. Each of the Build Alternatives results in increased throughput compared to the No Build Alternative. This translates into increased efficiency of the roadway network in getting people, goods, and services to their destinations. Additional benefits of increased throughput on the highway include reduced peak spreading (i.e., less congestion in the off-peak hours) and reduced burden on the surrounding roadway network. For this metric, Alternative 10 would perform the best by serving an average of 19,700 vehicles/hour during the peak periods at four key locations. Alternative 9M would perform the worst of the Build Alternatives, serving 17,900 vehicles/hour.

Table 3-11 provides additional detail by showing the vehicle throughput results generated from the VISSIM outputs at each key location. Results are reported in terms of vehicles per hour and percent increase in vehicle-throughput for each Build Alternative compared to the No Build Alternative, rounded to the nearest five percent. For additional information, refer to the *Traffic Analysis Technical Report* (**Appendix C, Section 5.8**).

3.3.6 Local Network

While the focus of the Study is to provide benefits to travelers using I-495 and I-270, the proposed action would also have impacts on the surrounding local roadway network[3]. This impact was quantified by using the results of the MWCOG regional model output for each Build Alternative and Alternative 5 (for comparison purposes) to calculate the total vehicle hours of delay on all arterials in Montgomery County, Maryland; Prince George's County, Maryland; and the District of Columbia. It should be noted that other regions in Maryland and Virginia showed negligible changes in local delay as a result of the project. **Table 3-12** shows the relative change in total delay on the local network for each of the Build Alternatives compared to the No Build Alternative.

The results indicated that all of the Build Alternatives would be projected to result in a net reduction in delay on the surrounding arterials by drawing traffic off the local network, despite some localized increases in arterial traffic near the managed lane access interchanges. For this metric, Alternative 9 would perform the best with a 7.0 percent delay savings on the local roadway network compared to the No Build

[3] For the purposes of this Study, the local roadway network includes minor and principal arterials, but not roadways that are classified as expressways, freeways, or interstate.

Alternative. Alternative 9M would perform the worst of the Build Alternatives, providing less benefit to the local network compared to the other Build Alternatives (5.9 percent delay savings).

Table 3-11: 2040 Vehicle Throughput Results from VISSIM Model

Metric	Peak Period	Location	Alternative							
			1	5[1]	8	9	9M	10	13B	13C
Vehicle-Throughput (veh/hr)	AM Peak	I-495 at American Legion Bridge	17,405	20,113	22,240	22,343	21,368	22,770	21,788	22,442
		I-495 west of I-95	13,910	15,977	18,994	19,189	17,307	19,052	19,000	19,679
		I-495 at MD 5	12,606	12,789	15,640	14,002	13,630	14,145	14,525	15,258
		I-270 at Montrose Rd	17,087	17,985	20,951	18,975	18,586	21,374	18,310	19,675
	PM Peak	I-495 at American Legion Bridge	15,421	18,776	18,817	20,906	19,681	20,801	20,035	20,288
		I-495 west of I-95	15,420	19,101	21,524	21,312	19,763	21,489	20,170	21,474
		I-495 at MD 5	13,916	15,132	13,868	15,715	15,647	15,725	15,652	15,853
		I-270 at Montrose Rd	17,972	16,098	18,540	20,156	16,848	22,305	16,946	19,989
Percent Change in Vehicle-Throughput vs. 2040 No Build	AM Peak	I-495 at American Legion Bridge	N/A	15%	30%	30%	25%	30%	25%	30%
		I-495 west of I-95	N/A	15%	35%	40%	25%	35%	35%	40%
		I-495 at MD 5	N/A	0%	25%	10%	10%	10%	15%	20%
		I-270 at Montrose Rd	N/A	5%	25%	10%	10%	25%	5%	15%
	PM Peak	I-495 at American Legion Bridge	N/A	20%	20%	35%	30%	35%	30%	30%
		I-495 west of I-95	N/A	25%	40%	40%	30%	40%	30%	40%
		I-495 at MD 5	N/A	10%	< 0%	15%	10%	15%	10%	15%
		I-270 at Montrose Rd	N/A	< 0%	5%	10%	< 0%	25%	< 0%	10%

Note: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

Table 3-12: 2040 Effect on the Local Network

Alternative	Percent Reduction Local Network Delay vs. No Build[1]
Alternative 1 (No Build)	N/A
Alternative 5[2]	3.7%
Alternative 8	6.6%
Alternative 9	7.0%
Alternative 9M	5.9%
Alternative 10	6.5%
Alternative 13B	6.8%
Alternative 13C	6.4%

Notes: [1] *Based on total daily vehicle-hours of delay from 2040 MWCOG model for arterials in Montgomery County, Prince George's County, and the District of Columbia-*; [2] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

Table 3-13 provides additional detail by showing the total vehicle hours of delay and percent reduction compared to the 2040 No Build Alternative for Montgomery County, Prince George's County, and the District of Columbia individually. For additional information, refer to the *Traffic Analysis Technical Report* (**Appendix C, Section 5.9**).

Table 3-13: 2040 Local Network Results from MWCOG Model

Metric	Alternative							
	1	5[1]	8	9	9M	10	13B	13C
Daily Delay (vehicle-hours) for All Arterials in Montgomery County	247,462	241,601	233,725	231,608	234,681	233,139	233,448	234,352
Percent Reduction vs. No Build (Montgomery County)	N/A	2.4%	5.6%	6.4%	5.2%	5.8%	5.7%	5.3%
Daily Delay (vehicle-hours) for All Arterials in Prince George's County	171,265	163,660	158,725	158,606	159,709	158,831	158,798	158,505
Percent Reduction vs. No Build (Prince George's County)	N/A	4.4%	7.3%	7.4%	6.7%	7.3%	7.3%	7.5%
Daily Delay (vehicle-hours) for All Arterials in District of Columbia (DC)	178,074	169,630	165,184	164,571	167,262	165,931	163,978	165,851
Percent Reduction vs. No Build (District of Columbia)	N/A	4.7%	7.2%	7.6%	6.1%	6.8%	7.9%	6.9%
Total Daily Delay (vehicle-hours) for All Arterials in Montgomery County, Prince George's County, and District of Columbia (DC)	596,801	574,891	557,634	554,785	561,652	557,901	556,224	558,708
Percent Reduction vs. No Build (Total)	N/A	3.7%	6.6%	7.0%	5.9%	6.5%	6.8%	6.4%

Note: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

3.3.7 Summary

The following summarizes the results of the design year 2040 traffic operational evaluation for each Build Alternative and Alternative 5 presented in this section.

1. **Alternative 1 (No Build)** would not address any of the significant operational issues experienced under existing conditions, and it would not be able to accommodate long-term traffic growth, resulting in slow travel speeds, significant delays, long travel times, and an unreliable network.

2. **Alternative 5** was determined to not be a reasonable alternative, as it does not meet the Study's Purpose and Need due to deficiencies in addressing the existing traffic and long-term traffic growth and trip reliability. However, the results for Alternative 5 have been included in this DEIS for comparison purposes only. Refer to the *Alternatives Technical Report* (**Appendix B**) for more information.
3. **Alternative 8**, **Alternative 13B**, and **Alternative 13C** would all outperform the No Build Alternative in every metric. However, these alternatives would not rank first in any of the operational metrics studied and would therefore only be expected to provide moderate benefits.

4. **Alternative 9M** was not originally included as a Build Alternative, but it has been evaluated to the same level of detail as the ARDS. This alternative was studied as a blend of Alternative 5 and Alternative 9. Refer to **Chapter 2, Section 2.6.4** and the *Alternatives Technical Report* (**Appendix B**) for more information. Alternative 9M would outperform Alternative 1 in every metric, but it would not rank first in any of the operational metrics studied, similar to Alternative 8, Alternative 13B, and Alternative 13C.

5. **Alternative 9** and **Alternative 10** would consistently perform well in all the operational metrics studied, and each Alternative ranked first in three of the six key metrics. Alternative 9 would perform the best in terms of average speed, LOS, and effect on the local network. Alternative 10 would perform the best in terms of delay, travel time index, and throughput. These two alternatives would be expected to provide the best operational benefits to the I-495 and I-270 Managed Lanes Study area and the surrounding transportation network.

3.4 Next Steps

The information presented in this chapter reflects the traffic analysis conducted during the DEIS stage of the Study to establish baseline conditions and evaluate the range of Build Alternatives. As noted above, the future analysis assumed a design year of 2040 and included the original preliminary set of proposed direct access locations for the managed lanes. Several updates are anticipated as the Study progresses, and the FEIS will include the following:

- Traffic forecasts for the Preferred Alternative will be performed to reflect year 2045 conditions.
- Traffic forecasts will be updated to continue to ensure the managed lanes would maintain an average speed of at least 45 mph if any toll policy changes from the analysis assumptions in the DEIS occur from Maryland's statutory requirements for tolling.
- Traffic models for the Preferred Alternative will be updated to include the latest set of proposed direct access locations following continued coordination with stakeholders.
- Traffic models will be updated to reflect any design changes implemented as part of the ongoing efforts to avoid or minimize impacts to sensitive resources while ensuring acceptable traffic operations would be achieved in the design year.

Additionally, MDOT SHA will continue to work with FHWA to evaluate operations and safety at all interchanges and project termini as part of the Interstate Access Point Approval (IAPA) process. This evaluation will utilize the 2045 design year and will focus on the Preferred Alternative.

4 ENVIRONMENTAL RESOURCES, CONSEQUENCES & MITIGATION

This chapter presents an overview of the socio-economic, cultural, natural, and other environmental resources along the study corridors, the anticipated effects to those resources, and a preliminary assessment of measures to avoid, minimize, and mitigate unavoidable effects to those resources. Additional opportunities to avoid, minimize, and mitigate effects will be considered and documented in the Final Environmental Impact Statement (FEIS) and the commitments documented in the Record of Decision (ROD). The effects presented in the chapter are described for the No Build and Build Alternatives. As described in **Chapter 2**, Alternative 5 does not meet the Study's Purpose and Need. However, to facilitate cooperating agencies' decisions for their actions and full comparison of impacts in relation to the Build Alternatives, FHWA and MDOT SHA are providing information on Alternative 5 at the same level of other retained alternatives in the Draft Environmental Impact Statement (DEIS) for comparison purposes only.

Because the Build Alternatives would either expand and/or reconfigure existing highways, in a constrained built environment, and because the engineering requirements are similar between all Build Alternatives, the total scope of impacts is anticipated to be very similar. At this stage of design, quantified impacts presented in this chapter are assumed to be permanent or long-term effects in the DEIS (refer to **Table 4-1**). As design is advanced on a Preferred Alternative, the long-term effects will be refined, and the specific short-term, construction-related effects will be segregated and quantified and documented in the FEIS. The anticipated construction effects are discussed qualitatively throughout this chapter, in **Section 4.23** and in **Chapter 2, Section 2.7.3**.

This chapter presents summaries of existing resources, methodologies of assessment, anticipated effects, and mitigation, where there is an impact or is applicable. More detailed documentation and data is included in the Study technical reports appended to this DEIS and cross-referenced throughout this chapter.

Supporting Technical Reports to the DEIS

A. Purpose and Need Statement
B. Alternatives Technical Report
C. Traffic Technical Report
D. Environmental Resource Mapping
E. Community Effects Assessment/ Environmental Justice Technical Report
F. Draft Section 4(f) Evaluation
G. Cultural Resources Technical Report
H. Draft Section 106 Programmatic Agreement
I. Air Quality Technical Report
J. Noise Analysis Technical Report
K. Hazardous Materials Technical Report
L. Natural Resources Technical Report
M. Avoidance, Minimization & Impacts Report (AMR)
N. Draft Compensatory Mitigation Plan
O. Indirect and Cumulative Effects Technical Report
P. Public Involvement & Agency Coordination Technical Report
Q. Conceptual Mitigation Plan
R. Joint Permit Application
S. Environmental Assessment Form

In accordance with Executive Order 13807, "One Federal Decision (OFD)", the Federal lead agency and all Cooperating and Participating agencies shall "record any individual agency decision in one Record of Decision (ROD)" and prepare a single Environmental Impact Statement (EIS). Therefore, this chapter presents additional details on impacts specific to National Park Service (NPS) properties. This chapter also presents details on wetland and waterway impacts to aid in the US Army Corps of Engineers (USACE) decision making for authorization of discharges of dredged/fill material into Waters of the US under Section 404 of the Clean Water Act. Refer to **Chapter 6** for additional details on the Executive Order (EO) and other Federal agency specific impacts related to OFD.

Common terms used throughout this chapter are defined below.

- ***Study corridors***, as defined in the Study scope, includes I-495 from south of the George Washington Memorial Parkway in Fairfax County, Virginia, including the American Legion Bridge crossing over the Potomac River, to west of MD 5 in Prince George's County, Maryland; and I-270 from I-495 to I-370 in Montgomery County, including the east and west I-270 spurs north of I-495.

- ***Corridor study boundary*** was defined as 48 miles long and approximately 300 feet on either side of the centerline of I-495 and I-270. It was used to define the data collection area for gathering information on existing environmental conditions. The corridor study boundary was used in the environmental resource investigations for Natural Resources, summarized in **Sections 4.11** through **4.20** of this chapter, and parks and Section 4(f) Resources summarized in **Section 4.4** and **Chapter 5** of this document.

- ***Limits of Disturbance (LOD)*** were defined for each Build Alternative as the proposed boundary within which all construction, staging, materials storage, grading, clearing, erosion and sediment control, landscaping, drainage, stormwater management (SWM), noise barrier replacement/construction, and related construction activities would occur (refer to **Chapter 2, Section 2.7.4**).

- ***Community Effects Assessment (CEA) Analysis*** was delineated to include all 2010 Census block groups that are located within one-quarter mile to either side of the study corridors and is applicable to **Sections 4.1** through **4.5**. The one-quarter mile boundary was established to include areas that would potentially be subject to direct impacts, to capture the data for all Census block groups, and provides a conservative spatial approximation of the neighborhoods surrounding the study corridors. The demographic data from these same Census block groups was used to identify minority and low-income populations to define the ***Environmental Justice Analysis Area*** and is applicable to **Section 4.21** of this chapter.

- ***Area of Potential Effects (APE)*** for Section 106 was generally defined as an additional 250 feet on either side of the corridor study boundary (550 feet in total from the centerline) to capture anticipated visual, atmospheric, or audible effects to identified historic properties. The APE continues to be refined through the ongoing Section 106 consultation process and is described in **Section 4.7.1** of this chapter.

- ***Air Quality Analysis Study Area*** was defined as Montgomery County, Prince George's County, and Fairfax County and is described in **Section 4.8** of this chapter.

- ***Hazardous Materials Investigation Area*** was defined as a one-quarter mile buffer area surrounding the widest LODs for I-495 (Alternatives 8, 9, 10, 13B and 13C) and I-270 (Alternative 13C) Build Alternatives and is described in **Section 4.10** of this chapter.

Table 4-1: Summary of Quantifiable Impacts by Alternative

Resource	Alt 1 No Build	Alt 5[1]	Alt 8	Alt 9	Alt 9M	Alt 10	Alt 13B	Alt 13C	Section Reference in Chapter 4
Change in Land Use (acres)	0	330.5	373.9	373.9	362.4	388.5	368.3	379.4	Section 4.1
Total Potential Impacts to park properties (acres)	0	128.5	133.1	133.1	130.4	134.8	131	131.9	Section 4.4
Total Right-of-way Required[2] (acres)	0	284.9	323.5	323.5	313.4	337.3	318.9	329.3	Section 4.5
Number of Properties Directly Affected	0	1,240	1,475	1,475	1,392	1,518	1,447	1,479	Section 4.5
Number of Residential Relocations	0	25	34	34	25	34	34	34	Section 4.5
Number of Business Relocations	0	4	4	4	4	4	4	4	Section 4.5
Number of Historic Properties with Adverse Effect[3] [Adverse effect cannot be determined[4]]	0	13[7]	13[7]	13[7]	13[7]	13[7]	13[7]	13[7]	Section 4.7
Noise Receptors Impacted (count)	0	3,661	4,470	4,470	4,249	4,581	4,411	4,461	Section 4.9
Hazardous Materials Sites of Concern (count)	0	501	501	501	501	501	501	501	Section 4.10
Wetlands of Special State Concern	0	0	0	0	0	0	0	0	Section 4.12
Wetlands Field-Verified (acres)	0	15.4	16.3	16.3	16.1	16.5	16.3	16.5	Section 4.12
Wetland 25-foot buffer (acres)	0	51.2	53.1	53.1	52.7	53.6	53.1	53.5	Section 4.12
Waters of the US (linear feet)	0	153,702	155,922	155,922	155,229	156,984	155,822	156,632	Section 4.12
Tier II Catchments (acres)	0	55.2	55.3	55.3	55.3	55.3	55.3	55.3	Section 4.13
100-Year Floodplain (acres)	0	114.3	119.5	119.5	116.5	120.0	119.5	119.9	Section 4.15
Forest canopy (acres)	0	1,434	1,497	1,497	1,477	1,515	1,489	1,503	Section 4.16
Sensitive Species Project Review Area (acres)	0	151.7	155.0	155.0	153.7	155.0	155.0	155.0	Section 4.19
Unique and Sensitive Areas (acres)	0	395.3	408.2	408.2	401.8	410.8	406.7	408.6	Section 4.20

Notes:

[1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.
[2] The right-of-way is based on State records research and filled in with county right-of-way, as necessary.
[3] Refer to Chapter 4, Section 4.7 and Appendix G, Volume 1 for additional details on the effects to historic properties.
[4] Based on current design information, effects cannot be fully determined on these seven historic properties. MDOT SHA will evaluate these properties further as design advances.
[5] Noise receptors are noise-sensitive land uses which include residences, schools, places of worship, and parks, among other uses. Note that these numbers include receptors that do not have an existing noise wall as well as receptors that have an existing noise wall which is expected to be replaced.

4.1 Land Use and Zoning

4.1.1 Introduction and Methodology

Land use patterns and development goals are identified in long-term comprehensive plans that are implemented through zoning codes and maps adopted by local governments. Zoning codes regulate the type and density of development that occurs within delineated land area. Within the CEA Analysis Area, existing land use conditions were identified through review of zoning designations because these data are consistently updated by municipalities (**Figure 4-1**). Other information, such as the land use data provided by the Maryland Department of Planning is valuable, but not as current (most recent reports date from 2010). For land use in Virginia, Fairfax County maintains current land use data (Fairfax, 2018). For details of the land use, zoning, and development patterns reviewed for the Study, refer to the *Community Effects Assessment and Environmental Justice Analysis Technical Report*, **Appendix E, Section 3.1**.

4.1.2 Affected Environment

Existing land use in the CEA Analysis Area is summarized into the following categories and shown in **Figure 4-1**.

- **Commercial/Employment:** includes, but is not limited to: retail, service, convenience, and lodging establishments; professional and medical offices; civic, cultural, and institutional establishments; public and private education and childcare facilities; public uses; places of worship; and indoor entertainment.
- **Industrial:** includes but is not limited to: office and research parks; employment uses requiring larger tracts of land; production, manufacturing, assembly, and processing establishments; hospitals; retail and wholesale; automobile services; and laundry services, warehouse, storage, and distribution.
- **Mixed-Use:** includes a mix of commercial/employment and residential uses.
- **Park/Open Space:** includes local, state, regional, and Federal parks and recreational areas, including, but not limited to: stream valley parks, railroad trails, community centers, parkways, and National Historic Parks; smaller tracts of public and private undeveloped open space interspersed among developed areas; and agricultural lands.
- **Planned Unit/Planned Community:** includes land reserved for future development, primarily for residential communities.
- **Residential:** includes detached single-family dwelling units and duplex dwelling units, attached single-family row housing; garden apartments; high-rise apartments/condominiums; mobile homes; and trailer parks; plus, yards and associated areas.
- **Transportation:** includes right-of-way reserved for road, rail, bicycle, pedestrian, and transit facilities, as well as supporting transportation infrastructure, such as park-and-ride facilities, maintenance areas, distribution warehouses, and open/forested areas adjacent to roadways.

Most of the CEA Analysis Area have been planned and built out based in large part on the presence of the existing I-495 and I-270 corridors. Existing data reflect a highly-developed system of land uses in the CEA Analysis Area. Specifically, 65 percent of the CEA Analysis Area has been built out for either residential, industrial, mixed, commercial/employment, or planned community uses. Much of the area reflects dense land use patterns with little potential for additional development based on the lack of available space or on existing land use restrictions, including preserved parklands and open space. The relative composition of land use in the CEA Analysis Area is shown in **Figure 4-2**.

Figure 4-1: Land Use within the CEA Analysis Area

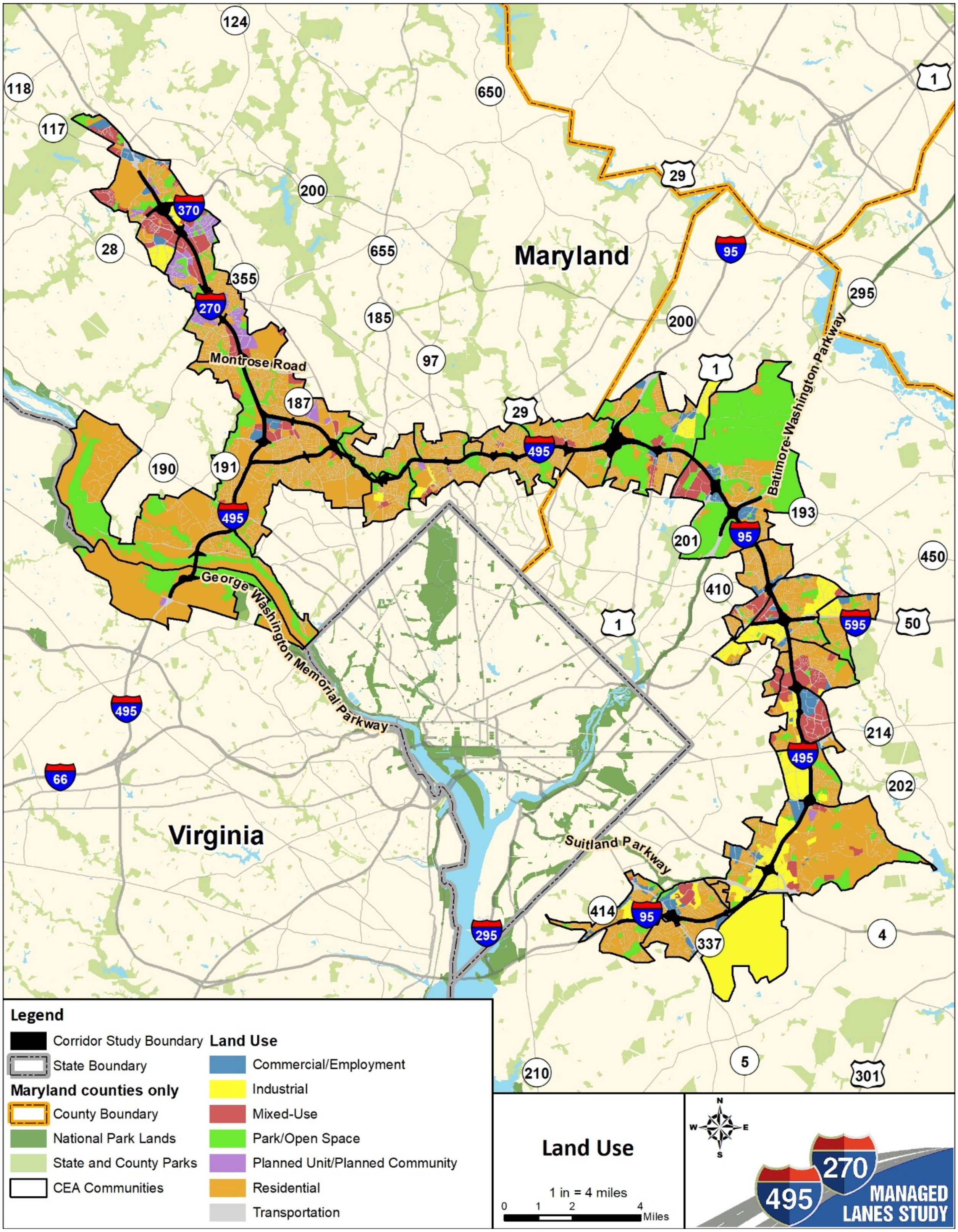
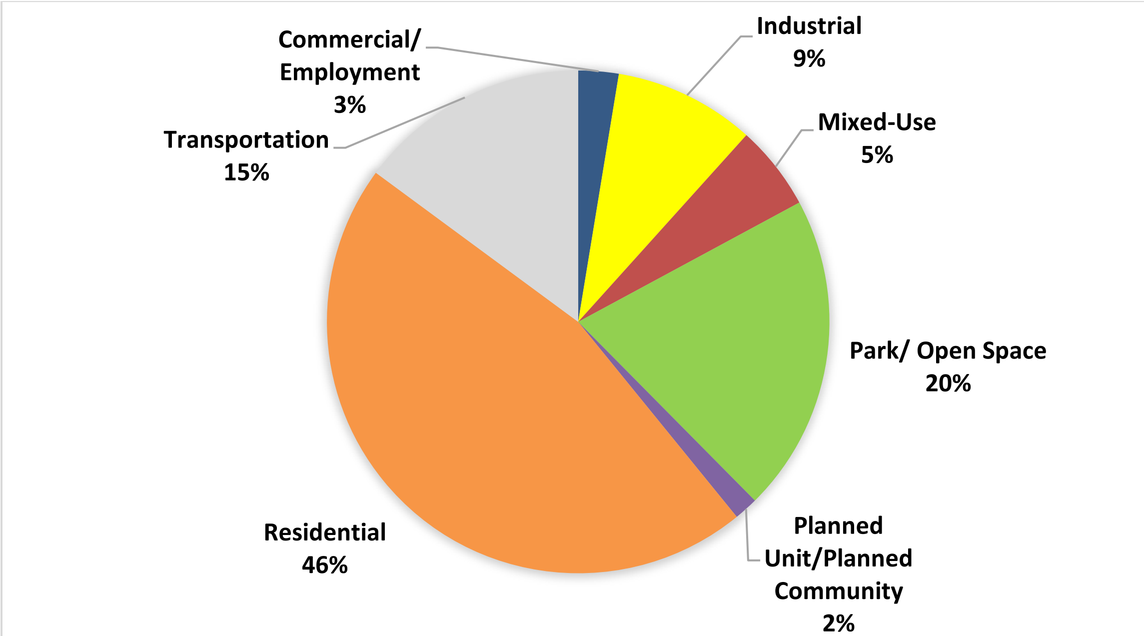


Figure 4-2: CEA Analysis Area Land Use Composition



Source: City of Gaithersburg Geographic Information System (GIS) web map (https://maps.gaithersburgmd.gov/gallery/); City of Rockville GIS Open Data (http://data-rockvillemd.opendata.arcgis.com/); Montgomery County/MNCPPC MCATLAS (http://www.mcatlas.org/viewer/); Prince George's County Open Data Portal (http://gisdata.pgplanning.org/metadata/); Fairfax County Open Geospatial Data (https://www.fairfaxcounty.gov/maps/open-geospatial-data).

The CEA Analysis Area is located almost entirely within the boundary of an urbanized area, as classified by the 2010 Census urban area-based reference map; as such, the CEA Analysis Areas is not subject to protection under the Farmland Protection Policy Act (FPPA) (7CFR 658.2).

Maryland's *Smart Growth Priority Funding Areas Act of 1997* (Smart Growth Act) directs Maryland state infrastructure funds to areas within or connecting with county-designated and state-certified Priority Funding Areas (PFAs). The Maryland portion of the CEA Analysis Area is located almost entirely within a PFA; small portions of the CEA Analysis Area in Potomac and Westphalia, plus the Beltsville Agricultural Research Center campus in Beltsville, fall outside of a PFA. As the proposed Study improvements would expand existing major regional corridors around which PFAs are designated, improvements within the CEA Analysis Area would be consistent with Maryland's *Smart Growth Priority Funding Areas Act of 1997*. Additional detail on the FPPA and Priority Funding Areas is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 3.1**).

Planning and development goals within CEA Analysis Area Communities (defined in **Section 4.3.2** of this chapter) are guided by a variety of comprehensive, master, and sector plans. A review of relevant plans that overlap portions of the CEA Analysis Area was conducted and is detailed in **Appendix E, Section 3.1**. Generally, each of these plans set goals that include enhancing transportation efficiency by promoting the use of major highways and arterial networks to limit traffic impacts on local and neighborhood streets. The following Comprehensive, Master Plans (MP) or Sectional Map Amendments (SMA) noted specific references to HOV or toll facilities on I-495 or I-270:

- Fairfax County Comprehensive Plan, 2017 Edition (Area II McLean Planning District (Amended February 20, 2018))
- Capital Beltway HOV Lane Project and Interchange at the Intersection of Randolph Road and Veirs Mill Road (Amendment to the MP of Highways in Montgomery County, 2004)
- Guiding the Future of the MD 355/I-270 Corridor (Montgomery County, 2008)
- City of Gaithersburg MP (2009 and 2018) (currently being updated)
- Technical Update to the MP of Highways and Transitways (Montgomery County, 2018)
- Bladensburg-New Carrollton and Vicinity Technical Bulletin: Transportation (Prince George's County, 1994)
- The Heights and Vicinity MP and SMA (Prince George's County, 2000)
- Henson Creek-South Potomac MP and SMA (Prince George's County, 2006)
- Glenn Dale, Seabrook, Lanham and Vicinity MP and SMA (Prince George's County, 2010)
- Metropolitan Washington Council of Governments FY 2019-2024 Transportation Improvement Program (2018)

4.1.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact land use. Because the No Build Alternative would not provide HOV or toll facilities on I-495 or I-270, it would not be consistent with Comprehensive, Master, or Sector Plans, listed above, that call for HOV or toll facilities on I-495 or I-270.

The Build Alternatives would result in the conversion of existing land uses to right-of-way for transportation use across each of the seven land use types, including the alteration of transportation right-of-way from non-highway facilities (e.g., railway, county right-of-way, etc.) outside of the I-495 and I-270 highway footprint (**Table 4-2**).

Table 4-2: Land Use Conversion of the Build Alternatives Within the CEA Analysis Area

Land Use		Alt 5[1]	Alts 8 and 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Transportation[3]	(acres)	49.2	53.5	52.3	54.3	52.7	53.4
	(% of land use type)	0.4%	0.5%	0.4%	0.5%	0.4%	0.5%
Residential	(acres)	136.1	157.8	150.2	164.7	156.2	160.9
	(% of land use type)	0.4%	0.4%	0.4%	0. 5%	0.4%	0.4%
Planned Unit/ Planned Community	(acres)	11.3	11.9	11.8	12.6	11.5	12.1
	(% of land use type)	0.9 %	1.0%	1.0%	1.0%	0.9%	1.0%
Park/Open Space	(acres)	53.9	59.0	56.6	60.8	57.7	58.7
	(% of land use type)	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%
Mixed-Use	(acres)	38.2	43.2	43.1	47.2	41.9	45.7
	(% of land use type)	0.9%	1.0%	1.0%	1.1%	1.0%	1.1%
Industrial	(acres)	27.0	31.6	31.6	31.6	31.6	31.6
	(% of land use type)	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Commercial/ Employment	(acres)	14.8	16.9	16.8	17.3	16.7	17.0
	(% of land use type)	0.7%	0.8%	0.8%	0.8%	0.8%	0.8%
TOTAL CHANGE IN LAND USE (ACRES)		**330.5**	**373.9**	**362.4**	**388.5**	**368.3**	**379.4**

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2]Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.[3]Transportation Zoning/ Land Use Designation totals refer to transportation right-of-way outside of the existing I-495 & I-270 highway footprint.

As shown in **Table 4-2**, the impacts to existing land use differ slightly under each Build Alternative, with Alternative 9M having the least impact to land use and Alternative 10 having the greatest impact to land use. The most common land use conversion between the Build Alternatives would be from residential land use to transportation right-of-way, which would impact between 150.2 and 164.7 acres, or 0.4 to 0.5 percent of the total residential lands within the CEA Analysis Area. The second most common land use conversion would be from park and open space land use to transportation right-of-way, which would be between 56.6 and 60.8 acres, or 0.4 percent of the total park and open space within the CEA Analysis Area.

With the exception of 29 to 38 full property acquisitions (depending on the Build Alternative; refer to **Section 4.5** for details on the property acquisitions and relocations), the land use conversions under the Build Alternatives would primarily consist of partial property acquisitions, which are mostly strips of land from undeveloped areas or areas of landscaping and trees along the existing I-495 and I-270 transportation corridors. The proposed expansion of existing interstates under all of the Build Alternatives would not be expected to result in a substantial land use change to the surrounding urbanized area within the CEA Analysis Area. As shown in **Table 4-2**, one percent or less of each land use type would be impacted by the Build Alternatives. The extent, pace, and location of development within the CEA Analysis Area would be influenced and controlled by the respective county land development policies and plans. The proposed improvements would accommodate future planned growth within the CEA Analysis Area; however, future growth is not dependent on these improvements. I-495 and I-270 would remain access-controlled under the Build Alternatives. Additional analysis on the extent, pace, and location of development along the study corridors is provided in **Section 4.22** of this chapter.

4.2 Demographics

4.2.1 Introduction and Methodology

The CEA Analysis Area included all 2010 Census block groups within one-quarter mile of the corridor study boundary in portions of Fairfax County, Virginia and Montgomery and Prince George's Counties in Maryland. The population and demographic data available from the US Census, 2012-2019 American Community Survey (ACS) Five-Year Estimates,[1] was reviewed for each CEA Analysis Area Census block group for comparison alongside state and county data. These Census block groups were then matched with the municipality or Census Designated Place (CDP) in which they were primarily located to define individual CEA Analysis Area Communities. The CEA Analysis Area is composed of 199 block groups sorted into 36 CEA Analysis Area Communities. Existing conditions data for environmental resources was sourced from the following:

- Geographic Information Systems (GIS) data from Fairfax, Montgomery, and Prince George's Counties;
- Comprehensive, master, sector, transportation and related planning publications, as well as zoning ordinances for Fairfax, Montgomery, and Prince George's Counties;

[1] 2012-2019 American Community Survey (ACS) Five-Year Estimates represents the most current data when the CEA and EJ Analysis was drafted. ACS updates have been made available; however, significant changes in populations trends have not occurred based on a cursory review. Future analysis on the Preferred Alternative will consider updated US Census and ACS Estimates.

- Pipeline of Approved Development Projects from Fairfax, Montgomery, and Prince George's Counties;
- Maryland Department of Commerce;
- US Census 2010 and 2012-2016 American Community Survey (ACS) Five-Year Estimates[2];
- US Census Longitudinal Employer-Household Dynamics data (2015);
- Google Earth and Google Maps- Street View; and
- Field reconnaissance where data gaps are identified.

The CEA Analysis Area population is further described by demographic data to include: age, sex, households with disabilities, race, ethnicity, national origin, and household income distribution using data from the US Census, ACS Five-Year Estimates, 2012-2016. Like the population overview, demographic data is presented for comparison with state and county existing conditions.

4.2.2 Affected Environment

The CEA Analysis Area is in the Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Statistical Area. The existing demographic patterns are summarized below. For details of the demographic patterns reviewed for the Study, refer to the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 3.2**).

- **Population:** The total population of the CEA Analysis Area is 320,162 people. Of this total, 54 percent reside in Montgomery County, 44 percent reside in Prince George's County, and two percent reside in Fairfax County. The Gaithersburg, North Bethesda, Rockville, and Greenbelt CEA Analysis Area Communities have the largest shares of populations in the CEA Analysis Area at eight to nine percent, each. The Kemp Mill, Landover Hills, and Morningside CEA Analysis Area Communities contain the smallest shares of the CEA Analysis Area total residents, with each at less than one percent. Population projections are calculated at the county level; between 2010 and 2040, the population of Montgomery County is expected to grow by 23 percent, while the population of Prince George's County is expected to grow by 14 percent.[3] In Fairfax County, Virginia the population growth is expected to grow by 25 percent.
- **Age and Sex Characteristics**: Across its 199 block groups, the CEA Analysis Area population has an average median age of 41; specifically, the average median age for male individuals is 39 and for female individuals is 42. The CEA Analysis Area population's age characteristics are similar to that of Montgomery County (median age of 39), Prince George's County (median age of 36), Fairfax County (median age of 38), and Maryland (median age of 38).
- **Disability:** 18 percent of the 116,259 households in the CEA Analysis Area include one or more persons with a disability. This percentage is similar to those for Montgomery County (17 percent) and Prince George's County (20 percent); it is slightly less than that of Maryland (22 percent) and slightly more than that of Fairfax County (15 percent).

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[2] 2012-2019 American Community Survey (ACS) Five-Year Estimates represents the most current data when the CEA and EJ Analysis was drafted. ACS updates have been made available; however, significant changes in populations trends have not occurred based on a cursory review. Future analysis on the Preferred Alternative will consider updated US Census and ACS Estimates.

[3] Maryland Department of Planning, "Historical and Projected Total Population for Maryland's Jurisdictions," August 2017.

- **Economy and Employment:** 93 percent of the CEA Analysis Area labor force is employed. A combined 40 percent of CEA Analysis Area residents are employed in management, business, financial, sales, and administrative occupations. Economic activity associated with the Study would produce future tax revenue. Local property tax revenues are also expected to grow as the strengthened economy supports higher assessed property value for homeowners and for business that improve and build new structures. For additional information on existing economic and employment conditions, refer to the *Community Effects Assessment and Environmental Justice Analysis Technical Report* **(Appendix E, Section 3.3).** For additional information on economic and employment projections, refer to **Section 4.22** of this chapter and the *Indirect and Cumulative Effects Technical Report* **(Appendix O, Section 3).**
- **Household Income:** 17 percent of CEA Analysis Area households, the largest portion of the CEA Analysis Area households earned $200,000 or more in annual income, followed by 13 percent of households who earned $75,000 to $99,999 in annual income. The smallest proportion of the CEA Analysis Area households, seven percent, earned $19,999 or less in annual income. The analysis of low-income populations within the CEA Analysis Area is detailed in **Section 4.22** of this chapter.
- **Race and Ethnicity Characteristics:** 34 percent (1/3) of the CEA Analysis Area population identified as Black or African American alone, and slightly more than one-third (37 percent) identified as White alone. Sixteen percent of the population identified as Hispanic or Latino of any race, while ten percent identified as Asian alone. Three percent of the population identified as either some other race alone or more than one race. Less than one percent of the CEA Analysis Area population identified as American Indian and Alaska Native alone (597 persons) or Native Hawaiian and other Pacific Islander alone (29 persons). The analysis of minority populations within the CEA Analysis Area is detailed in **Section 4.21** of this chapter.

4.2.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact population or demographics within the CEA Analysis Area. However, regardless of improvements within the corridor study boundary, the regional population is projected to experience significant growth over the 30-year period between 2010 and 2040 (refer to **Section 4.22.2** for additional information on regional population, housing and employment growth projections). It is anticipated that the Build Alternatives would have negligible impact on the general population or demographics within the CEA Analysis Area, with little differentiation in impacts among the Build Alternatives.

Potential residential relocations (and number of residents) resulting from implementation of any of the Build Alternatives would be a small proportion of the overall CEA Analysis Area population and, therefore, impacts to population or demographics would be minimal. As described in **Section 4.5** of this chapter, any permanent relocations would be in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended, 1987) and related MDOT SHA property acquisition guidance, with the first goal of relocation within the same community.

By providing additional roadway capacity through managed lanes, the Build Alternatives, to varying degrees, would accommodate increased traffic and congestion attributed to the projected regional population growth over the 30-year period between 2010 and 2040. The maintained function of I-495 and I-270, access to travel choices, and enhanced trip reliability would maintain the area's desirability for future economic activity. While the Build Alternatives would have a negligible impact to population growth or general demographics within the CEA Analysis Area, they would be viewed as consistent with approved master plans and population growth projections associated with those plans.

4.3 Communities & Community Facilities

4.3.1 Introduction and Methodology

The CEA Analysis Area included all 2010 Census block groups within a one-quarter mile of the corridor study boundary. Census block groups were then matched with the municipality or Census Designated Place (CDP) in which they were primarily located to define individual CEA Analysis Area Communities. A community profile for each of the of the 36 CEA Analysis Area Communities was developed and includes: an overview of community location; planning and development; community facilities; and minority/race populations and low-income populations, if present. Impacts, including impacted community facilities and services, among others, are quantified for each of the CEA Analysis Area Communities. For specific details of the communities and community facilities identified for the Study, refer to the *Appendix C* of the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E**).

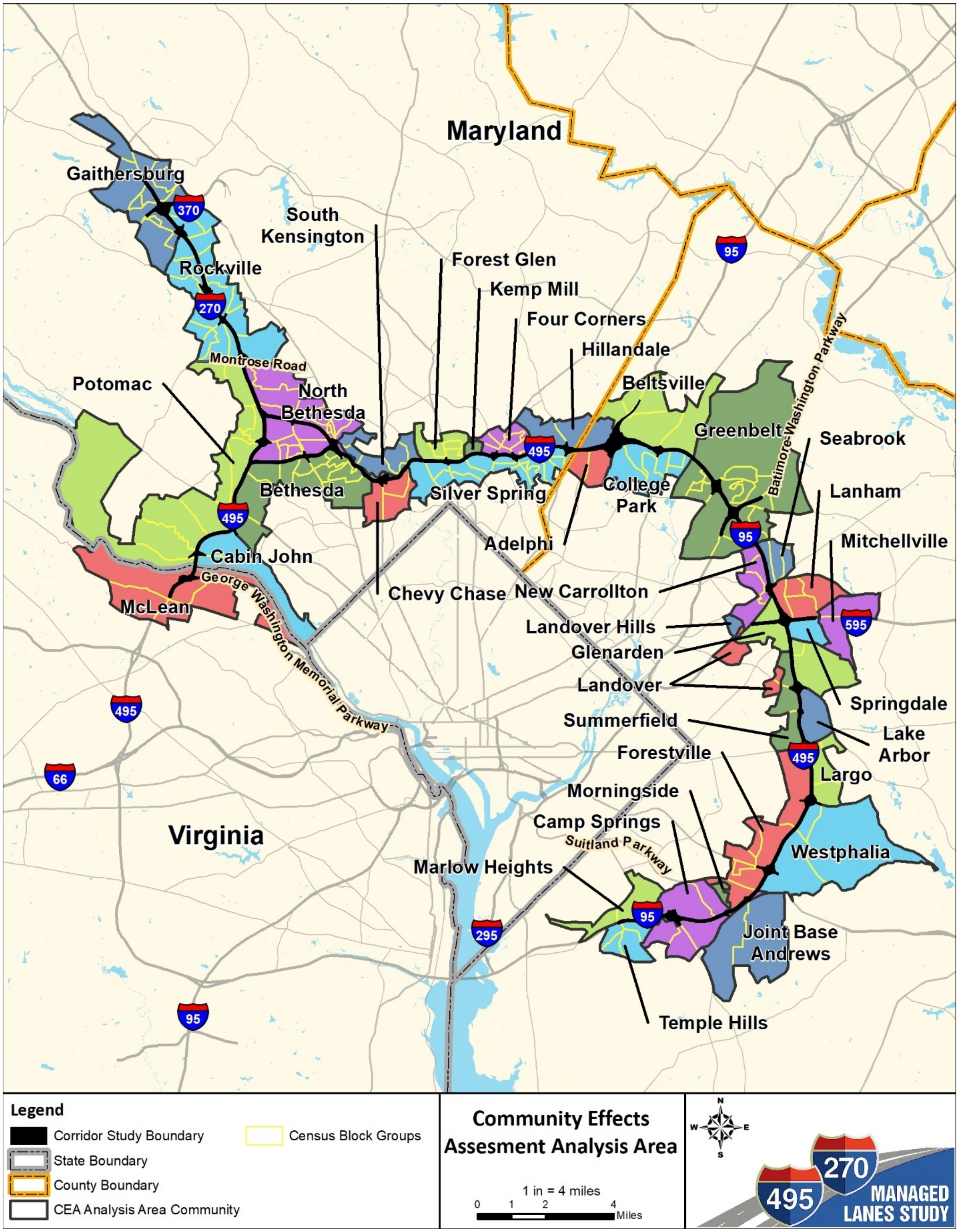
4.3.2 Affected Environment

A. Communities

Figure 4-3 highlights each of the CEA Analysis Area Communities within the CEA Analysis Area. In total, 199 CEA Analysis Area block groups composed of 36 CEA Analysis Area Communities make up the CEA Analysis Area. The CEA Analysis Area Communities include the following, listed from west to east along the study corridors:

- McLean
- Potomac
- Cabin John
- Bethesda
- North Bethesda
- South Kensington
- Chevy Chase
- Forest Glen
- Silver Spring
- Kemp Mill
- Four Corners
- Hillandale
- Gaithersburg
- Rockville
- Adelphi
- Beltsville
- College Park
- Greenbelt
- Seabrook
- New Carrollton
- Landover Hills
- Lanham
- Springdale
- Glenarden
- Mitchellville
- Summerfield
- Landover
- Lake Arbor
- Largo
- Forestville
- Westphalia
- Morningside
- Joint Base Andrews
- Camp Springs
- Marlow Heights
- Temple Hill

Figure 4-3: CEA Analysis Area Communities



To enhance public accessibility to the CEA data, a community profile for each of the 36 CEA Analysis Area Communities was prepared and is provided in *Appendix C* of the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E**). Each community profile includes two maps: Map 1 depicts the CEA Analysis Area Community boundary, as defined in this technical report and Map 2 shows the community facilities within the CEA Analysis Area. Each community profile also summarizes demographic data for the population of the community including minority race/ethnicity populations and low-income populations and a qualitative description of the community aesthetics and community character.

B. Community Facilities

An overview of the types of community facilities identified in the CEA Analysis Area is provided below along with the number of each type of facility (as applicable). Additional information on community facilities is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report*, (**Appendix E, Section 3.5**).

- **Educational Facilities** – 136 pre-kindergarten, primary, and secondary schools and four higher education facilities, as well as several higher education extension centers.
- **Places of Worship/Cemeteries** – 207 places of worship and 15 cemeteries[4]; additional religious facilities of note within the CEA Analysis Area include a series of eruvim, comprised of community-maintained boundary markers that encompass a designated area where Orthodox Jews can perform small tasks out-of-doors on the Sabbath without violating religious law.
- **Health Care Facilities** – 122 long-term care facilities in addition to three hospitals/medical centers and the National Institutes of Health (NIH) main campus.
- **Parks and Recreation areas** – 237 publicly-owned parks and recreation areas, in addition to 18 community recreation centers, including four community pools.
- **Emergency Facilities** – 17 fire stations, nine state and county police stations, various municipality departments, and the Montgomery County Detention Center.
- **Transportation** – four Park & Ride facilities; three MARC lines and five Metrorail lines; eight MARC and Metrorail Stations; one county bus-based rapid transit system; local bus services to include fixed-route and paratransit; one airport; two Heliports; and seven CSX and six Amtrak rail lines. Local bike transportation is also available via a network of interconnected bike lanes, paved and natural surface trails, sharrows, and on-road routes.
- **Public Utilities** – various public water, sewer, electricity, natural gas, phone, and cable services.
- **Other, including libraries and post offices** – seven public library branches, 19 post office locations, and three courthouses.

[4] In addition to the 15 cemeteries, preliminary archeological research has identified two potentially historic cemeteries whose sites are located within the Build Alternatives' limits of disturbance: the Moses Hall Cemetery (Cabin John CEA Analysis Area) and the Montgomery County Poor Farm Cemetery (Rockville CEA Analysis Area). Further archaeological investigations will be included in development of the Programmatic Agreement; additional information is provided in the Cultural Resources Technical Report, Volume 4 (Appendix G). MDOT SHA will work to avoid and minimize impacts and will coordinate with affected communities on treatment of human remains should avoidance not be possible.

4.3.3 Environmental Consequences

A. CEA Analysis Area Communities

The No Build Alternative would not result in any study-related construction and therefore would not directly impact communities or community facilities within the CEA Analysis Area. However, under the No Build condition, traffic congestion is anticipated to increase within the CEA Analysis Area, which would result in increased travel times along the study corridors. The No Build Alternative would result in increased response times for emergency services and travel times to other community facilities, especially during peak travel periods. Additionally, the No Build Alternative would not draw traffic off the local network and would not result in reduced delay on the surrounding local roadways thereby not improving access to facilities through less congestion or improving emergency response times along local roadways.

The community profiles featured in *Appendix C* of the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E**) identify the potential impacts from the Build Alternatives specific to each CEA Analysis Area Community, including: the number of potential property relocations, the number and type of community facilities impacted, changes to land use, potential noise abatement, viewshed alterations, and changes to community cohesion. **Table 4-3** highlights the presence of physical impacts in each CEA Analysis Area Community and directs the reader to where additional information can be found in **Appendix E**.

Table 4-3: Overview of Potential Impacts by CEA Analysis Area Community as Summarized from the Community Profiles

CEA Analysis Area Community	Acreage Range of Property Acquisitions[1]	Number of Full Residential and Business Property Acquisitions (Relocations)[1]	Is Noise Abatement Considered Feasible & Reasonable?[2]	Location in Appendix C of the of the CEA & EJ Technical Report (Appendix E)
Fairfax County, Virginia				
McLean	14.4	0	Abatement for the portion of the study area within Virginia is being evaluated in coordination with VDOT and in compliance with the VDOT Highway Traffic Noise Impact Analysis Guidance Manual. The results of this evaluation will be included in the FEIS.	pgs. 1 - 2
Montgomery County, Maryland				
Potomac	27.4 - 31.5	0	Yes	pgs. 3 - 4
Cabin John	15.7	0	Yes	pgs. 5 - 6
Bethesda	15.1 - 17.7	0	Yes	pgs. 7 - 8
North Bethesda	34.8 - 42.3	0	Yes	pgs. 9 - 10
South Kensington	4.8	1	Yes	pgs. 11 - 12
Chevy Chase	0.2 - 0.3	0	Yes	pgs. 13 - 14
Forest Glen	5.7 - 6.9	15 or 20	Yes	pgs. 15 - 16
Silver Spring	20.6 - 24.0	10 or 14	Yes	pgs. 17 - 18
Kemp Mill	0.6 - 1.0	0	Yes	pgs. 19 - 20
Four Corners	3.5 - 4.4	2	Yes	pgs. 21 - 22
Hillandale[4]	3.3 - 4.0	0	Yes	pgs. 23 - 24
Prince George's County, Maryland				
Adelphi	7.4 - 7.6	0	Yes	pgs. 25 - 26

CEA Analysis Area Community	Acreage Range of Property Acquisitions[1]	Number of Full Residential and Business Property Acquisitions (Relocations)[1]	Is Noise Abatement Considered Feasible & Reasonable?[2]	Location in Appendix C of the of the CEA & EJ Technical Report (Appendix E)
Beltsville	6.4	0	Yes	pgs. 27 - 28
College Park	16.4	0	Yes	pgs. 29 - 30
Greenbelt	31.5	0	Yes	pgs. 31 - 32
Seabrook	4.6	0	Yes	pgs. 33 - 34
New Carrollton	5.3	0	Yes	pgs. 35 - 36
Landover Hills	0.0	0	No	pgs. 37 - 38
Lanham	2.2	0	Yes	pgs. 39 - 40
Springdale	4.0	0	Yes	pgs. 41 - 42
Glenarden	16.4	1	Yes	pgs. 43 - 44
Mitchellville	0.0	0	No	pgs. 45 - 46
Summerfield	10.8	0	Yes	pgs. 47 - 48
Landover	0.0	0	No	pgs. 49 - 50
Lake Arbor	4.6	0	No	pgs. 51 - 52
Largo	3.4	0	Yes	pgs. 53 - 54
Forestville	21.5	0	Yes	pgs. 55 - 56
Westphalia	16.2	0	No	pgs. 57 - 58
Morningside	0.0	0	No	pgs. 59 - 60
Joint Base Andrews	0.0	0	No	pgs. 61 - 62
Camp Springs	19.1	0	Yes	pgs. 63 - 64
Marlow Heights	1.3	0	No	pgs. 65 - 66
Temple Hills	1.6	0	Other[3]	pgs. 67 - 68
Gaithersburg	4.5 - 5.9	0	Other[3]	pgs. 69 - 70
Rockville	35.3 - 42.4	0	Yes	pgs. 71 - 72

Notes: [1] Identifies the potential impacts under Alternatives 8, 9, 9M, 10, 13B, and 13C.

[2] Where noise abatement was warranted for consideration, additional criteria were examined to determine if the abatement is feasible and reasonable. The assessment of noise abatement feasibility, in general, focuses on whether it is physically possible to build an abatement measure (i.e., noise barrier) that achieves a minimally acceptable level of noise reduction. Detail is provided in Section 4.9.

[3] CEA Analysis Area Community contains existing barrier system(s) that would be considered effective in its existing condition.

[4] The Hillendale CEA Analysis Community falls within both Montgomery and Prince George's Counties

Property acquisitions for transportation right-of-way under the Build Alternatives would generally occur to properties adjacent to the existing I-495 and I-270 roadway alignments, acquiring strips of land from undeveloped areas or areas of trees and landscaping directly adjacent to I-495 or I-270; additional information is provided in **Section 4.5** and **Table 4-6** and **Table 4-7** of this chapter. The construction of a Build Alternative would include: managed lanes, shoulders, traffic barriers, cut and fill slopes, SWM facilities, retaining walls, and noise walls along the existing highway corridor. Construction of a Build Alternative would also require relocation of signage, guardrails, communications towers, and light poles due to the widening of the roadway. Similarly, where noise barriers already exist, they would be replaced; additional noise barriers may be constructed as detailed in **Section 4.9** of this chapter.

Full property acquisitions (relocations) would occur under the Build Alternatives as shown in **Table 4-4**. Additional detail is provided in *of the Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 3.6**).

Table 4-4: Property Relocations

	Residential Relocations[1] (# of properties)	Business/Other Relocations (# of properties)	CEA Analysis Area Communities Where Relocations Would Occur
Alt. 5[2]	25	4	Forest Glen CEAAA Community Four Corners CEAAA Community Glenarden CEAAA Community Silver Spring CEAAA Community South Kensington CEAAA Community
Alts. 8 and 9	34	4	
Alt. 9M	25	4	
Alt. 10	34	4	
Alt. 13B	34	4	
Alt. 13C	34	4	

Note: [1]Property owners affected by relocation would receive relocation assistance in accordance with The Federal Uniform Relocation and Real Estate Acquisition Policies Act of 1970 and amended by the Surface Transportation and Uniform Relocation Assistance Act of 1987 (The Uniform Act). [2] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

Impacts by full property acquisition (relocation) or partial property acquisition would be limited to the individuals immediately affected by the property acquisition and would occur in areas bordering the existing highway rights-of-way. Divisions or isolation of properties, persons, or groups would not occur due to the generally parallel nature of the LODs of the Build Alternatives along the study corridors. Additionally, direct access is proposed via at-grade auxiliary lanes within the roadway or new ramps at existing interchanges or overpasses along the study corridors; as such, divisions or isolation of properties would not occur due to the addition of new direct access. The proposed direct access locations are identified in **Chapter 2, Section 2.7.1**. Additional information on property impacts and relocations is provided in **Section 4.5** of this chapter.

Construction would require the removal of vegetation to varying degrees from strips of land adjacent to the study corridors. As a result of the vegetation removal, the wider interstates, added direct access at-grade auxiliary lanes or ramps, retaining walls, and noise barriers would become more visible and prominent. The views from adjacent properties, including residential properties, commercial enterprises, parkland/ open space properties, and a number of community resources would experience an impact; however, impacts would generally be consistent with existing views of the study corridors as the surrounding area is adjacent to the existing interstate facilities and the surrounding area is urban in nature.

Additionally, the Build Alternatives would require modification at existing interchanges to accommodate the mainline widening and direct access at-grade auxiliary lanes or ramps. This may require the reconstruction of structures spanning the study corridor to lengthen or raise the elevation of these structures. Where new direct access at-grade auxiliary lanes or ramps would be constructed, visual impacts would be readily apparent, but would not contribute to a change in the character of the existing viewsheds. These impacts would include widened roadways, increased amounts of pavement, and new ramps and elevated structures adjacent to the existing study corridors. In general, construction would introduce some new elements, such as direct access ramps, they would generally be compatible with the existing visual character or qualities along the study corridors as the Build Alternatives are expanding existing interstates. However, views from communities outside of the study corridors and to the periphery would not be affected. Refer to **Section 4.6** for additional details on visual and aesthetic resources.

The Build Alternatives are projected to relieve traffic congestion and improve trip reliability which would result in more predictable travel and increased response times for emergency services and travel times to other community facilities, especially during peak travel periods. The Build Alternatives would also reduce traffic on local roads by three to seven percent, depending on the alternative which would lead to better access to facilities and improved emergency response times along local roadways.

B. Community Facilities

Generally, the community facility properties that would be impacted by the Build Alternatives are dispersed throughout the 36 CEA Analysis Area Communities within the CEA Analysis Area; the distribution of full and partial property acquisitions along the study corridors is quantified in **Table 4-6**. Property impacts to community facilities would be nearly the same under all the Build Alternatives, except for minor differences in the amount of right-of-way required based on the footprint of the specific Build Alternative. Each of the Build Alternatives would impact property from the following community facilities: five schools, one higher education facility, three hospitals, four recreation centers, one correctional facility, and one police station. No community facilities would be relocated under any Build Alternative. Alternatives 8, 9, 9M, 10, 13B, and 13C would impact the properties of 14 places of worship and 45 parks. Alternatives 8, 9, 9M, 13B, and 13C would impact the property of one post office; while Alternative 10 would impact the property of two post offices. The impacted community facilities are shown the *Environmental Resource Mapping* (**Appendix D**) and further described below.

Within the CEA Analysis Area, 136 pre-kindergarten, primary, and secondary educational facilities were identified; of which five in Montgomery County, would be impacted by partial property acquisition. Additionally, the Build Alternatives would require partial property acquisition of one higher education facility in Prince George's County. None of the impacted educational facilities were identified as potential relocated properties.

The Build Alternatives would impact 14 places of worship. Four of the impacted places of worship are in Montgomery County, while ten are in Prince George's County. None of the impacted places of worship were identified as potential relocated properties. Additionally, eruvim,[5] located adjacent to the study corridors, would also be impacted by each of the Build Alternatives. Coordination with the local Orthodox Jewish community will be necessary prior to construction to ensure that any impacts to these facilities would be minimized or mitigated. Refer to the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 3.5.1.B**), for additional details on this religious facility. Two cemeteries[6] are located within the LODs of the Build Alternatives, the Moses Hall Cemetery and the Montgomery County Poor Farm Cemetery and they may be impacted. MDOT SHA will work to avoid and minimize impacts and will coordinate with affected communities, including descendant family members, on treatment of human remains should avoidance not be possible.

[5] Community-maintained boundary markers that encompass a designated area where Orthodox Jews can perform small tasks out-of-doors on the Sabbath without violating religious law.

[6] Preliminary desktop archeological research has identified two historic cemeteries whose sites are located within the Build Alternatives' LOD: the Moses Hall Cemetery (Cabin John CEA Analysis Area) and the Montgomery County Poor Farm Cemetery (Rockville CEA Analysis Area). Further archaeological investigations will be included in development of the Programmatic Agreement; additional information is provided in the Cultural Resources Technical Report, Volume 4 (Appendix G). MDOT SHA will work to avoid and minimize impacts and will coordinate with affected communities on treatment of human remains should avoidance not be possible.

The Adventist Healthcare Shady Grove Medical Center, Walter Reed National Military Medical Center, and Holy Cross Hospital would each be impacted by the Build Alternatives, by partial property acquisition; however, impacts to any individual facility would not alter access to or use of the hospital facilities. None of the impacted hospitals were identified as potential relocated properties. However, one medical office complex located in the South Kensington CEA Analysis Area Community was identified as a business property for potential relocation.

No fire stations would be impacted by the Build Alternatives; however, a correctional facility and a police station within the CEA Analysis Area would be impacted by partial property acquisition. The correctional facility is in Montgomery County; the police station is in Prince George's County. Impacts to emergency response times during construction are not anticipated as maintenance of traffic would be planned to continue operation of the existing number of lanes, if possible. Improved travel times and reliability through reduced congestion and managed lane strategies are anticipated with each of the Build Alternatives, which would in turn lead to improved emergency response times.

4.3.4 Mitigation

Where multiple residential and business relocations would occur in the same location, MDOT SHA would coordinate with the impacted neighborhoods and area stakeholders to ensure that potential changes to the sense of cohesion or interactions between persons or groups within the community are minimized.

The design of all highway elements would follow aesthetic and landscaping guidelines and would be visually consistent with the existing highway setting. The aesthetic and landscaping guidelines would be developed in consultation with the design team, local jurisdictions, private interest groups (private developers or companies), local community or business associations, as well as local, state, and Federal agencies.

Further detail on mitigation efforts for impacts to communities and community facilities are provided in **Section 4.5**: Property Acquisitions and Relocations, **Section 4.6**: Visual and Aesthetic Resources, and **Section 4.9**: Noise.

4.4 Parks and Recreational Facilities

4.4.1 Introduction and Methodology

Publicly-owned parks and recreation facilities within the CEA Analysis Area were identified and the potential impacts of the Build Alternatives were assessed. Data on parks and recreational facilities was gathered using multiple sources including geographic information system (GIS) data and relevant planning documents from Fairfax, Montgomery, and Prince George's Counties. Detailed information regarding individual, publicly-owned parks and potential impacts are addressed in the *Draft Section 4(f) Evaluation* (**Appendix F**) and **Chapter 5** of this DEIS.

4.4.2 Affected Environment

The identification of parks and recreation facilities for the *Community Effects Assessment and Environmental Justice Analysis Technical Report,* **Appendix E, Section 3.5** was completed to account for these properties and facilities within specific CEA Analysis Area Communities. The detailed analysis of individual publicly-owned parks and recreational facilities and potential impacts following the Section 4(f) of the US Department of Transportation (USDOT) Act of 1966 regulatory framework is provided in the *Draft Section 4(f) Evaluation* (**Appendix F**) and **Chapter 5** of this DEIS.

There are eight, public park property owners/operators of parkland along the study corridors: NPS; Maryland-National Capital Park and Planning (M-NCPPC), Montgomery County Parks; Maryland-National Capital Park and Planning, Prince George's County Parks; City of Gaithersburg; City of Greenbelt; City of New Carrollton; City of Rockville; and Montgomery County Department of Transportation. The public park property owners/operators are listed with their park properties in **Table 4-5**.

Two-hundred and thirty-seven (237) publicly-owned parks, in addition to 18 publicly-owned community recreation centers, comprise more than 16,000 acres within the CEA Analysis Area. Many of the park units within the CEA Analysis Area include stream valley parks, as well as neighborhood and local parks. The largest parks within the CEA Analysis Area are: George Washington Memorial Parkway, the Chesapeake and Ohio Canal National Historic Park, Cabin John Stream Valley and Regional Park, Rock Creek Stream Valley Park, Northwest Branch Stream Valley Park, Greenbelt Park, Henson Creek Stream Valley Park, Suitland Parkway, and Southwest Branch Stream Valley Park. Additionally, four public community pools were identified in the Fairfax County portion of the CEA Analysis Area. The park properties are shown in **Chapter 5, Figures 5-1 through 5-3** and on the *Environmental Resource Mapping* (**Appendix D**).

Non-public recreation facilities identified within the corridor study boundary include: Congressional Country Club, Burning Tree Club, the Chevy Chase Recreation Association, and the Silver Spring YMCA.

4.4.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact parks and recreational facilities within the CEA Analysis Area. Further, there would be no study-related changes in access to the facilities or viewsheds under this alternative.

The Build Alternatives would impact park/ open space land and recreational facilities. Based on the current LODs, the assumed right-of-way needed from park/ open space properties for each of the Build Alternatives is shown in **Table 4-5**. The majority of impact to publicly-owned parks would be partial property acquisitions along adjacent interstates for roadway widening, stormwater management, construction of retaining walls, grading, construction or reconstruction of noise walls, and landscaping. Removal of trees and landscaping that buffer the park from the study corridors would occur but will be minimized to the greatest extent possible.

Larger areas of property impacts to the George Washington Memorial Parkway, Chesapeake & Ohio Canal Historic Park, Northwest Branch Stream Valley Park, and Baltimore Washington Parkway would be needed to remove and construct a new American Legion Bridge, a new bridge on I-495 over Northwest Branch and provide direct access ramps to the Baltimore Washington Parkway. Location of stormwater management within parks was sited to avoid impacting recreational facilities and sensitive environmental resources and was done in coordination with most of the park owners. Stormwater management was eliminated from NPS property to the maximum extent practicable. At certain locations stormwater management facilities are required on NPS property because there is no other viable location to treat stormwater, such as at the American Legion Bridge and Baltimore Washington Parkway. Coordination with all the park owners will continue as the Study progresses to identify stormwater management facilities within parks. The detailed analysis and potential impacts to individual publicly-owned parks is represented in **Tables 5-1 through 5-3 in Chapter 5** and in greater detail in the *Draft Section 4(f) Evaluation* (**Appendix F**).

Table 4-5: Potential Public Park Impact by Build Alternative (Acres)

Public Park/ Open Space/ Rec. Facility	Park Owner/ Operator	Park Size[1] (Acres)	Alt 5[2]	Alts 8 & 9[3]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Baltimore Washington Parkway	NPS	~1,400	69.3	69.3	69.3	69.3	69.3	69.3
Chesapeake and Ohio Canal National Historical Park	NPS	~19,575	15.4	15.4	15.4	15.4	15.4	15.4
Clara Barton Parkway	NPS	96.2	1.8	1.8	1.8	1.8	1.8	1.8
Greenbelt Park	NPS	1,100	0.3	0.6	0.6	0.6	0.6	0.6
Suitland Parkway	NPS	419	0.3	0.3	0.3	0.3	0.3	0.3
George Washington Memorial Parkway	NPS	7,146	12.2	12.2	12.2	12.2	12.2	12.2
Malcolm King Park	City of Gaithersburg	78.5	0.1	0.1	0.1	0.1	0.1	0.1
Morris Park	City of Gaithersburg	30.7	0.1	0.1	0.1	0.1	0.1	0.1
McDonald Field	City of Greenbelt	2.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Spellman Overpass	City of Greenbelt	1.0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Buddy Attick Lake Park	City of Greenbelt	85.3	0.1	0.1	0.1	0.1	0.1	0.1
Indian Springs Park	City of Greenbelt	3.0	0.1	0.1	0.1	0.1	0.1	0.1
Beckett Field	City of New Carrollton	7.0	0.2	0.2	0.2	0.2	0.2	0.2
Bullards Park and Rose Hill Stream Valley Park	City of Rockville	16.8	0.3	0.3	0.3	0.3	0.3	0.3
Cabin John Stream Valley Park (Rockville)	City of Rockville	33.1	2.1	2.1	2.1	2.1	2.1	2.1
Millennium Garden Park	City of Rockville	1.3	0.2	0.2	0.2	0.2	0.2	0.2
Rockmead Park	City of Rockville	27.4	0.2	0.2	0.2	0.2	0.2	0.2
Woottons Mill Park	City of Rockville	95.3	0.2	0.2	0.2	0.2	0.2	0.2
Rockville Senior Center Park	City of Rockville	12.2	0.7	0.7	0.7	0.9	0.7	0.8
Blair Local Park	M-NCPPC Montgomery Co.	10.2	0.3	0.4	0.3	0.4	0.4	0.4
Cabin John Regional Park	M-NCPPC Montgomery Co.	514.0	4.4	5.7	5.7	7.2	4.5	5.2
Cabin John Stream Valley Park, Unit 2	M-NCPPC Montgomery Co.	105.0	1.1	1.1	1.1	1.1	1.1	1.1
Forest Glen Neighborhood Park	M-NCPPC Montgomery Co.	3.7	0.2	0.3	0.2	0.3	0.3	0.3
Indian Springs Terrace Local Park	M-NCPPC Montgomery	30.0	1.2	1.4	1.2	1.4	1.4	1.4
Locust Hill Neighborhood Park	M-NCPPC Montgomery Co.	5.0	0.2	0.3	0.2	0.3	0.3	0.3
Northwest Branch Stream Valley Park, Unit 3	M-NCPPC Montgomery Co.	144.0	3.2	3.2	3.2	3.2	3.2	3.2
Old Farm Neighborhood Conservation Area	M-NCPPC Montgomery Co.	0.8	0.1	0.1	0.1	0.1	0.1	0.1
South Four Corners Neighborhood Park	M-NCPPC Montgomery Co.	3.6	< 0.1	0.1	< 0.1	0.1	0.1	0.1

Public Park/ Open Space/ Rec. Facility	Park Owner/ Operator	Park Size[1] (Acres)	Alt 5[2]	Alts 8 & 9[3]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Tilden Woods Stream Valley Park	M-NCPPC Montgomery Co.	67.4	0.2	0.2	0.2	0.2	0.2	0.2
Fleming Local Park	M-NCPPC Montgomery Co.	24.0	0.1	0.1	0.1	0.1	0.1	0.1
Rock Creek Stream Valley Park, Unit 2	M-NCPPC Montgomery Co.	277.0	0.2	0.4	0.2	0.4	0.4	0.4
Rock Creek Stream Valley Park, Unit 3	M-NCPPC Montgomery Co.	326.6	2.5	3.3	2.5	3.3	2.5	2.5
Cabin John Stream Valley Park, Unit 6	M-NCPPC Montgomery Co.	19.8	0.4	0.4	0.4	0.4	0.3	0.4
Montgomery Blair High School Athletic Fields	M-NCPPC Montgomery Co.	30.0	1.1	1.4	1.1	1.4	1.4	1.4
Sligo Creek Parkway	M-NCPPC Montgomery Co.	543.0	3.3	4.1	3.3	4.1	4.1	4.1
Andrews Manor Park	M-NCPPC Prince George's Co.	4.1	2.6	2.6	2.6	2.6	2.6	2.6
Cherry Hill Road Park	M-NCPPC Prince George's Co.	43.1	1.6	1.8	1.8	1.8	1.8	1.8
Douglas E. Patterson Park	M-NCPPC Prince George's Co.	26.2	0.7	0.7	0.7	0.7	0.7	0.7
Henson Creek Stream Valley Park	M-NCPPC Prince George's Co.	1,103	0.1	0.1	0.1	0.1	0.1	0.1
Heritage Glen Park	M-NCPPC Prince George's Co.	38.2	0.5	0.5	0.5	0.5	0.5	0.5
Hollywood Park	M-NCPPC Prince George's Co.	22.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Manchester Estates Park	M-NCPPC Prince George's Co.	4.6	0.4	0.5	0.5	0.5	0.5	0.5
Southwest Branch Stream Valley Park	M-NCPPC Prince George's Co.	264.0	0.3	0.3	0.3	0.3	0.3	0.3
Henry P. Johnson Park	M-NCPPC Prince George's Co.	7.1	0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bethesda Trolley Trail	Montgomery County Department of Transportation	4 miles	0.2	0.2	0.2	0.2	0.2	0.2
Total Potential Impacts to Park Properties (acres)		**-**	**128.5**	**133.1**	**133.1**	**130.4**	**134.8**	**131.0**

Notes: [1]The size of Section 4(f) properties is sourced from data or documentation provided by the Officials with Jurisdiction. [2]MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [3]Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.

The Build Alternatives would impact four community recreation centers. Two of the impacted recreation centers are in Montgomery County and two are in Prince George's County. Three of the recreation centers would be impacted by partial property acquisition of undeveloped portions of the properties. However, impacts at one recreational facility, the Silver Spring YMCA, located adjacent to I-495 in the Silver Spring CEA Analysis Area Community, would include impacts to the outdoor and indoor pools. Based on initial review and coordination with the property owner, these facilities could be reconstructed on an undeveloped portion of the property with minimal disruption to its recreational use. MDOT SHA will continue to coordinate with the property owner to further minimize impacts to the property and develop a mitigation strategy to ensure the recreation facility continues to serve the community.

4.4.4 Mitigation

Mitigation for impacts to publicly-owned park properties is being coordinated with the Officials with Jurisdiction over the impacted park properties. Potential mitigation to park and recreational facilities could be, but not limited to, elements such as: landscaping, replacement land, completing natural resource surveys, reconfiguring recreational facilities, relocating recreational facilities out of environmentally compromised areas (i.e. floodplains), restoring streams, and funding of park related buildings and amenities. Mitigation for impacts to the Silver Spring YMCA may include reconstructing the outdoor and indoor pool on an undeveloped portion of the property. MDOT SHA will continue to coordinate with the property owner to develop a mitigation strategy to ensure the recreation facility continues to serve the community. Refer to the *Draft Section 4(f) Evaluation* (**Appendix F**) and **Chapter 5** of this DEIS for the additional details.

4.5 Property Acquisitions and Relocations

4.5.1 Introduction and Methodology

Property acquisitions in the study area for conversion to transportation right-of-way include either partial or full acquisitions. A partial acquisition is considered one that does not cause a business or residential relocation and has been assumed where a principle building is located more than 20 feet from a Build Alternative's LOD.[7] A full property acquisition resulting in a relocation has been assumed where a principle building of a residence, business, or community facility is located within 20 feet of a Build Alternative's LOD. The LODs for each Build Alternative were determined from the proposed roadway typical sections, interchange configuration, and roadside design elements. The proposed roadway typical section, roadside design features, and topography and terrain were used to determine the cut and fill lines required to construct each Build Alternative. Generally, the cut and fill lines were offset by an additional ten feet to create the LOD. For further details on the establishment of the LOD refer to the *Alternatives Technical Report* (**Appendix B**).

4.5.2 Affected Environment

Within the highly developed CEA Analysis Area, well-established communities, parklands and open space, commercial, and industrial areas are traversed by state and local transportation rights-of-way. The existing I-495 right-of-way within the study corridor ranges in width between 150 and 300 feet, to accommodate a six- to eight-lane freeway (three to four lanes in each direction) plus auxiliary lanes in some locations. The I-495 median is paved or grass and varies in width to a maximum of 54 feet wide. The existing I-270 right-of-way from the I-495 split, north to I-370 varies between 250 and 300 feet. Where the I-270 east and west spurs intersect with I-495, I-270 carries a total of six lanes with the left lane of both directions used as a HOV lane during peak periods. North of the spurs, I-270 is a twelve-lane freeway with one HOV lane and five GP lanes in each direction. The median of I-270 is barrier-separated with full-width shoulders and varies in width to a maximum of 26 feet wide.

MDOT SHA's existing right-of-way includes features such as: existing roadway lanes, auxiliary lanes, interchange ramps and structures, shoulders, traffic barrier, cut and fill slopes, SWM facilities, retaining walls, and noise walls.

[7] Generally defined as the proposed boundary within which all construction, materials storage, grading, landscaping, noise barrier replacement/construction, and related activities would occur.

4.5.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact right-of-way. The No Build Alternative would include only routine maintenance and safety improvements along I-495 and I-270.

Alternative 9M would result in 29 full property acquisitions (25 residential relocations and four business relocations). Alternatives 8, 9, 10, 13B and 13C would each result in 38 full property acquisitions (34 residential relocations and four business relocations). Relocations would occur in the following areas:

- Forest Glen CEA Analysis Area: 15 to 20 relocations
- Four Corners CEA Analysis Area: two relocations
- Glenarden CEA Analysis Area: one relocation
- Silver Spring CEA Analysis Area: 11 to 14 relocations
- South Kensington CEA Analysis Area: one relocation

As shown in **Table 4-6**, the Build Alternatives would impact between 313.4 and 337.3 acres of right-of-way from properties adjacent to the existing I-495 and I-270 roadway alignments. The proposed right-of-way impacts would not eliminate existing access or provide new access to impacted properties, as none of these properties are currently accessed directly from I-495 or I-270.

Table 4-6: Relocation and Right-of-Way Requirements

Property Types (# of properties)	Alt 5[1]	Alts 8 and 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Residential Relocations[3]	25	34	25	34	34	34
Residential Properties Impacted	926	1,127	1,046	1,164	1,105	1,127
Business/Other Property Relocations	4	4	4	4	4	4
Business/Other Properties Impacted[4]	314	348	346	354	342	352
Total Number of Properties Impacted	**1,240**	**1,475**	**1,392**	**1,518**	**1,447**	**1,479**
Total Right-of-way[5]	**284.9 acres**	**323.5 acres**	**313.4 acres**	**337.3 acres**	**318.9 acres**	**329.3 acres**

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2] Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts. [3] Property owners affected by relocation would receive relocation assistance in accordance with the Federal Uniform Relocation and Real Estate Acquisition Policies Act of 1970 and amended by the Surface Transportation and Uniform Relocation Assistance Act of 1987 (The Uniform Act).[4] Business/Other Properties Impacted is equal to the sum of impacted properties with non-residential zoning designations, including Commercial/Employment, Industrial, Mixed-use, Park/Open Space, Planned Unit/Planned Community, and Transportation.[5] Total right-of-way acreage requirements differs from total land use conversion acreage due to differences in GIS base layer boundaries. Right-of-way acreage requirements are calculated by applying the LOD over precise property line boundaries, while land use conversion acreage is calculated by applying the LOD over generalized land use/zoning boundaries.

The LODs for the Build Alternatives result in property impacts due to roadway widening to construct additional travel lanes, reconfiguration of interchange ramps, reconstruction of significant bridges and other structures, augmentation and extension of culverts, replacement or extension of existing noise barriers, construction of new noise barriers, and utility relocation that cannot be accommodated within existing right-of-way. Generally, the proposed property acquisition for right-of-way would include acquiring strips of land, or strip takes, from undeveloped areas or areas of trees and landscaping in yards that back to I-495 or I-270. Acquisition of larger areas would be needed for the accommodation of SWM facilities. The proposed relocations and SWM facilities are shown on the *Environmental Resource Mapping* (**Appendix D**).

A breakdown of property relocations (full property acquisitions) and partial property impacts along the study corridors are presented by areas between existing interchanges in **Table 4-7**. To provide localized context, property impacts are presented for 37 areas between existing interchanges; page references to the *Environmental Resource Mapping* (**Appendix D**) are provided for each area. Each individual property acquisition will be reviewed during final design.

Across all Build Alternatives, the following study corridor areas shown in **Table 4-7** would experience the highest acreages of property impacts, which would occur primarily in the form of strip takes:

- **Table 4-7**, Area 2: I-495 west side, between George Washington Memorial Parkway and Clara Barton Parkway;
- **Table 4-7**, Area 8: I-495 top side, between MD 185 and MD 97
- **Table 4-7**, Area 14: I-495 east side, between US 1 and Greenbelt Metro
- **Table 4-7**, Area 19: I-495 east side, between US 50 and MD 202
- **Table 4-7**, Area 23: I-495 east side, between Ritchie Marlboro Road and MD 4

4.5.4 Mitigation

Avoidance and minimization approaches have been applied to the Build Alternative LODs at potential, full property acquisition locations. Approaches that were evaluated included elimination of roadside elements such as, bioswales for stormwater management, steep side slope grading, addition of concrete barrier, and retaining walls at the edge of the proposed road shoulder, elimination/relocation of managed lane access points, shifting the centerline alignment (asymmetrical widening), reduction in number of lanes, and interchange configuration changes. The approaches that were studied and, where possible, incorporated into the LOD for the Build Alternatives are described in **Chapter 2, Section 2.7.4** and the *Alternatives Technical Report* (**Appendix B**). Impacts to property would continue to be refined and minimized during future design phases of the Study. All affected private property owners would be compensated for the fair market value of the acquired portion of land and any structures acquired for the construction of a Preferred Alternative which will be identified in the Final EIS. Additionally, any individual, family, business, or non-profit organization relocated as a result of the acquisition of real property is eligible to receive reimbursement for the fair market value of property acquired, as well as moving costs. This process is known as relocation assistance. In accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended, 1987) and related MDOT SHA acquisition guidance, relocated property owners would be provided relocation assistance advisory services together with the assurance of the availability of decent, safe, and sanitary housing. Relocation resources would be made available to all relocated persons without discrimination. Ongoing coordination with area businesses would occur to prevent or minimize both short- and long-term disruptions. Additionally, the MDOT SHA property acquisition process attempts to relocate first within the same community to minimize disruption to displaced households.

Table 4-7: Full and Partial Property Acquisition by Corridor Area Between Existing Interchanges

	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Area 1: I-495 west side, south of George Washington Parkway (Appendix D, pgs. 1, 56, 123)						
Number of Existing Properties	0	0	0	0	0	0
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions No impacts to properties adjacent to existing right-of -way	0.0	0.0	0.0	0.0	0.0	0.0
Area 2: I-495 west side, between George Washington Parkway and Clara Barton Parkway (Appendix D, pgs. 1-3, 56-58, 123-125)						
Number of Existing Properties	6	7	7	7	7	7
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to replacement of the American Legion Bridge and access needs at the Potomac River	19.2	19.8	19.8	19.8	19.8	19.8
Area 3: I-495 west side, between Clara Barton Parkway and MD 190 (Appendix D, pgs. 3-5, 58-60, 125-127)						
Number of Existing Properties	54	59	59	59	59	59
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, new SWM facilities, and construction of managed lane direct access ramps	7.9	9.6	9.6	9.6	9.6	9.6
Area 4: I-495 west side, between MD 190 and I-270 west spur (Appendix D, pgs. 1, 56, 123)						
Number of Existing Properties	74	77	77	77	77	77
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, stream relocation and culvert construction along Thomas Branch	9.0	11.3	11.3	11.3	11.3	11.3
Area 5: I-495 top side, between I-270 west spur and MD 187 (Appendix D, pgs. 7, 8, 44, 62, 63, 99, 111, 129, 130, 166, 178, 190, 202)						
Number of Existing Properties	44	90	44	90	90	90
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, new SWM facilities, interchange ramp reconfiguration, and construction of managed lane direct access ramps	8.8	10.2	8.8	10.2	10.2	10.2

	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Area 20: I-495 east side, between MD 202 and Arena Drive (Appendix D, pgs. 33, 34, 88, 89, 155, 156)						
Number of Existing Properties	10	11	11	11	11	11
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening	0.5	1.0	1.0	1.0	1.0	1.0
Area 21: I-495 east side, between Arena Drive and MD 214 (Appendix D, pgs. 34, 35, 89, 90, 156, 157)						
Number of Existing Properties	15	15	15	15	15	15
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, noise barrier construction, and new SWM facilities	3.9	4.8	4.8	4.8	4.8	4.8
Area 22: I-495 east side, between MD 214 and Ritchie Marlboro Road (Appendix D, pgs. 35, 36, 90, 91, 157, 158)						
Number of Existing Properties	44	57	57	57	57	57
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, noise barrier construction, culvert extension and augmentation, new SWM facilities, and construction of managed lane direct access ramps	9.4	11.2	11.2	11.2	11.2	11.2
Area 23: I-495 east side, between Ritchie Marlboro Road and MD 4 (Appendix D, pgs. 36-39, 91-94, 158-161)						
Number of Existing Properties	36	39	39	39	39	39
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, culvert extension and augmentation, new SWM facilities, interchange ramp reconfiguration, and construction of managed lane direct access ramps	16.4	19.9	19.9	19.9	19.9	19.9
Area 24: I-495 east side, between MD 4 and Forestville Road / MD 337 (Appendix D, pgs. 39, 40, 94, 95, 161, 162)						
Number of Existing Properties	17	24	24	24	24	24
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, culvert extension and augmentation, new SWM facilities, and construction of managed lane direct access ramps	5.1	5.8	5.8	5.8	5.8	5.8

	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Area 6: I-495 top side, between MD 187 and I-270 east spur **(Appendix D, pgs. 8, 9, 45, 63, 64, 100, 112, 130, 131, 167, 179, 191, 203)**						
Number of Existing Properties	19	22	19	22	22	22
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, replacement of Bethesda Trolley Trail bridge over I-495, noise barrier construction, new SWM facilities, interchange ramp reconfiguration, and construction of managed lane access ramps	5.5	6.4	5.5	6.5	6.4	6.4
Area 7: I-495 top side, between I-270 east spur and MD 185 **(Appendix D, pgs. 9-11, 64-66, 131-133)**						
Number of Existing Properties	11	15	11	15	15	15
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, culvert extension and augmentation, noise barrier construction, and construction of managed lane direct access ramps	3.6	4.8	3.6	4.8	4.8	4.8
Area 8: I-495 top side, between MD 185 and MD 97 **(Appendix D, pgs. 12, 13, 67, 68, 134, 135)**						
Number of Existing Properties	72	77	72	77	77	77
Number of Full Property Acquisitions (Relocations)	21	25	21	25	25	25
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, replacement of CSXT bridge over I-495, noise barrier construction, new SWM facilities, and interchange ramp reconfiguration	18.1	19.2	18.1	19.2	19.2	19.2
Area 9: I-495 top side, between MD 97 and US 29 **(Appendix D, pgs. 14, 15, 69, 70, 136, 137)**						
Number of Existing Properties	52	57	52	57	57	57
Number of Full Property Acquisitions (Relocations)	7	12	7	12	12	12
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, new SWM facilities, and interchange ramp reconfiguration, and construction of managed lane direct access ramps	5.2	7.6	5.2	7.6	7.6	7.6
Area 10: I-495 top side, between US 29 and MD 193 **(Appendix D, pgs. 15, 70, 137)**						
Number of Existing Properties	10	10	10	10	10	10
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, noise barrier construction, and construction of managed lane direct access ramps	3.9	4.6	3.9	4.6	4.6	4.6

	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Area 25: I-495 east side, between Forestville Road / MD 337 and Suitland Road / MD 337 **(Appendix D, pgs. 40, 95, 162)**						
Number of Existing Properties	2	3	3	3	3	3
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, noise barrier construction, culvert extension and augmentation, and new SWM facilities	1.2	1.3	1.3	1.3	1.3	1.3
Area 26: I-495 east side, between Suitland Road / MD 337 and MD 5 **(Appendix D, pgs. 40-42, 95-97, 162-164)**						
Number of Existing Properties	65	71	71	71	71	71
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Impacts due to roadway widening, bridge replacement, noise barrier construction, culvert extension and augmentation, new SWM facilities, and construction of managed lane direct access ramps	16.0	17.0	17.0	17.0	17.0	17.0
Area 27: I-495 east side, west of MD 5 **(Appendix D, pgs. 42, 43, 97, 98, 164, 165)**						
Number of Existing Properties	19	20	20	20	20	20
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, noise barrier construction, culvert extension and augmentation, and new SWM facilities	2.5	3.0	3.0	3.0	3.0	3.0
Area 28: I-270 west spur, between I-495 and Democracy Boulevard **(Appendix D, pgs. 44, 99, 111, 166, 178, 190, 202)**						
Number of Existing Properties	3	3	3	9	3	9
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Impacts due to roadway widening, noise barrier construction, stream relocation and culvert construction at Thomas Branch, and new SWM facilities	2.1	2.4	2.4	2.8	2.4	2.8
Area 29: I-270 west spur, between Democracy Boulevard and Westlake Terrace **(Appendix D, pgs. 44, 99, 111, 166, 178, 190, 202)**						
Number of Existing Properties	3	3	3	3	3	3
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Impacts due to roadway widening and construction of managed lane direct access ramps	1.1	1.4	1.4	1.8	1.0	1.4

	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Area 11: I-495 top side, between MD 193 and MD 650 (Appendix D, pgs. 15-17, 70-72, 137-139)						
Number of Existing Properties	74	89	74	89	89	89
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, replacement of the I-495 bridge over Northwest Branch, noise barrier construction, culvert extension and augmentation, utility relocation, and construction of managed lane direct access ramps	6.5	8.0	6.5	8.0	8.0	8.0
Area 12: I-495 top side, between MD 650 and I-95 (Appendix D, pgs. 17-19, 72-74, 139-141)						
Number of Existing Properties	40	42	40	42	42	42
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, new SWM facilities, and construction of managed lane direct access ramps	3.2	3.6	3.2	3.6	3.6	3.6
Area 13: I-495 east side, between I-95 and US 1 (Appendix D, pgs. 18-21, 73-76, 140-143)						
Number of Existing Properties	14	14	14	14	14	14
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, new SWM facilities, culvert extension and augmentation, and construction of managed lane direct access ramps	11.8	12.1	12.1	12.1	12.1	12.1
Area 14: I-495 east side, between US 1 and Greenbelt Metro (Appendix D, pgs. 21, 22, 76, 77, 143, 144)						
Number of Existing Properties	26	35	35	35	35	35
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, and new SWM facilities	21.6	22.0	22.0	22.0	22.0	22.0
Area 15: I-495 east side, between Greenbelt Metro and MD 201 (Appendix D, pgs. 23, 78, 145)						
Number of Existing Properties	9	10	10	10	10	10
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, culvert extension and augmentation, new SWM facilities, construction of new ramps at Greenbelt Metro, and construction of managed lane direct access ramps	3.7	4.7	4.7	4.7	4.7	4.7

	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Area 30: I-270 east spur, between I-495 and MD 187 (Appendix D, pgs. 45, 46, 100, 101, 112, 113, 167, 168, 179, 180, 191, 192, 203, 204)						
Number of Existing Properties	22	25	22	39	23	28
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Impacts due to roadway widening, bridge replacement including replacement of the Bethesda Trolley Trail bridge over I-270, noise barrier construction, culvert extension and augmentation, new SWM facilities, and construction of at-grade access slip ramps	5.3	5.7	5.3	8.2	5.5	6.6
Area 31: I-270 west and east spurs, between Y-split and Westlake Terrace and MD 187 (Appendix D, pgs. 44-47, 99-102, 111, 113, 114, 166, 168, 169, 178, 180, 181, 109, 192, 193, 202, 204, 205)						
Number of Existing Properties	22	23	23	26	22	24
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Impacts due to roadway widening, noise barrier construction, new SWM facilities, interchange ramp reconfiguration, and construction of managed lane access ramps	13.2	13.5	13.4	14.3	13.3	13.9
Area 32: I-270 mainline, between Y-split and Montrose Road (Appendix D, pgs. 47-49, 102-104, 114-116, 169-171, 181-183, 193-195, 205-207)						
Number of Existing Properties	39	58	58	65	38	42
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Impacts due to roadway widening, noise barrier construction, culvert extension and augmentation, and new SWM facilities	7.5	9.7	9.7	13.1	7.8	9.9
Area 33: I-270 mainline, between Montrose Road and MD 189 (Appendix D, pgs. 48-50, 103-105, 115-117, 170-172, 182-184, 194-196, 206-208)						
Number of Existing Properties	16	18	18	19	18	19
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Impacts due to roadway widening, bridge replacement, new SWM facilities, and construction of managed lane direct access ramps at Wootton Parkway	15.6	16.6	16.6	18.0	16.1	17.4
Area 34: I-270 mainline, between MD 189 and MD 28 (Appendix D, pgs. 50, 51, 105, 106, 117, 118, 172, 173, 184, 185, 196, 197, 208, 209)						
Number of Existing Properties	35	37	37	41	37	40
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Impacts due to roadway widening, noise barrier construction, culvert extension and augmentation, and new SWM facilities	4.3	5.3	5.3	6.6	4.7	5.9

	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Area 16: I-495 east side, between MD 201 and Baltimore-Washington Parkway (Appendix D, pgs. 23-26, 78-81, 145-148)						
Number of Existing Properties	22	24	24	24	24	24
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, culvert extension and augmentation, new SWM facilities, and construction of managed lane direct access ramps	3.9	4.6	4.6	4.6	4.6	4.6
Area 17: I-495 east side, between Baltimore-Washington Parkway and MD 450 (Appendix D, pgs. 24-28, 79-83, 146-150)						
Number of Existing Properties	114	169	169	169	169	169
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, culvert extension and augmentation, new SWM facilities, and construction of managed lane direct access ramps	12.1	15.2	15.2	15.2	15.2	15.2
Area 18: I-495 east side, between MD 450 and US 50 (Appendix D, pgs. 28-31, 83-86, 150-153)						
Number of Existing Properties	35	42	42	42	42	42
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, interchange ramp reconfiguration, and construction of managed lane direct access ramps	4.7	5.0	5.0	5.0	5.0	5.0
Area 19: I-495 east side, between US 50 and MD 202 (Appendix D, pgs. 29-33, 84-88, 151-155)						
Number of Existing Properties	175	182	182	182	182	182
Number of Full Property Acquisitions (Relocations)	1	1	1	1	1	1
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, culvert extension and augmentation, new SWM facilities, utility relocation, and construction of managed lane direct access ramps	21.9	23.7	23.7	23.7	23.7	23.7

	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Area 35: I-270 mainline, between MD 28 and Shady Grove Road (Appendix D, pgs. 51, 52, 106, 107, 118, 119, 173, 174, 185, 186, 197, 198, 209, 210)						
Number of Existing Properties	25	30	30	36	26	34
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Impacts due to roadway widening, bridge replacement, noise barrier construction, culvert extension and augmentation, new SWM facilities, and construction of managed lane direct access ramps at Gude Drive	5.8	7.8	7.8	10.2	7.4	9.7
Area 36: I-270 mainline, between Shady Grove Road and I-370 (Appendix D, pgs. 52-54, 107-109, 119-121, 174-176, 186-188, 198-200, 210-212)						
Number of Existing Properties	8	9	9	9	8	9
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Impacts due to roadway widening, culvert extension and augmentation, and construction of managed lane direct access ramps	3.3	3.6	3.6	4.3	3.3	3.7
Area 37: I-270 mainline, north of I-370 (Appendix D, pgs. 54-55, 108-110, 120-122, 175-177, 187-189, 199-201, 211-213)						
Number of Existing Properties	8	8	8	10	8	10
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Impacts due to roadway widening, culvert extension and augmentation, and construction of managed lane direct access ramps	1.2	1.2	1.2	1.6	1.2	1.6

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2] Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.

To provide localized context, property impacts are presented for 37 Areas divided by major interchanges along the of the I-495 and I-270 Study Corridors. Areas along the Study Corridor are delineated solely for presentation purposes in **Table 4-7**.

* Total right-of-way acreage requirements differs from total land use conversion acreage due to differences in GIS base layer boundaries. Right-of-way acreage requirements are calculated by applying the LOD over precise property line boundaries, while land use conversion acreage is calculated by applying the LOD over generalized land use/zoning boundaries. Each individual property acquisition will be reviewed during final design.

4.6 Visual and Aesthetic Resources

4.6.1 Introduction and Methodology

Visual resources are those physical features that comprise the visual landscape, including land, water, vegetation, and man-made elements. These elements are the stimuli upon which a person's visual experience is based. Consideration of visual impacts from the Study was in accordance with FHWA's *Guidance for Visual Impact Assessment of Highway Projects*.[8]

Site visits and reviews of satellite imagery and GIS data were conducted to identify the visual character along the study corridors and assess the potential effects of the proposed Build Alternatives on the surrounding viewshed. The existing visual character along the entire study corridor is a composition of features, including: bridges, light poles, guardrails, barriers and dividers, right-of-way fencing, communications towers, vegetation, and adjacent land uses.

Because the study corridors are within developed urban and suburban areas, the affected area for this visual and aesthetic resource assessment is primarily limited to adjacent land uses. The features comprising the visual character of I-495 and I-270 differ slightly; therefore, viewsheds for each corridor have been characterized separately. Further, the existing viewsheds and consequences of the Build Alternatives on those viewsheds have been described as both dynamic (what travelers on the road see) and static (such as what neighbors of the road see).

4.6.2 Affected Environment

A. I-495 Viewshed

The viewshed description below applies to I-495 within the study corridor, including the east and west I-270 spurs. Within the study corridor the existing I-495 typical width is variable, between 138 and 146 feet. Features include white concrete dividers between the inner and outer loops. A significant portion of roadway is bifurcated with the inner loop at a higher elevation than the outer loop. Many of the structural elements along I-495 in the study corridor are of galvanized metal, including guardrails, communications towers, and light poles. Additionally, the majority of bridges spanning I-495 in the study corridor are steel with concrete parapets and painted green. Pedestrian guardrails on bridges are predominantly galvanized chain link with a curved top portion. Noise barriers are mostly brown, concrete formliner except for bridge-mounted noise walls, which are corrugated metal barrier painted to match the color of the adjacent noise wall. Areas of deciduous trees, of varying density, provide a screen between I-495 and adjacent development in some areas. The lands adjacent to I-495 are primarily developed or built-out right up to the galvanized chain-link right-of-way fencing or noise barriers. Photographs of representative, existing views along I-495 are shown in **Figure 4-4 through Figure 4-10**.

Dynamic views from I-495 in the study corridor include a relatively consistent view of the galvanized and concrete features described above. Views from the roadway include limited portions of wooded areas interrupted by noise barriers where the roadway abuts development. Unique views from I-495 are of short duration due to the curvature of I-495, the extent of solid noise barriers, and portions of wooded areas. Views of the Potomac River at the westernmost study corridor extent are obscured from most travelers due to the height of the bridge parapet wall. The portion of I-495 closest to the I-270 east spur is the most

[8] Guidelines for the Visual Impact Assessment of Highway Projects, January 2015 https://www.environment.fhwa.dot.gov/env_topics/other_topics/VIA_Guidelines_for_Highway_Projects.aspx

serpentine; it is also heavily wooded as this portion of the road abuts Rock Creek Park. At the I-95 interchange, the inner and outer loops are separated by densely forested areas, obscuring the views of opposing traffic lanes and bridge structures.

Static views from residential properties, commercial properties, and community resources adjacent to I-495 in the study corridor are predominantly of noise barriers, buffered with vegetation at variable widths. A variable width vegetated buffer also screens portions of the roadway without noise barriers. Properties are separated from the roadway by the aforementioned galvanized right-of-way fencing.

Figure 4-4: Trees Framing I-495, West Side View

Figure 4-5: Overall View- North side Inner loop looking east at Route 29 Interchange

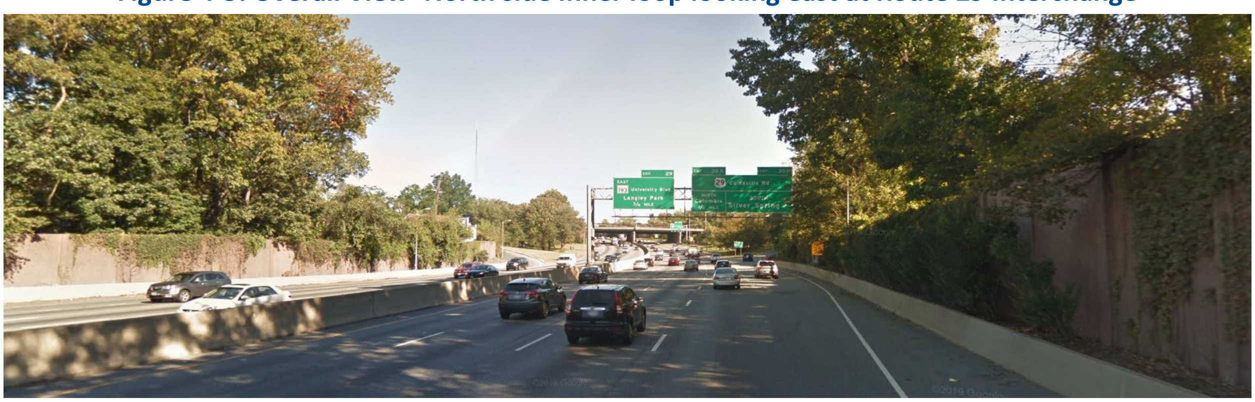


Figure 4-6: Median Plantings Separate I-495 Inner and Outer Loops at I-95 Interchange Outer Loop looking West

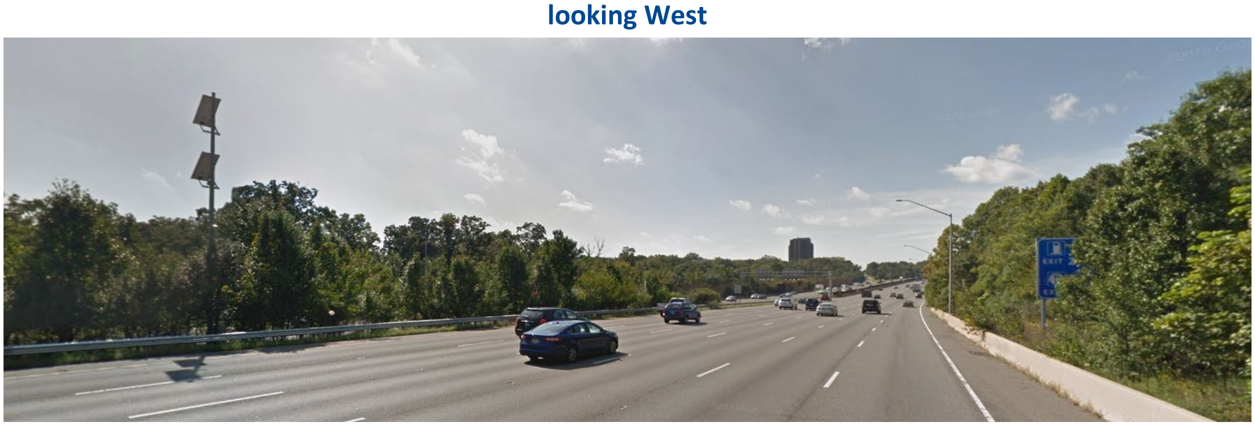


Figure 4-7: View Showing Adjacent Development and Vegetation on East side near Ritchie Marlboro Road intersection

Figure 4-8: Concrete Deck Bridge with Green Paint Beam on East side at Ardwick Ardmore Road intersection

Figure 4-9: View of Washington, DC Temple from I-495, Looking West

Figure 4-10: View of Bethesda Trolley Trail Crossing I-495, Looking East

B. I-270 Viewshed

The viewshed description below applies to I-270 from immediately north of the east and west spurs to the Study terminus at I-370. Within the study corridor the existing I-270 typical width is variable, between 228 and 256 feet. Features include white concrete dividers between east and westbound lanes. Many of the structural elements along I-270 in the study corridor are painted or finished in brown, differentiating them from the galvanized metal fixtures on I-495. These features include: guardrails, light poles, and bridges spanning I-270. Pedestrian guardrails on bridges are predominantly galvanized chain link with a curved top portion. Pedestrian bridges are steel truss structures with powder coated chain link fence. Noise barriers are mostly brown, concrete formliner. In some areas, there is a space between the noise barrier and parallel roadside barrier that provides a planting shelf. The lands adjacent to I-270 are primarily developed or built-out right up to the galvanized chain-link right-of-way fencing or noise barriers. Photographs of representative, existing views along I-270 are shown in **Figure 4-11 through Figure 4-13**.

Dynamic views from the I-270 portion of the study corridor include a relatively consistent view of the concrete and brown finished features described above, as well as noise barriers constructed within the roadway right-of-way, limiting views of residential properties, commercial enterprises, and community resources outside of the existing right-of-way. There are limited views of wooded areas at the roadway edge and short areas of visible development throughout this portion of the study corridor.

Static views from neighboring properties, including residential properties, commercial enterprises, and a number of community resources are predominantly of noise barriers, buffered with variable width vegetation. Variable width vegetated buffer also screens portions of the roadway without noise barriers. Properties are separated from the roadway by the aforementioned galvanized right-of-way fencing.

Figure 4-11: I-270 Looking North at the MD 189 Interchange

Figure 4-12: I-270 Looking North at Gude Drive Bridge

Figure 4-13: I-270 Looking North at Wooton Parkway Bridge

4.6.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact visual and aesthetic resources. Since this alternative does not address congestion issues on the study corridors, it would result in an increase in views of traffic by motorists and nearby residences and businesses.

The construction of a Build Alternative would include: managed lanes, shoulders, traffic barriers, cut and fill slopes, SWM facilities, retaining walls, and noise barriers along the existing highway corridor. Additionally, the Build Alternatives would require modifications at existing interchanges to accommodate the mainline widening and direct access at-grade auxiliary lanes or ramps. This may require the reconstruction of structures spanning the study corridors to lengthen or raise the elevation of these structures.

Construction of a Build Alternative would also require relocation of signage, guardrails, communications towers, and light poles due to the widening of the roadway. These ancillary features would be the same or similar in appearance as the existing interstate features. Under the Build Alternatives they may be positioned closer to the adjacent land uses (residential areas, commercial enterprises and community facilities). The design of all highway elements would follow aesthetic and landscaping guidelines that will be developed in consultation with the design team, local jurisdictions, private interest groups (private developers or companies), and local community or business associations, as well as local, state, and Federal agencies.

Similarly, where noise barriers already exist, they would be replaced. Additional noise barriers may be constructed as detailed in **Section 4.9**. Under the Build Alternatives, noise barriers may be positioned closer to the surrounding land uses (residential areas, commercial enterprises and community facilities); however, they would be of similar height, material, and aesthetic as the existing noise barriers. (Refer to the *Environmental Resource Mapping* (**Appendix D**) and *Maps 53 through 76* of the *Noise Analysis Technical Report* (**Appendix J**) for the proposed noise barrier locations.)

Construction would require the removal of vegetation to varying degrees throughout the study corridors. Larger areas of tree removal near the American Legion Bridge on NPS property will be needed for construction and cannot be accommodated elsewhere due to the steep slopes. As a result of the vegetation removal, the wider interstates, added ramps, retaining walls, and noise barriers would become more visible and prominent from both the dynamic and static views. The static views from adjacent properties, including residential properties, commercial enterprises, parkland/ open space properties, and a number of community resources would experience an impact. In general, however, impacts would be consistent with existing views along the majority of the study corridors because of the dominant presence of the existing interstate facilities and the surrounding area's urbanized nature.

In summary, impacts to visual resources would be detectable but localized to existing properties adjacent to the study corridors and viewsheds to and from adjacent parklands. Where new direct access at-grade auxiliary lanes or ramps would be constructed, visual impacts would be readily apparent, but would not contribute to a change in the character of the existing viewsheds. These impacts would include widened roadways, increased amounts of pavement, and new ramps and elevated structures adjacent to the existing study corridors. However, views outside of the study corridors and to the periphery would not be affected. In sum, the viewsheds following construction of a Build Alternative would generally be consistent with existing viewsheds associated with the study corridors. As design advances on a Preferred Alternative, MDOT SHA will complete a Visual Impact Assessment (VIA) in accordance with FHWA's Guidance, which would include renderings at select viewsheds along the study corridors at sensitive resources, such as Rock Creek and C&O Canal to ensure the design is context sensitive.

4.6.4 Mitigation

Mitigation measures to lessen the visual impact of the improvements would be considered as appropriate. Vegetation removal would be minimized and additional landscaping may be incorporated. Areas identified for tree removal on the NPS property will be further refined as the study progresses. Mitigation for tree removal will be done in accordance with the Maryland Reforestation Law which requires on-site planting, when feasible. Aesthetic treatments on retaining walls and noise barriers is a mitigation treatment that could be considered in final design.

The design of all highway elements would follow aesthetic and landscaping guidelines that will be developed in consultation with the design team, local jurisdictions, private interest groups (private developers or companies), local community or business associations, as well as local, state, and Federal agencies. The goal will be to design highway elements to be sensitive to the context of the surrounding land use, including historic and park resources. Further, mitigation for resource impacts would be developed in accordance with jurisdictional agency requirements.

4.7 Historic Architectural and Archaeological Resources

4.7.1 Introduction and Methodology

The Study's consideration of impacts to historic properties is being done in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) (54 U.S.C. § 306108), and its implementing regulations (36 CFR Part 800). The requirements for coordination of Section 106 review with NEPA is outlined in 36 CFR Part 800.8. A historic property is a district, site, building, structure, or object included in or eligible for the National Register of Historic Places (NRHP) (36 CFR Part 800.16[l][1]). The location of the historic properties is shown on the *Environmental Resource Mapping* (**Appendix D**).

Per consultation requirements at 36 CFR 800.4(a)(1), MDOT SHA established the area of potential effects (APE) to identify historic properties. Because the precise LODs were unknown when consultation was initiated, a corridor study boundary was the envelope within which physical effects to historic properties were assumed to be possible. The corridor study boundary was defined as a line extending 300 feet from the centerline on either side of I-495 and I-270 within the study limits, expanding farther at certain interchanges. Within the corridor study boundary, archaeological surveys were conducted to identify archaeological resources possibly subject to impact by the Study.

The APE generally encompassed an additional 250 feet beyond either side of the corridor study boundary to capture audible, visual, or atmospheric effects that are not direct physical impacts. MHT accepted this APE without additional comments on May 17, 2018. Since the original development of the APE, two modifications have been made. A revised APE in the Virginia area, along with summaries of MDOT SHA Section 106 responsibilities in Virginia, was presented to MHT, Virginia Department of Historic Resources (VDHR), and additional consulting parties on May 14, 2019. Based on design evolution and in consideration of Virginia Department of Transportation's (VDOT) NEXT project, the Study's APE in this area takes into account existing noise barriers and other factors that would shield adjacent properties from visual, atmospheric, or audible effects.

The APE was subsequently updated in November 2019, following design advancement, to ensure consistency of a 250-foot buffer of consideration on either side of the widest LOD (Alternative 10). MDOT SHA expects additional minor revisions to the APE going forward, as necessary to capture further design changes and project development.

As part of required Section 106 consultation, MDOT SHA developed and implemented the *Archaeological and Historic Architectural Gap Analysis and Assessment* (Hutchins-Keim et. al. 2018), included as *Volume 2* of the *Cultural Resources Technical Report* (**Appendix G**). The Gap Analysis detailed the proposed methodology to identify and evaluate historic properties for the Study. In general, the Gap Analysis specified known historic properties within the APE, inventoried properties without eligibility determinations, and identified locations for their potential to contain unidentified archaeological resources. An additional document, the *Suburbanization Historic Context Addendum (1961-1980), Montgomery and Prince George's Counties, Maryland* was developed to provide greater evaluation context for the numerous late twentieth century properties within the APE. As part of the methodology, MDOT SHA identified previously recorded and new resources constructed in or before 1978, 50 years prior to the anticipated end of construction, to include properties that may become NRHP-eligible during the duration of the Study. MDOT SHA provided Maryland Historical Trust (MHT) the Gap Analysis for review and comment on August 8, 2018 and the draft Suburbanization Context Addendum on October 19, 2018, for review and comment. Both were also shared with additional consulting parties (refer to *Volume 1, Appendix B* of the *Cultural Resources Technical Report* (**Appendix G**). MHT responded with minor comments and agreed with the general approaches in both documents on November 27, 2018.

C. Section 106 Consultation

36 CFR Part 800 outlines a consultation process with specific parties to complete the required review. FHWA notified the Advisory Council on Historic Preservation (ACHP) on March 26, 2018 of the Study. The ACHP chose to participate in consultation in a letter dated May 22, 2018. MDOT SHA, on behalf of and in coordination with FHWA, initiated the Section 106 process and presented the Study by letter to MHT. The VDHR and other consulting parties confirmed their intent to participate in the Section 106 consultation process on April 12, 2018.

In 2018, MDOT SHA and FHWA also invited additional parties to participate in the Section 106 compliance process for this undertaking (36 CFR Part 800.2[c][5] and 800.3[f]), including tribal, Federal, state, and local governments. FHWA consulted with Federally-recognized tribes; this included sending letters on June 17, 2019 to Virginia tribes requesting their interests in both Maryland and Virginia. MDOT SHA has and will continue to identify additional potential consulting parties as the Study progresses. **Table 4-8** lists consulting parties invited to consult in the Study to date.

Table 4-8: Section 106 Consulting Parties List

Federally Recognized Tribes		
Absentee-Shawnee Tribe of Oklahoma Delaware Nation Delaware Tribe of Indians Chickahominy Indian Tribe Chickahominy Indians Eastern Division Eastern Shawnee Tribe of Oklahoma	Monacan Indian Nation Nansemond Indian Tribe Oneida Indian Nation Onondaga Nation Pamunkey Indian Tribe Rappahannock Tribe, Inc.	Saint Regis Mohawk Tribe Seneca-Cayuga Nation Shawnee Tribe Tuscarora Nation Upper Mattaponi Indian Tribe

State Recognized and Other Tribal Groups	
Piscataway Conoy Tribe of Maryland (PCT) PCT - Cedarville Band of Piscataway PCT - Choptico Band of Piscataway	Piscataway Conoy Confederacy and Subtribes of Maryland Piscataway Indian Nation
Federal Agencies	
Federal Railroad Administration Federal Transit Administration General Services Administration National Capital Planning Commission National Institute of Standards and Technology	National Park Service US Army Corps of Engineers US Department of Agriculture US Department of Defense US Postal Service
State Agencies and Organizations	
Maryland Commission on Indian Affairs MDOT Maryland Transit Administration MDOT Maryland Transportation Authority Maryland Historical Trust Preservation Maryland	Virginia Department of Historic Resources Virginia Department of Transportation Maryland Department of Planning Virginia Department of Environmental Quality Washington Metropolitan Area Transit Authority
County Agencies and Organizations	
Maryland Milestones/Anacostia Trails Heritage Area, Inc. Montgomery County Department of Correction and Rehabilitation Montgomery County Department of General Services Montgomery County Department of Transportation Montgomery County Heritage Area, Heritage Tourism Alliance of Montgomery County Maryland-National Capital Parks and Planning Commission – Montgomery County Planning – Historic Preservation Maryland-National Capital Parks and Planning Commission – Montgomery Parks	Maryland-National Capital Parks and Planning Commission – Prince George's County Planning – Historic Preservation Maryland-National Capital Parks and Planning Commission – Prince George's County Department of Parks and Recreation Metropolitan Washington Council of Governments Montgomery Preservation, Inc. Prince George's County Historic Preservation Commission Prince George's County Historical and Cultural Trust Prince George's Heritage, Inc. Prince George's County Department of Public Works and Transportation
Municipal Agencies and Other Organizations	
C&O Canal Association C&O Canal Trust Cabin John Citizens' Association Carderock Springs Citizens' Association City of College Park City of Gaithersburg City of Glenarden City of Greenbelt City of New Carrollton City of Rockville City of Takoma Park	Friends of Moses Hall Gibson Grove First Agape A.M.E. Zion Church Historic Takoma, Inc. Peerless Rockville Rock Creek Conservancy Sandy Spring Ashton Rural Preservation Consortium Save Our Seminary at Forest Glen Sierra Club Maryland Chapter Town of Forest Heights Town of Morningside Village of North Chevy Chase

Three consulting parties' meetings have taken place: May 3 and November 13, 2018, and June 17, 2019. FHWA attended all three meetings. Future consulting parties' meetings are anticipated to continue discussions of historic properties findings, the Preferred Alternative and development of the Programmatic Agreement (PA) including efforts to mitigate adverse effects. (Refer to **Section 4.7.4.A** of this chapter and **Appendix H**, *Draft Section 106 Programmatic Agreement*, for additional information.)

On January 10, 2020 the *Cultural Resources Technical Report* (**Appendix G**) was provided to the consulting parties for their review and comment. In a letter dated March 12, 2020, MHT concurred with MDOT SHA's evaluation determinations of the archaeological resources investigated in Maryland during the study. MHT also agreed that further Phase I and Phase II archaeological investigations are warranted in the specified areas stated in *Volume 4* of the *Cultural Resources Technical Report* (**Appendix G**). They agreed that further consultation and coordination are needed to address the identification and treatment of cemeteries that may be impacted by the undertaking. Additionally, MHT concurred that significant submerged cultural resources are unlikely to be located within the study corridor and underwater archaeological investigations are not warranted at this time.

MHT also concurred with MDOT SHA's determination that the proposed undertaking will have an adverse effect on historic properties in Maryland. In addition, MHT agreed with the specific findings stated in MDOT SHA's submittal letter dated January 10, 2020 and presented in *Volume 1* of the *Cultural Resources Technical Report* (**Appendix G**).

The VDHR completed the review of *Volume 6* of the *Cultural Resources Technical Report* (**Appendix G**). In a letter dated February 14, 2020, VDHR concurred that Sites 44FX0374 and 44FX0379 are eligible for listing on the National Register of Historic Places (NRHP) under Criterion D. VDHR also concurred that sites 44FX3160 and 44FX3900 are not eligible for listing on the NRHP. In addition, they agreed that the portion of Site 44FX0373 located within the APE does not contribute to the site's overall potential eligibility for listing on the NRHP. Additionally, VDHR concurred that Sites 44FX0322, 44FX0326 and 44FX0377 should remain unevaluated for NRHP eligibility and no further archaeological investigation is necessary in the Build Alternative's limits of disturbance for these sites.

In the letter, VDHR also informed MDOT SHA that they disagreed that Sites 44FX0381 and 44FX0389 are not eligible and recommended that both sites as individually eligible for listing on the NRHP under Criterion D. Additionally, VDHR does not endorse the decision to list Sites 44FX0373, 44FX0374, 44FX0379, 44FX0381, 44FX0389, 44FX0380, 44FX0390, and 44FX0227 as an archaeological district. MDOT SHA will continue consultation with VDHR, NPS, and other parties on resolving the disagreement regarding eligibility and the district.

On March 16, 2020, other consulting parties concluded their review of the *Cultural Resources Technical Report* (**Appendix G**). Consulting party comments have been received and will be reviewed and addressed via ongoing consultation.

Public involvement requirements regarding historic resources are being fulfilled under the requirements of the Section 106 regulations and consistent with Study public outreach and NEPA public participation. The location of the historic properties is shown on the *Environmental Resource Mapping* (**Appendix D**). Complete details on Section 106 coordination and copies of the correspondence can be found in the *Volume 1* of the *Cultural Resources Technical Report* (**Appendix G)**.

4.7.2 Affected Environment

A. Historic Architectural Resources

As of November 26, 2019, 329 historic architectural resources were identified within the APE and were evaluated for the NRHP. These were reviewed by MHT, VDHR, and additional consulting parties. Out of the 329 resources identified, a total of 51 known and newly determined-eligible historic properties were identified within the APE (refer to **Table 4-9** and the resource mapping in **Appendix D** (*Environmental Resource Mapping*)). MDOT SHA has completed eligibility evaluations of above-ground resources in the APE per the methodology described in the Gap Analysis; there are no eligibility findings where SHPO concurrence has not been obtained. Refer to the *Cultural Resources Technical Report* (**Appendix G**) for the eligibility determinations and *Environmental Resource Mapping* (**Appendix D**) for mapping of the historic properties.

Table 4-9: Historic Properties within the APE

State	MIHP#/ VDHR#	Name	County	Period of Significance	NRHP Status	NRHP Criteria
MD	M: 30-38	Academy Woods	Montgomery	1967-1974	Eligible (Upon reaching 50 years)	C
MD	PG:LAU-29	Baltimore & Ohio Railroad, Washington Branch	Prince George's	1835-1945	Eligible	A, C
MD	PG:71A-54	Baltimore & Potomac Railroad, Washington City Branch	Prince George's	1872-1945	Eligible	A, C
MD	PG:69-26	Baltimore-Washington Parkway	Prince George's	1942-1954	Listed	A, C
MD	PG:62-14	Beltsville Agricultural Research Center (BARC)	Prince George's	Unspecified	Eligible	A, C
MD	M: 35-121	Burning Tree Club	Montgomery	1922-1923	Eligible	A, C
MD	M: 36-37	Calvary Evangelical Lutheran Church	Montgomery	1948, ca. 1950, ca. 1965	Eligible	C, Criteria Consideration A
MD	PG:70-95	Capitol Car Distributors	Prince George's	1965	Eligible	C
MD	M: 31-7	Capitol View Park Historic District	Montgomery	1887-1941	Eligible	A, C
MD	M: 29-59	Carderock Springs Historic District	Montgomery	1962-1967	Listed	A, C
MD	M: 35-194	Carderock Springs South	Montgomery	1966-1971	Eligible	C
MD	PG:73-36	Carsondale	Prince George's	1955-1962	Eligible	A

State	MIHP#/ VDHR#	Name	County	Period of Significance	NRHP Status	NRHP Criteria
MD	M: 31-72	Cedar Lane Unitarian Church	Montgomery	1958-1963	Eligible	C, Criteria Consideration A
MD	M: 31-8-5	Charles E. Brock Property	Montgomery	1908	Eligible	C
MD	M: 12-46	Chesapeake and Ohio Canal National Historical Park	Montgomery	1828-1924	Listed	A, C, D
MD	M: 29-79	Congressional Country Club	Montgomery	1924-1978	Eligible	A, C
MD	M: 29-47	David W. Taylor Model Basin	Montgomery	1938-1970	Listed	A, C
MD	M: 31-8	Forest Glen Historic District	Montgomery	1891-early 20th century	Eligible	A, C
MD and VA	M: 35-61 and 029-0228 (Virginia)	George Washington Memorial Parkway/Clara Barton Parkway	Montgomery/ Arlington and Fairfax (Virginia)/District of Columbia	1930-1966	Listed	B, C
MD	M: 29-39	Gibson Grove A.M.E. Zion Church	Montgomery	1923	Eligible	A, Criteria Consideration A
MD	PG:72-26 and PG:73-26	Glenarden Historic District	Prince George's	1939-1977	Eligible	A
MD	M: 31-26	Greater Washington Boy's and Girl's Club, Silver Spring Branch (Harry F. Duncan Building)	Montgomery	ca. 1950	Eligible	A, C
MD	PG:67-4	Greenbelt Historic District	Prince George's	1935-1941	Listed (NHL)	A, C
MD	PG:67-36	Greenbelt Maryland National Guard Armory	Prince George's	1955	Eligible	C
MD	PG:67-69	Greenbelt Park	Prince George's	1945-1972 (for Mission 66 era)	Eligible (for the purposes of Section 106)	A, C, D
MD	M: 30-39	Grosvenor Park	Montgomery	1963-1966	Eligible (Upon reaching 50 years)	A, C
MD	M: 35-199	Hawley Estate (Federation of American Societies for Experimental Biology)	Montgomery	1929-1954	Eligible	C
MD	M: 35-38	In the Woods (David Fairchild Estate)	Montgomery	1906-1926	Eligible	B, C
MD	M: 32-34	Indian Spring Club Estates and Indian Spring Country Club	Montgomery	1939-1957	Eligible	A, B, C

State	MIHP#/ VDHR#	Name	County	Period of Significance	NRHP Status	NRHP Criteria
MD	PG:78-39	Little Washington	Prince George's	1938-1969	Eligible	A
MD	M: 35-120	Locust Hill Estates	Montgomery	1941-1949	Eligible	A, C
MD	PG:67-41	Maryland State Highway Administration (MDOT SHA) District 3 Headquarters Building	Prince George's	1967	Eligible	C
MD	M: 37-16	Metropolitan Branch, B&O Railroad	Montgomery	1866-1873	Eligible	A, C
MD	PG:76A-39	Morningside	Prince George's	ca.1940-ca.1955	Eligible	A, C
MD	M: 20-47	National Institute of Standards and Technology (NIST) Headquarters	Montgomery	1963-1969	Eligible	A, C
MD	M: 36-1	National Park Seminary Historic District/Forest Glen/ Walter Reed A.M.C. Annex	Montgomery	1894-ca. 1930	Listed (MHT Easement)	Unspecified
MD	M: 29-52	Naval Surface Warfare Center Carderock Division (NSWCCD) Historic District	Montgomery	1938-1958	Eligible	A, C
MD	PG:72-76	New Carrollton Metrorail Station and Yard	Prince George's	1978-1983	Eligible (Upon reaching 50 years)	A, C
MD	PG:75A-35	Percy Benson Sansbury Property	Prince George's	ca. 1930	Eligible	C
MD	M: 35-162	Philip F. Gormley House/Gagarin Property	Montgomery	ca. 1912	Eligible (MHT Easement)	C
MD	M: 32-5	Polychrome Historic District	Montgomery	1934-1935	Listed	A, C
MD	M: 36-87	Rock Creek Stream Valley Park, Units 2 and 3	Montgomery	1931-1970	Eligible	A
MD	M: 32-15	Sligo Creek Parkway	Montgomery	Unspecified	Eligible	A, C
MD	PG:72-3	Street Railway Service Building	Prince George's	Unspecified	Eligible	A, C

State	MIHP#/ VDHR#	Name	County	Period of Significance	NRHP Status	NRHP Criteria
MD	PG:76A-22	Suitland Parkway	Prince George's	1942-1944	Listed	A, C
MD	M: 26-72-1	Ward Building	Montgomery	1978	Eligible (Upon reaching 50 years)	C
MD	M: 29-49	Washington Aqueduct	Montgomery	1853-1939	Listed (NHL)	A, C
MD	M: 33-31	Washington Coca-Cola Bottling Plant (Silver Spring)	Montgomery	1969	Eligible	C
MD	M: 31-71	Washington DC Temple (Church of Jesus Christ Latter-day Saints)	Montgomery	1971-1979	Eligible (Upon reaching 50 years)	A, C
MD	M: 30-15	Wild Acres (Grosvenor Estate)	Montgomery	1928-1966	Eligible	A, B, C
MD	M: 26-71	Woodley Gardens	Montgomery	1960-1970	Eligible	A, C

B. Archaeological Resources

Approximately 67 archaeological resources were identified within the APE. Fifty-seven of the resources were identified prior to the Study. Of the previously identified resources, site 18PR94 was determined eligible for the NRHP and was previously fully excavated as part of an archaeological mitigation associated with a separate project (**Table 4-10**). In addition, MDOT SHA recommended additional testing for one previously-known site (18PR750), located in the I-495 and I-95 interchange, in order to evaluate its NRHP eligibility. A Phase II evaluation was completed as part of this study and 18PR750 was determined not eligible for the NRHP, with MHT concurrence and requires no further investigation.

Ten newly-identified archaeological resources were identified in Maryland; seven were determined not eligible for the NRHP and require no further investigation. A Phase II evaluation (archaeological investigation to determine NRHP eligibility) was completed for two of the newly-discovered sites in Maryland within the C&O Canal National Historical Park, and they were determined NRHP-eligible (**Table 4-10**). Site 18MO752 within Cabin John Park has been recommended for Phase II evaluation, and this work has not yet been completed. In addition, design refinements would now impact portions of four unevaluated archaeological sites (18MO190, 18MO191, 18MO457, and 18MO510), and further archaeological work is recommended at these locations. Additional intensive archaeological testing was conducted on a number of sites in Virginia that lacked formal agency determination and concurrence on

NRHP eligibility. MDOT SHA's field investigations identified five related resources contributing to a NRHP-eligible archaeological district within the GWMP[9]; the district is proposed for treatment in the PA.

Table 4-10: Newly-Identified Eligible Archaeological Resources

State	MIHP#/ VDHR#	Name	County	Period of Significance	NRHP Status	NRHP Criteria
MD	18MO749	C&O Canal Site 1	Montgomery	Early Woodland	Eligible	D
MD	18MO751	C&O Canal Site 3	Montgomery	1828-1924	Eligible	D
MD	18PR94	Indian Creek V	Prince George's	Late Archaic	Eligible	D
VA	(N/A)	Dead Run Ridges Archaeological District[1]	Fairfax	Late Archaic-Woodland	Eligible	D

Note: [1] In a letter dated February 14, 2020 VDHR did not concur with characterizing the resources as an archaeological district and recommends Sites 44FX0374, 44FX0379, 44FX0381 and 44FX0389 individually eligible for listing on the NRHP.

C. Historic Cemeteries

Two historic cemeteries in Maryland were identified within the APE and are located within the LODs of the Build Alternatives. The Montgomery County Poor Farm Cemetery is located along I-270 and was associated with the Montgomery County Almshouse. Archaeological remains of the Poor Farm Cemetery were identified in 1984, and salvage archaeology was later conducted in 1987 when a small number of remains were identified and reinterred. An unknown but large number of interments were relocated from the Poor Farm Cemetery during construction of I-270, and an unknown number of unidentified remains may likely remain within the LODs of the Build Alternatives. The Moses Hall Cemetery (Moses Hall/ Morningstar Tabernacle No. 88 Moses Cemetery) is located on the west side of Seven Locks Road, south of I-495, and was closely associated with the Gibson Grove AME Zion Church community. The parcel containing the cemetery falls within the LODs of the Build Alternatives and likely contains an unknown number of interments. Several additional historic cemeteries in Maryland were identified within or near the APE but would not be impacted by any of the Build Alternatives. No historic cemeteries were identified in Virginia. Discussion of all the historic cemeteries identified during the Study can be found in the *Volumes 2* and *4* of the *Cultural Resources Technical Report* (**Appendix G**).

[9] February 14, 2020 - VDHR did not concur with characterizing the resources as an archaeological district and recommends four of the five sites individually eligible for listing on the NRHP (Sites 44FX0374, 44FX0379, 44FX0381 and 44FX0389). MDOT SHA, NPS and VDHR will continue consultation on eligibility and treatment of resources.

4.7.3 Environmental Consequences

An effect to a historic property occurs when there is an alteration to the characteristics of an historic property qualifying it for inclusion in or eligibility for the NRHP (36 CFR Part 800.16[i]). An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 CFR Part 800.5[a][1]). The No Build Alternative would not result in any study-related construction and would therefore not directly affect any historic architectural or archaeological resources.

Four Evaluation Criteria for Inclusion in the NRHP

A. Associated with events that have made a significant contribution to the broad patterns of our history; or
B. Associated with the lives of persons significant in our past; or
C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. Have yielded or may be likely to yield, information important in prehistory or history.

A. Historic Architectural Resources

Ten historic architectural properties (including parks and parkways) within the APE fall within the LODs of the Build Alternatives and would experience an adverse effect (**Table 4-11** and **Table 4-12**). No properties are proposed for complete demolition or destruction but contributing features of the properties would experience physical impacts of varying degrees.

Table 4-11: Historic Architectural Properties with Known Adverse Effect

State	MIHP#/ VDHR#	Jurisdiction	Name	Period of Significance	NRHP Criteria	Nature of Adverse Effect
MD	PG:69-26	NPS/ NACE[1]	Baltimore-Washington Parkway	1942-1954	A, C	LOD Impacts to contributing features; diminishment of the integrity of setting and association
MD	M: 12-46	NPS/ CHOH	Chesapeake and Ohio Canal National Historical (CHOH) Park	1828-1924	A, C, D	LOD Impacts to contributing features; diminishment of setting
MD and VA	M: 35-61 and 029-0228 (Virginia)[2]	NPS/ GWMP	George Washington Memorial Parkway (GWMP)/Clara Barton Parkway	1930-1966	B, C	LOD Impacts to contributing features; diminishment of setting (Virginia); temporary diminishment of setting (Maryland)
MD	PG: 72-26 and PG:73-26	Private/ Multiple Owners	Glenarden Historic District	1939-1977	A	LOD Impacts to contributing features; Diminishment of the integrity of design, materials, and setting
MD	PG:67-69	NPS/ NACE[1]	Greenbelt Park	Unspecified	A, C, D	Diminishment of setting; temporary diminishment of feeling

State	MIHP#/ VDHR#	Jurisdiction	Name	Period of Significance	NRHP Criteria	Nature of Adverse Effect
MD	M: 32-34	Private/ Multiple Owners	Indian Spring Club Estates and Indian Spring Country Club	1939-1957	A, B, C	LOD Impacts to contributing features; diminishment of the integrity of design, materials, and workmanship of the property
MD	M: 37-16	CSX	Metropolitan Branch, B&O Railroad	1866-1873	A, C	LOD Impacts to contributing features; diminishment of integrity of design, materials, and workmanship
MD	M: 36-1	Private	National Park Seminary Historic District/Forest Glen/Walter Reed A.M.C. Annex	1894-ca. 1930	Unspec-ified	LOD Impacts to contributing features; diminishment of the integrity of design and setting
MD	M: 36-87	M-NCPPC	Rock Creek Stream Valley Park, Units 2 and 3	1931-1970	A	LOD Impacts to contributing features; diminishment of the integrity of design, materials, and setting
MD	M: 32-15	M-NCPPC	Sligo Creek Parkway	Unspecified	A, C	LOD Impacts to contributing features; diminishment of integrity of design, materials, and workmanship; temporary diminishment of integrity of setting, feeling, and association

Notes: [1] National Park Service-National Capital Parks-East

[2] In a letter dated February 14, 2020 VDHR did not concur with characterizing the resources as an archaeological district and recommends Sites 44FX0374, 44FX0379, 44FX0381 and 44FX0389 individually eligible for listing on the NRHP.

Table 4-12: Number of Historic Properties (Historic Architectural and Archaeological Resources) with Adverse Effects by Build Alternative

	Alt 5[1]	Alt 8	Alt 9	Alt 9M	Alt 10	Alt 13B	Alt 13C
Historic Properties with Adverse Effect	13	13	13	13	13	13	13
Historic Properties where Adverse Effect Cannot be Determined	7	7	7	7	7	7	7

Note: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

Based on design information available when the *Cultural Resources Technical Report* was shared with consulting parties in January 2020, effects could not be fully determined on seven historic properties (refer to **Table 4-13** and **Appendix G, Volume 1**). These properties are within or adjacent to the LODs and may experience diminishment depending on final design information which is not yet available. MDOT SHA proposed to treat these historic properties under the PA for the Study to evaluate effects, and continue to avoid, minimize, or mitigate adverse effects, as design advances.

Table 4-13: Historic Properties Where Effects Cannot Be Fully Determined

State	MIHP#/ VDHR#	Jurisdiction	Name	Period of Significance	NRHP Criteria	Nature of Possible Adverse Effect
MD	M: 31-7	Private/ Multiple Owners	Capitol View Park Historic District	1887-1941	A, C	Dependent on design and construction needs, there may be diminishment of design and setting to contributing elements of the district.
MD	M: 29-59	Private/ Multiple Owners	Carderock Springs Historic District	1962-1967	A, C	Dependent on design and construction needs, there may be diminishment of design and setting to contributing elements of the district.
MD	PG:73-36	Private/ Multiple Owners	Carsondale	1955-1962	A	Dependent on design and construction needs, there may be diminishment of design and setting to contributing elements of the district.
MD	M: 29-39	Private	Gibson Grove A.M.E. Zion Church	1923	A	Dependent on design and construction needs, there may be diminishment of the property's setting.
MD	M: 32-5	Private/ Multiple Owners	Polychrome Historic District	1934-1935	A, C	Dependent on design and construction needs, there may be diminishment of design, materials, workmanship, and setting
MD	PG:76A-22	NPS/ NACE[1]	Suitland Parkway	1942-1944	A, C	If contributing features are transferred out of federal control, an adverse effect may result.
MD	M: 29-49	US Army Corps of Engineers	Washington Aqueduct (NHL)	1853-1939	A, C	Current project engineering is not expected to alter the character of the property, and ground disturbance will be limited to avoid effects to the aqueduct; however, construction impacts are not fully determined.

Note: [1] National Park Service-National Capital Parks-East

Upon additional review, MDOT SHA and FHWA believe sufficient information is available or minor design restrictions can be made for any of the Build Alternatives to provisionally revise determinations on several of these properties to facilitate analysis under Section 106 and Section 4(f). Capitol View Park and Washington Aqueduct would likely experience no adverse effect, while Carsondale, with minor but numerous impacts to contributing properties, would be adversely affected. MDOT SHA will continue consultation on these properties prior to finalization of the PA and prior to the FEIS.

Regarding Suitland Parkway, no standing structures or features that contribute to the historic significance of Suitland Parkway would experience an impact from the Build Alternatives. The existing bridges carrying I-495 over Suitland Parkway are currently being replaced by MDOT SHA. The bridges currently under construction will be wider in order to accommodate the Build Alternatives, but minor impacts are still anticipated. On March 12, 2020, MHT concurred that based on current design information, Section 106 effects cannot be fully determined. As transfer of property out of federal control may take place – a Section 106 adverse effect may result as described at 36 CFR 800.5(a)(2)(vii), in the absence of enforceable restrictions to ensure preservation. If ongoing coordination with NPS concludes that the proposed actions within the boundaries of Suitland Parkway can be accomplished via a special use permit that would not require the transfer of property ownership, or other legally enforceable conditions can be identified that avoid diminishment and ensure long-term preservation of any contributing features to the historic property, MDOT SHA would coordinate an Section 106 finding of no adverse effect to MHT and request signature acknowledging a finding of *de minimis* impact. The results of ongoing coordination and Section 106 consultation will be documented in the Final Section 4(f).

Of the remaining 34 eligible or listed properties within the APE, none would be adversely affected by the Build Alternatives. These properties would either experience slight alteration of the characteristics that qualify them for inclusion in the NRHP, but there would be no diminishment of these characteristics, or there would be no appreciable alteration of the properties at all.

On March 12, 2020, MHT concurred with the eligibility and effects determination of historic architectural resources in Maryland as well as the need for continued coordination of the seven historic properties where effects cannot be fully determined. MDOT SHA and FHWA are continuing consultation with VDHR on eligibility and effect determinations in Virginia.

a. Baltimore-Washington Parkway

The Baltimore-Washington Parkway, eligible under criteria A and C, would be adversely affected. It extends from the eastern border of the District of Columbia near the Anacostia River, through Prince George's and Anne Arundel counties and terminates just below Jessup Road (MD 175) at the Baltimore City line. It is associated with urban development of the National Capital as a Federal center. It exemplifies the last period of construction for this type of road and is the only fully developed parkway of its kind in Maryland. The period of significance is from 1942-1954. The Build Alternatives under consideration include modifications to contributing elements of the Parkway to accommodate a new interchange with I-495. Work is expected to include reconfiguring the existing interchange of I-495 and Baltimore-Washington Parkway; constructing direct access ramps to and from the managed lanes and the Baltimore-Washington Parkway; replacing the existing bridges carrying the parkway over I-495; constructing, operating, and maintaining stormwater management facilities; constructing a noise wall; and providing access for construction vehicles and materials.

LOD impacts are concentrated in two areas: a linear area along the Baltimore-Washington Parkway that extends approximately 3,800 feet north of the interchange with I-495; and a linear area along the Baltimore-Washington Parkway that extends approximately 3,000 feet south of the interchange with I-495. Activities in the LODs for the Build Alternatives would consist of grading, tree removal, and landscape plantings; realigning the existing parkway to accommodate direct access ramps to and from the managed lanes; realigning the interchange with Southway and Greenbelt Road; replacing the bridge carrying Greenbelt Road over Baltimore-Washington Parkway; constructing, operating, and maintaining stormwater management facilities; updating and installing signage; and access for construction equipment and materials.

Additional and/or elevated structure to accommodate managed lanes along I-495 at the Baltimore-Washington Parkway would likely diminish the integrity of the Parkway's setting and association as a designed scenic parkway.

b. Chesapeake and Ohio Canal National Historical Park

Built between 1828 and 1850, the Chesapeake and Ohio (C&O) Canal operated until 1924, extending 184.5 miles from Georgetown, DC to Cumberland, Maryland. It represents one of the most intact and impressive survivals of the American canal-building era. The C&O Canal National Historical Park, eligible under criteria A, C, and D, would be adversely affected.

Project activities at this location include access for construction vehicles and materials to build the new American Legion Bridge and remove the existing structure; the construction, operation, and maintenance of the realigned ramp from I-495 northbound to Clara Barton Parkway; the construction of a trail connection between a shared use path on the east side of the new American Legion Bridge and the C&O Canal towpath; the realignment of Rock Run; and the construction, operation, and maintenance of linear stormwater management features beneath the shoulders of I-495 mainline, south of the towpath.

The LODs for the Build Alternatives are concentrated along the northbound and southbound lanes of the existing I-495 alignment and to the south of the C&O Canal towpath both west and east of the highway. In order to move construction vehicles and materials to and from the base of the American Legion Bridge, temporary bridge crossings would be built across the canal and towpath. The locations of these crossings as well as the access points on Clara Barton Parkway have been coordinated with NPS. Two bridges and access roads are necessary to provide safe movement of construction equipment to, from and around the construction site. Having two construction roads will also shorten the duration of construction. The temporary access road and temporary bridges would require the removal of trees, grading land, and placing quarry spalls to support the movement of heavy equipment. These activities would require the temporary closure of the canal towpath for the construction and removal of the grade separated crossings that would be in place during construction of the new American Legion Bridge, which is anticipated to last between four and five years.

The Build Alternatives include expansion of the American Legion Bridge within the park boundaries, increasing visual and physical intrusion into the setting of the park, resulting in diminishment of setting. Long-term construction access and staging is also required at the park, which will cause additional temporary diminishment of setting, feeling, and association for the duration of construction.

c. George Washington Memorial Parkway/Clara Barton Parkway

As one of the nation's premier parkways, George Washington Memorial Parkway/Clara Barton Parkway comprises 7,146 acres and extends 38.3 miles in association with the Potomac River. The northern section of the parkway runs on opposite sides of the Potomac River from Arlington Memorial Bridge to the Capital Beltway/Interstate 495, a distance of 9.7 miles in Virginia, and includes the 6.6 mile Clara Barton Parkway.

The George Washington Memorial Parkway/Clara Barton Parkway, eligible under criteria B and C, would be adversely affected. Activities in Virginia include access for construction vehicles and materials to build the two new American Legion bridge structures and remove the existing structure; the construction, operation, and future maintenance of new direct access ramps to the managed lanes on I-495; and the installation, operation, and future maintenance of electrical conduit and signage to inform the traveling public of toll rates and operation of the facility. The LODs for the Build Alternatives in Virginia are concentrated at two locations: in the quadrant southeast of the American Legion Bridge and along a small strip of land north of the westbound lanes of George Washington Memorial Parkway extending from west of the bridges at Dead Run to where the parkway approaches the existing interchange with I-495.The large area within George Washington Memorial Parkway southeast of the American Legion Bridge is needed to construct a switchback road that will be used to maneuver construction vehicles and materials up and down the steep grade along the bank of the Potomac River. To erect the new bridge, construction cranes will be placed in each of the four quadrants adjacent to the existing crossing. Construction barges in the river will reduce the need for additional impacts on land. Access to the construction area within George

Washington Memorial Parkway will be from a temporary access road built within existing VDOT right-of-way.

Activities in Maryland consist of construction vehicle and material access beneath the grade-separated crossing with I-495 to accommodate the bridge replacement; the construction of a temporary access road to transport vehicles and materials to the American Legion Bridge construction site; and the construction, maintenance, and operation of a linear stormwater management feature that extends from the area currently maintained by MDOT SHA in a transportation use to an area within Clara Barton Parkway. The relocation of the I-495 interchange ramps is also required.

The LODs for the Build Alternatives in Maryland are concentrated in three locations: extending approximately 1,000 linear feet along the north side of Clara Barton Parkway east of the I-495 bridge; and two construction vehicle access locations to the American Legion Bridge. The linear impact north of Clara Barton Parkway would consist of tree removal, grading, and the installation of a stormwater management facility.

Both construction vehicle access locations are south of the parkway. One is approximately 1,000 feet west of the I-495 bridge. The other is approximately 450 feet east of the bridge. These locations were coordinated with NPS. Having two construction access locations will shorten the duration of construction and provide safe movement of equipment and materials to and from the construction site. Impacts associated with the construction vehicle access consist of tree removal, land grading, and placing quarry spalls to support the movement of equipment and materials. Construction access would be required for the duration of construction of the new American Legion Bridge which is anticipated to last between four and five years.

In Virginia, the George Washington Memorial Parkway would be adversely affected by expansion of the American Legion Bridge within the park boundaries, causing increased visual and physical intrusion into the setting of the park, resulting in diminishment of setting and possibly landscape design and materials. In Maryland, the Clara Barton Memorial Parkway would experience temporary diminishment of setting and feeling for the duration of construction. Long-term construction access and staging is also required at the parkway, which will cause additional temporary diminishment of setting and feeling for the duration of construction.

d. Glenarden Historic District

Glenarden is a historically African-American town located between John Hanson Highway and Landover Road in Prince George's County. The town is bisected by the Capital Beltway. Glenarden originally consisted of three subdivisions: Glenarden Heights (1911), Glenarden (1913) and Ardwick Park (1921). The three subdivisions today are characterized by modern, suburban single- and multi-family houses. Glenarden also includes municipal, recreational and educational facilities.

Glenarden Historic District, eligible under criterion A, would be adversely affected. Activities at this location include widening I-495; replacing the Glenarden Parkway overpass; constructing, operating, and maintaining stormwater management facilities; and access for construction vehicles and materials. The LODs for the Build Alternatives include:

- An area on a vacant lot at the northern end of the historic district east of the I-495 outer loop;

- narrow linear area that extends 1,600 feet along the eastern edge of the I-495 outer loop;
- A narrow linear area that extends approximately 3,800 feet along the western edge of the I-495 inner loop;
- Narrow linear areas that extend approximately 1,000 feet along the north and south sides of Glenarden Parkway; and
- A narrow linear area that extends approximately 400 feet along the east and west sides of 7th Street.

Although no dwellings would be physically affected, the LODs encompass significant portions of yards, including some outbuildings, of 24 dwellings that contribute to the district's significance. These include the rear yards of 13 dwellings along the west side of 7th Street (1418, 1420, 1431, 1433, 1436, 1504, 1506, 1508, 1516, 1520, 1522, 1524, and 1526) and 4 on the east side of Reichter Street (8616, 8620, 8706, and 8708). Alterations tying a new bridge into existing streets are also proposed, and the LODs include portions of the front and rear yards of 4 contributing dwellings along Glenarden Parkway (8901, 8903, 8932, 9001) and 3 dwellings at 1501 4th Street, 1504 5th Street, and 1438 8th Street. Activities affecting contributing resources in the district consist of grading; tree removal; paving; removing and replacing an existing noise wall along I-495; constructing, operating, and maintaining stormwater management facilities; raising the height of the local roads to match the elevation of the new bridge carrying Glenarden Parkway across I-495; and access for construction vehicles and materials.

These actions would diminish the integrity of design, materials, and setting of the district and contributing properties. Construction of the new bridge within the district would also result in temporary diminishment of setting, feeling, and association of the district for the duration of construction.

e. Greenbelt Park

Greenbelt Park is forested park located approximately 10 miles northeast of Washington, D.C., and is situated just within the Capital Beltway (I-495). The park received its National Park designation in 1950 and was acquired along with the land that would form the Baltimore-Washington Parkway, which divides the park in a roughly north-south direction.

The NPS has made a preliminary determination of eligibility for Greenbelt Park under criteria A, C, and D, and the park would be adversely affected. Activities at this location include widening along I-495; the realignment of the ramp from eastbound Greenbelt Road to southbound Baltimore-Washington Parkway; augmentation and repair of an existing storm drain outfall; and access for construction vehicles and materials. The LODs for the Build Alternatives include three locations: a narrow strip approximately 1600 feet in length along the southern side of the ramp from eastbound Greenbelt Road to the southbound Baltimore-Washington Parkway; and two small rectangular areas south of the ramp from northbound Baltimore-Washington Parkway to the I-495 inner loop. Work within the park includes tree removal, grading, augmentation of storm drain outfall pipes, construction of a retaining wall, and access for construction equipment and materials. A portion of the perimeter trail may need to be relocated near the ramps from Greenbelt Road to the southbound Baltimore-Washington Parkway.

The park, significant for its recreational history, would experience some diminishment of setting, due to the visibility and proximity of an enlarged interchange at the Baltimore-Washington Parkway. The property may also experience some temporary diminishment of feeling during construction. The interchange is uniquely situated in comparison with other properties, in that Greenbelt Park has discontinuous portions bordering two quadrants of the interchange. Features within the park would not be physically affected.

f. Indian Spring Club Estates and Indian Spring Country Club

Indian Spring Club Estates and Indian Spring Country Club is a 52-acre district comprising a 205-building planned suburban development and the former clubhouse and grounds for the Indian Spring Country Club. The district is roughly bounded by Colesville Road to the west, the on-ramp to I-495/Capital Beltway on the northwest, I-495/Capital Beltway to the north, Indian Spring Terrace Park to the northeast, and the southern property lines of the single-family dwellings on the south side of Normandy Drive, Lawndale Court, and Clearview Place.

The Indian Spring Club Estates and Indian Spring Country Club, eligible under criteria A, B, and C, would be adversely affected. Activities at this location include widening I-495; relocating the on-ramp from northbound US 29 to the I-495 inner loop; and access for construction vehicles and materials. The LODs for the Build Alternatives extend approximately 750 feet along the south side of the existing ramp and I-495. Work within the historic district consists of tree removal, grading, and realigning the ramp from northbound US 29 to the I-495 inner loop. These activities would displace indoor and outdoor swimming pools, including a wading pool, at the Silver Spring YMCA at 9800 Hastings Drive.

The main outdoor swimming pool, part of the original country club, is a contributing feature of the district. Demolition/removal of the swimming pool, and conversion of a portion of the property to highway use would diminish the integrity of design, materials, and workmanship of the property. Effects are confined to the original country club property, and the integrity of residences and other properties within the district would not be diminished.

g. Metropolitan Branch, B&O Railroad

The principal rail route from Washington to the West, the Metropolitan Branch extends along a narrow right-of-way from Union Station, Washington, through Montgomery & Frederick Counties to Point of Rocks where it connects with the original "main line" of the B&O Railroad. The Metropolitan Branch of the B&O Railroad is eligible under criterion A and C for its association with the transportation industry, as well as the agricultural and residential development of Montgomery County.

The Metropolitan Branch of the B&O Railroad would be adversely affected. Activities at this location include realigning the railroad crossing to the west and replacing the existing bridge across I-495. The section of the railroad within the LODs for the Build Alternatives consists of approximately 3500 linear feet of railroad, which extends approximately 1,800 feet south of I-495 and 1700 feet north. Work within the historic boundary includes providing construction access for vehicles and materials, removing the existing rail and track bed, and constructing a new alignment. The railroad would be realigned in a manner that allows continued operation during construction of both I-495 and the active CSX railroad. The portion of the historic property that would experience an impact consists of the rails, rail prism, bridge across I-495, and Small Structure 15046X0, which contributes to the significance of the railroad. While the small structure would not be removed, it may be altered by extension to the west in a manner similar to when it was extended beneath Forest Glen Road in 1979. Alteration would result in a diminishment of integrity of design, materials, and workmanship of the property.

h. National Park Seminary Historic District/Forest Glen/Walter Reed Army Medical Center Annex

Located south of I-495 at the intersection of Seminary Road, the National Park Seminary Historic District/Forest Glen/Walter Reed Army Medical Center Annex is listed in the NRHP, although the documentation, prepared prior to the Study, does not specify under which eligibility criteria. The property began as a finishing school for girls in 1894. By 1930, it was converted into a junior college and in 1942 became part of the Walter Reed Army Hospital.

The property would be adversely affected. Activities at this location include the replacement and realignment of two bridges across I-495: Linden Lane and the CSX railroad. The LODs for the Build Alternatives are concentrated at two locations: the northwestern and northeastern corners of the historic property boundary. The bridge carrying Linden Lane would be constructed directly east of the existing alignment. Its length would be extended to accommodate the added width of the managed lanes on I-495. The Y-split of Linden Lane and Newcastle Avenue would also shift slightly into the boundary of the historic property. The realignment would result in the removal of trees and grading, as well as the construction, operation, and maintenance of the relocated Linden Lane and bridge over I-495 at the northwestern corner of the historic property.

The CSX railroad and bridge would be realigned to the west of the existing alignment. The realignment of the CSX railroad over I-495 to the west would result in the removal of trees and grading, as well as the construction, operation, and maintenance of the relocated CSX railroad and bridge at the northeastern corner of the property.

The landscape of the National Park Seminary Historic District is an element that contributes to its significance; because the LODs would expand into the existing landscape and convert a portion of the property to highway use, the project would diminish the integrity of design and setting of the historic district.

i. Rock Creek Stream Valley Park, Units 2 and 3

Rock Creek Stream Valley Park (RCSVP), owned by the M-NCPPC and managed by Montgomery County Parks, consists of twelve units totaling approximately 1,832 acres. Units 2 and 3 of RCSVP follow the course of Rock Creek from East-West Highway on the south to the former B&O Railroad Stone Arch Viaduct on the north. The primary resource in Units 2 and 3 of RCSVP is the protected landscape of the Rock Creek valley which follows a serpentine path from north to south, and ultimately leads to the Potomac River. The landscape varies from wooded areas with steep slopes to grassy meadows along the creek. Other contributing resources include Beach Drive, the Rock Creek Hiker-Biker Trail, several bridges, as well as two stone culverts, playgrounds, picnic areas and other recreational resources.

The Rock Creek Stream Valley Park, Units 2 and 3, comprise a property eligible for the NRHP under Criterion A. The property would be adversely affected. Within the historic property, MDOT SHA has identified the need for a small, linear stormwater management facility east of the ramp from the outer loop of I-495 to northbound MD 355. This facility would require ground disturbance and the removal of trees from within this area of Unit 3 of Rock Creek Stream Valley Park. The repair and improvement, replacement, or augmentation of existing storm drain and stream conveyance pipes that traverse I-495 would require impacts to small, rectangular areas of the property, including ground disturbance and the removal of vegetation. At Unit 2, the LODs are concentrated along the I-495 outer loop, southwest of Jones Mill Road, consisting of the wooded area between the Rock Creek stream bank and I-495. Access to the Rock Creek Trail, which runs along the north side of I-495 through the corridor, would be maintained during construction with limited interruption.

A portion of the park would be converted to transportation use and/or associated stormwater management use, permanently diminishing integrity of design, materials, and setting of the property. Construction impacts may also temporarily diminish the integrity of setting and feeling of the property.

j. Sligo Creek Parkway

Sligo Creek Parkway is a linear park within the National Capital Parkway System that provides a scenic transportation link between residential suburbs and neighboring metropolitan areas. Located in a stream valley, the primary feature of the Parkway is an undivided two-lane road with associated bridges, culverts, drainage features, safety devices, and signage. Other important features of Sligo Creek Parkway include pedestrian trails with associated bridges, recreation areas and playgrounds, picnic areas, parking areas, native and ornamental plantings, a monument, and scenic viewpoints focused on Sligo Creek. The eligible portion of the Parkway is approximately five miles long with an average right-of-way 300 feet wide, comprising approximately 364 acres.

Sligo Creek Parkway is eligible under criteria A and C and would be adversely affected. Activities include widening along I-495; augmenting an existing culvert beneath I-495, and the construction, operation, and maintenance of a stormwater management facility. The LODs for the Build Alternatives are concentrated at three locations: a narrow area extending approximately 1400 linear feet along the I-495 outer loop; a narrow area extending approximately 2,300 feet along the I-495 inner loop; and an oblong shape at the northeast corner of the Sligo Creek Golf Course. Work within the historic boundary includes tree removal; grading; bridge replacement; movement of construction vehicles and materials; and the construction, operation and maintenance of a stormwater management facility. The area of impact along the I-495 inner loop would require the relocation of two tee boxes parallel to their current distance from the hole in order to maintain play at the Sligo Creek Golf Course, a contributing resource within the parkway. A stormwater management facility on the golf course is necessary at this location owing to limited available space for the treatment of stormwater along this portion of I-495. Access to Sligo Creek Trail, another contributing resource, would be restricted during the bridge replacement at a construction laydown area on the north side of the outer loop and northwest of the trail.

A portion of the park would be converted to transportation use and/or associated stormwater management use, resulting in a minor loss of integrity of design, materials, and workmanship of a portion of the property. Construction impacts may also temporarily diminish the integrity of setting, feeling, and association of the property.

B. Archaeological Resources

The effects assessment anticipates the Study would have an adverse effect on all NRHP-eligible archaeological resources located within the LODs of Alternatives 8, 9, 9M, 10, 13B and 13C. Archaeological resources outside these LODs would not be affected and no additional investigations to determine eligibility would be conducted for those sites outside the LODs. MDOT SHA finds three archaeological properties are adversely affected: two archaeological sites in Maryland and the proposed Archaeological District in Virginia listed in **Table 4-14**. One previously identified archaeological property was determined eligible for the NRHP within the APE: 18PR94 (Indian Creek V site). This site was previously mitigated and largely destroyed by the construction of a Washington Metropolitan Area Transit Authority (WMATA) facility. The Study would have no adverse effect to Indian Creek V site. Some additional archaeological investigations would be required within the APE to determine the presence of archaeological sites and/or National Register eligibility of sites, as discussed in *Volume 4* of the *Cultural Resources Technical Report* (**Appendix G**). In a letter dated March 12, 2020, MHT concurred with the eligibility and effects determination as well as the need for further Phase I and II archaeological investigation in the specified areas to which access was denied.

In a letter dated March 12, 2020, MHT concurred with the eligibility and effects determination in Maryland as well as the need for further Phase I and II archaeological investigation in the specified areas to which access was denied.

Table 4-14: Archaeological Resources with a Known Adverse Effect

State	MIHP#/ VDHR#	Jurisdiction	Name	Period of Significance	NRHP Criteria	Nature of Adverse Effect
MD	18MO749	NPS/ CHOH	C&O Canal Site 1	Early Woodland	D	The site will be partially or completely destroyed or significantly diminished in all aspects of integrity
MD	18MO751	NPS/ CHOH	C&O Canal Site 3	1828-1924	D	The site will be partially or completely destroyed or significantly diminished in all aspects of integrity
VA	(N/A)	NPS/ GWMP	Dead Run Ridges Archaeological District[2]	Late Archaic-Woodland	D	Portions of individual sites within the district would likely be destroyed, and the district would likely be diminished in all aspects of integrity

a. C&O Canal Site 1 (18MO749)

Located in the Chesapeake and Ohio Canal National Historical Park, Site 18MO749 is an Early Woodland period precontact archaeological site eligible under criterion D. Because the site is within the LODs for the Build Alternatives, the site would likely be partially or completely destroyed or significantly diminished in all aspects of integrity by construction of the project.

b. C&O Canal Site 3 (18MO751)

Situated in the Chesapeake and Ohio Canal National Historical Park Site 18MO751 is a historic period (circa 1828-1924) archaeological site eligible under criteria A, C and D. Because the site is within the LODs for the Build Alternatives, the site would likely be partially or completely destroyed or significantly diminished in all aspects of integrity by construction of the project.

c. Dead Run Ridges Archaeological District

MDOT SHA evaluated a number of recorded precontact archaeological sites within the George Washington Memorial Parkway property in Virginia. MDOT SHA has determined that the majority of the investigated sites together constitute a NRHP-eligible archaeological district of related resources. Contributing sites or possible contributing sites within the proposed district boundary and inside the project LOD include 44FX0373, 44FX0374, 44FX0379, 44FX0381, and 44FX0389. Sites 44FX3160 and 44FX3900 were investigated and found neither individually eligible nor, in the case of 44FX3160, contributing to the district (44FX3900 is not part of the defined District). Because the district is partially within the LODs for the Build Alternatives, portions of individual sites within the district would likely be destroyed, and the district would likely be diminished in all aspects of integrity by construction of the project.

In their letter dated February 14, 2020, VDHR did not concur with characterizing the resources as an archaeological district and recommends four of the five sites individually eligible for listing on the NRHP (Sites 44FX0374, 44FX0379, 44FX0381 and 44FX0389). MDOT SHA, NPS and VDHR are continuing consultation on eligibility, treatment, and effects determinations regarding these resources.

C. Historic Cemeteries

The parcels containing the likely location of the Montgomery County Poor Farm Cemetery and the Moses Hall Cemetery would be impacted by the LODs for the Build Alternatives. The boundaries of historic cemeteries have not been fully delineated and there is potential that an unknown number of interments are located within the LODs. Additional investigations through both engineering design and historic research (archival and oral history), including potential non-intrusive and intrusive archaeological fieldwork to avoid and minimize the 0.3 acres of impact as currently designed. In their letter dated March 12, 2020, MHT agreed that further consultation and coordination are needed to address the identification and treatment of cemeteries that may be impacted by the undertaking. MDOT SHA is continuing to evaluate both resources to the extent practicable through documentary and non-invasive research to obtain additional information that will inform treatment under the PA.

4.7.4 Mitigation

A. Section 106 Programmatic Agreement

Due to the complexity and wide scope of the Study, and because the full extent of effects to historic properties is uncertain due to the preliminary state of design, MDOT SHA expects the Section 106 process would conclude through the execution of a PA, as described at 36 CFR Part 800.14[b]. Therefore, FHWA notified the ACHP of this anticipated PA in March 2018, and ACHP stated in May 2018 their participation in consultation for this undertaking (36 CFR Part 800.6[a][1][iii]). The PA Annotated Outline, in **Appendix H**, will provide for the continued assessment of effects and resolution of adverse effects to known historic properties. It is also expected to provide protocols for additional consultation, historic properties identification, effects assessment, and adverse effects resolution as design advances. MDOT SHA will oversee implementation of the PA as the project continues following the anticipated Record of Decision. Additionally, the Study will have mitigation development needs for stream, wetland, and other environmental impacts should a Build Alternative be selected. Consideration of the impacts to any historic properties at the selected mitigation sites is also required and MDOT SHA will include procedures to evaluate and assess effects to cultural resources for these sites and other expansions or revisions to the APE in the PA.

In January of 2020, the consulting parties were provided the *Cultural Resources Technical Report* (**Appendix G**) for their review and comment. Since March of 2020, in response to consulting party comments, including the State Historic Preservation Offices (SHPOs) of Maryland (MHT and VDHR), MDOT SHA and FHWA have identified several technical next steps that require resolution prior to the FEIS that are necessary for advancing the Programmatic Agreement. These steps include:

- **Revision of the Area of Potential Effects (APE):** to include stream and wetland mitigation sites being submitted as part of the Joint Permit Application. Because these proposed locations have now been identified, as part of the undertaking they require additional inventory and evaluation effort for historic properties including archaeological evaluation.

- **Revise Effect Determinations for "Historic Properties Where Effects Cannot Be Fully Determined"**: As discussed in **Section 4.7.3.A**, sufficient information is now available to revise effect determinations for the properties listed as "properties where effects cannot be fully determined" in the January 2020 *Cultural Resources Technical Report* (**Appendix G**) and **Table 4-13.** MDOT SHA will provide revised effect determinations for these properties.

- **Eligibility Determination and further coordination regarding Moses Hall and Cemetery**: Multiple consulting parties provided additional information regarding the Moses Hall and Cemetery, also known as the Morningstar Tabernacle No. 88, in Cabin John. In response, MDOT SHA has conducted additional field work and documentary research and believes sufficient information is available to make an eligibility determination on this property and evaluate effects as a historic property. MDOT SHA will complete a determination of eligibility and effect for this property in consultation with MHT and consulting parties, and continue consultation regarding avoidance, minimization, and treatment of the resource, including potential burials within the LOD.

- **Additional historic property evaluations:** MDOT SHA has identified an additional resource in Maryland requiring an eligibility determination (Forest Glen Tower) and new information regarding the segment of the Metropolitan Branch of the B&O Railroad historic property within the APE. MDOT SHA will submit new and revised documentation on these resources to MHT and consulting parties.

- **Continued consultation:** with NPS and VDHR regarding archaeological resources within the George Washington Memorial Parkway. VDHR did not concur with MDOT SHA's finding of an eligible archaeological district within the George Washington Memorial Parkway; instead recommending treating individual sites as eligible or ineligible for the National Register of Historic Places. On April 28, 2020, the National Park Service (NPS) requested additional information from VDHR via letter and noted that NPS found that the archaeological district was valid. MDOT SHA will continue consultation with NPS and VDHR to finalize how these resources are characterized to finalize eligibility and effect findings, and document the resolution of the consultation.

MDOT SHA intends to provide the above information to SHPOs and consulting parties in the spring of 2020, and advance PA development with consulting parties including a draft document and consulting party meeting in the summer of 2020. MDOT SHA anticipates at least two drafts of the PA may be necessary prior to finalizing the agreement for signature. It is anticipated that the first draft will be developed with the consulting parties in the late summer of 2020 with the second draft to follow in the fall or early winter of 2020 with a goal of having a signature ready Programmatic Agreement in Winter 2020 or early 2021, prior to the completion of the FEIS.

B. Historic Architectural Resources

MDOT SHA will conduct consultation to identify mitigation to include in the PA for properties that would experience an adverse effect under any of the Build Alternatives, and where design cannot be adjusted to avoid adverse effects. Typical Section 106 mitigation for architectural resources could include, but is not limited to, elements such as: context-sensitive design, creation of interpretive materials, documentation, or property-specific initiatives. However, specific mitigation for the Study would be determined through the consultation process. Identified mitigation must be reasonable, feasible, and commensurate with the impact to the resource(s).

For historic properties for which the effects are unknown, MDOT SHA will treat these resources under the PA for the Study to evaluate effects, and continue to avoid, minimize, or mitigate such effects as design advances.

C. Archaeological Resources

For the NRHP-eligible archaeological resources located within the LODs of the Build Alternatives, the Section 106 consultation process will continue to assess anticipated effects and efforts to avoid, minimize, or mitigate such effects. MDOT SHA will record the terms and conditions in the PA agreed upon to resolve adverse effects to these archaeological resources. Typical Section 106 mitigation for unavoidable adverse effects to archaeological resources can include, but not be limited to efforts including recovery of archaeological data through excavation, reporting, and public interpretation of archaeological results. However, specific mitigation for the Study would be determined through the consultation process. Identified mitigation must be reasonable, feasible, and commensurate with the impact to the resource(s).

For previously identified archaeological sites within the LODs of the Build Alternatives that require additional evaluation to determine eligibility for the NRHP, MDOT SHA would include commitments in the PA for phased evaluation of these sites, in addition to additional evaluation of areas inaccessible in the initial Phase I survey, or where additional investigations such as deep testing has been recommended. The PA would also include provisions for avoidance, minimization, or mitigation of adverse effects should any of these resources, or newly identified resources be determined NRHP-eligible.

D. Historic Cemeteries

The two cemeteries within the LODs of the Build Alternatives, the Moses Hall Cemetery and the Montgomery County Poor Farm Cemetery, will be subject to additional investigation prior to the PA, with more delineation, evaluation and treatment expected under the PA, including consulting parties and any identified descendants. MDOT SHA will work to avoid or minimize impacts and coordinate with affected communities on treatment of human remains may exist regardless of NRHP eligibility. The PA will document how adverse effects will be addressed, mitigation commitments, and procedures for both marked and unmarked Human Remains in compliance with state and federal regulations. Upon further investigations, if these cemeteries are found to have integrity and also meet the criteria for the NRHP, MDOT SHA will make eligibility determinations and conduct additional Section 106 review, evaluation, and treatment as part of the PA.

4.8 Air Quality

4.8.1 Introduction and Methodology

The Clean Air Act and Amendments (CAA) is the overarching statute regulating air quality in the US. The CAA requires the EPA to set standards for air pollutants, approve state plans, and enforce deadlines for reducing air pollution, among many other responsibilities. EPA's transportation conformity rule (40 CFR Part 93) provides the criteria and procedures for implementing the transportation conformity provisions of the CAA. Because the area in which the Study is located is designated as nonattainment for ozone, Federal conformity requirements, including 40 CFR 93.114 and 40 CFR 93.115 are applicable. Accordingly, there must be a currently conforming transportation plan and program at the time of project approval, and the project must come from a conforming plan and program (or otherwise meet criteria specified in 40 CFR 93.109(b)). The Study is currently included in the National Capital Region Transportation Planning Board (NCRTPB) FY 2019 – 2024 Transportation Improvement Program (TIP) [TIP ID 6432 and Agency ID AW0731 (planning activities)] and the NCRTPB Visualize 2045 Long-Range Plan and accompanying Air Quality Conformity Analysis (CEID 1182, CEID 3281, and Appendix B page 56).

As required by the CAA, EPA sets the National Ambient Air Quality Standards (NAAQS) for airborne pollutants that have adverse impacts on human health and the environment, referred to as criteria pollutants. The criteria pollutants are carbon monoxide (CO), sulfur dioxide (SO_2), ozone (O_3), particulate matter ($PM_{2.5}$ and PM_{10}), nitrogen dioxide (NO_2), and lead (Pb). In addition to the criteria pollutants for which there are NAAQS, EPA also regulates Mobile Source Air Toxics (MSATs). The nine priority MSATs are: benzene, 1,3-butadiene, formaldehyde, acrolein, acetaldehyde, diesel particulate matter, ethylbenzene, naphthalene, and polycyclic organic matter. Greenhouse gases (GHGs) are another pollutant monitored by EPA. The primary GHGs in the Earth's atmosphere are Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), and Fluorinated Gases. A summary of the methodologies for assessing the pollutants within the *Air Quality Technical Report* (**Appendix I**) is provided below.

What is Transportation Conformity?

Transportation conformity is required by the Clean Air Act (42 U.S.C. 7506(c)) to ensure that Federal funding and approval are given to highway and transit projects that are consistent with air quality goals established by a state air quality implementation plan.

Conformity means that transportation activities will not cause or contribute to new violations of air quality standards or delay the attainment of national ambient air quality standards.

NEPA guidelines issued by the USDOT outline federal requirements for air quality analyses for transportation projects. Where applicable, other requirements derive from the Federal transportation conformity rule (40 CFR Parts 50 and 93). NEPA guidance for air quality analyses for transportation projects is found on the FHWA Office of Planning, Environment, & Reality website.[10]

FHWA's 1987 Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* provides general guidance for project-level air quality analyses.[11] That guidance focuses on carbon monoxide. FHWA provides separate guidance on MSATs.[12]

[10] http://www.fhwa.dot.gov/environment/index.cfm

[11] https://www.environment.fhwa.dot.gov/projdev/impTA6640.asp

[12] FHWA, "INFORMATION: Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents", October 18, 2016. See: http://www.fhwa.dot.gov/environment/air_quality/air_toxics/

The Air Quality Analysis Study Area (i.e., Montgomery County, Prince George's County, and Fairfax County) is in an attainment area for fine particulate matter ($PM_{2.5}$), therefore, transportation conformity requirements pertaining to $PM_{2.5}$ do not apply for this Project[13] and no further analysis of $PM_{2.5}$ emissions were evaluated per FHWA guidance.[14]

The Study is located in a region where the maintenance period for CO has expired and the CO NAAQS no longer apply, (**Section 4.8.2**) and the EPA project-level ("hot-spot") transportation conformity requirements do not apply. However, CO is highlighted in the FHWA 1987 guidance as a transportation pollutant to be summarized in an EIS. Therefore, potential impacts for CO were analyzed for the nearby intersections and interchanges that might be impacted by the Study. The methodologies and assumptions applied for the analysis are consistent with FHWA[15] and EPA guidance.[16,17] Air quality modeling was performed using MOVES emission factors, VISSIM traffic data, and the CAL3QHC Version 2.0 dispersion model. CO concentrations were estimated for the No Build Alternative and the Build Alternatives at worst-case intersections throughout the study corridors. The intersections were summarized by worst-case peak AM or PM volumes and level of service (LOS)[18] for all Build Alternatives for opening and design year conditions. The signalized intersections were ranked by LOS and the higher of the AM or PM peak hourly-ranked volumes were summarized for each of the Build Alternatives. Refer to the Air Quality Technical Report (**Appendix I**, **Chapter 3, Section 3.2.1**) for additional information on the traffic analysis supporting the air quality analysis.

The top three ranked intersections for high volume and low LOS for each Build Alternative for Opening Year (2025) and Design Year (2040) were chosen for dispersion modeling consistent with the November 1992 EPA Guidance. The worst-case modeling was conducted using EPA models (MOVES2014b and CAL3QHC) and worst-case assumptions including peak hour AM and PM traffic volumes, meteorology, and receptor locations on the right-of-way edge, which together result in worst-case estimates for near-road concentrations.

The Study is best characterized as one with "higher potential MSATs effects" since the projected 2040 Design Year traffic is expected to reach or exceed the 140,000 to 150,000 annual average daily traffic (AADT) criteria. A quantitative MSATs analysis was conducted consistent with the latest guidance including the 2016 FHWA Interim Guidance and the Frequently Asked Questions (FAQ) Conducting Quantitative MSATs Analysis for FHWA NEPA Documents.[19] The affected network for the MSATs analysis was identified using the Regional Travel Demand Forecast Metropolitan Washington Council of Governments (MWCOG) Regional Travel Demand Model for each Build Alternative and 2025 and 2040

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[13] For background, the EPA issued a final rule (81 FR 58010), effective October 24, 2016, on "Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements" that stated, in part: "Additionally, in this document the EPA is revoking the 1997 primary annual standard for areas designated as attainment for that standard because the EPA revised the primary annual standard in 2012." (See: https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf). Accordingly, Fairfax County is no longer designated as maintenance for $PM_{2.5}$, and the associated USEPA regulatory requirements for conformity for $PM_{2.5}$ are eliminated for northern Virginia

[14] Guidance for Preparing and Processing Environmental and Section 4(f) Documents October 30, 1987. https://www.environment.fhwa.dot.gov/projdev/impTA6640.asp

[15] https://www.environment.fhwa.dot.gov/projdev/impTA6640.asp

[16] https://www3.epa.gov/scram001/guidance/guide/coguide.pdf

[17] https://nepis.epa.gov/Exe/ZyPdf.cgi?Dockey=P100M2FB.pdf

[18] Level of Service (LOS) is a letter grade assigned to a section of roadway that measures the quality of traffic flow, ranging from LOS A (free flow) to LOS F (severely congested).

[19] https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/moves_msat_faq.cfm

analysis years. The Affected Network was determined using the Regional Travel Demand Forecast MWCOG Regional Travel Demand Model as a base for each alternative and analysis year within the study area along with FHWA suggested criteria for evaluating segment links outside of the study area where general meaningful changes in emissions could occur as a result of the Build Alternatives.

Greenhouse Gases (GHGs) are generated through burning fossil fuels and other human activities. Carbon dioxide (CO_2) is the largest component of GHG emissions; other prominent emissions include methane (CH_4), nitrous oxide (N_2O), and hydrofluorocarbons (HFCs). These emissions are different from criteria air pollutants since their effects in the atmosphere are global rather than localized, and also since they remain in the atmosphere for decades to centuries. Greenhouse gas emissions from vehicles using roadways are a function of distance traveled (expressed as vehicle miles traveled (VMT)), vehicle speed, and road grade. VMT derived from the MSATs affected network for each alternative was used to characterize the VMT changes for the GHG discussions as the links identified in the affected network include only roadway links that could significantly impact the study corridors and excludes roadway links not affected by the Build Alternatives. GHG emissions are also generated during roadway construction and maintenance activities.

4.8.2 Affected Environment

Maryland Department of the Environment's (MDE) Air and Radiation Management Administration is responsible for implementing and enforcing regulations to ensure that the air Maryland citizens breathe is clean and healthful. One of their functions is to operate a statewide network of air quality monitors that continuously measure air quality. This data is made available through the EPA's AirData website[20]. A review of data provided for the most recent three years (2016-2018) at the monitoring stations nearest the study corridors are used to describe the existing ambient air quality in the study area and are presented for CO, $PM_{2.5}$, and ozone, respectively, in the *Air Quality Technical Report* (**Appendix I, Chapter 2, Section 2.2**). Review of this data shows that the measured ambient air concentrations on CO and $PM_{2.5}$ closest to the study corridors were well below the corresponding NAAQS. Several of the monitor locations had ozone concentrations that exceeded the 2015 8-hour ozone standard.

The Study is located in Montgomery County and Prince George's County, Maryland as well as a small area in Fairfax County, Virginia. The EPA Green Book[21] lists these counties as attainment for all NAAQS with the exception of the 2015 8-hour ozone standard,[22] for which the counties are nonattainment. The EPA recently redesignated the area to maintenance/attainment for the 2008 8-hour ozone standard.[23] The 2015 Ozone NAAQS (0.070ppm) are more stringent than the 2008 NAAQS (0.075ppm). Maryland, Virginia and the District of Columbia submitted maintenance plans to EPA that demonstrated maintenance of the 2008 ozone NAAQS through 2030 and therefore their request to be redesignated to maintenance/attainment of those NAAQS was granted by EPA in April 2019. The measured ambient air concentrations closest to the study area were all well below the corresponding NAAQS, except for the exceedance of the 2015 8-hour ozone standard recorded at all the monitor locations.

[20] https://www.epa.gov/outdoor-air-quality-data/monitor-values-report
[21] https://www.epa.gov/green-book
[22] These counties were redesignated to attainment of the 2008 ozone NAAQS, effective May 15, 2019 (See: https://www.federalregister.gov/documents/2019/04/15/2019-06128/air-plan-approval-district-of-columbia-maryland-and-virginia-maryland-and-virginia-redesignation).
[23] https://www.federalregister.gov/documents/2019/04/15/2019-06128/air-plan-approval-district-of-columbia-maryland-and-virginia-maryland-and-virginia-redesignation

The Maryland counties were redesignated from a nonattainment area to attainment and entered a 20-year maintenance period for CO in March 1996. The area was considered a maintenance area for the 20 years following until March 2016 when the counties completed the maintenance period. Since the Maryland counties have completed the maintenance period, transportation conformity no longer applies for CO. The study corridor is an attainment area for fine $PM_{2.5}$.[24] Similarly, Fairfax County is designated attainment for CO, and is also considered attainment for the 1997 fine particulate matter per the EPA 2016 ruling.

4.8.3 Environmental Consequences

The No Build Alternative would not result in a reduction in VMT compared to existing conditions nor would it result in the congestion-relief that would result from the implementation of the Build Alternatives; therefore, improvements in air quality are not anticipated. The results of the 1-hour and 8-hour CO hot-spot analysis for the worst-case interchange and intersection locations conservatively assumed worst-case conditions, overestimating the emissions results for each alternative. Results indicate that the modeled worst-case CO concentrations for all alternatives remain well below the CO NAAQS at all receptor locations for each interchange and intersection location. These results demonstrate that the worst-case interchanges and intersections for each Build Alternative and the No Build Alternative, using very conservative assumptions, would not cause or contribute to a violation of the CO NAAQS within the study corridor. Typically, the worst case ranked intersection and interchanges would be modeled individually for comparison to the NAAQS in order to evaluate CO impacts for each Alternative. As shown in *Tables 3-29 and 3-30* of the *Air Quality Technical Report* (**Appendix I**), CO emission factors are expected to decline over time due to improved fuel quality and continued fleet turnover to vehicles built with more stringent exhaust emission standards for CO. Therefore, future CO impacts from the Build Alternatives are not expected to exceed the NAAQS and existing CO concentrations at worst case intersection and interchanges are expected to be higher than those for 2025 and 2040. Because of these factors and in an effort to streamline the CO analysis, a screening analysis was conducted assuming a worst case modeling approach for interchanges and intersections to address CO impacts to cover all the alternatives in lieu of separate alternative results since CO concentrations are expected to be below the NAAQS.

In general, all of the MSATs emissions are expected to increase slightly for the Build Alternative conditions when compared to the No Build condition for 2025 (Opening Year). MSATs emissions are expected to remain the same or slightly decrease for all Build Alternatives when compared to the No Build condition for 2040. In addition, all MSATs pollutant emissions are expected to significantly decline in the Opening Year (2025) and Design Year (2040) when compared to existing conditions. These reductions occur despite projected increase in VMT from 2016 to the 2025 and 2040 build scenarios. Information is currently incomplete or unavailable to credibly predict the study-specific health impacts due to changes in MSAT emissions associated with each of the alternatives. Under each of the Build Alternatives, there may be slightly higher or lower MSATs emissions in the design year relative to the No Build Alternative due to increased VMT or increased vehicle speeds. There could also be increases in MSATs levels in a few

[24] The EPA issued a final rule (81 FR 58010), effective October 24, 2016, on "Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements" that stated, in part: "Additionally, in this document the EPA is revoking the 1997 primary annual standard for areas designated as attainment for that standard because the EPA revised the primary annual standard in 2012." (See: https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf). Accordingly, Washington, DC-MD-VA is no longer designated as maintenance for $PM_{2.5}$, and the associated EPA regulatory requirements for conformity for $PM_{2.5}$ are eliminated for Washington (DC-MD-VA).

localized areas where VMT increases. However, lower MSATs levels are expected in the future due to cleaner engine standards coupled with fleet turnover. The magnitude of the EPA-projected reductions is so great that, even after accounting for VMT growth, MSATs emissions would be significantly lower in the future than they are today, regardless of the alternative selected[25].

The analysis shows GHG emissions are expected to increase slightly for the Build Alternative conditions when compared to the No Build condition for 2025 (Opening Year). In general, GHG emissions are expected to increase for all Build Alternatives when compared to the No Build condition for 2040. Under the No Build and Build Alternative conditions, VMT in the region is expected to increase between 2015 and 2040. Nationally, the Energy Information Administration (EIA) estimates that VMT will increase by approximately 22 percent between 2019 and 2050. It should be noted that the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule, finalized on March 30, 2020 may affect the EIA estimates. This new rule would require less stringent CAFE and CO_2 emissions standards through 2026 compared to the standards implemented in 2012 which it replaces. While VMT is expected to increase under the Build Alternatives, the increase is below the projected national rate. A major factor in mitigating the GHG emissions associated with this increase in VMT is more stringent fuel economy standards. EIA projects that vehicle energy efficiency, thus GHG emissions, on a per-mile basis, will improve by 28 percent between 2012 and 2040. By reducing congestion and increasing speeds, vehicle travel duration and the associated amount of fuel combustion and associated emissions will decrease, minimizing the impacts of GHGs. Regional accessibility will be increased through providing additional lanes so that motorists can more easily pass slow-moving vehicles. Thus, the study area would see a net reduction in GHG emissions under any of the Build Alternatives, even though VMT increases relative to the No Build Alternative and 2015 levels.

The Build Alternatives are not predicted to increase emission burdens compared to the No Build Alternative in 2040, aside from a slight increase in GHG emissions, nor cause or contribute to a violation of the NAAQS. With the mitigating factors in place for the slight increase in GHG emissions as noted above, no long-term or regional air quality impacts are anticipated. (Refer to **Appendix I**, **Chapter 3** for additional information.)

4.8.4 Mitigation

While no mitigation measures are required since the Build Alternatives are not predicted to increase emission burdens for MSATs, nor cause or contribute to a violation of the NAAQS, recent research has been conducted on the benefits of roadside barriers to improve air quality. The EPA report, *Recommendations for Constructing Roadside Vegetation Barriers to Improve Near-Road Air Quality*[26], provides recommendations on the use of walls and vegetation barriers to reduce downwind pollutant concentrations near roadways. MDOT SHA is evaluating the feasibility and reasonableness of noise mitigation in the form of noise barriers along the corridors as discussed in **Section 4.9.4**. Areas of vegetation will be developed in consultation with the design team, local jurisdictions, private interest groups (private developers or companies), local community or business associations, as well as local, state, and Federal agencies.

[25] Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. October 18, 2016. https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/

[26] https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NRMRL&dirEntryId=321772&simpleSearch=1&searchAll=Recommendations+for+constructing+roadside+vegetation+barriers+to+improve+near+road+air+quality

As the project's construction is not anticipated to last more than five years in any single location, construction impacts are considered to be temporary. All required construction-related permits would be obtained from MDE prior to construction. During construction the contractor may use the following dust control measures, to minimize and mitigate, to the greatest extent practicable, impacts to air quality:

- Minimize land disturbance;
- Minimize traffic disruption to the extent possible, especially during peak travel hours;
- Cover trucks when hauling soil, stone, and debris (MDE Law);
- Use water trucks to minimize dust;
- Use dust suppressants if environmentally acceptable;
- Stabilize or cover stockpiles;
- Construct stabilized construction entrances per construction standard specifications;
- Regularly sweep all paved areas including public roads;
- Stabilize onsite haul roads using stone; and
- Temporarily stabilize disturbed areas per MDE erosion and sediment standards.

Refer to **Section 4.23.3** for additional information on short-term construction related impacts.

4.9 Noise

4.9.1 Introduction and Methodology

As defined in Title 23 of the CFR Part 772 (23 CFR 772), this project is classified as a Type I project[27] for the noise analysis. The objective of this noise analysis is to present the predicted loudest-hour build traffic noise levels, to determine if these noise levels cause a traffic noise impact, and, if so, to determine where noise barriers are likely to be feasible and reasonable along the study corridors. All prediction modeling was performed using FHWA's Traffic Noise Model (TNM) v2.5. The TNM seeks to simulate the noise environment by considering variable inputs for traffic (including autos, medium trucks, heavy trucks, buses, and motorcycles), variable inputs of traffic speed for each vehicle type, variable inputs for roadway design, (including roadway width, horizontal and vertical alignment), variable inputs for terrain lines and propagation features (such as building rows, ground zones, and tree zones), and inclusion of traffic control measures including stop lights and stop signs. The preliminary direct access locations were included in this noise analysis (refer to **Chapter 2, Section 2.7.1**). Modifications to the managed lane direct access points will be considered in the updated noise analysis in support of the FEIS.

What is the difference between sound and noise?

The assessment of highway noise impacts distinguishes between "sound" and "noise." When an object moves, sound is created. The movements cause vibrations of the molecules in air to move in waves like ripples on water. Sound is heard when the vibrations reach a person's ears. By contrast, noise is defined by the FHWA as <u>unwanted</u> sound. It represents the unpleasant, unwanted sounds generated on streets and highways.

The TNM validation process reconfirms the model's ability to reproduce the Measured Noise Levels. Measured Noise Levels correspond to ambient measurements taken in conjunction with highway traffic

[27] 23 CFR Part 772.5 (1 through 8) define the types of projects that are classified as a Type I Project. The I-495 and I-270 Managed Lanes Study proposes the addition of through-traffic lanes, including the addition of HOV and HOT lanes. This qualifies this study as a Type I Project according to 772.5 (3).

counts. MDOT SHA considers a Traffic Noise Model to be properly validated when the Modeled Noise Levels are within ±3 decibel (dB(A)) of the Measured Noise Levels for most of the receptors.

Impact criteria is defined based upon the Noise Abatement Criteria (NAC) for the identified type of activities or land uses present within each noise-sensitive area (NSA). The majority of NSAs that MDOT SHA evaluates fall within Activity Categories B and C, which are considered impacted at a noise level of 66 dB(A) or greater. Activity Category B noise-sensitive receptors are defined exclusively as residences. Category C noise-sensitive receptors consist of non-residential land uses where frequent outdoor activity exists such as, sporting areas, campgrounds, parks, picnic areas, playgrounds, schools, places of worship, and other recreational areas.

Federal regulation (23 CFR 772) and the MDOT SHA *Highway Noise Abatement Planning and Engineering Guidelines* (April 2020) require that noise abatement be investigated at all NSAs where the build traffic noise levels approach or exceed the FHWA NAC for the defined land use category, or where there are substantial increases (10 dB(A) per the 2020 MDOT SHA Guidelines) from existing to build condition noise levels. For the NSAs that do not approach or exceed the NAC (and therefore are not considered impacted under that criterion), the lowest existing noise level was compared to the worst-case future build condition noise level in order to determine whether a substantial increase impact would occur. No NSAs will experience a substantial increase as a result of any Build Alternative evaluated for this project. Where noise abatement was warranted for consideration, additional criteria were examined to determine if the abatement would be feasible and reasonable. The assessment of noise abatement feasibility, in general, focuses on whether it is physically possible to build an abatement measure (i.e., noise barrier) that achieves a minimally acceptable level of noise reduction. Barrier feasibility considers three primary factors: acoustics (achieve a 5 dB(A) noise reduction at 70 percent of the impacted receptors), safety and access, and site constraints (construction would require significant grading, ROW, utilities, drainage, or structure costs). Barrier reasonableness considers three primary factors: viewpoints, design goal (achieve a 7 dB(A) noise reduction at a minimum of three (3)[28] or 50 percent of the impacted receptors), and cost effectiveness (700-2,700 square-foot per benefited receptor threshold depending on the scope of the project).

What is a decibel (dB(A))?

A decibel is the basic unit of sound measurement. Decibels represent relative acoustic energy intensities. Because the range of energy found throughout the spectrum of normal hearing is so wide, a base 10 logarithmic scale is used to make the numbers more understandable.

4.9.2 Affected Environment

The study corridors were divided into 133 NSAs in accordance with the MDOT SHA and FHWA noise policies and guidance. The NSAs are comprised of areas that have different land use activity categories which share a common noise environment and have been grouped into a single NSA. Geographically, 92 of the NSAs are located along I-495, 37 are located along I-270, two are located along I-95, and two are located along MD 295 adjacent to the respective interchanges with I-495 (**Table 4-15**).

There are several existing Type I barriers within the study corridors. Any existing noise barrier or portion of barrier falling within the LOD for the Build Alternatives is assumed to be demolished and relocated to accommodate roadway widening and/or storm water management ponds. Since the existing barriers are

[28] NSAs must have a minimum of three (3) impacted receptors in order to be considered for noise abatement.

presently in place, need for barriers and the cost effectiveness for the replacement barriers has been previously determined. Replacement barriers have been analyzed to verify there is no decrease in performance, and if necessary, recommendations to increase the height or length of the barriers have been included to ensure this. Modifications to existing barriers will be re-evaluated during the final design process.

4.9.3 Environmental Consequences

Because many of the Build Alternatives share similar cross sections and traffic parameters, the noise impact analysis results have been presented by grouping the similar Build Alternatives within each segment of the study corridors (refer to **Table 4-15** for details on proposed impacts by NSA).

Of the 92 NSAs along I-495, 89 NSAs contain noise impacts resulting from Alternatives 8, 9, 10, 13B and 13C, with 64 NSAs having levels equal to or exceeding 75 dB(A) [29]; and 89 NSAs contain noise impacts resulting from Alternative 9M, with 52 having levels equal to or exceeding 75 dB(A). Along I-495, 18 NSA locations currently do not have an existing noise barrier and warrant further consideration of noise abatement due to the construction of the proposed highway improvements. (Refer to the *Environmental Resource Mapping* (**Appendix D**) and *Maps 1 through 52, 79 and 80* of the *Noise Analysis Technical Report* (**Appendix J**).

For the 37 NSAs along I-270 and the East and West Spurs the Build Alternatives vary within the corridor and each distinct segment contains a unique combination of proposed alternatives. From I-370 to Montrose Road (NSAs 5-01 through 5-28), 16 NSAs contain noise impacts resulting from Alternative 13B, with four NSAs having levels equal to or exceeding 75 dBA. There were 16 NSAs with noise impacts resulting from Alternatives 8, 9, 9M, and 13C, with four NSAs having levels equal to or exceeding 75 dBA. Under Alternative 10, 18 NSAs were identified with noise impacts, with four NSAs having levels equal to or exceeding 75 dBA.

From Montrose Road to the spurs (NSA 5-29) one NSA contains impacts resulting from all of the Build Alternatives, with the levels equal to or exceeding 75 dBA for each alternative option as well. Along the spurs (NSA 5-30 through 5-37), eight NSAs contain noise impacts resulting from Alternatives 8, 9, 9M, 10, 13B, and 13C, with four NSAs having levels equal to or exceeding 75 dBA. (Refer to the *Environmental Resource Mapping* (**Appendix D**) and *Maps 53 through 76* of the *Noise Analysis Technical Report* (**Appendix J**)).

At the interchanges with I-95 and MD 295, all of the Build Alternatives tie into the highways with the same ramp configuration; therefore, only one Build Alternative was analyzed at each location. Two (2) NSAs were evaluated for impacts along I-95. Both NSAs contain noise impacts resulting from the Build Alternative, with one NSA having levels equal to or exceeding 75 dBA. Two (2) NSAs were evaluated for impacts along MD 295. Both NSAs contain noise impacts resulting from the Build Alternatives, but neither NSA has noise levels equal to or exceeding 75 dBA. (Refer to the *Environmental Resource Mapping* (**Appendix D**) and *Maps 77 through 78* of the *Noise Analysis Technical Report* (**Appendix J**))

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[29] Higher absolute noise levels, defined by MDOT SHA as at or above 75 dB(A), are factored into the reasonableness determination for the barrier system. Noise levels at or above 75 dB(A) may warrant a higher noise reduction design goal than the minimum of 7 dB(A) identified in the MDOT SHA Highway Noise Policy, and this condition is used in determining the square footage evaluation threshold.

4.9.4 Mitigation

Federal regulation (23 CFR 772) and MDOT SHA *Highway Noise Abatement Planning and Engineering Guidelines* (April 2020) require that noise abatement be investigated at all NSAs where the build traffic noise levels approach or exceed the FHWA NAC for the defined land use category. Where noise abatement was warranted for consideration, additional criteria were examined to determine if the abatement is feasible and reasonable. Elements of the feasibility and reasonableness criteria are defined in the MDOT SHA *Highway Noise Abatement Planning and Engineering Guidelines* (April 2020). The assessment of noise abatement *feasibility*, in general, focuses on whether it is physically possible to build an abatement measure (i.e., noise barrier) that achieves a minimally acceptable level of noise reduction. Barrier feasibility considers three primary factors: acoustics, safety and access, and site constraints. The assessment of noise abatement *reasonableness*, in general, focuses on whether it is practical to build an abatement measure. Barrier reasonableness considers three primary factors: viewpoints, design goal, and cost effectiveness. Refer to **Appendix J, Section 4.2** for additional details on the elements of the feasibility and reasonableness criteria.

Several noise barrier scenarios have been analyzed for this Study: existing noise barriers that would remain in place; existing noise barriers that will be displaced by construction and would be replaced by a reconstructed barrier on a new alignment; existing noise barriers that would be reconstructed and extended; and new barrier construction. The assumed LODs for the Build Alternatives include the area anticipated for reconstructed or new noise barriers (refer to **Section 4.5.2** for additional information on assumed property impacts). **Table 4-15** is a summary of the noise barrier system mitigation based on the current design of the Build Alternatives. The proposed and assumed locations of the noise barriers are shown on the *Environmental Resource Mapping* (**Appendix D**).

Abatement for the portion of the study area within Virginia is being evaluated in coordination with VDOT and in compliance with the VDOT Highway Traffic Noise Impact Analysis Guidance Manual. The results of this evaluation will be included in the FEIS.

4.9.5 Statement of Likelihood

Based on the studies performed thus far, MDOT SHA recommends installation of highway traffic noise abatement in the form of a barrier for the NSAs as reflected in **Table 4-15**. These preliminary indications of likely abatement measures are based upon preliminary design for barrier square footage equal to or less than the maximum amount allowed per benefited residence by the MDOT SHA Highway Noise Abatement Planning and Engineering Guidelines. Concrete is the typical material used for construction of noise barriers and is assumed as part of the barrier analysis; however, a final determination of material will be made in final design, based upon FHWA requirements to achieve a minimum 20 dB(A) Transmission Loss in accordance with ASTM Recommended Practice E413-87. The findings in this analysis are based upon preliminary design information. A preliminary determination of horizontal and vertical alignment for the noise barriers was made (**Table 4-15**); however, final determination of barrier dimensions will be made in final design. Engineering changes reflected in final design could alter the conclusions reached in this analysis, leading to recommendations to add or omit noise barrier locations. A Final Design Noise Analysis will be performed for this Study based on detailed engineering information during the design phase. The views and opinions of all benefited property owners and residents will be solicited through public involvement and outreach activities during final design.

Table 4-15: Summary of Noise Sensitive Area (NSA) Impacts and Preliminary Sound Barrier System Mitigation[30] by Alternative

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
Area 1: I-495 west side, south of George Washington Parkway												
VA-01	79,80	Y		Abatement for the portion of the study area within Virginia is being evaluated in coordination with VDOT and in compliance with the VDOT Highway Traffic Noise Impact Analysis Guidance Manual. The results of this evaluation will be included in the FEIS.								
VA-02	79,80	Y										
Area 2: I-495 west side, between George Washington Parkway and Clara Barton Parkway												
VA-02	79,80	Y		Abatement for the portion of the study area within Virginia is being evaluated in coordination with VDOT and in compliance with the VDOT Highway Traffic Noise Impact Analysis Guidance Manual. The results of this evaluation will be included in the FEIS.								
VA-04	79,80		N									
Area 3: I-495 west side, between Clara Barton Parkway and MD 190												
1-01	1,2,27,28	Y		✓	✓	✓	✓	✓	✓	✓	1,734	28
1-02	1,2,27,28	Y		✓	✓	✓	✓	✓	✓	✓	9,182	27
1-04	1,2,3,27, 28,29	Y		✓	✓	✓	✓	✓	✓	✓		
1-05	2,3,28,29	Y		✓	✓	✓	✓	✓	✓	✓		
1-03	1,2,27,28	Y		✓	✓	✓	✓	✓	✓	✓	3,751	30
2-01	2,3,28,29	Y		✓	✓	✓	✓	✓	✓	✓		
Area 4: I-495 west side, between MD 190 and I-270 west spur												
1-06	4,30	Y		✓	✓	✓	✓	✓	✓	✓	3,548	35
3-01	4,30	Y		✓	✓	✓	✓	✓	✓	✓		
4-01[31]	4,30	Y		×	×	×	×	×	×	×	N/A	N/A
2-02	4,30	Y		✓	✓	✓	✓	✓	✓	✓	4,182	22
Area 5: I-495 top side, between I-270 west spur and MD 187												
3-02	4,5,30,31	Y		✓	✓	✓	✓	✓	✓	✓	2,513	24
3-04	5,31	Y		✓	✓	✓	✓	✓	✓	✓	3,401	20
1-08	5,6,31,32	Y		✓	✓	✓	✓	✓	✓	✓		
2-03	5,6,31,32	Y		✓	✓	✓	✓	✓	✓	✓	1,621	24
2-04	6,32	Y		✓	✓	✓	✓	✓	✓	✓	4,042	20
2-05	6,32	Y		✓	✓	✓	✓	✓	✓	✓	4,614	20
Area 6: I-495 top side, between MD 187 and I-270 east spur												
2-06	6,7,32,33	Y		✓	✓	✓	✓	✓	✓	✓	2,650	17
1-09	7,33	Y		✓	✓	✓	✓	✓	✓	✓		
1-10	6,7,32,33	Y		✓	✓	✓	✓	✓	✓	✓	3,866	24
Area 7: I-495 top side, between I-270 east spur and MD 185												
1-11	7,8,33,34	Y		✓	✓	✓	✓	✓	✓	✓	5,972	19
1-13	8,9,34,35	Y		✓	✓	✓	✓	✓	✓	✓		
2-07	8,34	Y		✓	✓	✓	✓	✓	✓	✓	3,279	22
1-12	8,34	Y		✓	✓	✓	✓	✓	✓	✓		
2-08	8,9,34,35	Y		✓	✓	✓	✓	✓	✓	✓	2,007	18
3-05	9,35		N	Existing Barrier to Remain							N/A	N/A

[30] This table presents abatement that meets feasibility and reasonableness criteria based on preliminary studies. The feasibility and reasonableness of abatement is subject to change in final design. Concrete is the typical material used for construction of noise barriers and is assumed as part of the barrier analysis; however, a final determination of material will be made in final design, based upon FHWA requirements to achieve a minimum 20 dB(A) Transmission Loss in accordance with ASTM Recommended Practice E413-87.

[31] NSA 4-01 consists of the Burning Tree Country Club. This NSA is not considered to have sufficient frequency and duration of use to warrant consideration of noise abatement.

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
Area 8: I-495 top side, between MD 185 and MD 97												
1-14	9,10,11, 35,36,37	Y		✓	✓	✓	✓	✓	✓	✓	6,731	21
1-36	9,35	Y		✓	✓	✓	✓	✓	✓	✓	6,568	20
2-09	9,10,35,36	Y		✓	✓	✓	✓	✓	✓	✓		
3-06	10,11,36, 37	Y		✓	✓	✓	✓	✓	✓	✓		
2-10	11,37	Y		✓	✓	✓	✓	✓	✓	✓	3,514	77
3-07	11,37	Y		✓	✓	✓	✓	✓	✓	✓	3,393	22
2-11	11,37	Y		✓	✓	✓	✓	✓	✓	✓		
Area 9: I-495 top side, between MD 97 and US 29												
3-08	11,12,37, 38	Y		✓	✓	✓	✓	✓	✓	✓	1,363	20
3-09	11,12,37, 38	Y		✓	✓	✓	✓	✓	✓	✓	2,025	18
4-02[32]	12,38	Y		✗	✗	✗	✗	✗	✗	✗	N/A	N/A
4-03[33]	12,38	Y		✗	✗	✗	✗	✗	✗	✗	N/A	N/A
2-12	12,13,38, 39	Y		✓	✓	✓	✓	✓	✓	✓	4,142	24
2-13	12,13,38, 39	Y		✓	✓	✓	✓	✓	✓	✓	2,396	22
Area 10: I-495 top side, between US 29 and MD 193												
2-14	13,14,39, 40	Y		✓	✓	✓	✓	✓	✓	✓	2,733	20
4-04	13,14,39, 40	Y		Existing Barrier to Remain/Partial Replacement							N/A	N/A
Area 11: I-495 top side, between MD 193 and MD 650												
2-15	13,14,39, 40	Y		✓	✓	✓	✓	✓	✓	✓	5,399	20
2-17	14,40	Y		✓	✓	✓	✓	✓	✓	✓		
2-16	13,14,39, 40	Y		✓	✓	✓	✓	✓	✓	✓	7,678	20
1-35	14,40	Y		✓	✓	✓	✓	✓	✓	✓		
2-18	14,15,40, 41	Y		✓	✓	✓	✓	✓	✓	✓	1,942	22
Area 12: I-495 top side, between MD 650 and I-95												
2-19	15,41	Y		✓	✓	✓	✓	✓	✓	✓	1,785	20
2-20	14,15,40, 41	Y		✓	✓	✓	✓	✓	✓	✓	3,014	26
1-15[34]	15,15A,41 41A		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[32] NSA 4-02 consists of the Holy Cross Hospital and a portion of the Sligo Creek Trail. There are no outdoor land uses at the Holy Cross Hospital in this area, there would be no interior noise impacts resulting from this project. The Sligo Creek Trail is not considered to have sufficient frequency and duration of use to warrant consideration of noise abatement.

[33] NSA 4-03 consists of Sligo Creek Golf Course and a portion of Sligo Creek Park. These areas are not considered to have sufficient frequency and duration of use to warrant consideration of noise abatement.

[34] NSA 1-15 consists of Eglise Baptiste Du Calvaire and The Hindu Temple of Metropolitan Washington, as well as single family residences in the Adelphi Community, and Knollwood Park. There is no apparent outdoor use at the places of worship; the park does not have apparent areas of recreational activity.

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
1-16	15,15A,41 41A	Y		✓	✓	✓	✓	✓	✓	✓	3180	26
3-17	15,15A,41 41A		N	Existing Barrier to Remain/Partial Replacement							N/A	N/A
I95-N[35]	77	Y		×	×	×	×	×	×	×	N/A	N/A
Area 13: I-495 east side, between I-95 and US 1												
I95-S[36]	77	Y		×	×	×	×	×	×	×	N/A	N/A
1-17	15A,41A	Y		✓	✓	✓	✓	✓	✓	✓	3,692	17
1-18	15A, 16, 41A, 42		N	Active use area is behind building and not impacted.							N/A	N/A
Area 14: I-495 east side, between US 1 and Greenbelt Metro												
2-21	15A, 16, 41A, 42	Y		✓	✓	✓	✓	✓	✓	✓	1,775	20
2-22	16,42	Y		✓	✓	✓	✓	✓	✓	✓	3,559	20
3-18	16,42	Y		✓	✓	✓	✓	✓	✓	✓		
2-23	16,42	Y		✓	✓	✓	✓	✓	✓	✓	3,216	18
Area 15: I-495 east side, between Greenbelt Metro and MD 201												
1-20	17,43	Y		✓	✓	✓	✓	✓	✓	✓	3,289	19
Area 16: I-495 east side, between MD 201 and Baltimore-Washington Parkway												
1-21	17A,43A	Y		✓	✓	✓	✓	✓	✓	✓	3,556	20
1-22	17A,43A	Y		×	×	×	×	×	×	×	N/A	N/A
BW-N	78	Y		✓	✓	✓	✓	✓	✓	✓	1,156	15
Area 17: I-495 east side, between Baltimore-Washington Parkway and MD 450												
BW-S	78	Y		✓	✓	✓	✓	✓	✓	✓	3,489	16
1-23	17A,18,19 ,43A,44, 45	Y		✓	✓	✓	✓	✓	✓	✓	4,720	21
1-24[37]	17A,18, 43A,44	Y		×	×	×	×	×	×	×	N/A	N/A
2-24	18,19,44, 45	Y		✓	✓	✓	✓	✓	✓	✓	4,361	20
2-25	19,45	Y		✓	✓	✓	✓	✓	✓	✓	2,451	21
1-25	19,45	Y		✓	✓	✓	✓	✓	✓	✓		
2-26	19,45	Y		✓	✓	✓	✓	✓	✓	✓	6,182	21
2-27	19,45	Y		✓	✓	✓	✓	✓	✓	✓	3,274	18
Area 18: I-495 east side, between MD 450 and US 50												
3-10	19,20,45, 46	Y		✓	✓	✓	✓	✓	✓	✓	2,060	24
1-33	20,46	Y		✓	✓	✓	✓	✓	✓	✓		
2-28	20,46	Y		✓	✓	✓	✓	✓	✓	✓	1,553	20

[35] NSA I95-N consist of single family residences, two schools, athletic fields and places of worship. The barrier evaluated for this area is not reasonable (<50% of impacts achieve 7 dBA noise reduction).

[36] NSA I95-S consist of single family residences, a community center and athletic fields. The barrier evaluated for this area is not feasible (<70% of impacts are benefited)

[37] NSA 1-24 consists of a portion of Greenbelt Park. There are no apparent areas of recreational activity in this area, and therefore consideration of noise abatement is not warranted.

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
Area 19: I-495 east side, between US 50 and MD 202												
2-29	20,46	Y		✓	✓	✓	✓	✓	✓	✓	1,558	20
3-11	20,46	Y		✓	✓	✓	✓	✓	✓	✓	1,714	18
2-30	20,21,46, 47	Y		✓	✓	✓	✓	✓	✓	✓	3,155	19
2-31	21,47	Y		✓	✓	✓	✓	✓	✓	✓	2,916	21
Area 20: I-495 east side, between MD 202 and Arena Drive												
N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Area 21: I-495 east side, between Arena Drive and MD 214												
3-12	22,48	Y		✓	✓	✓	✓	✓	✓	✓	208	25
Area 22: I-495 east side, between MD 214 and Ritchie Marlboro Road												
1-26	23,23A,49 49A	Y		✓	✓	✓	✓	✓	✓	✓	4,701	19
Area 23: I-495 east side, between Ritchie Marlboro Road and MD 4												
1-37	23A,49A	Y		✓	✓	✓	✓	✓	✓	✓	2,645	25
Area 24: I-495 east side, between MD 4 and Forestville Road / MD 337												
1-27	24A,50A		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Area 25: I-495 east side, between Forestville Road / MD 337 and Suitland Road / MD 337												
1-28	24,50	Y		✓	✓	✓	✓	✓	✓	✓	5,342	22
Area 26: I-495 east side, between Suitland Road / MD 337 and MD 5												
1-29	24,50	Y		✓	✓	✓	✓	✓	✓	✓	878	35
3-14	24,25,50, 51	Y		✓	✓	✓	✓	✓	✓	✓		
3-13	24,25,50, 51	Y		✓	✓	✓	✓	✓	✓	✓	1,836	20
1-34[38]	25,51	Y		×	×	×	×	×	×	×	N/A	N/A
2-32	25,25A,51 51A	Y		✓	✓	✓	✓	✓	✓	✓	930	22
Area 27: I-495 east side, west of MD 5												
3-15	25A,51A		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3-16	25A,26, 51A,52		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Area 28: I-270 west spur, between I-495 and Democracy Boulevard												
5-35	60,63,72, 75		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3-03/5-36	64,76	Y		✓	✓	✓	✓	✓	✓	✓	3,344	21
5-37/1-07	64,76	Y		✓	✓	✓	✓	✓	✓	✓	528	20
Area 29: I-270 west spur, between Democracy Boulevard and Westlake Terrace												
5-32[39]	63,75	Y		×	×	×	×	×	×	×	N/A	N/A
Area 30: I-270 east spur, between I-495 and MD 187												
5-33	61,62,73, 74	Y		✓	✓	✓	✓	✓	✓	✓	6,164	21

[38] NSA 1-34 consists of the Manchester Estates community. A barrier is not feasible due to the topography and flanking noise coming from MD-5 and the distance between the receptors and the roadway.
[39] NSA 5-32 consists of a pedestrian path. The barrier is not feasible (<70% of impacts are benefited) and is not reasonable (>1700 sf-p-r).

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
5-34	61,62,73, 74	Y		✓	✓	✓	✓	✓	✓	✓	1,984	28
Area 31: I-270 west and east spurs, between Y-split and Westlake Terrace and MD 187												
5-31	60,61,72, 73		N	Existing Barrier to Remain/Partial Replacement							N/A	N/A
5-32	60,61,63, 72,73,75		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Area 32: I-270 mainline, between Y-split and Montrose Road												
5-28	58,70		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-29	58,59,70, 71	Y		Existing Barrier to Remain							N/A	N/A
5-30	60,72		N	Existing Barrier to Remain							N/A	N/A
Area 33: I-270 mainline, between Montrose Road and MD 189												
5-23	57,69		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-24	57,69		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-25	57,69		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-26	57,58,69, 70		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-27	58,70		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Area 34: I-270 mainline, between MD 189 and MD 28												
5-18[40]	56,68	Y		×	×	×	×	×	×	×	N/A	N/A
5-19	56,68	Y		×	×	×	×	×	×	×	N/A	N/A
5-16	55,56,67, 68	Y		✓	✓	✓	✓	✓	✓	✓	4,920	20
5-17	56,68	Y		✓	✓	✓	✓	✓	✓	✓		
5-20	56,68	Y		✓	✓	✓	✓	✓	✓	✓		
5-21	56,57,68, 69	Y		✓	✓	✓	✓	✓	✓	✓		
5-22	56,57,68, 69	Y		×	×	×	×	×	×	×	N/A	N/A
Area 35: I-270 mainline, between MD 28 and Shady Grove Road												
5-08[41]	54,66	Y		×	×	×	×	×	×	×	N/A	N/A
5-09[42]	54,66	Y		×	×	×	×	×	×	×	N/A	N/A
5-10[42]	54,66	Y		×	×	×	×	×	×	×	N/A	N/A
5-11	54,66		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-12	55,67		N	Existing Barrier to Remain							N/A	N/A
5-14[43]	55,67	Y		×	×	×	×	×	×	×	N/A	N/A
5-13	55,67	Y		✓	✓	✓	✓	✓	✓	✓	2,628	22
5-15	55,56,67, 68	Y		✓	✓	✓	✓	✓	✓	✓		
Area 36: I-270 mainline, between Shady Grove Road and I-370												
5-03	54,66		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-05	53,65		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[40] NSAs 5-18 and 5-19 will be re-evaluated to account for the existing berm along I-270. The results of this evaluation will be included in the FEIS.
[41] NSAs 5-08 and 5-09 consist of an apartment complex and various commercial land uses. The barrier evaluated for this area is not feasible (<70% of impacts are benefited) and is not reasonable (>1700 sf-p-r).
[42] NSA 5-10 consists of various commercial land uses. The barrier for this area is not feasible (<70% of impacts are benefited) and is not reasonable (>2700 sf-p-r).
[43] NSA 5-14 consists of various commercial land uses. The barrier for this area is not feasible (<70% of impacts are benefited) and is not reasonable (>2700 sf-p-r).

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
5-06[44]	53,54,65, 66	Y		×	×	×	×	×	×	×	N/A	N/A
5-07	54,66	Y		×	×	×	×	×	×	×	N/A	N/A
Area 37: I-270 mainline, north of I-370												
5-01	53,65		N	Existing Barrier to Remain							N/A	N/A
5-02	53,65		N	Existing Barrier to Remain							N/A	N/A
5-04	53,65		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Summary of Noise Barrier System Mitigation	
Existing Noise Barriers that would remain in place as currently constructed	7
Existing Noise Barriers that would be displaced and replaced with a reconstructed barrier	42
Existing Noise Barriers that would be reconstructed and extended	19
New Noise Barriers constructed	23
Noise Barrier System is not reasonable or feasible	17

Note: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

4.10 Hazardous Materials

4.10.1 Introduction and Methodology

In accordance with FHWA and MDOT SHA guidance, an evaluation of the potential for hazardous materials or contaminant mobilization during the construction of the Build Alternatives was considered. The results of this evaluation are detailed in the *Hazardous Materials Technical Report* (**Appendix K**). The evaluation referenced data from multiple public sources, including: a regulatory database review from Environmental Data Resources, Inc. (EDR); MDE fact sheets; EPA records; historical site documents and mapping; aerial photographs; and a non-intrusive field reconnaissance of current site conditions.

For the purposes of this analysis, the one-quarter mile buffer area surrounding the widest LODs (for I-495 (Alternative 8, 9, 10, 13B, and 13C) and I-270 (Alternative 13C)) was used as the hazardous materials investigation area. Sites of concern, where hazardous waste and contaminated listings were identified, were documented within the hazardous materials investigation area. In addition, Potential Environmental Concerns (PECs), such as observable fuel storage tanks, dry cleaning operations or chemical drum storage, were identified within the LODs.

4.10.2 Affected Environment

The environmental investigation and field reconnaissance of the hazardous materials investigation area resulted in the identification of 501 sites of concern. The term 'site of concern', as used in this evaluation, includes hazardous substances or petroleum products, even under conditions in compliance with applicable laws. A site of concern does not include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and are not generally the subject of an enforcement action if brought to the attention of appropriate governmental agencies (ASTM, 2013).

[44] NSA 5-06 consists of the Rio Washingtonian Center. NSA 5-07 consists of various commercial land uses. The barrier for this area is not feasible (<70% of impacts are benefited) and is not reasonable (>2700 sf-p-r).

Of the 501 identified sites of concern, site reconnaissance was conducted at 209 sites in order to better understand existing conditions. The site reconnaissance focused on sites that were observable from public rights-of-way and had a higher risk of contaminant or hazard mobilization during construction efforts within the widest LODs. Site reconnaissance was also performed at previously unidentified locations where environmental concerns were visible from public rights-of-way.

4.10.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact any hazardous materials.

The 501 sites of concern were ranked based on a weight of evidence approach using the regulatory database information, historical documentation and site reconnaissance feedback (**Table 4-16**). These rankings are based on the characteristics of the subject site of concern and its proximity within or adjacent to each Build Alternative LOD. Prior to acquisition of right-of-way and construction, detailed analysis would be conducted to further investigate properties within and in the vicinity of the final LOD that have a high potential for mobilization of contaminated materials from construction activities. Refer to the *Environmental Resource Mapping* (**Appendix D**) and the *Hazardous Materials Technical Report* (**Appendix K**) for mapping of these sites of concern.

Table 4-16: Sites of Potential Concern Priority Summary

Priority Ranking	Definition	# of Sites Alt 5[1]	# of Sites Alts 8, 9, 9M, 10, 13B, 13C
1	High Priority	65	65
2	Listed Site/Unknowns	22	22
3	Moderate/High Priority	83	83
4	Moderate Priority	34	34
5	Low Priority (Outside LOD)	147[2]	145
6	Low Priority (Inside LOD)	64[2]	66
7	Not Included	86	86
	Total Sites	501	501

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2] Due to the fact that the Alternative 5 LOD is narrower than the Build Alternative LODs, two low priority sites are outside the LOD of Alternative 5, but inside the LOD for the Build Alternatives.

Of the 501 sites of concern, 65 sites were classified as High Priority for all the of the Build Alternatives due to the potential for contaminant mobilization within or adjacent to the LODs of the Build Alternatives. These properties include: gasoline stations, businesses operating at former gasoline stations, auto repair facilities, dry cleaning facilities, former dry-cleaning facilities, government facilities, landfills, and the Joint Base Andrews (JBA) Air Force Base National Priorities List (NPL) site. Identified high priority sites of concern may require additional investigation to determine the extent and location of existing contaminants and whether or not these contaminants would impact construction activities. These sites have a high potential for contaminant mobilization from leaking underground storage tank (LUST) facilities, or other facilities with PECs relating to petroleum contamination. Several of the LUST facilities, as well as other properties not listed as LUST facilities, have evidence of environmental monitoring and/or remediation activity likely related to past petroleum releases.

Twenty-two sites were classified as Listed Site/Unknowns for all Build Alternatives, meaning the sites have insufficient information to evaluate the potential impact to the LODs of the Build Alternatives due to a lack of site access or insufficient regulatory records to define the location and extent of potential contaminant issues associated with these sites. A review of detailed site documentation for properties within and in vicinity of the final LODs would occur in future design phases of the Study, when property access is obtained to characterize contaminant distributions, and/or their potential for mobilization during construction activities.

The 83 sites identified as Moderate/High Priority and 34 sites identified as Moderate Priority for all Build Alternatives, meaning the sites have hazardous materials or contaminant documentation related to their current or historical use and are inside of the LODs of the Build Alternatives. These sites could include: USTs containing materials other than gasoline, jet fuel, kerosene fuel, waste oil or solvents, surface dumps with empty drums, unidentifiable mounds, Aboveground Storage Tanks (ASTs) with surface stains, suspected Polychlorinated Biphenyl (PCB) containing transformers, stressed vegetation, and hazardous materials storage sites. These sites may or may not require additional evaluation and characterization based on the needs of the final design and construction in the area.

There are 145 low priority sites outside the LOD and 66 sites within the LODs for Alternatives 8, 9, 9M, 10, 13B, and 13C. These low priority sites represent a low concern for additional mobilization or impact to the project construction. The sites are mapped and listed to document their location relative to the study corridors in the event significant changes to the proposed design require a reevaluation of the potential sites of concern. In addition, if hazardous materials or contamination is mobilized during construction, identification of these potential sites of concern may help to identify the contaminant source.

The 86 'Not Included' sites were eliminated from ranking due to inaccurate documentation, field observations, or *de minimis* conditions within the hazardous materials investigation area.

4.10.4 Mitigation

Prior to acquisition of right-of-way and construction, Preliminary Site Investigations (PSIs) would be conducted to further investigate properties within and in the vicinity of the final LODs that have a high potential for mitigation contaminated materials exposed during construction activities. Because the study corridors have been used for vehicular traffic since its construction in the 1950s, it's reasonable to assume that the highway has been the scene of several vehicle accidents, break-downs, and other automotive issues – due to both its daily use and its required maintenance activities. These would have resulted in numerous releases of fuel and other petroleum oils – including leaded gasoline before its gradual phase-out in the late 1970s. Since the locations of these releases and their subsequent subsurface transport are poorly documented, this hazardous material concern would need to be considered a non-point source pollution concern affecting the entire corridor. Pollutants of concern would be diesel-range and gasoline-range petroleum products, and hazardous metals. This concern would be most pronounced within the urbanized areas and other sections of high vehicle use along the corridor. Since this contaminant risk cannot be quantified or used in addressing areas of greater or lesser priority, this concern was not evaluated as part of this assessment. However, it is recommended that this non-point source pollution concern should be addressed in any PSI conducted within the investigation area, with the possibility that contingency plans for contaminated soils would need to be initiated.

Site owners of many of the identified properties may have undertaken additional site characterization studies and/or remediation pursuant to various state and Federal regulatory programs. Prior to designing the PSI, coordination would occur with MDE, Virginia Department of Environmental Quality (VDEQ), and EPA to obtain additional information on the identified properties, in order to further assess potential impacts anticipated during construction and develop the scope for additional investigation.

Following the evaluation of additional information, subsurface sampling would be conducted for those properties needing additional soil and/or groundwater analysis beyond the information documented in detailed regulatory records. The PSIs would implement a tiered approach to any additional investigation based on the risk of contaminant mobilization, distance from the alignment, and likelihood of impact due to environmental factors such as depth to groundwater and construction requirements (refer to **Section 4.23.2** and **Appendix K** (*Hazardous Materials Technical Report*) for additional details).

4.11 Topography, Geology, and Soils

4.11.1 Introduction and Methodology

The evaluation for topography, geology, and soils referenced data from multiple public sources including US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) website, Web Soil Survey, US Geological Survey (USGS) geospatial data, the physiographic map of Maryland, and Maryland's Environmental Resources and Land Information Network (MERLIN).

The Farmland Protection Policy Act (FPPA) (7 U.S.C. 4201; 7 CFR 658) aims to minimize the conversion of important food and fiber producing farmland into non-agricultural land by Federal programs. Prime Farmland Soils, Soils of Statewide Importance, and unique farmland soils within the corridor study boundary were identified using desktop review. The corridor study boundary is located almost entirely within the boundary of the Census Bureau Map designated urbanized area; as such, the corridor study boundary is not subject to protection under the FPPA. Additional detail on the FPPA is provided in **Appendix E** and **Appendix L**.

4.11.2 Affected Environment

The corridor study boundary includes the Piedmont Plateau and Atlantic Coastal Plain Physiographic Provinces. The provinces are separated by the Atlantic Seaboard Fall Line, which roughly matches the boundary between Montgomery and Prince George's Counties. The Atlantic Seaboard Fall Line is both a geologic and topographic boundary, marking the boundary between two distinct areas of geologic origin and of relative elevation: the low-lying Coastal Plain and the hilly and mountainous Piedmont. The elevation within the corridor study boundary ranges from 38 to 516 feet above mean sea level. The Piedmont Plateau Physiographic Province has broadly undulating to rolling topography underlain by metamorphic rock, with low knobs, ridges, and valleys. The Atlantic Coastal Plain Physiographic Province is characterized by flat to moderately rolling upland and an even flatter lowland, composed of unconsolidated sediments including gravel, sand, and silt.

The USDA-NRCS Web Soil Survey (2018) identified 151 mapped soil units within the corridor study boundary, which are depicted on the *Natural Resources Inventory Maps* (**Appendix L**). The majority of soils in the corridor study boundary exhibit slow to moderate infiltration rates. Within the corridor study boundary, three soil units are classified as hydric (approximately one percent of the area within the corridor study boundary), five soil units are classified as predominantly hydric (covering approximately three percent of the area within the corridor study boundary), five soil units are classified as partially hydric (covering approximately two percent of the area within the corridor study boundary), 33 soil units are classified as predominantly non-hydric, and 105 soil units are classified as non-hydric (predominantly non-hydric and non-hydric soil units covering the remaining 95 percent of the area within the corridor study boundary). Additionally, 54 soil units within the corridor study boundary are highly erodible. Highly erodible soils are located throughout the corridor study boundary, with higher concentrations along I-270, and I-495 west of New Hampshire Avenue.

Twenty-eight soils within the corridor study boundary were identified by USDA NRCS as Prime Farmland Soils, 21 soils were identified as Soils of Statewide Importance, and no soils were identified as Unique Farmland Soils. Two soils were identified as having the potential to be Prime Farmland, one if drained (FaaA) and one if irrigated (HgB).

4.11.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and therefore would not directly impact topography, geology, or soils within the corridor study boundary.

Topography within Build Alternative construction areas would be altered by surficial excavation and grading, thereby changing the relative ground elevation, but this work is not anticipated to have a substantial effect on underlying sediments. Possible impacts to geologic formations and rock structures include impacts from construction activities, such as cutting and filling. The primary impact to soils from the Build Alternatives would be soil removal or alterations to the soil profile and structure due to construction activities. Additional impacts include leaching of chemicals into the soil from general construction or accidental spills, soil erosion, and soil compaction associated with the use of heavy equipment.

Impacts to soils from the Build Alternatives are presented in **Table 4-17** and **Table 4-18**. The impacts to "hydric soils" listed in the tables are based upon the NRCS Web Soil Survey and do not reflect hydric soils identified as jurisdictional wetlands in accordance with the Clean Water Act.

Table 4-17: Impact to Soils by Type in Acres

	Alt 5[1]	Alt 8&9[2]	Alt 9M	Alt10	Alt 13B	Alt 13C
Farmland of Statewide Importance	1.9	1.9	1.9	1.9	1.9	1.9
Prime Farmland	2.1	2.1	2.1	2.1	2.1	2.1
Hydric	20.0	20.4	20.3	20.8	20.3	20.6
Predominantly Hydric	80.4	82.2	81.8	82.8	82.0	82.4
Partially Hydric	24.2	25.3	25.3	25.3	25.3	25.3
Predominantly Non-Hydric	711.0	733.1	724.2	742.4	728.2	735.6
Non-Hydric	2,508.3	2,556.9	2,544.2	2,566.7	2,552.8	2,561.7

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2]Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.

Impacts to hydric soils would be similar across all Build Alternatives. Alternative 9M would result in the lowest hydric soil impact of 20.3 acres and Alternative 10 would result in the highest hydric soil impact of 20.8 acres. The impacts to Prime Farmland and Farmland of Statewide importance are the same for all Build Alternatives, 2.1 and 1.9 acres respectively. As detailed in **Table 4-18**, Alternative 10 would result in the highest high-erodible soil impact of 1,206.9 acres. Refer to the *Natural Resources Technical Report* (**Appendix L, Section 2.1**) for detailed impacts on the different classifications of soils.

Table 4-18: Impacts to Steep Slopes and Highly Erodible Soils in Acres

	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Steep Slopes > 5, K Factor > 0.35	350.5	362.1	357.4	369.0	359.1	364.5
Steep Slopes 15	808.2	831.4	824.1	837.9	827.9	796.4
Total Impacts to Highly Erodible Soils	**1,158.7**	**1,193.5**	**1,181.5**	**1,206.9**	**1,187.0**	**1,160.9**

Note: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2]Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.

4.11.4 Mitigation

Construction in the corridor study boundary requires consideration of hydric and highly erodible soils, as well as steep slopes. Measures to protect soils from erosion would be implemented based on approved Erosion and Sediment Control Plans (E&S Plans) prepared in accordance with Maryland and Virginia regulations. Detailed geotechnical studies would be performed before construction to identify subsurface issues that may impact project construction or the surrounding environment. MDOT SHA would minimize any negative effects, such as unstable soils or high-water table, through engineering design. Negative impacts to the surrounding environment, such as sedimentation, would be minimized through implementation and strict adherence to erosion and sediment control plans.

Additional water quality protection measures are required for highway construction projects in Maryland to prevent soil erosion and subsequent sediment influx into nearby waterways. Construction contractors are designated as co-permittees on the National Pollutant Discharge Elimination System (NPDES) permit to ensure compliance. This permit is issued under Maryland's General Permit for construction activities and is implemented with a regular inspection program for construction site sediment control devices that includes penalties for inadequate maintenance. To ensure compliance, onsite evaluations by a certified erosion and sediment control inspector would occur throughout the duration of construction.

Fairfax County, Virginia requires any projects with land-disturbing activities exceeding 2,500 square feet (SF) to prepare an erosion and sediment control plan (Fairfax County, 2018g). The County must approve each plan before any land-disturbing activities begin, and each project is subject to inspections throughout the duration of land-disturbing activities to prevent erosion and sediment control violations.

4.12 Waters of the US and Waters of the State, Including Wetlands

4.12.1 Introduction and Methodology

Wetlands and waterways are protected by several federal and state regulations. Jurisdictional Waters of the US, including wetlands, are jointly defined by the Environmental Protection Agency (EPA) and the US Army Corps of Engineers (USACE) in 40 CFR 230.3(s) and 33 CFR 328.3. Effective June 22, 2020, the regulatory definitions for Jurisdictional Waters of the US will be set forth in 33 CFR 328.3 and 40 CFR 120.2. Unavoidable impacts caused by the discharge of dredge or fill material into Waters of the US, including wetlands, within the corridor study boundary are federally regulated under Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Act (33 U.S.C. 403). Section 10 will only apply to the Potomac River for the Study.

Wetlands and their buffers are also protected by the State of Maryland Environment Article Title 5, Subtitles 5 and 9 of the Maryland Annotated Code. Pursuant to the Maryland Code, the MDE has promulgated stringent regulations to protect wetlands (COMAR, Title 26). Buffers are defined in COMAR 26.23.01.01 as a regulated area, 25 feet in width, surrounding a nontidal wetland, measured from the outer edge of the nontidal wetland. According to COMAR 26.23.01.04, nontidal wetland buffers shall be expanded to 100 feet for nontidal Wetlands of Special State concern, nontidal wetlands with adjacent areas containing steep slopes or highly erodible soils (soils with an erodibility factor greater than 0.35), and outstanding national resource waters. Wetlands of Special State concern are examples of Maryland's most valuable wetlands resources and are designated for special protection under COMAR 26.23.06. These wetlands have high ecological or educational value and may provide specialized habitat for rare plant or animal species. Waterways regulated by the State are defined in COMAR 26.17.04.02 as Waters of the State and include the 100-year floodplain. Impacts to waterways, 100-year floodplains, nontidal wetlands, 25-foot nontidal wetland buffers, or 100-foot expanded buffers require a Maryland Nontidal Wetlands and Waterways Permit. Additionally, a Section 401 Water Quality Certificate from MDE is required for any impacts to waterways or wetlands requiring a USACE Section 404 permit.

In Virginia, the Virginia Department of Environmental Quality (VDEQ) is the authority that provides the Section 401 certification through its Virginia Water Protection Permit (VWPP) Program (9 VAC 25-210), which gets its statutory authority from the Code of Virginia (VAC 62.1-44.15). Work in non-tidal streams with drainage areas greater than five square miles also require a permit from the Virginia Marine Resources Commission (VMRC) under the authority of the Code of Virginia (VAC 28.2-1204). Virginia state law requires that a VWPP be obtained before disturbing a stream by clearing, filling, excavating, draining, or ditching (VDEQ, 2018). Work in non-tidal streams with drainage areas greater than five square miles also require a permit from the VMRC under the authority of the Code of Virginia (VAC 28.2-1204).

Wetlands and waterways within the corridor study boundary were delineated by environmental scientists on behalf of MDOT SHA and VDOT from March 2018 through January 2019, with delineations ongoing for properties that have not yet permitted access. Much of the MDOT SHA right-of-way within the corridor study boundary was previously delineated as part of the Prince George's County and Montgomery County Integrated Roadside Vegetation Management (IRVM) and the I-270 Innovative Congestion Management projects. All previously delineated features were field reviewed and delineations were revised as needed for the purposes of the Study. No previous delineations were referenced for the Virginia portion of the corridor study boundary.

Wetlands features were delineated in accordance with the following:

- USACE Wetlands Delineation Manual, Y-87-I (Environmental Laboratory, 1987)
- USACE 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0 (USACE, 2012)
- USACE 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Coastal Plain Region (USACE, 2010)

A functions and values assessment was conducted for all delineated wetlands using the USACE New England Method as presented in *The Highway Methodology Workbook Supplement – Wetland Functions and Values; A Descriptive Approach* (USACE 1999).

Waterways features were delineated using the limits defined in 33 CFR 328. The boundaries of nontidal waterways features were set at the ordinary high water (OHW) mark and include but are not limited to: in-line stormwater management (SWM) ponds, palustrine open water (POW or ponds), stream systems (waterways), and some disturbed areas. The OHW mark was determined in the field using physical characteristics established by the fluctuations of water (e.g., change in plant community, changes in the soil character, shelving) in accordance with USACE Regulatory Guidance Letter No. 05-05 (USACE 2005).

Unavoidable impacts to regulated wetlands and waterways within the corridor study boundary in Maryland are subject to a Section 404 permit from the USACE, as well as a Maryland Nontidal Wetlands and Waterways Permit from MDE, and Section 401 Water Quality Certification. USACE Baltimore District will be the lead district for permitting impacts to Waters of the US within both the Virginia and Maryland portions of the corridor study boundary. The Potomac River is considered a navigable waters of the US under Section 10 of the Rivers and Harbors Act. Typically, the designation of a waterway under Section 10 would require a bridge permit to be issued by the US Coast Guard (USCG), but in a letter dated September 19, 2019, included in *Appendix N of the Natural Resources Technical Report* (**Appendix L**), the USCG stated that a bridge permit would not be required under Section 10 for the American Legion Bridge. USACE will regulate the Potomac River under Section 10 regarding the piers and abutments for the American Legion Bridge reconstruction.

Under the OFD Federal Agency Memorandum of Understanding (MOU) for Major Infrastructure Projects, signed in 2018, the wetlands and waterways permit application and authorization process must be completed concurrently with the NEPA process, requiring permitting decisions to be made based on preliminary design within 90 days from the Record of Decision. Refer to **Chapter 6** of the DEIS for additional information on the OFD. The study team, including roadway engineers, stormwater engineers, structural engineers, construction engineers, environmental planners, and environmental scientists, worked in close coordination with the regulatory agencies, USACE, and MDE, for nearly two years to review delineated features and coordinate avoidance and minimization of impacts to wetlands and waterways throughout the study corridor to the greatest extent practicable. This effort included close coordination via calls, emails, and office meetings as well as extensive multi-agency field reviews of resources over the two-year time period.

A desktop investigation of the National Wetlands Inventory (NWI), Maryland Department of Natural Resources (MDNR) Wetlands and Waters GIS data was conducted prior to beginning the field investigation to identify existing mapped waterways and nontidal wetlands in the corridor study boundary. No statewide wetland and stream GIS layer exists for Virginia. The results of the desktop investigation are included in the *Natural Resources Technical Report* (**Appendix L, Section 2.3**).

4.12.2 Affected Environment

A total of 407 nontidal wetland features and 1,075 waterway segment features were delineated within the corridor study boundary (**Table 4-19**). One Traditional Navigable Water, the Potomac River, was identified within the corridor study boundary. All other perennial waterways are classified as tributaries of the Potomac or Patuxent Rivers.

Table 4-19: Total Number of Delineated Features

Features	Total (# features)
Wetlands	**407**
Palustrine Emergent (PEM)	117
Palustrine Forested (PFO)	269
Palustrine Scrub-Shrub (PSS)	21
Waterways	**1,075**
Ephemeral	140
Intermittent	464
Perennial	458
Palustrine Open Water (POW)	13

The wetlands and waterways features are shown on the *Environmental Resource Mapping* (**Appendix D**). Additional detailed information is available in the *Natural Resources Technical Report* (**Appendix L**), including a summary of delineated waterways features, maps of each feature's location within the corridor study boundary, Routine Wetland Determination Data Forms, Waterways Datasheets, Wetland Functions and Values Evaluation Forms, and photographs of each feature.

4.12.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact wetlands and other Waters of the US or Waters of the State.

Direct impacts to wetlands and waterways associated with construction of the Build Alternatives include fill from roadway and interchange construction, drainage improvements, and temporary construction-related activities. An assessment of temporary construction-related impacts will occur in later phases of design. **Table 4-20** provides a summary of all impacts to wetlands in acres (AC) and square feet (SF), and all impacts to waterways in linear feet (LF) and SF within the corridor study boundary by classification. In comparing the Build Alternatives, Alternative 9M would have the least amount of impacts to wetland features with 16.1 acres, which is slightly less than the wetland impacts for Alternatives 8, 9, and 13B with 16.3 acres each. Alternatives 10 and 13C would have the highest wetland impacts with 16.5 acres each. No Maryland Wetlands of Special State Concern would be impacted within the Build Alternative LODs.

Table 4-20: Summary of Impacts to USACE/MDE Wetlands and Waterways Corridor-wide

Type	Classification	ALT 5[1]		ALT 8 & Alt 9[2]		ALT 9M		ALT 10		ALT 13B		ALT 13C	
		AC	SF	AC	SF	AC	SF	AC	SF	AC	SF	AC	SF
Wetlands	PEM	3.7	162,549	3.9	167,750	3.9	167,750	4.0	173,615	3.8	167,589	4.0	172,983
	PFO	10.7	464,917	11.4	497,307	11.2	486,114	11.5	499,176	11.4	496,280	11.4	498,158
	PSS	1.0	45,524	1.1	46,802	1.1	46,802	1.1	46,802	1.1	46,802	1.1	46,802
	Total	**15.4**	**672,990**	**16.3**	**711,859**	**16.1**	**700,412**	**16.5**	**719,593**	**16.3**	**710,671**	**16.5**	**717,943**
Waterways		**LF**	**SF**	**LF**	**SF**	**LF**	**SF**	**LF**	**SF**	**LF**	**SF**	**LF**	**SF**
	Ephemeral	10,829	46,016	11,167	47,293	11,135	47,168	11,199	47,556	11,167	47,293	11,196	47,539
	Intermittent	64,252	368,373	65,354	373,447	64,980	371,577	65,580	375,839	65,287	372,841	65,445	374,323
	Perennial	78,621	1,401,275	79,401	1,424,712	79,114	1,418,147	80,205	1,432,736	79,368	1,424,335	79,991	1,429,246
	POW[3]	N/A	64,134	N/A	64,134	N/A	64,134	N/A	64,134	N/A	64,134	NA	64,134
	Total	**153,702**	**1,879,798**	**155,922**	**1,909,586**	**155,229**	**1,901,026**	**156,984**	**1,920,265**	**155,822**	**1,908,603**	**156,632**	**1,915,242**

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.
[2] Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.
[3] POW= Palustrine Open Water (a nontidal system that is permanently flooded and largely lacks rooted vegetation above the water's surface)
[4] The summary totals shown in **Table 4-20** include the features on NPS properties. Refer to **Table 4-21** for the specific impacts by NPS property using the Cowardin classification system.

NPS has adopted a goal of no net loss of wetlands and uses the *Classification of Wetlands and Deepwater Habitats of the US* as the standard for defining, classifying, and inventorying wetlands, as outlined in Director's Order (DO) #77-1. The Cowardin Classification of wetlands used by NPS not only includes the areas defined as wetlands by USACE and MDE, as well as shallow water habitats such as intermittent and perennial stream channels under 2.5 meters deep. Therefore, the acreage of wetlands calculated on NPS property includes some of the features that are considered waterways by USACE and MDE. NPS requires avoidance, minimization, and compensation for unavoidable adverse impacts to NPS wetlands via restoration of degraded wetlands on NPS property at a minimum of a 1:1 restoration/replacement ratio that can be adjusted upward to ensure functional replacement. NPS requires that a Wetland Statement of Findings (WSOF) be prepared in accordance with the procedural manual during NEPA documenting compliance with DO #77-1 for proposed actions that would result in adverse impacts to wetlands. The WSOF is required to include a detailed and site-specific mitigation plan for mitigation sites to be located on NPS property following the mitigation site location hierarchy in the procedural manual. MDOT SHA will work with NPS to identify mitigation opportunities on NPS property for unavoidable impact to wetlands.

The draft WSOF will be developed once a Preferred Alternative has been identified and temporary and permanent impacts have been determined. The FEIS and the draft WSOF will be advertised for public comment and will have a concurrent 30-day comment period. The final, signed WSOF will be attached to the ROD. The following NPS wetlands subject to DO #77-1 and will be included in the WSOF: three palustrine emergent (PEM), nine palustrine forested (PFO), one palustrine scrub-shrub (PSS), four riverine lower perennial, two riverine upper perennial, and 22 riverine intermittent wetlands. Impacts to and full Cowardin classification of these features are summarized for each NPS property in **Table 4-21**; this table is also included in *Appendix I* of the *Natural Resources Technical Report* (**Appendix L**). Work within floodplains on NPS lands must adhere to NPS Floodplain Management DO #77-2 unless exempted. The Floodplain Statement of Findings will be prepared and may be combined with the WSOF in the FEIS.

Table 4-21: Summary of Delineated NPS Wetland Features and Impacts on NPS Properties within the Corridor Study Boundary

Park Property	Feature ID	Cowardin Classification	Total Size Delineated (SF)	Total Size Delineated (AC)	Impact (SF)	Impact (AC)
George Washington Memorial Parkway	22WW	R4SB4	27,447	0.63	2,703	0.06
	22WW_C	R4SB4	1,360	0.03	1,360	0.03
George Washington Memorial Parkway Total			**28,807**	**0.66**	**4,063**	**0.09**
C&O Canal	22LL	PFO1C	1,987	0.05	1,988	0.05
	22M_1	R3UB1H	1,316	0.03	1,121	0.03
	22M_C	R3UBr	15,356	0.35	1,848	0.04
	22MM	R2UB2	338,853	7.78	19,651	0.45
	22MM_B	R2UB2	78,622	1.80	1,752	0.04
	22NN	R4SB4	3,474	0.08	3,474	0.08
	22NN_B	R4SB4	1,599	0.04	1,599	0.04
	22OO	PFO1B	36,794	0.84	12,137	0.28
	22PP	PFO1A	642	0.01	643	0.01
	22QQ	R4SB5	469	0.01	469	0.01
	22W	PEM1Fx	72,306	1.66	15,186	0.35
C&O Canal Total			**551,417**	**12.66**	**59,868**	**1.37**

Park Property	Feature ID	Cowardin Classification	Total Size Delineated (SF)	Total Size Delineated (AC)	Impact (SF)	Impact (AC)
Clara Barton Parkway	22V	R4SB3d	576	0.01	190	0.00
	22V_1	R4SB3d	92	0.00	92	0.00
	22V_2	R4SB3d	66	0.00	66	0.00
	22V_B	R4SB3	331	0.01	331	0.01
	22V_B1	R4SB3	69	0.00	69	0.00
		Clara Barton Parkway Total	**1,134**	**0.03**	**748**	**0.02**
Baltimore Washington Parkway	10F	R4SB3	237	0.01	237	0.01
	10F_C	R4SBr	670	0.02	670	0.02
	10FF	R4SB5	1,569	0.04	1,569	0.04
	10GG	PFO1A	3,075	0.07	3,076	0.07
	10JJ	R4SB4r	2,840	0.07	67	0.00
	10KK	R4SB4r	1,488	0.03	1,488	0.03
	10MM	R4SB3	2,678	0.06	203	0.00
	10MM_1	R4SB3	4,741	0.11	3,411	0.08
	10MM_C	R4SBr	2,419	0.06	2,419	0.06
	10P	PFO1B	378	0.01	378	0.01
	10PP	R4SB3r	412	0.01	235	0.01
	10PP_1	R4SB3r	830	0.02	830	0.02
	10PP_C	R4SBr	2,477	0.06	2,477	0.06
		Baltimore Washington Parkway Total	**23,814**	**0.55**	**17,060**	**0.39**
Greenbelt Park	10AAA	R4SB3	267	0.01	18	0.00
	10EE	PFO1B	4,188	0.10	4,189	0.10
	10TT_C1	R5UBr	4,993	0.11	1,473	0.03
		Greenbelt Park Total	**9,448**	**0.22**	**5,680**	**0.13**
Suitland Parkway	3KKK	PSS1B	3,313	0.08	1,193	0.03
	3L	R2UB2	2,397	0.06	493	0.01
	3L_1	R2UB2	1,067	0.02	820	0.02
	3M	PEM1B	1,043	0.02	68	0.00
	3O	PFO1E	60,660	1.39	328	0.01
	3S	R2UB1	12,463	0.29	2,824	0.06
	3T	PFO1A	6,077	0.14	6,078	0.14
	3V	PFO1C	745	0.02	746	0.02
		Suitland Parkway Total	**87,765**	**2.01**	**12,550**	**0.29**
TOTAL NPS WETLANDS IMPACTED AND DELINEATED			**702,386 SF**	**16.12 AC**	**99,969 SF**	**2.29 AC**

Note: The wetlands in this table are only those wetlands occurring on NPS property as defined in the NPS Director's Order #77-1: Wetland Protection and Procedural Manual #77-1: Wetland Protection.

4.12.4 Mitigation

A. Avoidance and Minimization

The corridor study boundary is characterized by an extensive network of streams and wetlands that are located adjacent to and flow beneath the existing roadway, resulting in unavoidable impacts to these resources with roadway modification and/or widening under any Build Alternative. Continual efforts to avoid and minimize impacts have occurred throughout the planning process and will continue during final design.

The process for avoidance and minimization of impacts to wetlands, their buffers, waterways, and the FEMA 100-year floodplain to the greatest extent practicable is detailed in the *Avoidance, Minimization, and Impacts Report* (AMR) (**Appendix M**). In summary, this process entailed identification of avoidance and minimization opportunities throughout the limits of the study corridor, and extensive coordination of potential options with the regulatory agencies over a 16-month period. The AMR summarizes the study corridors and the Build Alternatives; explains how the Build Alternative LODs were established based on a corridor-wide stepwise process of avoidance and minimization of impacts; and describes the targeted avoidance and minimization of impacts to resources in specific areas of the study corridor. The AMR then presents impact reductions resulting from the avoidance and minimization process and provides justifications for unavoidable impacts.

MDOT SHA worked with regulatory and resource agencies during field and office meetings to review impacted natural resources and explore further avoidance and minimization possibilities. The study team evaluated agency recommendations and implemented them wherever practicable. Design revisions to avoid and minimize direct impacts to natural resources to date include the following:

- Elimination of the collector-distributor system on I-270;
- Preliminary alignment shift designs;
- Alterations to preliminary roadside ditch and grading designs;
- Additions to preliminary retaining wall designs to minimize the roadway footprint;
- Revisions to preliminary ramp designs, construction access areas, and preliminary stormwater management (SWM) facility locations; and
- Relocations of preliminary managed lane access locations.

1.

Examples of Avoidance and Minimization Efforts

- **Rock Creek:** reduction in waterway impacts by 3,287 linear feet to Rock Creek and reduction in parkland impacts of approximately 10 acres
- **Thomas Branch:** reduction in waterway impacts by 592 linear feet
- **Paint Branch Mainstem:** reduction in waterway impacts by 2,393 linear feet

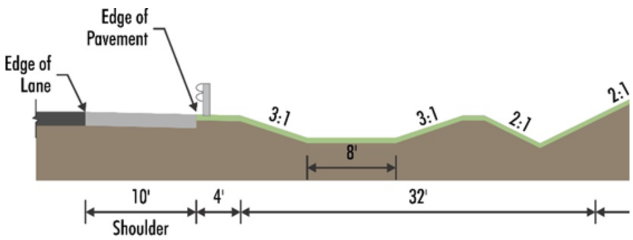
To ensure that avoidance and minimization was applied to limit impacts to wetlands and waterways, a step-wise process was applied corridor-wide to avoid or limit impacts to wetlands and waterways which included the application of five progressively narrower roadside typical sections from widest to narrowest until impacts were avoided or Step 5 was reached. The five steps applied to the avoid or minimize resources are shown in **Figure 4-14**.

The five roadside typical sections are described further in the *Alternatives Technical Report* (**Appendix B**) and the *Natural Resources Technical Report* (**Appendix L, Section 2.3.4**), and the *Avoidance, Minimization and Impacts Report* (**Appendix M**).

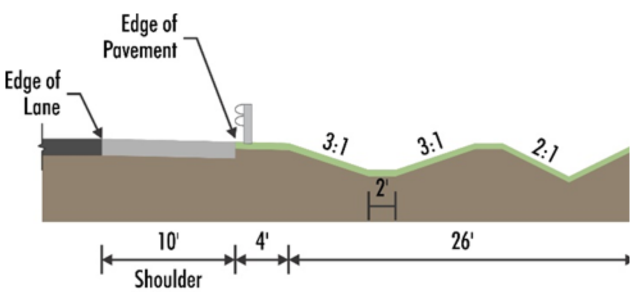
Wetlands and waterways were avoided and minimized to the maximum extent practicable along the outer edge of interchanges using the same five-step process as along the roadway. Additionally, the design was refined and portions of the LOD within interchanges were excluded to limit impacts to wetlands and waterways.

Figure 4-14: Five-Step Avoidance and Minimization Process

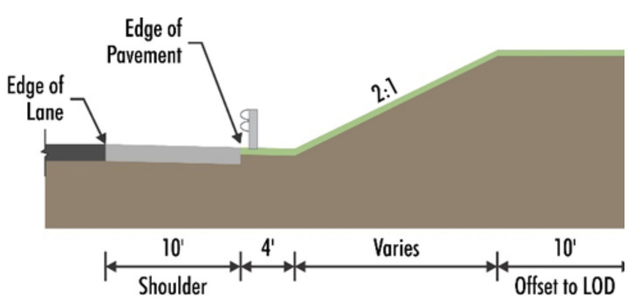
1.Step 1 - an open section with a full-width (8ft) bioswale for stormwater management



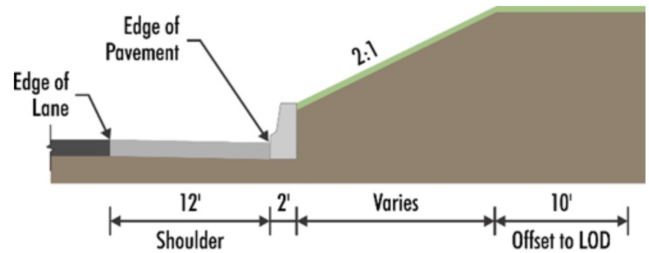
2.Step 2 - an open section with a reduced-width (2-4ft) bioswale for stormwater management



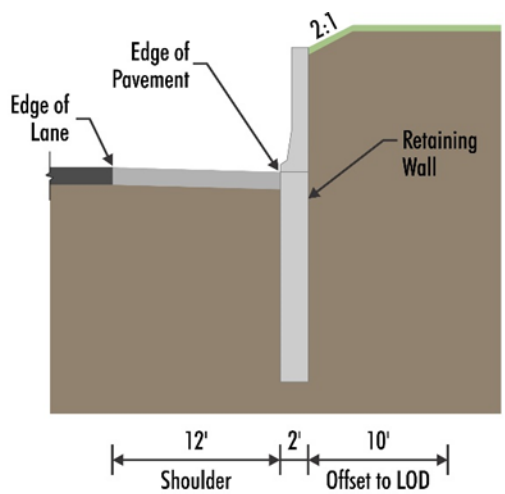
3.Step 3 - an open section with no surface stormwater management (drainage ditch only)



4. **Step 4 - a closed section with concrete barrier**



5. **Step 5 - a closed section with retaining wall**



Balance between avoidance and minimization of impacts to features and providing adequate space to construct the roadway improvements was necessary. MDOT SHA reviewed the entire corridor with respect to constructability to avoid and minimize impacts to wetlands and waterways while maintaining a constructible work area. The LOD was expanded in areas where construction activities would likely require additional space, especially for elements such as culvert or drainage outfalls and bridge construction/expansion and was reduced in areas adjacent to wetlands and waterways where practicable. Construction needs were also determined for staging, stockpiling, access, outfall stabilization, and construction equipment areas with consideration to avoid wetlands, their buffers, waterways, and the FEMA 100-year floodplain to the maximum extent practicable.

All wetlands, their buffers, waterways, and FEMA 100-year floodplains were avoided and minimized to the greatest extent practicable at this stage of the Study, resulting in a significant reduction of impacts. In mid-late 2018, preliminary impact quantities for a two-lane Build Alternative were computed, and these quantities represent the impacts before avoidance and minimization techniques were applied. The total impacts of all Build Alternatives were calculated in May 2020, and these quantities represent the impacts after the application of avoidance and minimization techniques, including corridor-wide and targeted avoidance and minimization. Note that impacts reported in **Table 4-22** are summation totals of all feature impacts regardless of jurisdiction (i.e., USACE and MDE jurisdictional wetlands and waterways are reported as a composite quantity). For totals of impacts by agency jurisdiction, refer to the *Impact Tables* in the *Joint Permit Application* (**Appendix R**).

Table 4-22: Comparison of a Two Managed Lane Alternative Pre-Avoidance and Minimization (A&M) to All Build Alternatives Post-A&M Impacts

Resources	Pre-A&M Impacts	Post-A&M Impacts					
	2018 Two Managed Lanes Alternative	Alts 8 & 9[1]	Alt 9M	Alt 10	Alt 13B	Alt 13C	Estimated Difference in Impact
Waterways (LF)	168,534	155,922	155,229	156,984	155,822	156,632	-14,000 LF
Wetlands (AC)	38.10	16.34	16.08	16.52	16.31	16.48	-21.5 AC
Wetland Buffer (AC)	69.05	53.14	52.66	53.62	53.08	53.49	-15.0 AC
FEMA Floodplain (AC)	143.44	119.53	116.51	120.00	119.51	119.93	-23.0 AC

Note: [1]Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.
Alternative 5 was not considered a reasonable alternative and therefore avoidance and minimization was not advanced on this alternative.

B. Mitigation

Wetland mitigation requirements in Maryland and Virginia were developed using standard practices of USACE, MDE and VDEQ. The proposed permittee-responsible, off-site mitigation in Maryland consists of 13 mitigation sites, including a total of 61.94 acres of potential wetland mitigation credits and 74,085 linear feet of potential stream mitigation credits. Permittee-responsible mitigation sites included in the *Draft Compensatory Mitigation Plan* (CMP) (**Appendix N**) were chosen based on their potential for functional uplift, construction feasibility, proximity to the study area, mitigation credits, and replacement of lost functions and values resulting from roadway improvements.

Privately-owned mitigation banks would be used to fulfill all mitigation requirements in Virginia. The mitigation requirement of 0.1 wetland mitigation credits and 729 riverine mitigation credits in the Fairfax

County Middle Potomac-Catoctin watershed would be met by purchasing bank credits. MDOT SHA will negotiate with the banker to identify credits, confirm credit use with the USACE, and purchase credits to be included in the Final CMP.

No mitigation bank credits or in-lieu fee programs were identified in Maryland. Due to the lack of in-lieu fee programs and mitigation bank credits in Maryland, MDOT SHA decided to pursue permittee-responsible mitigation for the remaining mitigation requirements. A two-tiered approach was used to identify potential permittee-responsible mitigation sites for the remaining off-site mitigation requirements in Maryland that included a traditional mitigation site search on public lands and a Request for Proposals (RFP) on private lands. Refer to the *Draft Compensatory Mitigation Plan* (**Appendix N**) for additional details.

NPS requires avoidance, minimization, and compensation for unavoidable adverse impacts to NPS wetlands via restoration of degraded wetlands on NPS property at a minimum of a 1:1 restoration/replacement ratio that can be adjusted upward to ensure functional replacement. NPS requires that a Wetland Statement of Findings (WSOF) be prepared in accordance with the procedural manual during NEPA documenting compliance with DO #77-1 for proposed actions that would result in adverse impacts to wetlands. The WSOF is required to include a detailed and site-specific mitigation plan for mitigation sites to be located on NPS property following the mitigation site location hierarchy in the procedural manual. MDOT SHA will work with NPS to identify mitigation opportunities on NPS property for unavoidable impact to wetlands.

4.13 Watersheds and Surface Water Quality

4.13.1 Introduction and Methodology

Surface waters include rivers, streams, and open water features such as ponds and lakes. Streams are generally defined as water flowing in a channel with defined bed and bank and an ordinary high water mark. Section 401 and Section 402 of the Federal CWA (33 U.S.C. 1341 and 1342) regulate water quality and the introduction of contaminants to waterbodies. The MDE and VDEQ are the regulatory agencies responsible for ensuring adherence to water quality standards in Maryland and Virginia, respectively. In general, the National Pollutant Discharge Elimination System (NPDES) stormwater program requires permits for discharge from construction activities that disturb one or more acres, and discharges from smaller sites that are part of a larger common plan of development. Individual permits for erosion and sediment control approval will be submitted and approved as contract packages are developed.

Under the COMAR: Title 26 Department of the Environment, Subtitle 08 Water Pollution, Chapter 02 Water Quality (26.08.02), the State of Maryland has adopted water quality standards to enhance and protect water resources and serve the purposes of the Federal CWA. Similarly, all of Virginia's surface waters are classified by VDEQ according to designated uses promulgated in Virginia's water quality standards (9 VAC 25-260). The water quality standards serve this purpose by designating uses to the waters of the state and setting criteria by which these uses are protected. Water quality in Maryland and Virginia shall be protected and maintained for these "Designated Uses." Coordination with the MDNR Environmental Review Program (ERP) and online research through the MDE and VDEQ websites was conducted to determine designated uses and regulations for the waters crossed by the corridor study boundary.

The Maryland Scenic and Wild Rivers Act of 1968 established the Maryland Scenic and Wild Rivers System to preserve and protect the natural values and enhance the water quality of rivers, or segments of rivers, which possess outstanding scenic, geologic, ecologic, historic, recreational, agricultural, fish, wildlife, cultural, and other similar resource values. Each unit of state and local government, in recognizing the intent of the Act and the Scenic and Wild Rivers Program, is required to take whatever action is necessary to protect and enhance the qualities of a designated river. Potential effects to scenic and wild rivers are reviewed and coordinated by the MDNR in collaboration with the relevant Scenic and Wild River Advisory Board.

The Virginia Scenic Rivers Act of 1970 established the Virginia Scenic Rivers Program with the intent to identify, designate, and help protect rivers and streams that "possess superior natural and scenic beauty, fish and wildlife, and historic, recreational, geologic, cultural, and other assets." River segments are evaluated based on 13 criteria, including water quality, corridor development, recreational access, historic features, natural features, visual appeal, quality of fisheries, and the presence of unique habitats or species. If a waterway qualifies for designation, the Virginia Department of Conservation and Recreation (VDCR) prepares a report including supporting comments by local governments and state agencies.

Existing information on surface water resources (to include scenic and wild rivers) and water quality within the corridor study boundary was obtained from MDOT SHA, MDE, MDNR Maryland Biological Stream Survey (MBSS), Montgomery County Department of Environmental Protection (MCDEP), Prince George's County Department of the Environment (PGDoE), VDEQ, and Fairfax County Department of Public Works and Environmental Services (FCDPWES); all of which utilize a variety of data sources in order to assess the overall health and condition of the applicable watersheds. This includes data on chemical water quality, fish and benthic macroinvertebrate communities, aquatic habitat, land use characteristics, riparian buffer conditions, and impervious surface coverage.

Data collected on aquatic habitat conditions and fish and benthic macroinvertebrate communities are often used to summarize existing water quality conditions based on an overall narrative rating (e.g., Very Poor, Poor, Fair, Good, etc.), using established methodologies. These methodologies and rating criteria are summarized in **Section 4.18** of this chapter and are detailed within *the Natural Resources Technical Report* (**Appendix L, Section 2.9**).

Discussions of water chemistry within the *Natural Resources Technical Report* (**Appendix L, Section 2.4**) are based upon data collection from both in-situ multi-probe sampling and chemical grab sampling. In-situ data are defined as data collected with field measurement techniques such as water quality meters, while chemical grab sampling is defined as sampling where water samples were collected in the field and transported to a laboratory for detailed analysis.

4.13.2 Affected Environment

Within Virginia, the entirety of the corridor study boundary crosses the Potomac River drainage basin in Fairfax County. More specifically, the corridor study boundary crosses the Middle Potomac watersheds, comprised of the Bull Neck Run, Scotts Run, Dead Run, Turkey Run, and Pimmit Run subwatersheds (FCDPWES, 2008). For the purposes of this document, only streams within the Fairfax County Middle Potomac watersheds that cross the corridor study boundary are discussed. These subwatersheds include the Scotts Run and Dead Run watersheds.

Within Maryland, the majority of the corridor study boundary crosses the Potomac River drainage basin, with the eastern-most portion of the corridor study boundary, between approximately US 50 and MD 4, falling within the Patuxent River drainage basin. Within the Potomac River drainage basin, the corridor study boundary crosses state-designated Washington Metropolitan watershed (MDE 6-digit watershed), encompassing the Potomac River-Montgomery County, Cabin John Creek, Rock Creek, Anacostia River, Potomac River Upper Tidal, and Oxon Creek subbasins (MDE 8-digit watersheds). Within the state-designated Patuxent River watershed (MDE 6-digit watershed), the corridor study boundary crosses the Western Branch subbasin (MDE 8-digit watershed).

MDNR 12-digit watersheds are third order stream drainage watersheds determined by USGS contours in a joint state and Federal effort. For the purposes of this document, only streams with watersheds that cross the corridor study boundary are discussed. The MDNR 12-digit watersheds that cross the corridor study boundary include Potomac River/Rock Run, Cabin John Creek, Rock Creek, Sligo Creek, Northwest Branch of the Anacostia River (Northwest Branch), Paint Branch, Little Paint Branch, Northeast Branch, Bald Hill Branch, Upper Beaverdam Creek, Upper Southwest Branch, Lower Southwest Branch of the Western Branch of the Patuxent River (Lower Southwest Branch), Upper Henson Creek, Watts Branch, and Muddy Branch. A watershed characteristics summary and water quality data based upon chemical sampling for each watershed is provided in *the Natural Resources Technical Report* (**Appendix L, Section 2.4**).

Based on review of available information on the National Wild and Scenic River System website, there are no Federally-designated Wild and Scenic Rivers in Maryland. However, the Potomac River in Montgomery County, the Anacostia River, the Patuxent River, and their tributaries are state-designated as Scenic under the Maryland Scenic and Wild Rivers Program. Most streams within the corridor study boundary are regulated under the Maryland Scenic and Wild Rivers Act, as they drain to one of the rivers or river segments mentioned above. Streams in the Rock Creek and Henson Creek watersheds are not regulated under the Maryland Scenic and Wild Rivers Act, as these watersheds enter the Potomac River downstream of the designated river segments.

No waterways within the Virginia portion of the corridor study boundary are state-designated as Scenic Rivers.

4.13.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact surface waters, surface water quality, and watershed characteristics.

All Build Alternatives would affect surface waters, surface water quality, and watershed characteristics in the corridor study boundary due to direct and indirect impacts to ephemeral, intermittent, and perennial stream channels and increases in impervious surface in their watersheds. The impacts to jurisdictional surface waters by classification are summarized in **Table 4-20** of this chapter. The impacts to jurisdictional surface waters by MDNR 12-digit and USGS HUC8 watersheds are provided in *the Natural Resources Technical Report* (**Appendix L, Section 2.3**).

MDE has designated certain surface waters of the state as Tier II (High Quality) waters, based on monitoring data that documented water quality conditions that exceeded the minimum standard necessary to meet designated uses. The only delineated tributaries within the corridor study boundary that also drain to Tier II waters were identified in the Bald Hill Branch and Beaverdam Creek–Northeast Branch watersheds. Although the corridor study boundary also intersects a small portion of the Piscataway Creek Tier II watershed, no features were identified within and no runoff would drain to this watershed. No impacts would occur within the Piscataway Creek Tier II watershed.

Impacts to surface water quality during construction include physical disturbances or alterations, accidental spills, and sediment releases. These impacts can affect aquatic life through the potential to contaminate waterways in the vicinity of the corridor study boundary. Direct stream channel impacts associated with each Build Alternative are compared and quantified in the *Natural Resources Technical Report* (**Appendix L, Section 2.3**). The potential negative water quality results of these impacts are discussed below.

During construction, large areas of exposed soil can be severely eroded by wind and rain when the vegetation and naturally occurring soil stabilizers are removed. Erosion of these exposed soils can considerably increase the sediment load to receiving waters (Barrett et al., 1993). These increased sediment loads can destroy or damage fish spawning areas and macroinvertebrate habitat. An accidental sediment release in a stream can clog the respiratory organs of fish, macroinvertebrates, and the other members of their food web (Berry et al., 2003). Additional suspended sediment loads have also been shown to cause stream warming by reflecting radiant energy (CWP, 2003).

An additional impact associated with the initial construction phase of roadway improvements is the removal of trees and possibly other riparian buffer vegetation. The removal of riparian vegetation greatly reduces the buffering of nutrients and other materials and allows unfiltered water to directly enter a stream channel (Trombulak and Frissell, 2001). Tree removal during the construction process can reduce the amount of shade provided to a stream and thereby raise the water temperature of that stream. In addition to tree removal, stormwater discharges also have the potential to increase surface water temperatures in nearby waterways. The effect of the temperature change depends on stream size, existing temperature regime, the volume and temperature of stream baseflow, and the degree of shading. Thermal effects from decreased shading and stormwater discharge are of particular concern for Use III and IV stream networks, such as Paint Branch and Northwest Branch, as they support aquatic biota less tolerant of warmwater conditions.

Impacts associated with the use of the road after construction are mainly based on the potential for contamination of surface waters by runoff and from new impervious roadway surfaces. The most common heavy metal contaminants are lead, aluminum, iron, cadmium, copper, manganese, titanium, nickel, zinc, and boron. Most of these contaminants are related to gasoline additives and regular highway maintenance. Other sources of metals include mobilization by excavation, vehicle wear, combustion of petroleum products, historical fuel additives, and catalytic-converter emissions. Generally, heavy metals from highways found in streams are not at concentrations high enough to cause acute toxicity (CWP, 2003).

Deicing compounds that are used during the winter for highway safety maintenance also pose a threat to water quality. Sodium chloride is the most common deicing compound, but it can also be blended with calcium chloride or magnesium chloride. Urea and ethylene glycol are also sometimes used to deice. MDOT SHA most commonly uses rock salt (sodium chloride), a salt brine, and magnesium chloride. Chlorides from these salts can cause acute and chronic toxicity in fish, macroinvertebrates, and plants.

The effect of chlorides in streams is dependent on the amount that is applied and the dilution of the receiving waters. Runoff containing road salts, among other things, can cause elevated conductivity in streams, especially during the spring.

Organic pollutants, including dioxins and PCBs, have been found in higher concentrations along roadways. Sources of these compounds include runoff derived from exhaust, fuel, lubricants, and asphalt (Buckler and Granato, 1999). These organic pollutants are known to accumulate in concentrations that can cause mortality and affect growth and reproduction in aquatic organisms (Lopes and Dionne, 1998).

Sediments are also a primary pollution concern associated with an increase in impervious areas. All Build Alternatives would add the most impervious surface to the Cabin John Creek, Northeast Branch, and Upper Beaverdam MD 12-digit watersheds, with between 49.4 and 108.4 acres added. The least additional impervious surface would be added to Northwest Branch, Little Paint Branch, Muddy Branch, Watts Branch, and Bald Hill Branch watersheds, with between 0 and 13.9 acres added. The only Tier II watershed that would experience an increase in impervious surface is the Beaverdam Creek – Northeast Branch watershed, with an increase of less than 0.1 acres. Refer to the *Natural Resources Technical Report* (**Appendix L, Section 2.3**) for a discussion of jurisdictional surface water impacts and **Table 4-29** for additional impervious surface by Build Alternative. Additional impervious surface includes all new impervious surface outside of the existing roadway footprint. Water quality would be protected by implementing strict erosion and sediment control plans with BMPs appropriate to protect water quality during construction activities. Post-construction stormwater management and compliance with total maximum daily loads (TMDLs) will be accounted for in the stormwater design and water quality monitoring to comply with required permits.

Regulatory agencies and the NPS expressed interest in the impacts to 15 streams/rivers: Rock Creek, Paint Branch, Thomas Branch, a tributary to Southwest Branch, Northwest Branch, the Potomac River, Rock Run, Booze Creek, Cabin John Creek, Sligo Creek, Little Paint Branch, Indian Creek, Henson Creek, Muddy Branch, and Watts Branch. The specific proposed impacts to these streams are included in the *Avoidance, Minimization and Impacts Report* (**Appendix M**). These streams are of particular interest to the agencies due to the proximity of their mainstems to the corridor study boundary, their particular ecological significance, and the potential need to relocate, bridge, and culvert portions of these stream channels. Segments of Thomas Branch and Rock Creek were relocated to accommodate construction of I-495 in the 1960s and currently flow parallel to and very near the roadway. Paint Branch flows through the I-95 interchange with I-495, a very large interchange that would require reconfiguration with any of the Build Alternatives. The tributary to Southwest Branch flows parallel to and near I-495 in the vicinity of MD 214 and MD 202. The other eleven waterways are major crossings within the proposed LODs. One element that contributes to the LOD required for major stream crossings is the potential need for capacity augmentation/auxiliary culverts to accommodate potential increases in surface water elevation and reduce flood risk. Culverts were evaluated throughout the study corridor to determine flood risk potential and auxiliary culverts, additional culvert pipes running alongside the existing culverts, are proposed in those areas where flood risk potential was identified.

The impacts to rivers and tributaries designated as scenic would be the same as other streams. Any aesthetic impacts to scenic streams would be mostly temporary, during construction activities. However, replacement or major modification of the American Legion Bridge and Northwest Branch Bridge could have a longer-term aesthetic effect on the Scenic designated rivers, and would therefore be designed to protect the scenic value of the resource. As noted in **Section 4.13.1** of this document, MDNR will assist the study team with coordination for Maryland Scenic Rivers.

4.13.4 Mitigation

Impacts to surface waters would be unavoidable if a Build Alternative is selected. However, continual efforts to avoid and minimize impacts have occurred throughout the planning process in consultation with the regulatory agencies and would continue as the Study moves forward to more detailed stages of design. MDOT SHA would work with regulatory agencies and resource managers to identify sensitive aquatic resources and determine further avoidance and minimization possibilities. Agency recommendations would be and have been evaluated and implemented wherever practicable and will continue to be evaluated as the Study progresses. Efforts to avoid and minimize direct impacts to natural resources, including surface water and water quality, to date have included elimination of the collector-distributor system on I-270, alignment shifts to avoid water resources, alteration of roadside ditch design, addition of retaining walls to minimize the roadway footprint, revision of ramp design, revision of construction access areas, relocation of managed lanes access to avoid water resources, and revision of preliminary stormwater management locations to avoid streams. MDOT SHA is committed to continuing efforts to maximize avoidance and minimization where practicable. The results of the planning stage avoidance and minimization efforts are further detailed in the *Avoidance, Minimization, and Impacts Report* (**Appendix M**).

Impacts to all Scenic Rivers have been avoided and minimized to the maximum extent practicable during preliminary design. Coordination with MDNR and the Scenic and Wild River Advisory Board will continue throughout future project design phases. Typically, protection of tributaries to state-designated Scenic Rivers is achieved through minimization and mitigation measures that are already being applied to waterways within the corridor study boundary.

The Study will be required to adhere to E&S requirements during construction. Water quality would be protected by implementing stringent erosion and sediment control plans with BMPs appropriate to protect water quality during construction activities. Post-construction stormwater management and compliance with TMDLs will be accounted for in the stormwater design and water quality monitoring to comply with required permits. Post-construction stormwater management and compliance with TMDLs will be accounted for in the stormwater design and water quality monitoring to comply with required permits. Other measures may also be considered in particularly sensitive watersheds after further coordination with MDE, such as redundant erosion and sediment control measures in especially sensitive watersheds or providing on-site environmental monitors during construction to provide extra assurance that erosion and sediment control measures are fully implemented and functioning as designed.

Any unavoidable impacts would be regulated under state and Federal wetlands and waterways permits that would be issued for the Study. Avoidance and minimization efforts to reduce impacts to natural resources are described in **Section 4.12.4**, and the *Avoidance, Minimization and Impacts Report* (**Appendix M**). The wetlands and waterways mitigation process for the Study is described in the *Draft Compensatory Mitigation Plan* (**Appendix N**). Avoidance and minimization efforts for the 15 targeted streams/rivers is discussed in the *Natural Resources Technical Report* (**Appendix L, Section 2.3.4**) and within the *Avoidance, Minimization, and Impacts Report* (**Appendix M, Section 3.3**).

4.14 Groundwater Hydrology

4.14.1 Introduction and Methodology

In 1974, Congress passed the Safe Drinking Water Act (SDWA) to regulate the public drinking water supply (EPA, 2004). The SDWA Amendments of 1986 require each state to develop Wellhead Protection Programs to assess, delineate, and map source protection areas for their public drinking water sources, and determine potential risks to those sources (42 U.S.C. 300h-7). Wellhead Protection specifically manages the land surface around a well where activities might affect water quality (MDE, 2018). Source water protection is not specifically mandated by the SDWA, though it does mandate source water assessments, as described below. This allows for flexibility in the delineation and development of source water protection areas to fit the needs of the state (42 U.S.C. 300j-13). States, tribes, and communities are encouraged to use SDWA guidance to protect their public water sources from pollution of major concern and to pass local regulations (EPA, 2004).

The EPA approved Maryland's Wellhead Protection Program in June of 1991, and Maryland's Source Water Assessment Program in November of 1999. The EPA approved Virginia's Source Water Assessment Program in October 1999, and their Wellhead Protection Program in 2005 (VDH, 1999; VDEQ, 2005). The EPA, as authorized by Section 1424(e) of the Safe Drinking Water Act of 1974, is responsible for the Sole Source Aquifer (SSA) Program, which allows the EPA to designate an aquifer as a sole source of drinking water and establish a review area for any Federally-funded projects that fall within the area (42 U.S.C. 300h-6). Both Virginia's and Maryland's program provides technical assistance, information, and funding to local governments to aid in water supply protection. The SDWA does not regulate private wells serving fewer than 25 individuals (EPA, 2004). Data on wells and groundwater conditions within the corridor study boundary were gathered from online sources from the USGS, Maryland Geological Survey (MGS), Virginia Department of Health (VDH), and the EPA. Groundwater well data were gathered from the USGS National Water Information System (USGS, 2017).

4.14.2 Affected Environment

The hydrogeology of the corridor study boundary is largely defined by the geology of the area. According to USGS and Maryland Geological Survey (MGS), two main aquifers split the corridor study boundary almost evenly in half. The western half of the corridor study boundary is underlain by the crystalline-rock and undifferentiated sedimentary-rock aquifer, one of the three primary aquifers of the Piedmont and Blue Ridge Physiographic Province. The eastern half of the corridor study boundary is underlain by the North Atlantic Coastal Plain aquifer, which is comprised of 16 local aquifers and 14 confining units that vary in their extent depending on the location within the North Atlantic Coastal Plain aquifer. The Atlantic Seaboard Fall Line is an area of the Coastal Plain Physiographic Province that is underlain by a wedge of unconsolidated sediments including gravel, sand, silt, and clay, which overlaps the consolidated rocks of the eastern Piedmont along an irregular line of contact (MGS, 2018). The Atlantic Seaboard Fall Line, or Fall Zone, transects the corridor study boundary near and generally parallel to the I-95 corridor, but the exact outcrop locations of the coastal aquifers along the Atlantic Seaboard Fall Line vary in width and depth depending on where coastal sediments and consolidated rocks come together. These outcroppings along the Atlantic Seaboard Fall Line serve as groundwater recharge areas for these coastal aquifers, making this area important to groundwater discussions as they can be more prone to pollutant contamination (Water Management Administration, 2013).

Each aquifer is comprised of a variety of bedrock, rocks, and regolith which results in the recharge in the aquifers to be highly variable. Aquifers and aquifer systems are distinguished by their geology, with aquifers being more homogenous and aquifer systems being more heterogeneous in terms of composition and continuity of the formation(s). The Sole Source Aquifer (SSA) Program allows the EPA to designate an aquifer as a sole source of drinking water and establish a review area for any Federally-funded projects that fall within the area. SSAs are defined as providing at least 50 percent of the drinking water for its service area, and where that service area has no reasonably available alternative drinking water sources. No SSAs are present within the project study corridor.

The aquifers beneath the corridor study boundary are used for groundwater withdrawals. MDE has documented numerous groundwater wells within Montgomery and Prince George's Counties, although the majority of these fall in locations far from the corridor study boundary where homes still use well water (MDE, 2015). MDE does not release the exact locations of groundwater wells for landowner privacy and security, therefore the exact location of most wells within the corridor study boundary cannot be determined.

In Maryland, the entire corridor study boundary falls within the service area of the Washington Suburban Sanitary Commission (WSSC), which receives its water from the Potomac River and the Patuxent River. WSSC provides all drinking water within the corridor study boundary. Similarly, in Virginia, the Fairfax County Water Authority serves the areas immediately surrounding the corridor study boundary and receives its water from the Potomac River via the Washington Aqueduct (Fairfax Water, 2018). Less than 20 percent of the population in Fairfax County is served by private wells (VDH, 2019). Groundwater wells within the corridor study boundary that are still in use are generally for commercial and industrial usage, and not used as drinking water. Additional information on Groundwater and Hydrology can be found in the *Natural Resources Technical Report* (**Appendix L, Section 2.5**).

4.14.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact groundwater quality.

All Build Alternatives have the potential to affect groundwater and hydrology in the corridor study boundary, mainly due to highway runoff impacts from stormwater infiltration. Groundwater can be contaminated by roadway runoff which could include substances such as gasoline, oil, and road salts that can seep into the soil and enter the groundwater flow. Soil composition affects how readily contaminants may reach groundwater sources. For example, contaminants are more likely to reach groundwater in sandy soils, which allow more infiltration, than clay soils, which have low infiltration rates. Groundwater wells within the corridor study boundary that are still in use are generally for commercial and industrial usage, and not for drinking water. Consequently, drinking water impacts are not anticipated. Groundwater impacts are highly geographically variable, based on local soil types, slope variability, impervious area, and widespread construction throughout the region. Therefore, groundwater impacts are difficult to quantify and attribute to one source.

4.14.4 Mitigation

During construction activities of any of the Build Alternatives, erosion and sediment (E&S) plans with the most appropriate best management practices (BMPs) would be in place to mitigate potential impacts to groundwater and hydrology by capturing sediment and pollutants before they are released to the surrounding environment, while also maintaining local groundwater quantities through recharge. The use of the latest stormwater management BMP in design, including wet ponds and bioswales that filter pollutants through vegetation and soil mediums, would help to reduce the potential for contamination of shallow groundwater resources, while promoting infiltration.

4.15 Floodplains

4.15.1 Introduction and Methodology

Floodplains provide numerous natural and beneficial functions including: flood moderation; water impurity and sediment filtration; groundwater recharge; habitat for fish, terrestrial wildlife, and plants; outdoor recreation space; and open space for agriculture, aquaculture, and forestry (USDOT, 1979). Floodplains naturally and economically help to maintain water quality and reduce flood property damage by providing floodwater storage and decreasing water flow velocity and sedimentation. Floodplains also provide protected environments for plants to grow and for fish and other wildlife to breed and forage. In addition to the advantage of flood damage reduction, humans also benefit from floodplains through the agricultural and recreational space they provide (FEMA, 2018).

Executive Order 11988, USDOT Order 5650.2, and the National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 et. seq. govern the construction and fill within floodplains. Floodplains are governed by local Flood Insurance Programs and supervised by the Federal Emergency Management Agency (FEMA). MDE houses Maryland's Coordinating Office for the National Flood Insurance Program (NFIP) and is responsible for coordination of all state floodplain programs in Maryland under the Maryland Model Floodplain Management Ordinance (MDE, 2014). Impacts to the 100-year floodplain must be included in the Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland and coordinated through MDE's Water Management Administration – Regulatory Services Coordination Office. Regulatory authority for floodplain impacts includes Section 404 of the CWA; §5-501 through 514, Environment Article, Md. Code Ann.; and COMAR 26.17.04 (Construction on Nontidal Waters and Fllodplains) (MDOT, 2015). Work within floodplains on NPS lands must adhere to NPS Floodplain Management DO #77-2 unless exempted. In Maryland, Waters of the State include the 100-year floodplain. The VDCR floodplain management program and Virginia Department of Transportation (VDOT) construction specifications for roadways also address roadway construction within floodplains. Fairfax County Floodplain Regulations are more stringent than the Federal minimum requirements of the NFIP. Activities within their floodplains may require written approval from the Fairfax County Department of Public Works and Environmental Services, or a Special Exception approval issued by the Board of Supervisors (Fairfax County, 2018c). Floodplain approvals will be obtained by the appropriate jurisdiction. The Study will meet floodplain requirements.

Floodplains within the corridor study boundary were identified using Maryland iMap and the FEMA Effective Floodplain GIS layer. Acreage of the 100-year floodplains within the Build Alternative LODs were calculated using GIS. Floodplain analysis will be conducted at a later stage of design.

4.15.2 Affected Environment

The corridor study boundary overlaps the FEMA 100-year floodplains of 21 stream systems to varying degrees. **Table 4-23** lists each stream and the location where its associated floodplain crosses or enters the corridor study boundary. All FEMA 100-year floodplains within the corridor study boundary are depicted on the *Environmental Resource Mapping* (**Appendix D**) of this document and the *Appendix B of the Natural Resources Technical Report* (**Appendix L**).

Table 4-23: Waterways and Associated Floodplains within the Corridor Study Boundary

Name of Associated Waterway	Location Where Floodplain Crosses Corridor Study Boundary
Muddy Branch	Crosses under I-270, north of I-370 interchange and enters SE of I-270/ Muddy Branch Road intersection
Watts Branch	Crosses under I-270, NW of West Montgomery Avenue interchange
Unnamed Tributary to Watts Branch	Small area between I-270 and Watts Branch Parkway near Fallswood Court
Cabin John Creek	Enters NE portion of I-270/Montrose Road interchange, enters south of the I-495/Cabin John Parkway, crosses the I-495/Cabin John Parkway interchange, enters southwest of I-495/River Road interchange
Booze Creek	SW of the I-495/Cabin John Parkway
Unnamed Tributary to Old Farm Creek	Small area between I-270 and Windermere Court
Thomas Branch	Follows Thomas Branch from I-270 Spur S at Democracy Blvd (starting at NE corner of interchange), south along I-495 to the River Road interchange where it meets Cabin John Creek
Potomac River	At the Maryland/Virginia border
Rock Run	Northwest of I-495/Clara Barton Parkway interchange
Rock Creek	Along 495 from I-270 to Jones Mill Road
Sligo Creek	Crosses under I-495 at Sligo Creek Parkway
Northwest Branch Anacostia River	Crosses under I-495 at Northwest Branch Stream Valley Park
Paint Branch	Crosses under I-495/I-95 interchange
Little Paint Branch	Crosses under I-495 west of the I-495/Baltimore Avenue interchange
Indian Creek	Crosses under I-495 east of the Greenbelt Metro station
Unnamed Tributary to Paint Branch	Crosses under MD 295 in Greenbelt Park (south of I-95/MD 295 interchange) and I-495 at Kepner Court and Lake Park Drive. Enters southeast portion of I-495/ MD295 interchange.
Beaverdam Creek	Crosses under US 50 west of the US 50/I-495 interchange
Bald Hill Branch	Crosses under US 50 east of the US 50/I-495 interchange
Southwest Branch Western Branch Patuxent River	Crosses under through southern portion of MD 214/I-495 interchange
Ritchie Branch	Crosses under I-495 near Kaverton Road
Henson Creek	Crosses under I-495 at Suitland Parkway and again at west of Branch Avenue

4.15.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact the 100-year floodplain within the corridor study boundary.

The 100-year floodplain impacts presented in **Table 4-24** represent the estimated footprint of fill areas associated with construction of the Build Alternatives. Actual analysis of potential study related changes to hydraulic function and elevation of floodplains would be determined using hydraulic and hydrologic floodplain modeling as part of the engineering process for each structure in later phases of design. In general, construction of roadway improvements across drainageways and in floodplains may lead to increases in floodplain elevation and size, which would be addressed by adjusting stormwater structures to ensure that no property damage or impacts to other natural resources result. Portions of the I-495 roadway are already significant encroachments according to 23 CFR §650.105(q). The proposed expansion of the roadway would increase the size of existing significant encroachment areas, but would not propose significant encroachment in new areas.

Table 4-24: Impacts to FEMA 100-Year Floodplain in Acres

Resource	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
FEMA 100-Year Floodplain (acres)	114.3	119.5	116.5	120.0	119.5	119.9

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2] Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.

Section 14 of the Rivers and Harbors Act of 1899, as amended and codified in 33 U.S.C 408 (Section 408) regulates alteration of USACE civil work's projects, such as dams, levees, or flood channels. One Section 408 resource was identified by USACE near the corridor study boundary, the Washington Aqueduct, adjacent to the Clara Barton Parkway near the Potomac River. This feature would not be impacted by any of the Build Alternatives.

4.15.4 Mitigation

FEMA 100-year floodplain impacts were avoided and minimized to the greatest extent practicable based on the preliminary design while also minimizing increases to flooding levels. Impacts to large vegetated floodplains such as Rock Creek were avoided and minimized to maintain hydrologic function as well as wildlife habitat. A detailed hydrologic and hydraulic (H&H) study would be prepared during final design to identify the existing storm discharge and floodplain impacts. All construction occurring within the FEMA designated floodplains must comply with FEMA-approved local floodplain construction requirements. These requirements consider structural evaluations, fill levels, and grading elevations. Stormwater Management would be provided and all hydraulic structures would be designed to accommodate flood volumes without causing substantial impact. Culverts and bridges would be designed to limit the increase of the regulatory flood elevation to protect structures from flooding risks, and the use of standard hydraulic design techniques for all waterway openings would be utilized where feasible to maintain current flow regimes, limit upstream flooding, and preserve existing downstream flow rates (COMAR 26.17.04). The use of state-of-the-art erosion and sediment control techniques and stormwater management controls would also minimize the risks or impacts to beneficial floodplain values due to encroachments.

If H&H studies find that the flood elevation would change, floodplain storage mitigation will be implemented, if required. SHA will submit project plans to MDE for approval of structural evaluations, fill volumes, proposed grading evaluations, structural flood-proofing, and flood protection measures in compliance with FEMA requirements, USDOT Order 5650.2, *Floodplain Management and Protection*, and Executive Order 11988. Improvements at existing culverts are required to maintain existing 100-year high water elevations. At new culverts, 100-year high water elevation is required to be contained within either right-of-way or permanent easement. Culvert improvements and new culvert design would ensure that flood risk to adjacent properties is not increased, a requirement of COMAR 26.17.04.11. 23

CFR § 650.115(a) will be consulted when determining design standards for flood control measures. The requirement set forth in 23 CFR § 650.111 will be complied with at later stages of design to complete location hydraulic studies for floodplain encroachment areas. Any significant encroachments associated with the Preferred Alternative will include a finding by FHWA in the FEIS that the proposed significant encroachment is the only practicable alternative. This finding will be supported by the three elements of 23 CFR § 650.113(a).

4.16 Vegetation and Terrestrial Habitat

4.16.1 Introduction and Methodology

Terrestrial habitats identified within the corridor study boundary include: forests, urban and maintained areas, agricultural lands, open fields, and barren lands. While some wetlands have adjacent terrestrial zones, they are considered a separate and distinct habitat type for the purposes of this document and are discussed in **Section 4.12** of this chapter.

Forest is the most common terrestrial habitat within the corridor study boundary. COMAR (2016) defines a forest as, "a biological community dominated by trees and other woody plants covering a land area of 10,000 SF or larger. It includes areas that have at least 100 trees per acre with at least 50 percent of those having a two-inch or greater diameter at breast height (DBH), and forest areas that have been cut but not cleared (08.19.03.01, Article 2.17)." State-funded highway construction projects that involve cutting and clearing of forests are regulated under Maryland Reforestation Law, a regulation created to protect Maryland forests and mitigate for the loss of forest cover. Virginia Department of Forestry (VDOF) regulates the use of Virginia state forests.

Individual forest stand data was not able to be collected in the field for the Study due to the large extent of the study area. However, GIS forest cover data from the Chesapeake Conservancy Conservation Innovation Center's High Resolution Land Cover Data for tree canopy cover and the most recent data from the Virginia Department of Forestry (VDOF) 2005 Virginia Forest Cover dataset (VDOF, 2014), were used to identify forest coverage within the corridor study boundary. Data from the 2006 MDOT SHA Draft Capital Beltway Study Natural Environmental Technical Report (NETR) and the 2017 MDOT SHA I-270 ICM Project provide vegetation cover type information that remains applicable within the Maryland portions of the corridor study boundary. Land cover types were identified according to the Anderson Land Use Classification System (Anderson et al., 1976). Forests were classified by cover types in the 2006 and 2017 studies in accordance with "Forest Cover Types of the United States and Canada" (Eyre, 1980) and associations in accordance with the "Vegetation Map of Maryland" (Brush et al., 1976). The aerial extent of vegetation cover within the corridor study boundary was identified using GIS data obtained from the Chesapeake Conservancy Conservation Innovation Center's High Resolution Land Cover Data for tree canopy cover and the VDOF 2005 Virginia Forest Cover dataset (VDOF, 2014). This information was collectively used to determine forest cover within the corridor study boundary.

As noted above, VDOF regulates the use of state forests. No state forests exist within the Virginia portion of the corridor study boundary. The only forest resources within the corridor study boundary in Virginia are on NPS property and Scott's Run Nature Preserve, owned by Fairfax County Park Authority. Park Use Permits would require coordination and application with the Fairfax County Park Authority for construction within parkland, including removal of trees and vegetation. Any impact to forests on NPS lands must be coordinated directly with the NPS.

Existing county and state forest conservation easement locations within the corridor study boundary were determined using MD iMap data and through coordination with the counties and MDNR. Land cover types were identified according to the Anderson Land Use Classification System.

4.16.2 Affected Environment

The following terrestrial land cover types were identified within the corridor study boundary in the 2006 and 2017 studies: residential; commercial and services; industrial; transportation, communication, and utilities; industrial and commercial complexes; mixed urban or built-up land; cropland and pasture; orchards, groves, vineyards, nurseries, and ornamental horticultural areas; strip mines, quarries, and gravel pits; open fields/meadows/grasslands, scrub/shrub lands; and deciduous, evergreen, and mixed forests. Forest is the most common terrestrial habitat.

Larger forested areas within the corridor study boundary are found on parkland and within stream valleys, with smaller areas of mostly disturbed vegetation occurring in residential and commercial areas. MDOT SHA planted thousands of trees within the corridor study boundary under the Chesapeake Bay TMDL Tree Program and the MD 200 Intercounty Connector (ICC) Project Mitigation Program, with the goal of establishing new forested areas to mitigate for stormwater runoff and MDOT SHA project construction impacts. TMDL tree planting sites are located in interchanges throughout the corridor study boundary, with the majority of sites located in Prince George's County.

In accordance with Maryland Reforestation Law, reforestation areas were established within the MDOT rights-of-way along I-495 and I-270 to mitigate for forest impacts associated with ICC construction. Two reforestation sites are located in the Montgomery County portion of the corridor study boundary in the eastern clover leaf of the I-270/Shady Grove Road interchange and the northern clover leaf of the I-495/Connecticut Avenue interchange. No reforestation areas were identified by VDOT within the Virginia portion of the corridor study boundary.

Other terrestrial vegetation and habitat areas of note are summarized within the *Natural Resources Technical Report* (**Appendix L, Section 2.7**) include MDOT SHA reforestation areas, Maryland county forest conservation easements, VDOF open space easements, and forests found on national/state/county parkland. The only forest resources with the corridor study boundary in Virginia are on NPS property and Scott's Run Nature Preserve.

4.16.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact terrestrial habitats, including forests, conservation easements, or reforestation sites.

Construction of any of the Build Alternatives would involve the physical removal and disturbance of vegetated areas, including forests, within the LOD due to clearing and grading of land needed for construction of highway travel lanes; highway interchanges and ramps; noise barriers; and construction of required stormwater management, among other construction related activities. Forest canopy impacts under the Build Alternatives would range from 1,477 to 1,515 acres, depending on the alternative. Impacts to Forest Conservation Act easements, including state and county-owned easements, would range from 18.6 to 20.8 acres under the Build Alternatives. **Table 4-25** summarizes impacts to forested areas based on forest cover by Build Alternative and **Table 4-26** summarizes the tree canopy cover impacts on NPS properties.

Table 4-25: Impacts to Forests in Acres

Resource	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Forest Canopy	1,434	1,497	1,477	1,515	1,489	1,503
Forest Conservation Act Easements[3]	17.2	19.3	18.6	20.8	18.8	19.7
TMDL Reforestation Sites[4]	60.7	60.7	60.7	60.7	60.7	60.7
ICC Reforestation Sites	4.6	4.6	4.6	4.6	4.6	4.6

Notes: [1]MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2]Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts. [3] Forest Conservation Easement impacts include both county and state forest conservation easements. [4]MDOT SHA planted thousands of trees within the corridor study boundary under the Chesapeake Bay TMDL Tree Program and the Intercounty Connector (ICC) Project Mitigation Program, with the goal of establishing new forested areas to mitigate for stormwater runoff and project construction impacts.

Table 4-26: Tree Canopy Cover Impacts on NPS Properties in Acres

NPS Property	Potential Impacts from the Alternatives 8, 9, 9M, 10, 13B, 13C (Acres)
George Washington Memorial Parkway	9.3
Chesapeake and Ohio Canal National Historical Park	16.6
Clara Barton Parkway	1.2
Baltimore-Washington Parkway	47.0
Greenbelt Park	0.8
Suitland Parkway	1.3
TREE CANOPY COVER TOTAL[1] IMPACTS ALL NPS PROPERTIES (ACRES)	**76.2**

Note: [1] The total reflects no overlapping areas and is not a sum of the individual property totals.

Direct forest and tree impacts would include tree removal, critical root zone (CRZ) disturbance, tree canopy/limb damage, soil compaction, changes in soil moisture regimes due to grading operations and other construction-related activities, and sunscald and windthrow of individual trees growing along the newly exposed edges of retained forested areas. Indirect impacts to vegetated areas could result from increased roadway runoff, sedimentation, and the introduction of non-native plant species within disturbed areas. These indirect impacts could lead to terrestrial habitat degradation within the corridor study boundary, and ultimately a decrease in plant and animal species that inhabit these areas.

Impacts to contiguous forest areas, such as Forest Interior Dwelling Bird Species (FIDS) habitat areas, increase habitat fragmentation and edge to interior ratio, which has the potential to negatively impact wildlife species that rely on these forested corridors as habitat. Many wildlife species in the Washington DC metropolitan region rely on forested corridors to move safely within an otherwise urbanized environment. Impacts to potential FIDS habitat would be due to widening of the existing highway, resulting in slightly contracted forest interiors required by FIDS species, but most of these impacts would not result in new edge habitat that would occur from bisecting the FIDS habitat. A few contiguous forested areas within the study corridor would be bisected, such as those along the George Washington Memorial Parkway, which would result in increased edge habitat. Increased edge habitat supports species common to developed areas such as deer and red-tailed hawks, but impacts populations that rely on mature forests such as barred owls and scarlet tanagers, thereby reducing biodiversity. Increased deer habitat within an urbanized setting promotes unhealthy population growth and can pose a roadway hazard by increasing deer-related automobile accidents. Increased edge-to-interior ratio in forests also results in increased introduction of invasive plant species, resulting in lower plant biodiversity and fewer native plant species that support native wildlife.

4.16.4 Mitigation

Avoidance and minimization efforts to reduce forest impacts will involve a two-tiered approach. The first level will occur during the planning stage where every reasonable effort will be made to minimize disturbance to or removal of forest and trees by minimizing the LODs of the Build Alternatives. The second level of additional avoidance and minimization will occur during final design. Cost reduction related to tree removal and replacement provide incentive for the Developers to reduce impacts to resources, but due to the fixed nature of the highway corridor, opportunities for avoidance and minimization of impacts to roadside forest and tree resources are limited.

Unavoidable impacts to forest from the Study will be regulated by MDNR under Maryland Reforestation Law. Forest impacts must be replaced on an acre-for-acre or one-to-one basis on public lands, within two years or three growing seasons of project completion (MDNR, 1997). The Maryland Reforestation Law hierarchy for mitigation options is on-site planting, then off-site planting on public lands within the same county and/or watershed. If planting is not feasible, there is the option to purchase credits from forest mitigation banks, or to pay into the state Reforestation Fund at a rate of ten cents per square foot or $4,356 per acre. As such, MDOT SHA would first be required to find available public land to be reforested within the same county and/or watershed. If this is not possible, MDOT SHA could purchase credits in a forest mitigation bank or pay into the MDNR Reforestation Fund. The Maryland Reforestation Fund is used by DNR to plant replacement trees.

The only forest resources within the corridor study boundary in Virginia are NPS property and Scott's Run Nature Preserve. Mitigation for any impacts to these forests would require specific coordination with NPS and VDCR. No Virginia Department of Forestry open space easements or Agricultural/Forested Districts are located within the corridor study boundary.

Specific mitigation requirements for impacts to Forest Conservation Easement areas, Reforestation Areas, State Parks, county parks, or NPS lands are discussed in further detail within the *Natural Resources Technical Report* (**Appendix L, Section 2.7**) and will be developed in coordination with the appropriate regulatory agency (e.g., MDNR, NPS, Virginia Department of Conservation and Recreation (VDCR)).

4.17 Terrestrial Wildlife

4.17.1 Introduction and Methodology

The protection of all migratory birds is governed by the Migratory Bird Treaty Act (16 U.S.C. 703-712), under which it is illegal to "take, kill, possess, transport, or import migratory birds or any part, nest, or egg of any such bird" unless authorized by a valid permit (16 U.S.C. 703). A list of migratory birds protected by the Migratory Bird Treaty Act (MBTA) is included in 50 CFR 10.13, and includes most species within Maryland and Virginia including the peregrine falcon.

The conservation of terrestrial wildlife is managed in both Maryland and Virginia through the implementation of state wildlife action plans (SWAP). The SWAP was initiated by the USFWS in 2005 to have states track wildlife species to determine those species of greatest conservation need (SGCN).

In Maryland, Colonial Water Bird Nesting Areas and FIDS are regulated as protected resources within the Chesapeake Bay Critical Area (Critical Area) (COMAR 27.01.09.04). Additionally, the MDNR and USFWS track these species to ensure their populations remain viable and do not become threatened or endangered. Examples of colonial water birds include black-crown night-heron (*Nycticorax nycticorax*), snowy egret (*Egretta thula*), and black skimmer (*Rynchops niger*). Examples of FIDS include red-shouldered hawk (*Buteo lineatus*), barred owl (*Strix varia*), pileated woodpecker (*Dryocopus pileatus*), and scarlet tanager (*Piranga olivacea*).

FIDS habitat was identified by estimating the size of forest patches within the corridor study boundary from aerial photography. (Refer to the *Environmental Resource Mapping* in **Appendix D** of this document.) FIDS habitat typically includes contiguous forest of at least 50 acres with at least 10 acres of forest interior habitat or riparian forests at least 50 acres in size with a width of at least 300 feet. Forest interior habitat is defined as forest at least 300 feet from the nearest forest edge. Regulated FIDS habitat includes documented FIDS breeding areas within existing riparian forests that are at least 300 feet in width and that occur adjacent to streams, wetlands, or the Chesapeake Bay shoreline, and other forest areas used for breeding by FIDS (Jones et al., 2000). Those patches that met the definition of FIDS habitat as defined above, were considered FIDS habitat for the purposes of this Study. There are no designated Critical Areas within the corridor study boundary, and FIDS are not specifically regulated outside of the Critical Area; however, MDNR encourages avoidance of impacts to FIDS habitat throughout the state, including those associated with transportation improvements.

Several types of amphibians are obligate vernal pool species, meaning that they must use temporary pools during a portion of their life stage. In Maryland, vernal pools may or may not be regulated by the USACE under Section 404, depending upon their position within the landscape, duration of inundation, and connection or lack thereof to Waters of the US. Because vernal pools are necessarily ephemeral in nature, they may not hold water long enough to create hydric soil conditions. The presence of vernal pool amphibian species discussed in **Section 4.17.2** is based upon the availability of vernal pool habitat within the corridor study boundary, as observed and mapped during fieldwork for the I-495 & I-270 Managed Lanes Study, and information gathered from Cunningham and Nazdrowicz (2018).

Data on wildlife habitat and documented wildlife species within the corridor study boundary were collected through aerial imagery of vegetative cover and incidental observations of wildlife species and related habitat made during various natural resource field investigations (e.g., wetland delineations) for the Study.

4.17.2 Affected Environment

Terrestrial wildlife expected within the corridor study boundary reflect the availability of various natural and man-modified habitats across a wide swath of the western Coastal Plain and eastern Piedmont physiographic provinces. Because most of the area adjacent to the existing highway corridors is urbanized, natural habitats along the corridors are comprised of a mix of scattered, small, remnant patches of forest and disturbed old fields. Man-modified open agricultural lands were observed within the corridor study boundary. A complete list of wildlife species identified within the corridor study boundary during wetlands and waterways delineation is included in the *Natural Resources Technical Report* (**Appendix L, Section 2.8**).

MDNR indicated in an email on February 28, 2020, included in *Appendix N of the Natural Resources Technical Report* (**Appendix L**), that MDNR no-longer tracks bald eagle nests and that although this species is no-longer listed by the state, it is protected under the Federal Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c).

USFWS responded to MDOT SHA's request for information regarding potential bald eagle nest locations within the proximity of the corridor study boundary and potential protection measures for the peregrine falcons nesting on the American Legion Bridge during bridge replacement on May 13, 2020 and this correspondence is included in *Appendix N of the Natural Resources Technical Report* (**Appendix L**). USFWS reports that there have been no bald eagle nests identified within the corridor study boundary and that the nearest nest is more than eight miles away.

Peregrine falcons began nesting at the American Legion Bridge (ALB), the bridge that spans the Potomac River, in 2007 (USFWS. C. Koppie, 2007 MD Peregrine Falcon Annual Nest Survey). When MDOT SHA initiated a contract for bridge painting and maintenance, it became apparent that peregrine falcon nesting attempts would be unsuccessful. Soon after, MDOT SHA formed a partnership with USFWS and MDNR to protect and promote more favorable conditions for nesting falcons on the ALB over the Potomac River. Through this partnership MDOT SHA constructed and installed a nest box platform to ensure long term protection for nesting peregrine falcons on the ALB. The falcon pair has been successfully using the nest box for 12 consecutive years (USFWS. Koppie, C.A, 2019 MD Peregrine Falcon Nest Survey). A peregrine falcon nest box is installed on the underside of the American Legion Bridge, spanning the Potomac River, which is proposed to be replaced as part of the Study. MDOT SHA has coordinated with USFWS to determine appropriate conservation measures for the peregrine falcons during potential bridge replacement.

Six Species of Greatest Conservation Need (SGCN) were observed within the corridor study boundary, including eastern box turtle (*Terrapene carolina*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), American kestrel (*Falco sparverius*), chimney swift (*Chaetura pelagica*), and magnolia warbler (*Setophaga magnolia*).

Vernal pool amphibians are another specialized group of wildlife potentially occurring within the corridor study boundary. Vernal pools are temporary pools that typically retain water only during winter and spring and are dry by mid-summer. Vernal pools do not support fish, allowing specialized frog and salamander species to exploit a predator-free breeding and early life stage environment. Species that rely completely on vernal pools for reproduction that could occur within the corridor study boundary include marbled salamanders (*Ambystoma opacum*), spotted salamanders, (*Ambystoma maculatum*) and wood frogs (*Lythobates sylvaticus*). Vernal pool habitat exists within the corridor study boundary as natural or man-modified shallow depressions that appear to hold water only for a temporary period of time. The Rock Creek floodplain had the most mapped potential vernal pools within the corridor study boundary. No obligate vernal pool species were incidentally observed during the study.

4.17.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact wildlife.

There would be wildlife impacts from construction of any of the Build Alternatives, as each alternative would involve widening along the existing highways. Therefore, clearing of small forest fragments and encroachments on larger forest resources would result in displacements of some edge-adapted species, but would not result in substantial loss of terrestrial wildlife habitat. Typically, forests along the corridor study boundary are early- to mid-successional (MDOT SHA, 2006) and many areas would regain functionality due to replanting requirements. The Build Alternatives could potentially contribute contaminants to remaining wildlife habitat through pollutant runoff.

Bald eagles are not expected to be impacted by the Study, because USFWS has indicated that no bald eagle nests have been identified within the corridor study boundary. One peregrine falcon pair has been documented to have successfully nested on the American Legion Bridge for 12 consecutive years (USFWS. Koppie, C.A, 2019 MD Peregrine Falcon Nest Survey). The replacement of the ALB would be expected to disturb nesting of the resident peregrine falcons.

The Study is not located within the Critical Area; therefore, no Colonial Water Bird Nesting Areas are anticipated to appear or be affected within the corridor. There would be impacts to potential FIDS habitat within the corridor study boundary from the Build Alternatives. Alternative 9M has fewer impacts than Alternatives 8, 9, 10, 13B, and 13C, as summarized in **Table 4-27**. Impacts to potential FIDS habitat would be due to widening of the existing highway, resulting in slightly contracted forest interiors required by FIDS species, but would not result in new edge habitat in most cases, as would occur from bisecting the FIDS habitat.

Table 4-27: Impacts to Forest Interior Dwelling Species Habitat in Acres

Resource	Alt 5[1]	Alts 8 and 9[2]	Alt 9M	Alternative 10	Alternative 13B	Alternative 13C
Potential FIDS Habitat	25.2	27.7	26.6	27.7	27.7	27.7

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2]Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.

Most of these impacts would be to smaller, upland forest stands resulting in reductions in available edge habitat, rather than complete elimination of habitat. Therefore, some less mobile wildlife could be killed during construction and other more mobile species would be shifted away from the new construction, potentially into already occupied territories requiring further movement into unoccupied suitable habitat, if available. It is also possible that these wildlife movements would be onto existing roadways resulting in potential mortality from vehicle strikes, posing threats to both wildlife and drivers. This effect would likely be most pronounced within the smallest forest stands where remaining habitat may be too small to support populations. The vast majority of wildlife-vehicle collisions reported in the US involve deer, as they are most likely to cause human injury and vehicle damage due to their size, use of edge habitats adjacent to roadways, and prevalence (FHWA,[45] 2008).

4.17.4 Mitigation

Impacts to terrestrial wildlife would be unavoidable if a Build Alternative is selected, primarily due to the associated reduction in the availability of vegetated habitat. Impacts to wildlife are anticipated to be

[45] FHWA, 2008. Wildlife-Vehicle Collision Reduction Study: Report to Congress. August 2008. FHWA-HRT-08-034.

minimal since the Study would improve an existing roadway corridor primarily populated by edge and disturbance acclimated species. In addition, impacts to potential FIDS habitat would be minimal, resulting from slightly impacted forest interiors. Efforts to avoid and minimize forest impacts are discussed in **Section 4.16.4** in this chapter. To minimize vehicle collisions with large animals, MDOT SHA would also investigate options such as fencing and landscaping. In addition, the use of erosion and sediment control BMPs would help to minimize pollutant runoff into surrounding wildlife habitat.

To minimize potential impacts to the currently nesting peregrine falcons, USFWS recommends that MDOT SHA remove the existing peregrine falcon nest box on the American Legion Bridge just prior to the nesting season when construction is scheduled to begin. Disruption for one or more nesting season due to long-term construction activities is anticipated. Once construction activities are mostly complete near the former nest site, MDOT SHA will reinstall the nest box on the bridge in coordination with USFWS. MDOT SHA will follow the USFWS recommendation to contact USFWS just prior to construction to confirm the absence/presence of bald eagle nests located within the corridor study boundary.

4.18 Aquatic Biota

4.18.1 Introduction and Methodology

Fish and shellfish species are protected through Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and MDNR Fishery Management Plans. Existing data on aquatic biota within the corridor study boundary were gathered from Montgomery County Department of Environmental Protection (MCDEP), Prince George's County Department of the Environment (PGDoE), Maryland Biological Stream Survey (MBSS), MDOT SHA, Fairfax County Department of Public Works and Environmental Services (FCDPWES), Virginia Department of Game and Inland Fisheries (VDGIF), and VDEQ, all of which conduct periodic monitoring of stream habitat, benthic macroinvertebrates, and/or fish within the vicinity of the corridor study boundary. Additionally, MDOT SHA requested information from MDNR Environmental Review Program (ERP) and MDNR Wildlife and Heritage Service (WHS) regarding the presence of sensitive species and other natural resources within the corridor study boundary.

A variety of indices and data measurement techniques were used to analyze metrics for aquatic habitat, fish assemblages and benthic macroinvertebrate communities. These methods, together with the qualitative meanings of the resulting index values, are described in detail within the *Natural Resources Technical Report* (**Appendix L, Section 2.9**).

4.18.2 Affected Environment

No Essential Fish Habitat (EFH) was identified within the study corridors, therefore the MSFCMA does not apply to this Study. MDOT SHA requested information from the MDNR Environmental Review Program (ERP) regarding the presence of protected aquatic species within the corridor study boundary. MDNR ERP provided feedback in a response letter dated January 10, 2019 that included a list of fish species likely to occur within the waterbodies crossed by I-495 and I-270 and time of year restrictions for instream work to minimize impact to these species. A copy of this letter is included in *Appendix N of the Natural Resources Technical Report* (**Appendix L**) and the Study will comply with all time of year restrictions for construction activities within stream channels to protect fish species that are included in this correspondence.

Three parameters were evaluated for each of 15 MDNR 12-digit watersheds and areas in the USGS HUC8 Fairfax County Middle Potomac watershed within the corridor study boundary: aquatic habitat, benthic macroinvertebrates, and fish. Aquatic habitat quality was quantified using the EPA Rapid Bioassessment Protocol (RBP), which uses a numerical index ranking scale from 0 (Poor) to 200 (Excellent). Benthic macroinvertebrates and fish were assessed using various Indices of Biological Integrity (IBI), with scores ranging from Very Poor to Excellent. The *Natural Resources Technical Report* (**Appendix L**) expands upon the different IBIs used and the significance of the scores. A summary of the quality index score results (numerical range) for each of the parameters within the assessed watersheds is provided in **Table 4-28**. The total number of waterways within each watershed that were evaluated varied depending on data availability. Detailed information, broken down by waterway, is provided within the *Natural Resources Technical Report* (**Appendix L, Section 2.9**).

Table 4-28: Summary of Watershed Quality Index Narrative Score Results

Watershed	Aquatic Habitat (RBP Score Range)	Benthic Invertebrates (IBI Score Range)	Fish (IBI Score Range)
Fairfax County Middle Potomac	Fair – Good	Very Poor - Poor	Very Poor
Potomac River/Rock Run	Good	Poor - Fair	Fair - Good
Cabin John Creek	Fair – Good	Very Poor – Poor/Fair	Poor – Fair/Good
Rock Creek	Fair – Good/Fair	Very Poor – Poor/Fair	Very Poor - Good
Sligo Creek	Fair – Good/Fair	Poor	Poor - Fair
Northwest Branch	Good/Fair – Excellent/Good	Poor - Fair	Fair - Good
Paint Branch	Severely Degraded – Partially Degraded	Very Poor – Fair	Good
Little Paint Branch	Degraded – Minimally Degraded	Poor - Fair	Good
Northeast Branch	Severely Degraded – Partially Degraded	Poor - Fair	Poor
Bald Hill Branch	Severely Degraded	Very Poor - Fair	No Data
Upper Beaverdam Creek	Severely Degraded – Partially Degraded	Very Poor - Fair	Very Poor - Fair
Upper Southwest Branch	Severely Degraded – Partially Degraded	Very Poor - Poor	Fair
Lower Southwest Branch	Degraded	Poor - Fair	No Data
Upper Henson Creek	Severely Degraded – Partially Degraded	Very Poor - Fair	Very Poor - Good
Watts Branch	Fair – Good	Fair	Fair - Good
Muddy Branch	Fair – Good	Poor - Fair	Fair - Good

A list of fish species found within the assessed watersheds within the corridor study boundary is found in the *Natural Resources Technical Report* (**Appendix L, Section 2.9**). The highest number of fish species (33) were found within the Cabin John Creek Watershed.

4.18.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact aquatic biota.

All Build Alternatives have the potential to affect aquatic biota in the corridor study boundary due to direct and indirect impacts to perennial and intermittent stream channels. Stream channel impacts associated with the Build Alternatives range from 155,229 to 156,984 linear feet, and wetland impacts range from 16.1 to 16.5 acres are provided in more detail in **Section 4.12** of this chapter. Impacts to aquatic biota could range from mortality of aquatic organisms during construction of culvert extensions and loss of natural habitat from the placement of culvert pipes and other in-stream structures, to more gradual changes in stream conditions. Impacts to aquatic biota, including species of freshwater mussels, are possible from the replacement of bridges and their in-water piers. Replacement of the American Legion Bridge crossing the Potomac River will require extensive in-stream work and all required precautions will be taken to avoid and minimize impacts to the stream and its aquatic biota.

During construction of culvert extensions, the associated stream channel is excavated and any organisms living within the stream channel would be displaced or crushed by construction equipment. The primary impact from this activity would be to benthic organisms, such as macroinvertebrates, that are relatively stationary. However, fish mortality is also a possibility as they can be trapped in pools during dewatering of the channel. Even if a natural stream bottom is reestablished within the culvert, the habitat is unlikely to support the same fish or macroinvertebrate community present before construction as culverts are relatively straight and typically do not allow for the development of the varied habitat of an unrestrained channel. In the majority of the impacted streams, the area of channel disturbance for the culvert extension is relatively small in comparison to the remaining habitat available. In addition to displacement and habitat alteration, decreased aquatic organism passage could result from the extension of culverts. Other temporary impacts to aquatic biota related to construction include the potential for unintentional sediment discharges that degrade aquatic habitat and impair aquatic communities. Additionally, the conversion of open-space and forested areas to impervious surfaces has the potential to have a wide range of impacts on corridor study boundary streams and their inhabitants. **Table 4-29** identifies the additional impervious surface impacts by watershed. Additional impervious surface includes all new impervious surface outside of the existing roadway footprint.

Impervious surface creation is unavoidable when widening a roadway. Converting open space and forested areas to impervious surfaces increases hydrologic flashiness, or the change in flow rate of surface waters from the input of surface water runoff. Flashy systems contribute to bank erosion and channel incision, resulting in disconnection of stream channels from their floodplains; increased sediment loading; degraded physical habitat; and changes in channel morphology. Disconnection from the floodplain effects water quality by eliminating water filtration by floodplain wetlands from the system. Poor water quality has detrimental effects on aquatic biota by negatively impacting their health and limiting which species can survive in a given system. Bank erosion contributes to sedimentation and can also uproot riparian trees, effecting the width of the riparian forest, which effects water temperature and quality, and creating log jams, which can effect stream morphology. Increased sediment loading contributes to turbidity and poor water clarity, which degrades in-water habitat for fish and other aquatic biota such as bottom invertebrates.

Table 4-29: Additional Impervious Surfaces by Watershed

Watershed Name	MDNR 12-Digit Watershed	Alt 5[1]		Alts 8 & 9[2]		ALT 10		ALT 13B		ALT 13C	
		AC	SF	AC	SF	AC	SF	AC	SF	AC	SF
Potomac River/Rock Run	021402020845	9.1	396,479	13.8	599,986	13.8	599,986	13.8	599,986	13.8	599,986
Cabin John Creek	021402070841	64.1	2,791,915	90.4	3,937,384	111.7	4,865,280	80.6	3,510,516	96.4	4,199,977
Rock Creek	021402060836	43.7	1,904,069	56.5	2,460,759	62.9	2,739,693	54.5	2,375,644	58.4	2,542,005
Sligo Creek	021402050821	17.7	770,111	24.5	1,066,885	24.5	1,066,885	24.5	1,066,885	24.5	1,066,885
Northwest Branch	021402050818	16.6	722,856	23.7	1,030,664	23.7	1,030,664	23.7	1,030,664	23.7	1,030,664
Paint Branch	021402050826	24.7	1,077,300	29.2	1,270,058	29.2	1,270,058	29.2	1,270,058	29.2	1,270,058
Little Paint Branch	021402050825	8.4	364,474	10.1	439,088	10.1	439,088	10.1	439,088	10.1	439,088
Northeast Branch	021402050822	64.8	2,823,465	86.3	3,758,473	86.3	3,758,473	86.3	3,758,473	86.3	3,758,473
Upper Beaverdam Creek	021402050816	45.7	1,992,463	51.0	2,219,977	51.0	2,219,977	51.0	2,219,977	51.0	2,219,977
Upper Southwest Branch	021311030924	22.2	967,846	33.1	1,443,606	33.1	1,443,606	33.1	1,443,606	33.1	1,443,606
Lower Southwest Branch	021311030922	15.0	653,087	18.4	800,512	18.4	800,512	18.4	800,512	18.4	800,512
Upper Henson Creek	021402010797	35.3	1,539,708	47.0	2,045,481	47.0	2,045,481	47.0	2,045,481	47.0	2,045,481
Muddy Branch	021402020848	13.4	582,659	14.5	632,307	19.1	830,422	14.9	650,486	18.3	796,919
Watts Branch	021402020846	1.1	47,398	2.9	127,328	7.6	331,873	2.4	102,407	5.4	233,242
Bald Hill Branch	021311030928	0.9	38,634	1.0	42,208	1.0	42,208	1.0	42,208	1.0	42,208
Beaverdam Creek	021402050823	0.0	2,007	0.0	2,007	0.0	2,007	0.0	2,007	0.0	2,007
Nichols Run - Potomac River (Virginia)[3]	N/A	12.9	562,791	14.5	631,590	14.5	631,590	14.5	631,590	14.5	631,590

Notes: [1]MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.
[2] Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.
[3] Part of the additional impervious surface area is in the Potomac River HUC8 Watershed in Virginia and is not associated with an MDNR 12-digit Watershed.

4.18.4 Mitigation

MDOT SHA will continue to coordinate with regulatory agencies and resource managers to identify sensitive aquatic resources and determine further potential avoidance and minimization as design is refined. Agency recommendations would be evaluated based on engineering and cost effectiveness and would be implemented wherever possible. Avoidance and minimization efforts to date have included alignment shifts, reductions to roadside ditch widths to minimize the overall width of improvements, bridging waterways when feasible, and addition of retaining walls where practicable.

Bridges and depressed culverts would be used wherever possible to maintain natural stream substrate in areas where new or replaced culverts are necessary. However, opportunities for using depressed culverts may be limited because most existing culverts would be extended or augmented rather than replaced. Channel morphology would be evaluated, and culvert extensions designed to maintain aquatic life passage by avoiding downstream scour and channel degradation. Preliminary designs do not include culvert replacements, but do include augmentations resulting from installing new pipes adjacent to existing culverts to provide additional area for flow.

All in-stream work would comply with the stream closure period for the designated use class of the stream, including that for culvert extensions, and any potential waiver requests would require agency approval(s). In-stream work is prohibited in Use I streams from March 1 through June 15, Use III streams from October 1 through April 30, and Use IV streams from March 1 through May 31, to protect aquatic species. In addition, in areas where yellow perch have been documented (Bald Hill Branch and Western Branch of the Patuxent River), no in-stream work is permitted in Use I waters from February 15 through June 15.

In particularly sensitive areas, other impact minimization activities may be considered and could include: more specialized stormwater management options; redundant erosion and sediment control measures; monitoring of aquatic biota above and below sensitive stream crossings before and after construction to quantify any inadvertent impacts that occur at the crossing; fish relocation from dewatered work areas during construction to reduce fish mortality; and use of a qualified environmental monitor on-site to enhance erosion and sediment control compliance. Through the use of erosion and sediment control measures, stormwater management, and other BMPs, MDOT SHA will minimize impacts from any additional impervious area from the proposed project to the greatest extent practicable to avoid further declines in the quality of aquatic habitat and communities.

4.19 Rare, Threatened, and Endangered Species

4.19.1 Introduction and Methodology

A. Regulatory Context

Section 7 of the Endangered Species Act (ESA) of 1973 (16 U.S.C. § 1531-1544) requires all Federal agencies to use their authorities to conserve endangered and threatened species in consultation with the USFWS and/or National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). Section 7(a)(2) (16 U.S.C. § 1536) establishes substantive requirements for Federal agencies to ensure, in consultation with the USFWS, any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any endangered or threatened species or destroy or adversely modify designated critical habitat.

The Section 7 implementing regulations (50 CFR Part 402) specify how Federal agencies must fulfill their Section 7(a)(2) consultation requirements. Section 9 of the ESA (16 U.S.C. § 1538) prohibits any action that causes a "take" of species listed as endangered or threatened. "Take" is further defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt any of these. The USFWS administers the ESA for all terrestrial and nontidal freshwater species, while the NMFS administers the ESA for marine and anadromous species or critical habitat. While there are no tidal areas within the corridor study boundary, NMFS also regulates effects to other trust resources, such as anadrous fish species, estuaries, and EFH. The Fish and Wildlife Coordination Act (FWCA) requires consultation with the NMFS to address impacts to fish and aquatic resources under their jurisdiction. The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires consultation with NMFS to address effects to fish and EFH identified under the MSFCMA. These resources are discussed in **Section 4.18**.

Although the bald eagle (*Haliaeetus leucocephalus*) is no longer a listed species under the ESA, it is still protected under the Bald and Golden Eagle Protection Act (16 U.S.C. § 668-668c). The Bald and Golden Eagle Protection Act prohibits the take, possession, sale, purchase, barter, transport, export, or import of any bald or golden eagle (alive or dead), including any part (such as feathers), nest, or egg without a valid permit issued by the Secretary of the Interior (50 CFR 22.3). MDOT SHA's position is that the MLS is not an activity that deliberately intends to kill or take migratory birds. MDOT SHA coordinated with USFWS to determine whether any bald eagle nests occur within the corridor study boundary.

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). Endangered species are those whose continued existence in Maryland is in jeopardy. Threatened species are those that are likely, in the foreseeable future, to become endangered in Maryland. Species with a status of In Need of Conservation are animals whose populations are limited or declining in Maryland such that the species may become threatened in the foreseeable future if current trends or conditions persist. 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.

The Virginia Department of Agriculture and Consumer Services (VDACS), Virginia Department of Game and Inland Fisheries (VDGIF), and VDCR cooperate in the protection of Virginia's state and Federally listed threatened and endangered species. Threatened and endangered wildlife species are protected under the Virginia Endangered Species Act of 1972 (Chapter 5 Wildlife and Fish Laws; Va. Code Ann., § 29.1¬563 through 570). Virginia's threatened and endangered plant and insect species are protected under the Endangered Plant and Insect Species Act of 1979 (Chapter 10 Endangered Plant and Insect Species of the Virginia Code; Va. Code Ann., § 3.2¬1000 through 1011). In addition, a cooperative agreement with the USFWS, signed in 1976, recognizes VDGIF as the designated state agency with regulatory and management authority over Federally-listed animal species and provides for Federal/state cooperation regarding the protection and management of those species. VDACS holds authority to enforce regulations pertaining to plants and insects. However, as per a memorandum of agreement between VDCR and VDACS, VDCR represents VDACS in comments regarding potential impacts to state-listed threatened and endangered plant and insect species.

B. Methodology

The Information for Planning and Consultation (IPaC) tool was used to assess the potential presence of Federally-listed species under the jurisdiction of the USFWS. This online resource allows an assessment of potential listed species within an estimated action area. The IPaC official species list for both the Virginia and Chesapeake Bay Ecological Services field offices of the USFWS were originally accessed on July 11, 2018. Follow-up IPaC coordination occurred on October 24, 2019. The NMFS was contacted by email on July 16, 2018 regarding the potential presence of EFH or Federally-listed tidal aquatic threatened or endangered species. NOAA Fisheries indicated via email dated July 27, 2018 that no EFH resources exist within the study area. Response letters, online reviews, and other correspondence from the state and Federal agencies responsible for rare, threatened, and endangered (RTE) species are included in *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**).

The results of the USFWS Virginia field office official species list in 2018 indicated the potential presence of the northern long-eared bat (*Myotis septentrionalis*) and the yellow lance (*Elliptio lanceolata*), both federally-listed threatened species. However, the yellow lance is presumed extirpated within the study area, as explained by USFWS in the 2018 Final Rule[46] and the *Species Status Assessment Report for the Yellow Lance (Elliptio lanceolata)* (USFWS, 2018[47]). No federally-listed species were noted in the 2018 USFWS Chesapeake Bay field office official species list. However, in early 2019 during coordination meetings with MDOT SHA, USFWS voiced concerns about potential impacts from the Study in Maryland and Virginia to the northern long-eared bat (NLEB) and Indiana bat (*Myotis sodalis*) (IB), a federally-listed endangered species due to positive detections of these species through field research conducted by researchers from Virginia Polytechnic Institute and State University (Virginia Tech) in areas surrounding the study corridor boundary in their 2017, 2018, and 2019 spring/summer surveys. As a result of new information, the USFWS met with MDOT SHA and FHWA on March 25, 2019 to further discuss Study coordination efforts regarding the NLEB and IB. The IPaC reviews for the Virginia and Chesapeake Bay field offices were rerun on October 24, 2019. Both field offices listed only the NLEB as potentially occurring within the corridor study boundary.

On July 18, 2019, the USFWS submitted a letter to the MDOT SHA providing comments on the IPaC Section 7 coordination for the two Federally listed bat species. Two potential ESA consultation pathways can be used when transportation projects may affect the NLEB or IB. These include 1) the Programmatic Biological Opinion (BO) for Transportation Projects in the Range of the Indiana Bat and Northern Long-eared Bat, currently dated February 2018 due to revisions, and 2) the Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-eared Bat and Activities Excepted from Take Prohibitions, dated January 5, 2016. Either of these two Biological Opinions could be used to help facilitate ESA Section 7(a)(2) compliance for transportation projects.

According to the July 18, 2019 USFWS letter to MDOT SHA, the Study would not qualify under the Programmatic BO for Transportation Projects referenced above because the Study proposes to clear more than 20 acres of suitable habitat within any given five-mile section of roadway. The Study would qualify under the Programmatic BO on the Final 4(d) Rule for the NLEB even though forest clearing may affect NLEB. However, the following conservation measures in the Final 4(d) Rule must be followed: Incidental

[46] USFWS, 2018a. Threatened Species Status for the Yellow Lance; Final Rule. 83. Fed. Reg. 14189. (May 3, 2018).
[47] US Fish and Wildlife Service (USFWS). 2018b. Species Status Assessment Report for the Yellow Lance (*Elliptio lanceolata*). Species Status Assessment Reports. Version 1.3. January, 2018. Raleigh Ecological Services Field Office.

take resulting from tree removal is prohibited if it: (1) occurs within a 0.25 mile (0.4 kilometer) radius of known NLEB hibernacula; or (2) cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot (45-meter) radius from the known maternity tree during the pup season (June 1 through July 31). Based on the data collected by researchers at Virginia Tech over the previous three summers, the USFWS recommended that MDOT SHA conduct surveys to determine if IB are utilizing summer habitat within the corridor study boundary. These studies, which include visual bridge surveys and emergence bridge surveys, would qualify as "conservation measures" under Section 7(a)(I) of the ESA for the NLEB and are recommended for the IB to let the USFWS know if conservation measures need to be implemented to avoid adverse effects to the IB.

A follow-up meeting between the MDOT SHA, FHWA, and USFWS was held on July 26, 2019 to further discuss potential bat survey activities and to finalize an acceptable survey approach. To apply "conservation measures" under Section 7(a)(I) of the ESA for the NLEB, MDOT SHA proposed acoustic presence/absence surveys within the corridor study boundary and informational mist netting and radio tracking in areas with positive acoustic identification of rare, threatened and endangered bat species during the survey window from May 15 through August 15, 2020. The USFWS concurred with the survey approach on March 11, 2020. USFWS subsequently asked that mist netting and radio telemetry surveys be removed from the study plan due to concerns of transmission of COVID-19 to bats (refer to *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**) for copies of the agency correspondence). The results of the acoustic and 2020 bridge surveys will be presented in the FEIS. Results of the 2020 bridge survey are discussed in **Section 4.19.2A**. Refer to the *Natural Resources Technical Report* (**Appendix L, Section 2.10**) for the complete summary of USFWS coordination related to these species.

The Maryland Trilogy Application was completed to determine the potential for the presence of Maryland state-listed terrestrial or aquatic RTE species within the corridor study boundary. This online application solicits state-listed RTE species review from the MDNR Wildlife and Heritage Service (WHS) and MDNR Environmental Review Program (ERP). In addition, mapped MDNR Sensitive Species Project Review Areas (SSPRA) were reviewed in Maryland to determine areas supporting or providing habitat buffers for RTE species within the corridor study boundary. SSPRAs are mapped to include both sensitive species habitat and a buffer to allow potential activities anywhere within or near the SSPRA to be flagged for more detailed review by MDNR to determine if a sensitive species could potentially be affected.

MDOT SHA requested information from USFWS about potential bald eagle nest locations in proximity to the corridor study boundary as well as potential protection measures for the peregrine falcons nesting on the American Legion Bridge during the proposed replacement of the bridge. USFWS replied to this request via email on May 13, 2020 (included in *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**)), and a summary of this response is included in **Section 4.19.2**.

For Virginia state-listed RTE species, the VDCR was contacted for information on the potential presence of RTE plant and insect species within the corridor study boundary. Response letters, online reviews, and other correspondence from the state and Federal agencies responsible for rare, threatened, and endangered (RTE) species are included in *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**).

4.19.2 Affected Environment

A. Northern Long-eared Bat and Indiana Bat

The NLEB and IB, both Federally-listed bat species, are found throughout the eastern and north-central US, hibernating in mines and caves during winter and spending the summer in wooded areas (USFWS, 2016; USFWS, 2018c). NLEB is typically a short-distance migrant, with the distance from winter hibernacula in caves and mines to summer roosts being typically less than 50 miles (USFWS, 2016), while IB are known to migrate hundreds of miles from their hibernacula (USFWS 2007). No winter hibernacula exist within the corridor study boundary for either species, but summer roosting and maternity habitat can include any patch of typically upland forest or loose clusters of trees that have individual live or dead trees with loose bark, crevices, cavities, or hollows. The NLEB will also use barns and sheds in areas where suitable roost trees do not occur (USFWS, 2016). Upland forest habitat that could serve as summer roost habitat for NLEB or IB occurs throughout the corridor study boundary in Virginia and Maryland.

Due to timing of the Study and the short survey period, MDOT SHA was not able to conduct acoustic or mist netting surveys in 2019. However, based on agreement between USFWS and MDOT SHA, bat surveys of bridges, both visual and emergence, adjacent to suitable forest habitat were able to be conducted prior to the August 15, 2019 survey deadline. Between August 5 and 12, 2019, 14 bridge structures and associated ramp bridges within the corridor study boundary were assessed for the presence of roosting bats or their suitability to support roosting bats. While suitable bat roosting habitat features were present on most bridges, most did not combine all necessary habitat variables. Bat guano was found beneath the American Legion Bridge on the Maryland side of the Potomac River, the McArthur Boulevard/Clara Barton Parkway Westbound bridge, and the bridge over Seven Locks Road. Based on the results of the visual assessment, there was no evidence of use of the bridges by the NLEB or IB. However, five big brown bats, not state or Federally- listed, were found day-roosting singly within gaps between pier caps of the bridge over the McArthur Boulevard/Clara Barton Parkway Westbound bridge. All five roosting bats were in locations with a vertical clearance of at least 10 feet with forested habitat adjacent to the bridge. All had small amounts of guano on the ground beneath them suggesting that these were not extensively used roosts. Bat emergence surveys were conducted at the American Legion Bridge on August 12, 2019 and at the Northwest Branch Bridge on August 13, 2019. Small and larger bats were observed flying beneath or near each bridge, but no bats were definitively confirmed exiting the bridge structures.

Based on suitable conditions for bridge roosting reported in the literature and evidence of roosting bats from MDOT SHA's visual survey, corridor study boundary bridges that support or could support roosting bats include the American Legion Bridge, Clara Barton Parkway Eastbound bridge (not surveyed due to construction, but with conditions similar to the McArthur Boulevard/Clara Barton Parkway Westbound bridge), McArthur Boulevard/Clara Barton Parkway Westbound bridge, Seven Locks Road bridge, and Northwest Branch bridge. Details of the bridge visual and bridge emergence surveys can be found within the *Bridge Survey Report for the Northern Long-eared Bat (Myotis septentrionalis) and Indiana Bat (Myotis sodalis)* in *Appendix P* of the *Natural Resources Technical Report* (**Appendix L**). MDOT SHA will perform acoustic surveys during the survey window from May 15 through August 15, 2020 to determine whether listed bat species are present within the Build Alternative LODs as well as some additional bridge surveys for those bridges not able to be surveyed in the 2019 season. The results of the bat acoustic surveys will be presented in the FEIS.

B. Fisheries

A response was received on August 9, 2018 from NMFS, included in *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**), stating the corridor study boundary lies outside the limits of potential direct or indirect effects to Federally-listed or proposed threatened or endangered species under the jurisdiction of NMFS. Therefore, further consultation with NMFS under Section 7 of the ESA is not needed unless the study changes substantially or new information becomes available.

C. Sensitive Species Project Review Areas

MDNR has mapped five SSPRAs that intersect with the corridor study boundary. As mentioned previously, these mapped areas include both sensitive species habitat and a buffer to allow potential activities within the SSPRA to be flagged for more detailed review by MDNR to determine if a sensitive species could potentially be affected. Presence of an SSPRA within the corridor study boundary or LOD does not necessarily mean an impact would occur. **Table 4-30** displays the total acreage of SSPRA impacted by Build Alternative.

Table 4-30: SSPRA Acreage Impacted by Build Alternative

	Alt 5[1]	Alts 8&9	Alt 9M	Alt 10	Alt 13B	Alt 13C
Total SSPRA in Acres	151.7	155.0	153.7	155.0	155.0	155.0

Note: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2] Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.

D. Maryland Species of Concern

MDNR indicated that the state-listed RTE species shown in **Table 4-31**, located within riparian areas of the Potomac River in the western portion of the corridor study boundary, were those of greatest concern. Known occurrences of RTE species identified by MDNR (two species of dragonflies, six species of plants, three species of fish, and one crustacean) are described in the *Natural Resources Technical Report* (**Appendix L, Section 2.10**).

Table 4-31: RTE Plant Species in Riparian Areas of the Potomac River Within the Corridor Study Boundary, as indicated by MDNR

Scientific Name	Common Name	Status
Rumex latissimus	Tall dock	Endangered
Paspalum fluitans	Horse-tail paspalum	Endangered
Matelea obliqua	Climbing milkweed	Endangered
Baptisia australis	Blue wild indigo	Threatened
Coreopsis tripteris	Tall tickseed	Endangered
Phacelia covellei	Buttercup scorpionweed	Endangered

All of the Maryland-listed species are known to occur on scour bars of the Potomac River or within the adjacent floodplain, and MDNR recommended habitat surveys of the area where the Potomac River crosses the corridor study boundary to determine whether suitable habitat exists for the listed species. MDOT SHA conducted state-listed RTE plant habitat assessments within the corridor study boundary within forested habitat on terraces and slopes immediately above the Potomac River floodplain, the forested Potomac River floodplain itself, and the rocky shoreline of the Potomac River on June 25 and July 10, 2019 to determine the presence of suitable habitat for six state-listed plant species. A targeted species survey was also completed for four of the six species. Marginally-suitable habitat for the climbing milkweed and the buttercup scorpionweed was found within upland terrace forest in two locations within the corridor study boundary, one just south of the C&O Canal Towpath and the other just west of the American Legion Bridge. Neither of these species were observed during the field survey. Marginally-suitable habitat was also found for tall dock, tall coreopsis, wild blue indigo, and horse-tail paspalum within bedrock scour bar/riverside outcrop barrens habitat, though the scour areas appear to be too frequently disturbed and the outcrop barrens devoid of sufficient soil to support these plants. None of these four species were found during the survey. Field survey methodologies are described within the *Natural Resources Technical Report* (**Appendix L, Section 2.10**).

Much of the forested upland terrace areas within the proposed LODs had dense invasive species cover within the understory, vine, and groundcover layers. Dominant species included bush honeysuckle (*Lonicera* spp.), Asian bittersweet (*Celastrus orbiculatus*), Japanese stilt grass (*Microstegium vimineum*), and ground ivy (*Glechoma hederacea*). The scour bar areas occurred beneath the American Legion Bridge and intermittently downstream to the extent of the corridor study boundary. Areas beneath the bridge appeared to be frequently flooded and may not have been able to support herbaceous vegetation growth, as much of the area was bare mud. Riverside outcrop barrens occurred on boulders at the edge of the river, but these areas had very little soil. Vegetation present in this area included sapling American sycamore (*Platanus occidentalis*) and sticky goldenrod (*Solidago racemosa*). None of the targeted RTE plant species were found during the surveys. One of the targeted species, buttercup scorpionweed (*Phacelia covellei*), is an early spring blooming herbaceous plant that would not have been present at the time of the surveys. Follow up surveys for this and the other targeted species identified by the state and Federal resource agencies are being conducted between spring and late summer 2020.

E. Virginia Species of Concern

Correspondence with VDCR indicated that the corridor study boundary overlaps the Potomac Gorge Conservation Site. According to VDCR, conservation sites are tools for representing key areas of the landscape that warrant further review for possible conservation action because of the natural heritage resources and habitat they support. Conservation sites are like SSPRAs tracked by the MDNR in Maryland and discussed above. The Potomac Gorge Conservation Site has been given a biodiversity significance rank of B1, which represents a site of outstanding significance. The list of the natural heritage resources known to occur within the Potomac Gorge Conservation site includes several state-listed rare plant and invertebrate fauna. While not protected under state or Federal laws, these species are tracked by the state because they are vulnerable to becoming state threatened or endangered. Additionally, the NPS has identified state and globally rare plants and invertebrates from national park property within the Potomac Gorge on both sides of the Potomac River through numerous distributional surveys over the past ten to twenty years. Some of these areas lie adjacent to the corridor study boundary. **Table 4-32** includes a list provided by the NPS of these state-listed rare plant and invertebrate species documented by VDCR or the NPS.

The above referenced NPS Potomac Gorge park surveys also noted numerous Virginia state first records for various species of beetles, moths, caddisflies, and land snails and slugs. VDCR also indicated the potential presence of other Stygobromus amphipod species within the corridor study boundary. VDCR and NPS have recommended conducting plant surveys to document whether any of the listed species are presently located within the corridor study boundary. Coordination with VDCR and NPS will continue and targeted plant species surveys within the corridor study boundary are planned for 2020 and the results will be presented in the FEIS.

Table 4-32: Virginia and Maryland State Listed Species From the Potomac Gorge Known or Potentially Occurring[3] (VDCR/NPS/MDNR) Within the Corridor Study Boundary

Scientific Name	Common Name	Organism	Global Rank[2]	State Rank/Status[3]
Stygobromus phreaticu	Northern Virginia Well Amphipod	Amphipod	G1	S1
Stygobromus pizzinii[1]	Pizzini's Amphipod	Amphipod	G3G4	S1S2
Fontigens bottimer	Appalachian Springsnail	Snail	G2	S1S2
Hydropsyche brunneipenni	Caddisfly	Caddisfly	G3G4	S1S3
Cordulegaster erronea	Tiger Spiketail	Dragonfly	G4	S3
Gomphus fraternus	Midland Clubtail	Dragonfly	G5	S2
Acronicta radcliffei	Radcliffe's Dagger Moth	Moth	G5	S2S4
Acronicta spinigera	Nondescript Dagger Moth	Moth	G4	S1S3
Sphinx frankii	Frank's Sphinx	Moth	G4G5	S2S3
Arabis patens	Spreading Rock Cress	Vascular Plant	G3	S1
Baptisia australis	Blue Wild Indigo	Vascular Plant	G5T5	S2
Boechera dentata	Short's Rock Cress	Vascular Plant	G5	S1
Cirsium altissimum[1]	Tall Thistle	Vascular Plant	G5	S1
Clematis viorna	Vase-vine Leatherflower	Vascular Plant	G3	S3
Coreopsis tripteris	Tall Tickseed	Vascular Plant	G5T5	S1
Cuscuta polygonorum[1]	Smartweed Dodder	Vascular Plant	G5	S1
Echinocystis lobata[1]	Wild Cucumber	Vascular Plant	G5	SH
Erigenia bulbosa	Harbinger-of-Spring	Vascular Plant	G5	S1
Eryngium yuccifolium var. *yuccifolium*[1]	Northern Rattlesnake-Master	Vascular Plant	G5T5	S2
Galactia volubilis	Downy Milkpea	Vascular Plant	G5	S3
Helianthus occidentalis	McDowell's Sunflower	Vascular Plant	G5	S1/T
Hibiscus laevis	Halberd-leaf Rosemallow	Vascular Plant	G5	S3
Hybanthus concolor	Green Violet	Vascular Plant	G5	S3
Lipocarpha micrantha	Small-flower Halfchaff Sedge	Vascular Plant	G5	S2
Maianthemum stellatum	Starry Solomon's-Plume	Vascular Plant	G5	S2
Monarda clinopodia	Basil Beebalm	Vascular Plant	G5	S3S4
Orthilia secunda[1]	One-sided Shinleaf	Vascular Plant	G5	SH
Phacelia covillei	Covilli's Phacelia	Vascular Plant	G3	S1
Phaseolus polystachios	Wild Kidney Bean	Vascular Plant	G5	S3
Polygala polygama	Racemed Milkwort	Vascular Plant	G5	S1/T
Sida hermaphrodita	Virginia Sida	Vascular Plant	G3	S1
Silene nivea	Snowy Campion	Vascular Plant	G4*	S1

[1] Historically occurred within the Potomac Gorge Conservation Site crossed by the project. [2] G1 = Highly Globally Rare, G2 = Globally Rare, G3 = Very Rare and Local or Range Restricted, G4 = Apparently Secure Globally, G5 = Demonstrably Secure Globally, GNR = Not Yet Ranked, * = Species has not yet been Ranked or additional information is needed [3] Rank: S1 = Highly State Rare, S2 = State Rare, S3 = Watch List, S4 = Apparently Secure; Status: E = Endangered, T = Threatened; *Sources: VDCR July 31, 2019 letter, Steury et al. 2007, NPS Coordination*

4.19.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact RTE species.

The USFWS IPaC indicates that the NLEB may occur within the corridor study boundary. Additionally, the NPS and VDCR have identified rare, state-listed plant and invertebrate species that occur on NPS lands within the Potomac River Gorge. Potential impacts to RTE habitat would be the same for all Build Alternatives along I-495, except for Alternative 9M. Surveys were initiated in spring 2020 for NLEB, IB and identified rare state-listed plant and invertebrate species and will continue to the end of the surveying season in late summer 2020. Coordination also continues with the USFWS, VDGIF, VDCR, and NPS to determine whether any potential effects could occur to any of these species from any of the Build Alternatives. The survey results and effects will be documented in the FEIS.

Within the Maryland portion of the corridor study boundary, the NLEB and IB may occur within suitable forested habitat. Neither species was confirmed within the corridor study boundary during visual bridge and emergence surveys in 2019. However, temporary day roosting by big brown bats on the bridge over McArthur Boulevard/Clara Barton Parkway Westbound and evidence of guano beneath the American Legion Bridge and bridge over Seven Locks Road, suggest that bats do occasionally roost on suitable I-495 bridges. None of the I-495 bridges appeared to serve as maternity roosting habitat, but were likely used as temporary day or night roosting sites. Therefore, potential impacts to bridge roosting bats would be minimal and would likely cause a shift to other suitable roosting sites near the bridges rather than resulting in an impact to the bats. The ALB and many other bridges within the study corridors will need to be replaced in all Build Alternatives, so any impacts to potential roosting bats on these bridges would occur regardless of which Build Alternative is selected. To determine potential impacts to suitable forested habitat for the NLEB and IB, further studies will be undertaken within the corridor study boundary during the 2020 active season (May 15 through August 15). Acoustic surveys are proposed to be conducted to better determine the potential presence of these Federally-listed bat species within the corridor study boundary. Mist net and radio telemetry surveys were proposed within the corridor study boundary for the 2020 survey season, however the USFWS has asked that mist netting not be conducted due to concerns of transmission of COVID-19 to bats, included in *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**).

The MDNR identified several state-listed threatened or endangered plant species that may occur within scour bars or the adjacent floodplain of the Potomac River. A habitat assessment and targeted species survey was completed on Federal lands within the C&O Canal National Historical Park in late June and early July 2019 to determine whether suitable habitat for the state listed plant species exists. Marginally suitable habitat was found for climbing milkweed (*Matelea obliqua*) and buttercup scorpionweed within less disturbed understory of upland terrace forest habitat and on scour bar/riverside outcrop barren habitat along the Potomac River for the remaining species. The targeted species survey did not identify any of the listed species, though follow-up surveys for the buttercup scorpionweed were conducted during the suitable flowering period for this species in the spring of 2020. Based on the results of the targeted RTE species survey conducted in 2019, the Build Alternatives for the Study would not be anticipated to impact five of the six DNR WHS-listed plant species of concern within the Potomac River corridor. However, further surveys will be conducted in this area and within the Potomac Gorge in Virginia in the spring and summer of 2020 to determine whether buttercup scorpionweed and other state listed or rare plants occur within the corridor study boundary. These surveys are currently ongoing and, if found, an evaluation will be made of the potential impacts of the Study on these species and will be documented in the FEIS.

4.19.4 Mitigation

Acoustic surveys for federally-listed bats are proposed during spring and summer 2020 to determine the presence/probable absence of these species within the LODs of the Build Alternatives. MDOT SHA will continue to coordinate with USFWS regarding federally listed bat species before, during, and after the bat surveys are completed. USFWS confirmed in a meeting with MDOT SHA on April 30, 2020, that if high frequency calls from NLEB and/or IB are identified within the LODs of the Build Alternatives, each positive acoustic detection location will receive a 3-mile buffer for NLEB and a 5-mile buffer for IB, within which there will be a tree clearing time-of-year restriction from May 1 to July 31. Additional bridge surveys for bats will also be conducted in the 2020 survey season. If either the NLEB or IB are found roosting on bridges within the corridor study boundary, minimization efforts could include a time of year restriction on the start of construction on these bridges. This would ensure that bats would not be present when the construction work begins. Most species of bats, and particularly NLEB and IB, would be expected to be absent from the corridor study boundary from mid to late October through March. Bats returning to the area the following season would likely seek other suitable roosting sites to avoid an active work zone on the bridge. In the unlikely event of a construction delay or stoppage lasting longer than two months, bridges under construction would be re-surveyed for bat utilization prior to resuming construction. All bridges where guano was found occur in areas with large stands of suitable forest habitat for bats that could be and are likely used for roosting. USFWS indicated in the April 30, 2020 meeting that full compliance with the time-of-year restrictions would conclude informal Section 7 consultation.

For state-listed plant species, additional surveys have been initiated and will continue through summer of 2020 for the buttercup scorpionweed and other rare and listed species to determine whether project-related impacts could occur to these species if present. Coordination with the regulatory agencies is ongoing and will continue regarding Federally- or state-listed RTE species. If more detailed surveys or later coordination indicate that effects could occur, those effects will be minimized and mitigated to the extent practicable and in accordance with state and Federal regulations.

4.20 Unique and Sensitive Areas

4.20.1 Introduction and Methodology

Unique and Sensitive Areas are ecological resources designated by state and local municipalities that do not fall within the regulations of other environmental resources such as waterways or forests. Maryland's 2001 GreenPrint Program was established to protect Maryland's most-ecologically-valuable natural lands and watersheds, which were designated as Targeted Ecological Areas (TEAs). TEAs were created based on rankings of Green Infrastructure (GI); RTE species; aquatic habitat and biota; water quality; coastal ecosystem; and climate change adaptation. GI areas were identified by the Maryland Greenways Commission and MDNR's Green Infrastructure Assessment (GIA), which considered land cover, wetlands, sensitive species, roads, streams, terrestrial and aquatic conditions, floodplains, soils, and developmental pressure to identify a network of "hubs" and "corridors" containing the most-ecologically-critical undeveloped lands remaining in Maryland. Montgomery County has designated certain watersheds as Special Protection Areas (SPAs) due to the presence of high-quality water resources and related natural features that could be jeopardized by development activities without additional water quality protection measures. Environmental Overlay Zones were established within the limits of SPAs to impose additional land use regulations and impervious surface limits on the underlying areas (Montgomery Planning, 2012[48]; Blackwell, 1989[49]).

A review of MDNR, Maryland iMap, and the Montgomery County Atlas (MCAtlas) was conducted to identify the locations of TEAs, GI hubs and corridors, SPAs, and Environmental Overlay Zones within the corridor study boundary.

The VDCR Natural Heritage (DNH) Program conserves Virginia's natural resources through programs such as biological inventories, natural community inventory and classification, and the creation of Natural Area Preserves throughout the state. VDCR-DNH also identifies Conservation Sites, which represent key areas of the landscape worthy of protection and stewardship action, because of the natural heritage resources and habitat they support.

Additional information including the locations of identified unique and sensitive areas, can be found in the *Natural Resources Technical Report* (**Appendix L, Section 2.11**).

4.20.2 Affected Environment

A. Targeted Ecological Areas and Green Infrastructure

Ten GI corridors and eight GI hubs overlap with the corridor study boundary, as shown in *Appendix Q of the Natural Resources Technical Report* (**Appendix L**). In addition, TEAs overlap with the corridor study boundary between Cabin John Creek and the Potomac River in Montgomery County, a small area along Little Paint Branch, and along Bald Hill Branch east of the I-495/US 50 interchange in Prince George's County.

B. Special Protection Area (SPA) and Environmental Overlay Zones

There are no SPAs or Environmental Overlay Zones within the corridor study boundary, but the Piney Branch SPA is located approximately 4,000 feet southwest of the I-270/Shady Grove Road interchange.

C. Natural Area Preserves and Conservation Sites

There are no VDCR-DNH Natural Area Preserves within the corridor study boundary or within Fairfax County, Virginia. There are two VDCR Conservation Sites within a five-mile radius of the corridor study boundary.

4.20.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact GI hubs and corridors, TEAs, or SPAs.

Impacts associated with the Build Alternatives are summarized in **Table 4-33**. All of the Build Alternatives would impact 77.1 acres of TEAs. The GI hubs would be impacted from between to 43.8 acres under Alternative 13B and 46.2 acres with Alternative 10. GI corridors would be impacted by all Build Alternatives as well, with the lowest impact of 280.4 acres for Alternative 9M and the highest impact of

[48] Montgomery Planning. 2012. Special Protection Areas (SPA). Available at: http://www.montgomeryplanning.org/environment/spa/index.shtm [Accessed 7 September 2018].
[49] Blackwell, Robert J. 1989. *Overlay Zoning, Performance Standards, and Environmental Protection After Nollan*. 16 B.C. Envtl. Aff. L. Rev. 615. Available at: http://lawdigitalcommons.bc.edu/ealr/vol16/iss3/6 [Accessed 7 September 2018].

287.5 acres for Alternative 10. There would be no impacts to SPAs or VDCR Natural Area Preserves and Conservation Sites resulting from the Build Alternatives.

Table 4-33: Impacts to Unique and Sensitive Areas (acres)

Resource	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alte 13C
Targeted Ecological Areas	74.7	77.1	77.1	77.1	77.1	77.1
Green Infrastructure Hubs	41.8	45.0	44.3	46.2	43.8	44.4
Green Infrastructure Corridors	278.8	286.1	280.4	287.5	285.8	287.1
Special Protection Areas	0	0	0	0	0	0
TOTAL Unique and Sensitive Area Types	**395.3**	**408.2**	**401.8**	**410.8**	**406.7**	**408.6**

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2]: Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.

Each of the Build Alternatives would increase the man-made footprint within the TEAs and GI areas, but the GI hubs and corridors would remain intact. However, road widening would create larger gaps in GI corridors, further fragmenting the GI network. New manmade structures and roadways impact contiguous forest blocks and wetland complexes in TEAs and GI areas, which are often habitats for FIDS, and contain biologically important rivers, streams, and other natural resources.

4.20.4 Mitigation

Avoidance and minimization efforts to reduce impacts to GI and TEAs will involve a two-tiered approach. The first tier is occurring during the planning stage where effort is being made to avoid wetlands and waterways, floodplains, and large forested areas to the greatest extent practicable. Many GI, TEA, and wildlife corridors overlap with wetlands, waterways, and park land. The second tier of avoidance and minimization will occur during final design, with advancement of the design and further refinements to the LOD to further reduce impacts.

4.21 Environmental Justice and Title VI Compliance

4.21.1 Introduction and Regulatory Context

All federal agencies must comply with Title VI of the 1964 Civil Rights Act and Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EJ Order). Under Title VI and related statutes, each federal agency is required to ensure that no person is excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving federal financial assistance on the basis of race, color, national origin,[50] age, sex, disability, or religion. Executive Order 12898 states that "…each Federal agency shall make achieving Environmental Justice 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."

Executive Order 12898 directs Federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. A disproportionately high and adverse effect on

[50] Including individuals with Limited English Proficiency.

minority and low-income populations is defined by the FHWA Order 6640.23A: *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (2012), as an impact that:

- Would be predominately borne by a minority and/or low-income population, or
- Will 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 will be suffered by the nonminority population and/or non-low-income population.

The Executive Order is intended to promote nondiscrimination in Federal programs that affect human health and the environment, as well as provide minority and low-income communities access to public information and public participation.

The strategies developed under Executive Order 12898 and subsequent Environmental Justice (EJ) FHWA guidance set forth 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. The guidance also addresses an important aspect of EJ: providing meaningful opportunities for public involvement by members of minority populations and low-income populations during the planning and development of programs, policies, and activities (including the identification of potential effects, alternatives, and mitigation measures). The following policies and guidance documents provide assistance for addressing minority and low-income communities.

- US Department of Transportation (USDOT) Order 5610.2(a) Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (2012 revision);
- FHWA Order 6640.23A, FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (2012); and
- FHWA memorandum Guidance on Environmental Justice and NEPA (2011).

Executive Order 12898 does not define the terms *minority* or *low-income*, but the terms have been defined in the USDOT and FHWA Orders on EJ. FHWA Order 6640.23A provides the following definitions, which have been used in this analysis:

- *Minority Individual* – A person who identifies as:
    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.
- *Low-Income Individual* – A person whose household income is at or below the US Department of Health and Human Services (HHS) poverty guidelines.

4.21.2 Environmental Justice Analysis Methodology

As stated previously, the strategies developed under Executive Order 12898, USDOT Order 5610.2(a), FHWA Order 6640.23A, and FHWA memorandum *Guidance on Environmental Justice and NEPA* (2011) set forth the appropriate and necessary steps to identify and address disproportionately high and adverse effects of Federal transportation projects on minority and low-income populations. Based on these strategies, the following steps are documented in this Environmental Justice Analysis in support of the DEIS:

1) The identification of minority race and ethnicity populations and low-income populations (EJ populations) along the study corridors (**Section 4.21.2A** **and** **4.21.2B**);

2) The review of demographic data to determine the existing environmental and community conditions of the EJ populations (**Section 4.21.3**);

3) The documentation of public outreach as planned, conducted and refined throughout the study duration in consideration of the demographic and community data to ensure meaningful involvement in EJ populations (**Section 4.21.4**); and

4) The identification of beneficial and adverse effects to EJ populations under the No Build and Build Alternatives (**Section 4.21.5**).

The following steps will be documented in the FEIS:

5) The consideration of mitigation and enhancement measures if unavoidable adverse effects are expected to occur under the Preferred Alternative.

6) A comparison of adverse effects from the Preferred Alternative within EJ populations to adverse effects within a non-EJ population reference community;

7) A determination of whether disproportionately high and adverse effects would occur under the Preferred Alternative to EJ populations; and

8) A final conclusion of whether disproportionately high and adverse effects would occur, based on unmitigated adverse effects and whether public feedback has been addressed.

A. Identification of Minority Race and Ethnicity Populations

MDOT SHA, in coordination with FHWA, identified the methodology for the EJ Analysis for the Study. Using this methodology, the following definition applies to this Study:

- *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 FHWA program, policy or activity (refer to USDOT Order 5610.2(a) and FHWA Order 6640.23A).

Per the Council on Environmental Quality (CEQ) Environmental Guidance Under NEPA (1997), a minority population is present when: (A) the minority race/ethnicity population of the affected area exceeds 50 percent or (B) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

For the purposes of this EJ Analysis, the appropriate unit of geographic analysis utilized was the block group, with boundaries defined by the US Census Bureau in 2010.[51] Collectively, 199 block groups are within the EJ Analysis Area surrounding the I-495 and I-270 study corridors[52] (**Figure 4-15**). Based on data collected from the American Community Survey (ACS) Five-Year Estimates (2012-2016), the minority population percentage within the EJ Analysis Area was 63 percent. Of the 199 block groups within the EJ Analysis Area, 107 had minority populations equal to or above 50 percent while 108 had minority populations equal to or above 48 percent. For the EJ Analysis, a block group was considered an EJ population where the percent of minority race and/or ethnicity persons was equal to or greater than 50 percent of the total block group population, consistent with the CEQ guidance.

B. Identification of Low-Income Populations

As stated previously, MDOT SHA, in coordination with FHWA, identified the methodology for the EJ Analysis for the Study. Using the methodology, the following definition applies to this Study:

- *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 program, policy, or activity (refer to USDOT Order 5610.2 and FHWA Order 6640.23A).

The ACS Five-Year Estimates (2012-2016) were also used to collect the median household income and average household size data for each of the 199 EJ Analysis Area block groups. The average household size within the block groups was three persons. The HHS Poverty Guidelines provide a threshold median household income for low-income household identification by size of household. Using the HHS 2016 Poverty Guidelines income threshold for a three-person household, an EJ Analysis Area block group would have a median income of $20,160 or less to be considered a low-income population. However, no EJ Analysis Area block groups had a median household income at or below $20,160. Under the HHS 2016 Poverty Guidelines methodology, no low-income populations would be in the EJ Analysis Area.

Additional guidance provided in the EJ Federal Interagency Working Group (IWG) report, *Promising Practices for EJ Methodologies in NEPA Reviews* (2016) was used to evaluate low-income populations for the EJ Analysis Area. Guidelines for identifying low-income populations explain that it may be appropriate for agencies to select a threshold for identifying low-income populations that exceed the poverty level as defined by the HHS Poverty Guidelines (IWG EJ 2016). While HHS Poverty Guidelines are calculated based on a national average, the EJ Analysis Area is in a high-income area compared to the rest of the 48 contiguous states. Because the cost of living in the EJ Analysis Area was determined to be greater than the national average and comparison with the HHS 2016 Poverty Guidelines did not yield any low-income populations, a more conservative methodology for determining low-income populations was adopted

[51] Block groups were selected as the appropriate unit of geographic analysis for this EJ Analysis because they provide demographic detail for small selections of the study corridor population and because they were also determined to be the appropriate unit of geographic analysis for the demographic data collection in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (Appendix E, Section 2.1).

[52] Block group delineation for the EJ Analysis Area is the same as the delineation for the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (Appendix E, Section 2.1).

using the Department of Housing and Urban Development (HUD) 2016 Income Limits Survey. The HUD Income Limits Survey calculates the threshold for a low-income family/household designation at the Metropolitan Fair Market Rent (FMR)/Income Limits Area-level. The calculations are based on the number of persons in a family.

The HUD 2016 FMR/Income Limits, shown in **Table 4-34**, provided a more appropriate comparison for determining local low-income populations in the EJ Analysis Area. HUD defines *low-income* as a family earning 80 percent or less of an area's median family income. The EJ Analysis Area is in the Washington-Arlington-Alexandria, DC-VA-MD FMR Area. As previously stated, the average household size within the EJ Analysis Area block groups was three persons. Therefore, for this EJ Analysis, a block group was considered an EJ population if its median household income was at or below $63,150, the HUD 2016 Low-Income Limit for a family of three in the Washington-Arlington-Alexandria, DC-VA-MD FMR Area.

Table 4-34: HUD 2016 Low-Income Limit for the Washington-Arlington-Alexandria, DC-VA-MD FMR Area

Persons in Family/Household	Guideline
1	$49,150
2	$56,150
3	$63,150
4	$70,150
5	$75,800
6	$81,400
7	$87,000
8	$92,600

Source: Department of Housing and Urban Development, FY 2016 Income Limits Survey (www.huduser.gov/portal/datasets/il/il2016/2016summary.odn)

4.21.3 Existing Conditions of Environmental Justice Populations

The existing conditions of minority race and ethnicity populations and low-income populations are identified for each EJ Analysis Area block group. Of the total 199 EJ Analysis Area block groups along the study corridors, 111 are considered EJ populations. Note that EJ Analysis Area block groups are sometimes described as belonging to an *EJ Analysis Area Community* for the purpose of local context[53]. The 199 EJ Analysis Area block groups have been sorted into 36 EJ Analysis Area Communities using the same methodology as done for *CEA Analysis Area Communities* in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Chapters 2 and 3**).

A. Existing Minority Race and Ethnicity Populations

As described in **Section 4.21.2A**, a block group was identified as minority population if 50 percent or more of the block group population identified as a minority.

[53] The terms "CEA Analysis Area Community and "EJ Analysis Area Community" are interchangeable. For instance, the Silver Spring EJ Analysis Area Community has the same block groups and boundaries as the Silver Spring CEA Analysis Area Community. As such, the profile for the Silver Spring CEA Area Community serves as the profile for the Silver Spring EJ Analysis Area Community. Refer to the Community Effects Assessment and Environmental Justice Analysis Technical Report (Appendix E, Section 2.1) for delineation details.

The percent minority population within the EJ Analysis Area (63 percent) exceeds that of the state of Maryland (48 percent) by 15 percent. In the Montgomery County portion of the EJ Analysis Area, 45 percent of the population identifies as of minority race and/or ethnicity, which is less than that of Montgomery County as a whole (54 percent). In the Prince George's County portion of the EJ Analysis Area, 86 percent of the population identifies as of minority race and/or ethnicity, which is equal to that of Prince George's County. In the Fairfax County portion of the EJ Analysis Area, 28 percent of the population identifies as of minority race and/or ethnicity, which is nearly half that of Fairfax County as a whole.

Within the EJ Analysis Area as a whole, the population composition is highly diverse (refer to *Race and Ethnicity Characteristics* in **Section 4.2.2**). Of the 199 EJ Analysis Area block groups, 107 had minority populations equal to or above 50 percent. Minority populations were present to varying degrees in all EJ Analysis Area Communities except for the McLean; Cabin John; North Bethesda; Bethesda; South Kensington; Chevy Chase; and Joint Base Andrews EJ Analysis Area Communities. Within Montgomery County, 31 of the 112 EJ Analysis Area block groups (nearly 28 percent) were identified as minority populations; 76 of the 82 EJ Analysis Area block groups (nearly 93 percent) in Prince George's County were identified as minority populations.

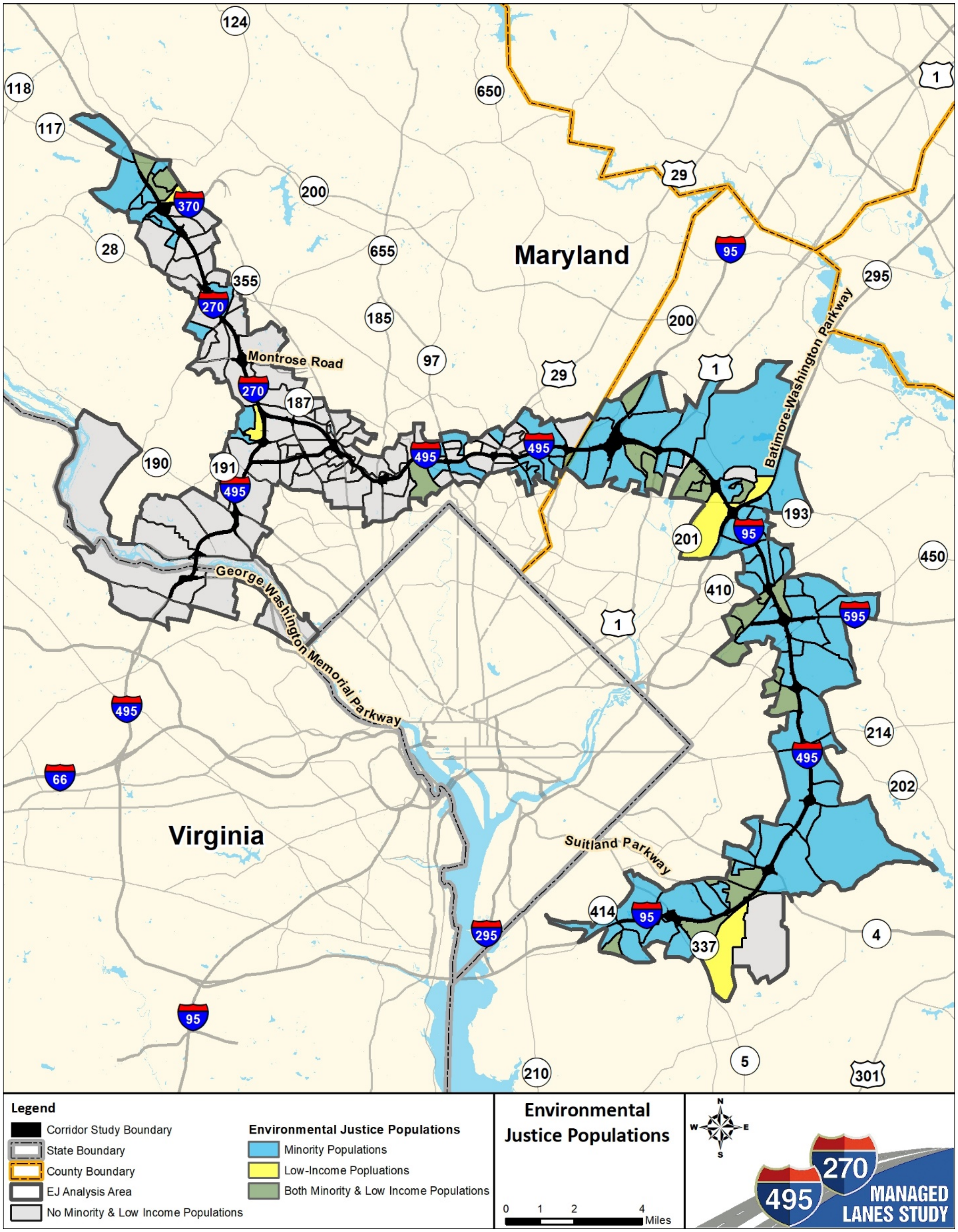
Minority populations were present to varying degrees in all EJ Analysis Area Communities except for the McLean; Cabin John; North Bethesda; Bethesda; South Kensington; Chevy Chase; and Joint Base Andrews EJ Analysis Area Communities. Within Montgomery County, 31 of the 112 EJ Analysis Area block groups (nearly 28 percent) were identified as minority populations; 76 of the 82 EJ Analysis Area block groups (nearly 93 percent) in Prince George's County were identified as minority populations. The minority populations are shown in blue in **Figure 4-15**.

Race and ethnicity data for each EJ Analysis Area block group is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 4.3.1** and **Table 4-2**).

B. Existing Low-Income Populations

As described in **Section 4.21.2B**, a block group was identified as low-income population if its median household income was at or below $63,150. EJ Analysis Area block groups that qualified as low-income populations are highlighted in yellow in **Figure 4-15**. (Refer to **Appendix E, Table 4-3** for details on the EJ Analysis Area household/low-income characteristics and EJ populations.) Of the 199 EJ Analysis Area block groups, 30 had a median household income below $63,150. The highest density of low-income populations was in the Landover and Landover Hills EJ Analysis Area Communities, where all the block groups had median household income below $63,150. Slightly less than half of the Greenbelt EJ Analysis Area Community block groups (seven of the 16) had a median household income below $63,150. The remaining low-income populations were individual block groups located in the Potomac, Silver Spring, Beltsville, College Park, New Carrollton, Lanham, Summerfield, Forestville, Joint Base Andrews, Camp Springs, Gaithersburg, and Temple Hills EJ Analysis Area Communities. Household income data for each EJ Analysis Area block group is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 4.3.2**).

Figure 4-15: EJ Populations in the EJ Analysis Area



C. Supplemental Community Data

Supplemental data reviewed to further identify EJ populations is summarized below, including: households' English-speaking status, the locations of low-income subsidized housing, the distribution of Food Stamps/Supplemental Nutrition Assistance Program (SNAP) benefits, the proportion of students receiving free and reduced-price lunch programs, and Equity Emphasis Areas[54].

a. Limited English-Speaking Households

Executive Order 13166 *Improving Access to Services for Persons with Limited English Proficiency* (2000) requires Federal agencies to examine the services they provide, identify any need for services to those with limited English proficiency (LEP), and develop and implement a system to provide those services so LEP persons can have meaningful access to them. A person who does not speak English as their primary language and who has a limited ability to read, speak, write or understand English may be LEP. In accordance with MDOT SHA's *Title VI Program Implementation Plan* (2015), "MDOT SHA will provide translation services to individuals that have limited ability to read, write, speak or understand English. SHA will seek to communicate with LEP populations and provide LEP individuals meaningful access to SHA programs and activities." Interpretation services were available by request at each Public Workshop and outreach event and will be available for the Public Hearings and any subsequent public outreach effort. Spanish and American Sign Language (ASL) interpreters have been requested and utilized at several Public Workshops and will be available for the Public Hearings.

ACS Five-Year Estimates (2012-2016) data on limited English-Speaking households was evaluated to identify potential LEP populations within the EJ Analysis Area where specific LEP supporting outreach would be targeted. The ACS allows respondents to identify one's household as English-speaking only, Spanish-speaking, other Indo-European language-speaking, Asian and Pacific Island language-speaking, or other language-speaking. Respondents who identify as part of a non- English-speaking only household further classify as either a "limited English-speaking household" or, "not a limited English-speaking household."

Using ACS Five-Year Estimates (2012-2016) data, LEP populations were identified in nearly every block group within the EJ Analysis Area. Half of the EJ Analysis Area block groups had a population of limited English-speaking households that is three percent (rounded down from 3.03 percent) or less, and half of EJ Analysis Area block groups have a population of limited English-speaking households greater than three percent (rounded down from 3.03 percent).

b. Free and Reduced-Price Lunch Programs

The Virginia Department of Education (VDOE 2016) and Maryland State Department of Education (MSDE 2017) provide annual data on public school student enrollment in the free and reduced-price lunch program. Among the public schools in the EJ Analysis Area, an average of 45 percent of students use free and reduced-price lunch programs per school. Within the EJ Analysis Area, 36 schools (all located in the Maryland portion of the EJ Analysis Area) have a student population that receives free or reduced-price

[54] The National Capital Region Transportation Planning Board (TPB) *Methodology for Equity Emphasis Areas,* referenced tract-level Census data to identify communities that have significant concentrations of low-income and/ or minority populations. Data from the American Community Survey for each of the following four population groups is used: Low-Income, African American, Asian, and Hispanic or Latino.

lunches, which is greater than the 45 percent, the EJ Analysis Area average. All of the schools with an above-average population of students receiving a free and reduced-price lunch are in block groups already identified as minority or low-income populations. A list of the 36 public schools with an average of 45 percent or more students using free and reduced-price lunch programs is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Chapter 4, Section 3.3**).

c. Places of Worship[55]

Additionally, to support and facilitate outreach efforts places of worship located within EJ Analysis Area Communities that contain minority or low-income populations were identified. A list of the 108 places of worship is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 4.3.3**).

d. Low-Income Subsidized Housing Complexes

The HUD Multifamily Assistance & Section 8 Database, Montgomery County Housing Opportunities Commission, Prince George's County Housing Authority, and Fairfax County Redevelopment and Housing Authority were consulted to locate housing complexes with subsidized units within the EJ Analysis Area. Housing complexes are identified in their respective Community Profile[56] in *Appendix C of* the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E**). In the EJ Analysis Area, a total of 32 housing complexes rent units at affordable, below-market rates for qualifying households. A list of the housing complexes is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 4.3.3**).

Four of the 32 subsidized housing complexes (Timberlawn Crescent, Victory Forest Senior Apartments, St. Luke's Homes, Inc., and Pooks Hill Tower and Court Apartments) are located outside of minority or low-income populations; in the North Bethesda, Bethesda, and Forest Glen EJ Analysis Area Communities. The remaining 28 housing complexes with subsidized units are in minority or low-income populations within the EJ Analysis Area.

e. Food Stamps/SNAP Benefits

American Community Survey Five-Year Estimates (2012-2016) were used to collect data on households utilizing Food Stamps/SNAP benefits. The average percent of households receiving Food Stamps/SNAP benefits for the Maryland EJ Analysis Area block groups is seven percent. Of the 199 EJ Analysis Area block groups, 74 block groups have a proportion of households that receive Food Stamps/SNAP benefits above the seven percent EJ Analysis Area average. Seventy-one (71) of these block groups were identified as minority or low-income populations. The three block groups that were not identified as minority or low-income populations are located within EJ Analysis Area Communities that contain multiple minority or low-income populations.

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[55] Geographic Information Systems (GIS) data sourced from Maryland iMap (data.imap.maryland.gov/datasets/maryland-land-use-land-cover-land-use-land-cover-2010); Prince George's County Open Data Portal (gisdata.pgplanning.org/metadata/); Montgomery County Planning Department Open Data Portal (Montgomery County Planning Department. Open Data Portal). Corresponding mailing addresses gathered using Google Search.

[56] The Community Profiles provide information for each CEA Analysis Area Community in *Appendix C* of the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (Appendix E).

f. Equity Emphasis Areas

The National Capital Region Transportation Planning Board (TPB) identified Equity Emphasis Areas as census tracts with higher than average concentrations of minority, low-income populations, or both. The TPB methodology used census tract data, which encompassed a larger geographic area than the census block groups referenced to identify minority or low-income populations. As a result, there are a few areas where TPB identified an entire census tract as an Equity Emphasis Area; however, individual census block groups within the EJ Analysis Area did not contain higher than average concentrations of minority populations or low-income populations. Similarly, there were census tracts that TPB did not identified as Equity Emphasis Areas; however, block groups within the EJ Analysis Area were identified as minority or low-income populations for this analysis.

g. MDOT SHA Voluntary Demographic Survey

It is MDOT SHA policy to offer a demographic survey to voluntarily complete for attendees of MDOT SHA public meetings. Attendees at the April 11, 23, 24, 2019 and November 13 and 21, 2019 Public Workshops completed the survey and provided the demographic information shown in **Table 4-35**. Note that, due to the voluntary nature of the survey and the small sample size, the results of the survey may not accurately represent the demographics of all the Public Workshop attendees.

Table 4-35: Voluntary Demographic Survey Results

Demographic Information*	Number of Attendees
Race	
Asian	1
Black or African American	3
Hispanic or Latino	3
White	48
Sex	
Female	21
Male	23
Not Answered	12
Age Bracket	
65+	24
41-65	27
18-40	4
Not Answered	
Disability with Reasonable Accommodation	
N/A	37
Not Answered	10
Yes	3
Conditional Yes	1
No	7
Other Language Spoken	
ASL	2
Not Answered	24

Demographic Information*	Number of Attendees
No	14
Spanish	1
French	1
Lithuanian	1
N/A	2

Note: Categories listed here reflect categories checked by the attendees and do not necessarily include all survey question options. Associated comments, where provided on the surveys, are not included here.

The review of the above additional data confirmed that minority and low-income populations previously identified correspond with the locations of limited English-Speaking households, low-income subsidized housing, households receiving Food Stamps/SNAP benefits, and students receiving free and reduced-price lunches. Further, block groups identified as minority and low-income populations are located within census tracts that were identified as Equity Emphasis Areas.

D. Summary of the Existing Conditions of Environmental Justice Populations

Based on the methodology described in **Section 4.21.2**, there are a total of 111 block groups identified as EJ populations within the EJ Analysis Area. The 111 EJ Analysis Area block groups (“EJ populations”) are shown above in **Figure 4-15** and listed in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Sections 4.3.1 and 4.3.2**).

4.21.4 Public Outreach with Environmental Justice Populations

Providing full and fair access to meaningful involvement by low-income and minority populations in project planning and development is an important aspect of EJ. Meaningful involvement means the Lead Agencies invite participation from populations typically underrepresented, throughout all the project stages. It is important to engage and advise EJ populations of the project development steps and consider their feedback. Residents are an important source for local history, special sites, and unusual traffic, pedestrian or employment patterns relevant to the project. This information is used in the design and evaluation of alternatives, to avoid negative impacts to valued sites, and to support the development of safe, practical, and attractive transportation options that are responsive to the EJ population’s needs. Due to the highly diverse demographics composing the population adjacent to and using the study corridors, much of the corridor-wide public involvement efforts conducted for the Study were aimed at reaching this socioeconomically diverse audience. This section summarizes the public involvement efforts conducted in EJ populations, as well as additional efforts to notify traditionally underserved populations. Additional detail on the public involvement efforts presented here is provided in the *Public Involvement and Agency Coordination Technical Report* (**Appendix P**).

A. Study Corridor-Wide Public Involvement Efforts

Beginning with the initiation of the Study in March 2018, public involvement efforts have included comprehensive outreach through Public Open Houses/Workshops, Community Association meetings, stakeholder meetings, community pop-up events, updates via website and email, and solicitation of public comments. Outreach events were held or attended in EJ Analysis Area Communities that contain one or more EJ populations, in locations adjacent to EJ populations, or at events generally serving EJ populations in the EJ Analysis Area. These public involvement efforts are shown in **Table 4-36**.

Table 4-36: Public Involvement Efforts in or near EJ Populations

EJ Analysis Area Community[1]/ General EJ Population	Date	Outreach Type	Event/ Organization/ Location	Number of Attendees
Summerfield, Lake Arbor, Glenarden, and Landover EJ Analysis Area Communities	April 23, 2018	Community Association Meeting during Scoping	Greater 202 Coalition St. Margaret's Catholic Church 410 Addison Road South, Capitol Heights, MD 20743	Approx. 50
General EJ Population throughout EJ Analysis Area	August 5, 2018	Pop-Up Informational Booth	9th Annual Salvadoran American Festival/7th Annual Latino Health Fair Montgomery College Rockville Campus, Rockville, MD 20850	120
General EJ Population throughout EJ Analysis Area	August 7, 2018	Pop-Up Informational Booth	National Night Out Against Crime Heurich Park 2800 Nicholson Street Hyattsville, MD 20782	105
Greenbelt EJ Analysis Area Community	April 24, 2018	Public Scoping Open House	Eleanor Roosevelt High School 7601 Hanover Parkway, Greenbelt, MD 20770	56
	July 17, 2018	Preliminary Alternatives Public Workshop		130
	April 23, 2019	ARDS Public Workshop		99
College Park EJ Analysis Area Community	January 30, 2019	Stakeholder Meeting	Four Cities Meeting (College Park, Berwyn Heights, Greenbelt, New Carrollton)	-
Gaithersburg EJ Analysis Area Community	April 8, 2019	Legislative/Elected Officials Briefing	Gaithersburg Mayor and Council City Hall, 31 S Summit Ave Gaithersburg, MD 20877	6
Landover and Summerfield EJ Analysis Area Communities	April 11, 2019	ARDS Public Workshop	Prince George's Sports & Learning Complex 8001 Sheriff Rd Landover, MD 20785	48
Silver Spring EJ Analysis Area Community	April 24, 2019	ARDS Public Workshop	Eastern Middle School 300 University Blvd E Silver Spring, MD 20901	377
Marlow Heights, Camp Springs, and Forestville EJ Analysis Area Communities	April 27, 2019	ARDS Public Workshop	Suitland Community Center 5600 Regency Ln, Forestville, MD 20747	23
Marlow Heights and Temple Hills EJ Analysis Area Communities	May 14, 2019	ARDS Public Workshop	Oxon Hill High School 6701 Leyte Drive Oxon Hill, MD 20745	26

EJ Analysis Area Community[1]/ General EJ Population	Date	Outreach Type	Event/ Organization/ Location	Number of Attendees
Glenarden EJ Analysis Area Community	May 23, 2019	Legislative/Elected Officials Briefing	City of Glenarden Councilmembers	18
College Park EJ Analysis Area Community	June 4, 2019	Stakeholder Meeting	Four Cities Meeting (College Park, Berwyn Heights, Greenbelt, New Carrollton)	-
College Park EJ Analysis Area Community	June 13, 2019	Community Association Meeting	North College Park Citizens' Association	53
General EJ Population throughout EJ Analysis Area	June 13, 2019	Stakeholder Meeting	Montgomery County Hispanic Chamber 12276 Rockville Pike, Rockville, MD 20852	2
Glenarden EJ Analysis Area Community	June 17, 2019	Residents' Meeting	City of Glenarden Residents	80
Gaithersburg EJ Analysis Area Community	June 30, 2019	Pop-Up Informational Booth	SummerFest 506 South Frederick Ave., Gaithersburg, MD 20877	200
Lake Arbor EJ Analysis Area Community	July 13, 2019	Pop-Up Informational Booth	Lake Arbor Community Center 10100 Lark Arbor Way, Mitchellville, MD 20721	300
Gaithersburg and Rockville EJ Analysis Area Communities	July 26, 2019	Legislative/Elected Officials Briefing	Del. Kumar Barve, District 17 Montgomery County 150 Gibbs St, Rockville, MD 20850	1
Forestville EJ Analysis Area Community	July 31, 2019	Large Landowner Meeting	Calvary Lutheran Evangelical Church 9545 Georgia Ave Silver Spring, MD 20910	9
General EJ Population throughout EJ Analysis Area	August 15, 2019	Stakeholder Meeting	Hispanic Chamber of Commerce Montgomery County 11001 Veirs Mill Rd, Silver Spring, MD 20902	25
Gaithersburg EJ Analysis Area Community/ General EJ Population throughout EJ Analysis Area	August 9-17, 2019	Pop-Up Informational Booth	Montgomery County Agricultural Fair 501 Perry Pkwy., Gaithersburg, MD 20877	286
Forestville EJ Analysis Area Community	September 6, 2019	Large Landowner Meeting	Jabbok Ministries 7819 Parston Dr Forestville, MD 20747	6
General EJ Population throughout EJ Analysis Area	September 5-8, 2019	Pop-Up Informational Booth	Prince George's County Fair 14900 Pennsylvania Avenue, Upper Marlboro, MD 20772	134
Rockville EJ Analysis Area Community	October 3, 2019	Large Landowner Meeting	First Baptist Church 55 Adclare Rd Rockville, MD 20850	10
Gaithersburg and Rockville EJ Analysis Area Communities	October 10, 2019	Legislative/Elected Officials Briefing	Del. Julie Palakovich-Carr, District 17 Montgomery County	1

EJ Analysis Area Community[1]/ General EJ Population	Date	Outreach Type	Event/ Organization/ Location	Number of Attendees
			225 N Washington St, Rockville, MD 20850	
General EJ Population throughout EJ Analysis Area	October 17, 2019	Stakeholder Meeting	Maryland Hispanic Chamber of Commerce 11 W Mt Vernon Pl, Baltimore, MD 21201	35
New Carrollton EJ Analysis Area Community	November 9, 2019	Community Association Meeting	295 Coalition Meeting New Carrollton Library, 7414 Riverdale Rd., New Carrollton, MD 20784	30
General EJ Population throughout EJ Analysis Area	November 14, 2019	Stakeholder Meeting	Maryland Black Chamber of Commerce 8630 Fenton Street, Plaza 5, Silver Spring, MD 20910	2
General EJ Population throughout EJ Analysis Area	December 4, 2019	Legislative/Elected Officials Briefing	Montgomery County Minority Legislative Breakfast Event 5151 Pooks Hill Rd, Bethesda, MD 20814	300
Gaithersburg and Rockville EJ Analysis Area Communities	December 10, 2019	Legislative/Elected Officials Briefing	Sen. Cheryl Kagan, District 17 Montgomery County 225 N Washington St, Rockville, MD 20850	1
General EJ Population throughout EJ Analysis Area	February 26, 2020	Stakeholder Meeting	Asian American Chamber of Commerce 1801 Rockville Pike, Rockville, MD 20852	25
General EJ Population throughout EJ Analysis Area	March 4, 2020	Stakeholder Meeting	Maryland Black Chamber of Commerce 8630 Fenton Street, Plaza 5, Silver Spring, MD 20910	2
Gaithersburg and Rockville EJ Analysis Area Communities	April 6, 2020	Legislative/Elected Officials Briefing	Montgomery County District 17 Legislative Town Hall (Conference Call)	75

Note: [1] Identifies the community containing EJ populations in which the event either occurs directly, is adjacent to, or is outside of but in whose community EJ populations are served.

Public outreach events were accessible by public transit, such as the Suitland Metro Station near the Suitland Community Center and the Greenbelt Road/Frankfort Drive bus station near Eleanor Roosevelt High School. All Public Open House/Workshop venues were accessible by Americans with Disabilities Act (ADA) standards; each Public Open House/Workshop and several pop-up events featured an American Sign Language interpreter. As shown in **Table 4-36**, pop-up informational booths were staffed at the Annual Salvadoran American Festival/7th Annual Latino Health Fair at Montgomery College (August 5, 2018), and the National Night Out Against Crime at Hyattsville's Heurich Park (August 7, 2018 and August 6, 2019). A Spanish interpreter was available at the Annual Salvadoran American Festival/7th Annual Latino Health Fair, and Spanish and English outreach materials were provided at both events.

Advertisement campaigns for Public Open Houses/Workshops included a variety of outreach methods. Digital outreach included P3 Program website announcements, e-mail blasts, social media posts, downloadable newsletters, and digital newspapers. Print outreach included local/regional newspaper advertisements, newspaper inserts, postcards, and mailed newsletters. Advertisements were featured in print and online newspapers whose local/regional readership includes EJ populations in the EJ Analysis Area as well as those whose primary audiences are of minority races/ethnicities and are considered traditionally underserved (Tiempo Latino, Washington Hispanic, Prince George's Sentinel, Afro.com, and DCBlack.com). Additionally, a newspaper insert was distributed in the Washington Post's Local Living Section to over 690,000 regional subscribers and non-subscribers, also including EJ populations. Radio outreach for the Alternatives Retained for Detailed Study (ARDS) Public Workshops included "traffic sponsorships" on 14 regional radio stations whose local/regional audiences also broadly encompass EJ populations in the EJ Analysis Area.

Multi-lingual meeting materials for the Public Open Houses/Workshops were provided by request; requests were made for Amharic, Spanish, and Chinese language materials. Each Public Open House/Workshop and several pop-up events featured a Spanish-language interpreter. Newspaper inserts and postcards stated that Amharic, Vietnamese, Spanish, and Chinese language materials could be requested in each respective language. Spanish-language "Stay Connected" cards were distributed at engagement events, and Spanish-language meeting materials, including display boards and Public Workshop handouts were made available on the P3 Program website. The website also features Google Translate capabilities.

Additional detail on the public involvement efforts presented here is provided in the *Public Involvement and Agency Coordination Technical Report* **(Appendix P)**.

B. Coordinated Local Outreach and Demonstrated Engagement of Traditionally Underrepresented Populations

Based on initial low attendance at Prince George's County events and receipt of fewer public comments compared to Montgomery County, MDOT SHA reached out to the M-NCPPC Prince George's County Planning Department to enhance local engagement during the ARDS Public Workshop outreach campaign. Coordinated local outreach efforts included, but were not limited to:

- M-NCPPC Prince George's County Planning Department distribution of the Public Workshops' announcement flyer via Office of Municipalities' community outreach database for display at 45 County community centers (March 14, 2019);
- M-NCPPC Prince George's County Planning Department distribution of the Public Workshops' announcement flyer via WMATA Office of Communications for their community update posting (March 29, 2019);
- M-NCPPC Prince George's County Planning Department forwarding of study e-mail blasts to their Community Association database and Office of Planning database (e-mail blasts distributed on March 7, April 10, May 8, June 10, 2019);
- Prince George's County Department of Public Works and Transportation distribution of Public Workshops' announcement flyer through email blast; and
- Distribution of Public Workshops' announcement flyer to several large places of worship along the study corridor (on and after March 14, 2019), including First Baptist Church of Glenarden, the

Collective Empowerment Group (an umbrella group for more than 300 churches in the County), Prince George's County Liaison for Faith Connections/Relationship Building, People's Community Baptist Church, Sanctuary at Kingdom Square, and the Transforming Neighborhoods Initiative.[57]

While study awareness, meeting attendance, and the volume of comments received was consistently strong in Montgomery County; additional outreach was conducted that included distribution of the Public Workshops' announcement flyer through the Montgomery County Department of Transportation email blasts.

To enhance engagement of the Study's identified EJ populations and other underserved populations, and consistent with recommendations in NCHRP Report 710, *Practical Approaches for Involving Traditionally Underserved Populations in Transportation Decisionmaking*, demographic data was used to identify locations for targeted mailing outreach. These locations included EJ Analysis Area schools with above-average participation in the Free and Reduced-price Meals Program;[58] places of worship[59] in EJ Analysis Area Communities containing EJ populations; and all affordable-housing complexes[60] in the EJ Analysis Area.

In early April 2019, an introductory cover letter asking recipients to display an enclosed Public Workshops' announcement flyer wherever community information is displayed was mailed to the 174 affordable-housing complexes, schools, and places of worship listed in the *Community Effects Assessment and Environmental Justice Analysis Technical Report*, **Appendix E, Section 4.2**. English and Spanish versions of the flyer were included with the cover letter.

C. Public Comments with Socioeconomic Themes

Public input on the I-495 and I-270 Managed Lanes Study has been solicited continually since the initiation of the Study in March 2018. Over 3,900 comments have been received via postal mail, e-mail, the website comment form, hard copy comment forms at Public Workshops, and oral testimony. Comments specifically from EJ populations cannot be identified as commenters do not submit race/ethnicity or income status with their submissions. However, the following socioeconomic-related statements, questions, or suggestions raised by some commenters may be broadly considered as relevant to Environmental Justice principles: concerns that toll pricing could have a negative impact on low-income users; concerns about the potential financial impact of tolls on households, particularly lower/middle-income; general commentary on toll affordability and wealth; the socioeconomic status of I-495 and I-270

[57] The Transforming Neighborhoods Initiative was an effort by Prince George's County to provide additional services and resources to six underserved communities within the County.

[58] The MDOT SHA Office of Equal Opportunity collects public feedback surveys to ensure compliance with Title VI of the Civil Rights Act of 1964. Maryland State Department of Education (*Free and Reduced-Price Meal Statistics for School Year 2017-2018.* http://marylandpublicschools.org/programs/pages/school-community-nutrition/freereducedpricemealstatistics.aspx).

[59] Geographic Information Systems (GIS) data sourced from Maryland iMap (data.imap.maryland.gov/datasets/maryland-land-use-land-cover-land-use-land-cover-2010); Prince George's County Open Data Portal (gisdata.pgplanning.org/metadata/); Montgomery County Planning Department Open Data Portal (Montgomery County Planning Department. Open Data Portal). Corresponding mailing addresses gathered using Google Search.

[60] Sourced from Housing and Urban Development Multifamily Assistance & Section 8 Database, Montgomery County Housing Opportunities Commission, Prince George's County Housing Authority, and Fairfax County Redevelopment and Housing Authority websites. Corresponding mailing addresses gathered using Google Search.

highway corridor users; and support for mass transit transportation improvements either in combination with the proposed Build Alternatives or instead of the proposed Build Alternatives.

Additional detail on the comment themes discussed here is provided in the *Scoping Report, Summary of July 2018 Alternatives Public Workshops, and Summary of Public and Stakeholder Engagement for the Recommended ARDS*, available for download on the Study website (https://495-270-p3.com/your-participation/past-public-outreach/). An overview of other comment themes received during the Study is provided in the *Public Involvement and Agency Coordination Technical Report* **(Appendix P)**.

4.21.5 Identification of Beneficial and Adverse Effects to Environmental Justice Populations

Both beneficial and adverse effects to the existing conditions of EJ populations are considered in this EJ Analysis. Effects described in this section include physical impacts to and relocations of existing private property, including community facility property, as well as physical impacts to transportation right-of-way. Per FHWA EJ Order 6640.23A, consideration is also given to effects on the following environmental characteristics: human health and safety; air quality; noise/vibration; water quality; hazardous materials; natural resources; visual landscape and aesthetic values; economy and employment; access and mobility; community cohesion/isolation and quality of life; and tolling considerations.

A. No Build Alternative

The No Build Alternative would not result in any study-related construction and therefore no right-of-way or property acquisitions are required; no direct impacts would occur in EJ populations. Increased traffic congestion under the No Build Alternative would contribute to increased overflow congestion on the local road network. As a result, the No Build Alternative would result in increased response times for emergency services and increased travel times to community facilities, especially during peak travel periods.

Existing congestion on I-495 and I-270 occur for periods of ten to seven hours per day, respectively. Re-occurring congestion results in vehicles idling for extended periods which can increase emissions and impact air quality. The No Build Alternative would not address the existing congestion experienced along the study corridors.

B. The Build Alternatives

The Build Alternatives would, to varying degrees, provide improvements as outlined by the Study Purpose and Need. The impacts of the Build Alternatives to EJ populations are presented in this section. As shown in **Table 4-37**, the Build Alternatives would convert between 163.3 and 313.3 acres of right-of-way from properties in EJ populations adjacent to the existing I-495 and I-270 roadway alignments. The conversion of land would be mostly sliver takes along existing interstate systems.

Table 4-37: Right-of-Way Requirements in EJ Populations

Build Alternative	Right-of-Way Required (acres)
Alternative 5[1]	163.3
Alternatives 8 and 9[2]	182.9
Alternative 9M	313.3
Alternative 10	185.0
Alternative 13B	182.0
Alternative 13C	184.0

Notes: [1]MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2] Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.

Each of the Build Alternatives would result in the relocation of four businesses, one of which is located in the Glenarden EJ Analysis Area Community, an EJ population. Alternative 9M would result in 25 residential relocations, seven of which are located in the Silver Spring EJ Analysis Area Community, an EJ population. Alternatives 8, 9, 10, 13B and 13C would result in 34 residential relocations, eight of which are also located in the Silver Spring EJ Analysis Area Community. Impacted properties under the Build Alternatives are shown on the *Environmental Resource Mapping* (**Appendix D**). None of the 32 housing complexes in the EJ Analysis Area with subsidized units would experience relocation.

Community facility properties within EJ populations would be impacted by partial property acquisition (generally, sliver impacts along property lines), including (depending on the Build Alternative): 11 to 12 places of worship, three schools, one higher education facility, one to two postal facilities, one police station, two recreation centers, and 15 to 16 parks. No community facilities would be relocated. However, impacts at one recreational facility located adjacent to I-495 in the Silver Spring EJ Analysis Area Community would include the outdoor and indoor pools; further information on impacts to this facility is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report*, **Appendix E**, **Section 3.5.2**.

Additionally, preliminary archeological research has identified two potentially historic cemeteries whose sites are located within the Build Alternatives' LOD and may be cultural significant: the Moses Hall Cemetery (Cabin John EJ Analysis Area Community) and the Montgomery County Poor Farm Cemetery (Rockville EJ Analysis Area Community). Further archaeological investigations will be included in development of the Programmatic Agreement; additional information is provided in the *Volume 4* of the *Cultural Resources Technical Report*, (**Appendix G**). MDOT SHA will work to avoid and minimize impacts. MDOT SHA will continue to coordinate with affected communities and the Friends of Moses Hall, which includes some descendant families of those buried in the cemetery, on treatment of human remains should avoidance not be possible.

Other environmental characteristics within EJ populations would experience effects from the Build Alternatives. The nature of most of these characteristics makes it difficult to precisely quantify effects at the block group-level. The effects within EJ populations are described qualitatively for each environmental characteristic below.

a. Human Health and Safety

When traffic speeds and flow are optimized, less idling occurs; thereby reducing excessive emissions. As the No Build Alternative would not address traffic speed and flow, excessive emissions would not be expected to be reduced under the No Build Alternative. The Build Alternatives would address congestion on two of the most heavily traveled highways in the region. Implementation of any of these would, to varying degrees, reduce emissions through the corridor, as documented in the *Air Quality Technical Report* (**Appendix I**). The Build Alternatives would maintain the existing separation between highway operations and local traffic, bicyclists, and pedestrians through access limits and physical barriers in accordance with state and Federal regulation. Where direct access ramps would be constructed, alterations to traffic patterns and roadway/sidewalk networks would be mitigated by the inclusion of signage, high-visibility crosswalk markings, pedestrian countdown signals, and the implementation of a temporary detour network. Existing pedestrian and bicycle facilities impacted by the Build Alternatives would be replaced in-kind, at a minimum, regardless of the alternative and would be coordinated with the counties and local jurisdictions. Additional capacity on I-495 and I-270 would assist in accommodating a population evacuation and improving emergency response access should an event related to homeland security occur. Further, by providing additional travel choices, the Build Alternatives are expected to reduce congestion on the mainline and local roadways networks, allowing for more reliable travel times for all users, including emergency responders, as documented in the *Alternatives Technical Report* (**Appendix B**). In summary, the Build Alternatives would result in a reduction in emissions and congestion while improving emergency response access, increasing travel choice, and providing reliable travel times; resulting in a benefit to human health and safety throughout the study corridors. Human health and safety impacts and benefits would be borne throughout the study corridors in both EJ populations and non-EJ populations.

b. Air Quality

As stated above, when traffic speeds and flow are optimized, less idling occurs; thereby reducing excessive emissions. As the No Build Alternative would not address traffic speed and flow, excessive emissions would not expect to be reduced under the No Build Alternative.

As documented in the *Air Quality Technical Report* (**Appendix I**), the Build Alternatives are not predicted to cause or exacerbate a violation of the NAAQS or measurably increase regional emission burdens or MSATs levels. The Build Alternatives would address congestion on two of the most heavily traveled highways in the region. As a result, the Build Alternatives are not predicted to increase emission burdens compared to the No Build Alternative in 2040, aside from a slight increase in GHG emissions; nor cause or contribute to a violation of the NAAQS, no long-term or regional air quality impacts are anticipated, and no mitigation measures are warranted.

As the project's construction is not anticipated to last more than five years in any single location, construction-related effects of the project would be limited to short-term increased fugitive dust and mobile-source emissions during construction. State and local regulations regarding dust control and other air quality emission reduction controls would be followed.

c. Noise

The *Noise Analysis Technical Report* (**Appendix J**) found that Build Alternatives would increase traffic noise in communities adjacent to the proposed limits of disturbance throughout the corridor. Where noise barriers already exist, they would be replaced, as needed. In accordance with Federal regulation (23 CFR 772) and the MDOT SHA *Highway Noise Policy*, approved by FHWA, noise abatement is being investigated at all noise sensitive areas (NSAs) where the traffic noise levels would approach or exceed the FHWA noise abatement criteria (NAC) for the defined land use category. The study area was divided into 133 noise sensitive areas in accordance with the MDOT SHA and FHWA noise policies and guidance. Geographically, 92 of the noise sensitive areas (NSAs) are located along I-495, 37 are located along I-270, and four are located along I-95 and MD 295 adjacent to the respective interchanges with I-495. The NSAs are comprised of areas that have different land use activity categories which have been combined into a single NSA. Federal regulation (23 CFR 772) and the MDOT SHA *Highway Noise Policy* require that noise abatement be investigated at all NSAs where the Build traffic noise levels approach or exceed the FHWA

Noise Abatement Criteria (NAC) for the defined land use category. Where noise abatement was warranted for consideration, it was examined to determine if the abatement is feasible and reasonable.

The following is a summary of the proposed feasible and reasonable noise barrier systems under the Build Alternatives and their NSA locations relative to EJ populations:

- Of the seven NSAs where the existing noise barrier would remain in place as currently constructed, five are located in EJ populations;
- Of the 42 NSAs where the existing noise barrier would be displaced by construction and replaced by a reconstructed barrier, 24 are located in EJ populations;
- Of the 19 NSAs where the existing noise barrier would be reconstructed and extended, eight are located in EJ populations;
- Of the 23 NSAs where there is currently not an existing noise barrier and a new barrier would be constructed, 10 are located in EJ populations;

Noise barrier systems are considered not feasible and reasonable[61] based on the MDOT SHA Highway Noise Policy in 17 NSAs, 9 of which are located in EJ populations.

Refer to the *Noise Analysis Technical Report* (**Appendix J**) for the locations of the proposed noise barriers.

d. Water Quality

As documented in the *Natural Resources Technical Report* (**Appendix L**), the Build Alternatives would result in additional impervious surface to accommodate additional lanes throughout the study corridors. Public drinking water within the EJ Analysis Area is supplied through the Occoquan Reservoir, Potomac River, and Patuxent River. Potential impacts to water quality, including public drinking water sources, would be mitigated via stormwater management measures in accordance with appropriate Federal and state stormwater management regulations. The impacts and benefits from stormwater management would be borne throughout the study corridors in both EJ populations and non-EJ populations.

e. Hazardous Materials

Construction of any of the Build Alternatives would require disturbance of existing soil conditions, including identified hazardous materials sites of concern as documented in the *Hazardous Materials Technical Report* (**Appendix K**). Prior to acquisition of right-of-way and construction, Preliminary Site Investigations (PSIs) would be conducted to further investigate properties within the final limits of disturbance and vicinity that have a high potential for mobilization of hazardous materials as a result of construction activities.

f. Natural Resources

As documented in the *Natural Resources Technical Report* (**Appendix L**), the Build Alternatives would impact: soils, wetlands and waters, floodplains, vegetation and terrestrial habitats, and wildlife. Efforts to mitigate for these impacts would include development and implementation of an Erosion and Sediment

[61] Feasible and reasonable criteria are determined in accordance with MDOT SHA policy. The assessment of noise abatement feasibility, in general, focuses on whether it is physically possible to build an abatement measure (i.e., noise barrier) that achieves a minimally acceptable level of noise abatement reasonableness, in general, focuses on whether it is practical to build an abatement measure. Barrier reasonable ness considers three primary factors: viewpoints, design goal, and cost effectiveness.

Control Plan, water resource mitigation, and the replacement of impacted trees and habitat to the extent possible with priority replacement on-site near the impacted area.

g. Visual Landscape and Aesthetic Values

The Build Alternatives would result in changes to viewsheds or visual impacts within the EJ Analysis Area. The construction of managed lanes, shoulders, traffic barrier, cut and fill slopes, stormwater management facilities, retaining walls, and noise walls along the existing highway corridor would not introduce new elements incompatible with the existing visual character or qualities along the study corridors. However, where managed lanes access ramps would be constructed, new interchange ramps and structures may be introduced that could impact the viewsheds of adjacent properties and communities. The locations or design of these elements have not been finalized. The design of all highway elements would follow aesthetic and landscaping guidelines that will be developed in consultation with the design team, local jurisdictions, private interest groups (private developers or companies), local community or business associations, as well as local, state and Federal agencies.

h. Economy and Employment

Except where right-of-way acquisitions would result in business property relocation, the Build Alternatives would not impact access to area businesses or employers. Within EJ populations, one business, a warehouse/office property in the Glenarden EJ Analysis Area Community, is anticipated to require relocation. Similar services exist and facilities and properties are available for the relocation of these services if business owners choose to relocate. There would be no overall impact to the distribution of worker occupation, or major employers within EJ populations or non-EJ populations within the EJ Analysis Area.

Proposed improvements would help address increasing congestion, thereby maintaining mobility throughout the region, including areas with EJ populations.

Additionally, through Opportunity MDOT Program the agency will provide resources for job seekers as well as small, minority-, women- and veteran-owned businesses and disadvantaged businesses to access training, advisory services and advanced industry resources to prepare for potential opportunities to work with MDOT and the I-495 & I-270 P3 Program.

i. Access and Mobility

The No Build Alternative would not provide reduced congestion, enhanced trip reliability, or travel choices to destination points within the region, thereby reducing access and mobility conditions along the study corridors.

For each of the Build Alternatives, traffic, access, and mobility would be maintained during construction in compliance with MDOT SHA Work Zone Safety and Mobility requirements. Where direct access ramps would be constructed, alterations to traffic patterns and roadway/sidewalk networks would be mitigated by the inclusion of signage, high-visibility crosswalk markings, pedestrian countdown signals, and the implementation of a temporary detour network. Existing pedestrian and bicycle facilities impacted by the Build Alternatives would be replaced in-kind, at a minimum, regardless of the alternative and would be coordinate with the counties and local jurisdictions. The Build Alternatives would not eliminate access, nor would they impede access between residences and community facilities and business. However, an incremental enhancement to access may occur due to reduced congestion on local routes. Additionally, bus transit systems could utilize I-495 and I-270 managed lanes implemented under the Build Alternatives.

j. Community Cohesion/Isolation and Quality of Life

Under the Build Alternatives, changes to community cohesion would occur from the loss of 25 or 34 residences and four businesses. This would include the loss of seven or eight residences in two EJ populations in the Silver Spring EJ Analysis Area Community and the loss of one business in an EJ population within the Glenarden EJ Analysis Area Community. Additionally, partial property acquisition for right-of-way would occur throughout the study corridors. Generally, these would include acquiring strips of land from undeveloped areas or areas of trees from properties adjacent to I-495 or I-270, resulting in a reduction of the overall property size. However, impacts by relocation or partial property acquisition would be limited to the individuals immediately affected by the property acquisition and would occur in areas bordering the existing highway rights-of-way due to the generally parallel nature of the limits of disturbance of the Build Alternatives along the study corridors.

Changes to land use and development would be limited to those properties affected by property acquisition. Residents and employees who live, work, and utilize services immediately adjacent to the study corridors may experience changes in current quality of life due to property acquisition and temporarily during construction activities. However, community residents would experience a benefit to quality of life due to reduced congestion along the study corridors and enhanced trip reliability and travel choices to destination points within the region.

k. Tolling Considerations

The FHWA's, *Impacts of Congestion Pricing on Low-Income Populations* (FHWA 2017), explains that the impacts of congestion pricing on low-income populations vary widely by context and type of project (i.e., full facility tolling or partial facility tolling). In the tolled managed-lanes scenario, new travel choice becomes available for all users and additional network capacity is provided. According to FHWA, well planned congestion pricing schemes:

- "Increase transportation options for all commuters, including low-income commuters, to achieve relatively congestion-free travel on specific occasions.
- Demonstrate wide acceptance and usage of priced-managed facilities by low-income commuters.
- Demonstrate that low-income commuters, many of whom are transit riders, particularly benefit from reduced congestion and transit investments made from pricing revenues (FHWA 2017)."

Consistent with FHWA guidance, while the travel speed and trip reliability benefits offered by the tolled lanes could be a less feasible choice for EJ populations due to cost burden, under any of the managed lane alternatives, all existing GP lanes would remain toll-free and would undergo some travel time improvements. Traffic analysis conducted in support of the Study indicates that travel times would improve and congestion would decrease along GP lanes under each of the Build Alternatives. MDOT currently provides the following in managed lanes throughout the state:

- Free transponders for all customers
- Prepaid cash/check payment options at MDTA walk-in centers, including four MVA's and six MDTA facilities

- Allowing multiple payment methods, including credit card, cash, check or money order
- Funding alternative modes of transportation through commuter programs such as Commuter Choice Maryland, Guaranteed Ride Home, and Maryland Rideshare
- Providing more than 100 park-n-ride locations throughout the state
- Minimum prepaid balances sized to reduce the chance of users violating account minimums

All electronic tolling (AET) methods would be enlisted to collect tolls for the managed lanes under each of the Build Alternatives. Tolls would be set using dynamic pricing, based on a tolling algorithm that would correlate the traffic volumes and demands with the toll rate. The toll rate caps, or upper and lower thresholds for tolls, would be set through a public process by the Maryland Transportation Authority in accordance with COMAR 11.07.05. Additionally, COMAR 11.07.05. requires public notice of toll schedule revisions. The advantage of using dynamic pricing is that it enables the managed lanes to maintain a 45-MPH speed at all times and would reduce congestion in the GP lanes, which results in benefits for all users of the roadway facilities. GP lanes would remain free for users under all Build Alternatives. In addition, under Build Alternatives 9, 9M, and 13B all HOV +3 users would be able to travel toll-free.

C. The Potential for Adverse Effects to Environmental Justice Populations

As described above, both beneficial and adverse effects to EJ populations would occur from the Build Alternatives. The potential for adverse effects to EJ populations is summarized in **Table 4-38**.

Table 4-38: Potential for Adverse Effects to Environmental Resources within EJ Populations

No Build	Alt. 5[1]	Alts. 8 & 9[2]	Alt. 9M	Alt. 10	Alt. 13B	Alt. 13C
Right-of-Way Requirements and Property Relocations within EJ Populations						
No	Yes (163.3 acres) (8 relocations)	Yes (182.9 acres) (9 relocations)	Yes (313.3 acres) (29 relocations)	Yes (185.0 acres) (9 relocations)	Yes (182.0 acres) (9 relocations)	Yes (184.0 acres) (9 relocations)
Impacted Community Facility Properties[3] within EJ Populations						
No	Yes (19 properties)	Yes (20 properties)	Yes (20 properties)	Yes (21 properties)	Yes (20 properties)	Yes (20 properties)
Human Health and Safety						
Yes	Yes	Yes	Yes	Yes	Yes	Yes
Air Quality						
Yes	Yes	Yes	Yes	Yes	Yes	Yes
Noise						
No	Yes	Yes	Yes	Yes	Yes	Yes
Water Quality						
No	Yes	Yes	Yes	Yes	Yes	Yes
Hazardous Materials						
No	Yes	Yes	Yes	Yes	Yes	Yes
Natural Resources						
No	Yes	Yes	Yes	Yes	Yes	Yes
Visual and Aesthetic Resources						
No	Yes	Yes	Yes	Yes	Yes	Yes
Economy and Employment						
TBD	No	No	No	No	No	No

Access and Mobility						
Yes	No	No	No	No	No	No
Community Cohesion/ Isolation and Quality of Life						
No	No	No	No	No	No	No
Tolling Considerations						
No	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The potential for adverse effects to environmental resources in EJ populations, as documented in the DEIS and in other Technical Reports are described in the *Community Effects Assessment and Environmental Justice Analysis Technical Report*; Appendix E, Chapter 5 identifies the direct impacts as well as effects to environmental characteristics for the CEA Analysis Area Communities, including those containing EJ populations.

[1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.

[2]Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts. [3]Community facility properties within EJ populations would be impacted by partial property acquisition (generally, sliver impacts along property lines). No community facilities would be relocated.

The determination of disproportionately high and adverse impacts to EJ populations will be made on the Preferred Alternative and will be disclosed in the FEIS. Measures to mitigate any disproportionately high and adverse impacts will be determined in consideration of the specific impacts to EJ populations and will be done with input from the potentially affected minority of low-income populations. Strategies for mitigating potential adverse effects to EJ populations may consist of, but are not limited to:

- Free bus transit usage of managed lanes for faster and more reliable trip
- Direct access to existing and proposed transit stations and transit-oriented development areas within the EJ Analysis Area
- Direct access supporting transit connections in Equity Emphasis Areas
- No toll for eligible High Occupancy Vehicles (Alts 9 and 13B)
- Making cross highway pedestrian and bicycle enhancements and connections

As enumerated in **Section 4.21.2**, the next steps for the EJ Analysis, to be documented in the FEIS, include the following:

- The consideration of mitigation and enhancement measures if unavoidable adverse effects are expected to occur under the Preferred Alternative
- A comparison of adverse effects from the Preferred Alternative within EJ populations to adverse effects within a non-EJ population reference community
- A determination of whether disproportionately high and adverse effects would occur under the Preferred Alternative to EJ populations
- A final conclusion of whether disproportionately high and adverse effects would occur, based on unmitigated adverse effects and whether public feedback has been addressed.

4.22 Indirect and Cumulative Effects

4.22.1 Introduction and Methodology

Indirect effects are caused by the action and are later in time or farther removed in distance but are still reasonably-foreseeable(40 CFR § 1508.8(b)).

Cumulative effects are defined as impacts on the environment that result from the incremental impact of the action when added to past, present, and reasonably-foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR § 1508.7).

This indirect and cumulative effects (ICE) assessment was conducted in accordance with MDOT SHA's current ICE guidelines (MDOT SHA, 2012) and in accordance with NEPA and its implementing regulations. The ICE analysis considers the effects discussed in this chapter on general population trends, employment trends, and general growth trends based on master plans, reports, census and geographic data, historic maps, and aerial imagery. It considers planning and forecasting documents concerning past, present, and future economic development; the history and origins of the proposed action and previous studies; and data reflected in previously completed NEPA documents for understanding of the potential for indirect and cumulative effects in the region.

The ICE Analysis methodology includes the following four general steps:

- Step 1: Collect data and identify resources
- Step 2: Define the ICE Analysis Boundary
- Step 3: Define the ICE time frame
- Step 4: Define the analysis approach and methodology

Step 1: This ICE analysis considers the resources, listed below, that could potentially experience direct or indirect impacts by the Build Alternatives:

- Socioeconomic Resources (communities, residences, businesses, parks and recreation);
- Cultural Resources (historic structures/districts and archeological sites);
- Natural Resources (surface water, wetlands, floodplains, forest, wildlife /wildlife habitat, and sensitive species); and
- Air Quality

Step 2: Representative sub-boundaries were identified and reviewed, for example Area of Traffic Influence, Planning Areas, and watersheds. The geographic boundary used for the ICE analysis was developed by synthesizing sub-boundaries to create a single ICE Analysis Area boundary (**Figure 4-16**) to capture the full geographic area where potential indirect and/or cumulative effects would be reasonably-foreseeable. The representative sub-boundary components can be found in the *Indirect and Cumulative Effects Technical Report* **(Appendix O, Section 2.2.2)**.

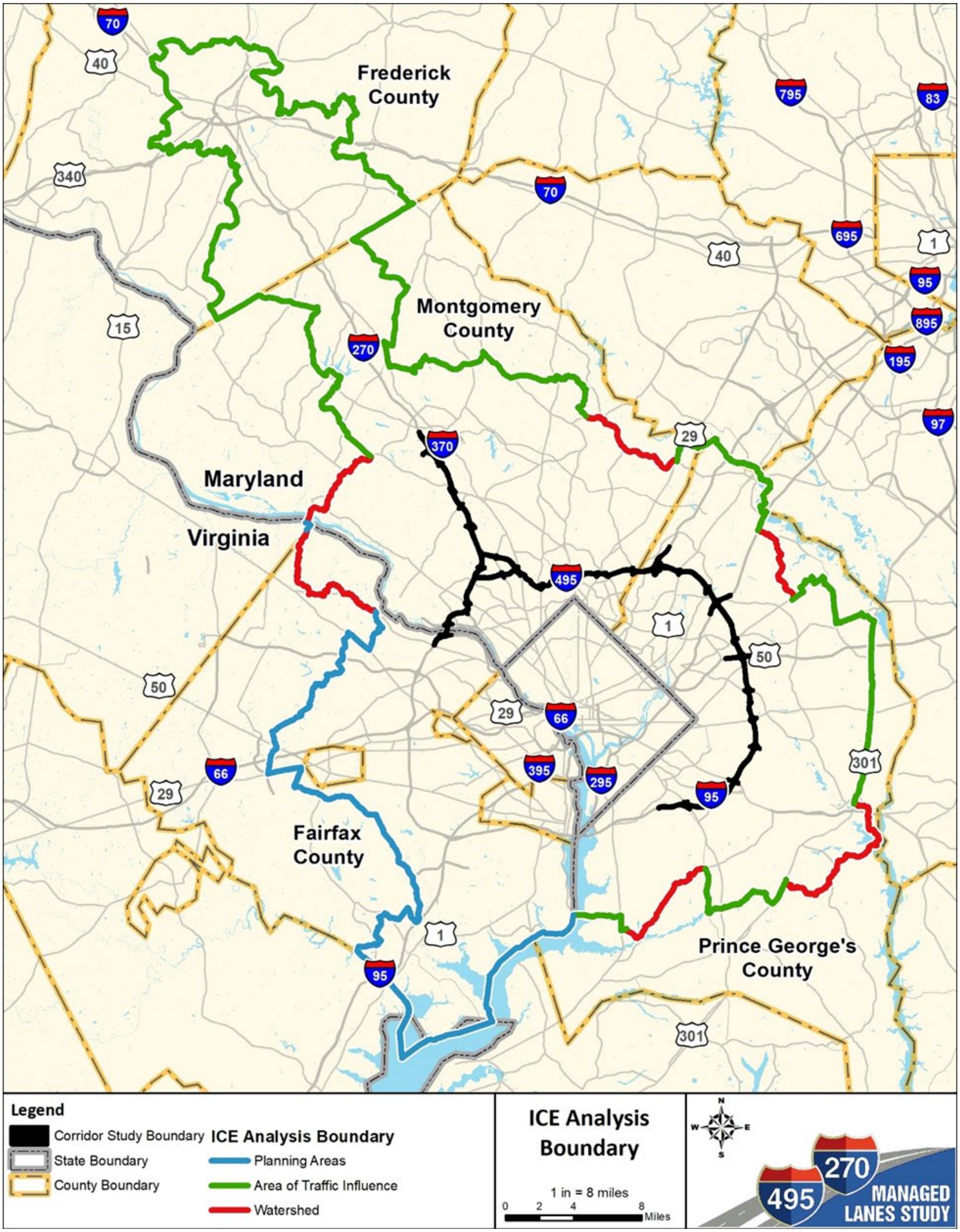
Step 3: The temporal boundaries, or time frame, of the ICE analysis includes setting a past and future time frame. In general, the temporal boundary is identified based on factors including data availability, relevant historical events or trends, data availability and the design year for improvements being evaluated in the EIS.

A period of 70 years, from 1970 to 2040, is the ICE time frame (or temporal boundary). The first section of I-495 was opened in 1961, and the highway was completed in 1964. The first year for which decennial census data was available after the completion of I-495 was 1970. In addition, 1970 generally coincides with the opening of I-95 between Baltimore and Washington, DC. Washington National Pike was built from 1953 to 1960 and became known as I-270 in 1975.

The future time frame of 2040 was determined based on the Study's design year, as well as the availability of data. Population and employment projections are available through 2040 from MWCOG, allowing a more accurate depiction of future conditions within the ICE Analysis Area.

Step 4: The ICE analysis requires an understanding of past, current and potential future conditions in the ICE analysis area in order to assess the potential for impacts associated with the range of study alternatives. Consideration of past effects included research and review of published literature, census information, and historic aerial imagery. Geographic information systems (GIS) mapping was obtained or created for the ICE Analysis Area and used to assess trends from the past to the present time frame. Resources identified within the ICE boundary are considered in light of past and present socioeconomic, cultural, and natural environmental conditions and trends. Future conditions are analyzed to compare build and no build scenarios and the resulting potential indirect and cumulative effects.

Figure 4-16: Overall ICE Analysis Area Boundary



The methodologies identified in the MDOT SHA ICE guidance were applied, including trends analysis and overlays.

- Trends analysis involves qualitative discussion of impacts to a resource over time. Past and current effects can allow for an informed projection of likely future effects.
- Overlays of present and future land use maps over the existing environmental resources allow for quantitative or qualitative description of the impacts to those resources.

Based on these methods, the ICE Analysis is designed to identify impacts to resources from other actions (past, present, and future) including indirect impacts—if any—due to each Build Alternative. Then, the potential incremental effects of the Build Alternatives are evaluated in light of the past, present, and future impacts identified. **Table 4-39** provides a brief summary of the resources, data, data sources, and analysis methodology used for identifying potential indirect and cumulative effects.

Table 4-39: ICE Analysis Data Sources and Methodology

Resource	Data	Data Sources	Analysis Methodology
Socioeconomic Resources			
Communities (facilities, services, cohesion), residences, businesses, parks and recreation	Aerial photos, land use maps, census data, county comprehensive plans	M-NCPPC, MDP, Maryland iMap GIS, MWCOG, US Census Bureau, Montgomery County, Prince George's County, Fairfax County, Alexandria, City of Fairfax	Overlay mapping and aerial photos, analyze trends in population and housing and availability of services, examine county comprehensive plans
Cultural Resources			
Historic structures/districts and archeological sites	Historic maps and photos, land use maps, historical site records	M-NCPPC, MHT, VDHR, National Register	Overlays of land use surrounding historical sites; trend analysis
Natural Resources			
Surface Water / Floodplains	Stream mapping, aerial imagery, land use data, watershed boundaries, floodplain mapping	M-NCPPC, MDNR, MDE, VDEQ, FEMA	Overlays of land use and historical imagery, trends analysis
Wetlands and Aquatic Habitat	Wetlands mapping, land use and historical imagery	M-NCPPC, MDNR, VDNR, NWI	Overlays of land use and historical imagery, trends analysis
Forests	Land use mapping and historical imagery	M-NCPPC, MDP, VDNR	Overlays of land use and historical imagery, trends analysis
Other			
Air Quality	CLRP	NCRTPB	Regional conformity discussion

4.22.2 Affected Environment

A. Past and Present Land Use

Substantial population growth and land development has occurred in the ICE Analysis Area during the analysis time frame. Most ICE Analysis Area jurisdictions have seen substantial population growth since 1970 and are projected to have an increase in population by 2040. Most populations in the ICE Analysis Area are estimated to rise at a somewhat more modest pace compared to the prior decades, as the land uses become older and available land becomes scarcer.

MWCOG member jurisdictions include the ICE Analysis Area jurisdictions of Montgomery, Prince George's and Fairfax Counties, as well as Frederick, Charles, Arlington, Loudoun and Prince William Counties, the District of Columbia, and the many independent cities and municipalities within the region. According to the MWCOG 2016 Amended CLRP (NCRTPB, 2016), approximately 57 major roadway construction projects and 15 major transit projects are proposed in the ICE Analysis Area. According to MWCOG's Round 9.1 Cooperative Forecast, the Metropolitan Washington Region will add more than 633,000 households between 2015 and 2040, for a total of 2.6 million households. More than half of the expected household growth in the ICE Analysis Area will occur in Fairfax County, the District of Columbia, and Montgomery County. Commercial development in the MWCOG region declined by seven percent in 2017 compared to 2016 (MWCOG, 2018d). Seven of the ten largest development projects in the MWCOG region, by square footage, are located within the ICE Analysis Area.

The majority of the study corridor is located within the Potomac River drainage basin, with the eastern-most portion of the study corridor, between approximately US 50 and MD 4, falling within the Patuxent River drainage basin. The full ICE Analysis Area contains approximately 40,900 acres of wetlands according to NWI mapping and approximately 6,700 acres of FEMA's 100-year floodplains. A total of 407 nontidal wetlands and 1,061 stream segments were delineated within the corridor study boundary. More detailed descriptions of wetland resources and impacts are included in the *Natural Resources Technical Report* (**Appendix L**).

The Chesapeake Bay Land Cover GIS dataset was used to identify land cover in the full ICE Analysis Area (670,000 acres total). Forest and shrub land cover accounts for approximately 51 percent (341,700 acres) of the ICE Analysis Area, with herbaceous and impervious land cover at 25 percent (168,300 acres) and 20 percent (137,600 acres), respectively. The remaining categories account for three percent (19,400 acres) water cover and less than one percent (3,200 acres) of barren land.

Existing land use in the ICE Analysis Area includes a mix of developed residential, commercial, and institutional land uses, along with open spaces, forested areas, and relatively small areas of farmland. For the Maryland portion of the ICE Analysis Area, Land Use/Land Cover (LULC) is available for 1973, 2002, and 2010 data years from the MDP. The data suggests an overall pattern of agricultural and forest land converted into residential use between 1973 and 2010. Institutional and industrial uses rose modestly in this time frame, and other land use categories were generally stable. Land use in the Maryland portion of the ICE Analysis Area is predominantly suburban, mid to low-density residential use, with more dense areas closer to Washington, DC and becoming less intense further from the city core. Commercial, industrial, and institutional uses are generally clustered around major transportation corridors, especially interstate highways. Green spaces are generally stream valley corridors and larger parks dispersed throughout the area.

The land use data for the District of Columbia from 2005, as presented in the District of Columbia Comprehensive Plan notes the expansive city core of about four-square miles centered around the open spaces of the Federal city. The core is surrounded by an inner ring of moderate- to high-density residential and mixed-use neighborhoods. Beyond the inner ring is an outer ring of less dense development, characterized largely by single-family housing and garden apartments. However, as noted in the Comprehensive Plan, the District was almost fully developed by 1960.

The Virginia portion of the ICE Analysis Area is generally characterized by mature suburban residential land uses, with commercial and other uses focused in hubs along major transportation corridors. The land uses are denser in the areas closer to Washington, DC, becoming more suburban further away from the urban core. The Virginia portion of the ICE Analysis Area has seen a major growth in office buildings since 1970, particularly in areas close to highways, Metrorail stations, and near Washington, DC. Residential land use accounts for 50 percent of the land use in the Fairfax County portion of the ICE Analysis Area.

A. Future Land Use

The availability and level of detail for future land use varies depending on the planning jurisdiction. Background information on future land use is summarized below based on available plans and data by jurisdiction. County and local master plans focus on protecting existing open space and residential communities by directing future development to designated areas. There are no planned developments in the ICE Analysis Area that are dependent upon the completion of the Build Alternatives. For additional information refer to the *Indirect and Cumulative Effects Technical Report* (**Appendix O, Chapter 3, Section 3.1**).

- Montgomery County, Maryland: A review of the various land use plans in Montgomery County, indicates that the comprehensive planning documents aim to protect existing suburban residential areas along I-495, and maintain them in their current form. New growth is to be primarily focused into hubs around existing mass transit, and in more-densely-urbanized areas closer to Washington, DC.

- Prince George's County, Maryland: Future land use changes are outlined in the Growth Policy Map, included in the Prince George's Approved General Plan (M-NCPPC, 2014). The Regional Transit Districts, Employment Areas, and Local Centers are primarily focused along and inside I-495, particularly near highways and Metro lines. Most of the area between I-495 and US 301 is designated as Established Communities with pockets of Future Water and Sewer Service Areas scattered throughout. The Rural and Agricultural Areas are primarily east of US 301, along with several large areas near the northern and southern boundaries of the County. This overall distribution indicates that new growth will be focused primarily around major transit hubs and highways, along with infill development in existing residential communities.

- Frederick County, Maryland: The 2010 comprehensive plan policy is to direct future land use growth in the vicinity of existing population centers and highway infrastructure, particularly near Frederick and along I-270 in the ICE Analysis Area.

- Fairfax County, Virginia: The 2017 county plan also calls for the creation of community-focused, mixed-use centers with a compatible mix of housing, commercial, institutional/public services, and recreation uses. These are encouraged within the established urban centers such as Tysons

Corner, primarily located along major highways in the County, and focused mostly closer to Arlington and Washington, DC.

- Arlington County, Virginia: The 2016 comprehensive plan calls for retention of the predominant residential character of the County, and limitation of intense development to defined areas (Arlington County, 2016). In particular, it calls for concentrating high-density development within the Rosslyn-Ballston and Jefferson Davis Metrorail Transit Corridors.

- District of Columbia: The District of Columbia comprehensive plan notes that the City has been largely built-out since the 1960s, but demand for land for housing and jobs has continued to fuel land use change (DC Office of Planning, 2010). The plan notes that two areas are emerging as major hubs of central city growth in DC. The first includes land in the triangle bounded by New York Avenue, Massachusetts Avenue NW, and the CSX railroad, along with adjacent lands around the New York Avenue Metro station. The second includes the South Capitol corridor and Near Southeast.

B. Population, Housing and Employment Growth

Most ICE Analysis Area jurisdictions have seen substantial population growth since 1970. Montgomery County's population nearly doubled between 1970 and 2016; and Prince George's County grew by over 35 percent. Frederick County, the least populous of the three Maryland counties, nearly tripled with a growth of 187 percent. Fairfax County, the most populous of the ICE Analysis Area counties in Virginia, grew nearly 150 percent during that time. Arlington County grew by approximately 30 percent.

All of the ICE Analysis Area jurisdictions are projected to increase in population by 2040. Most are estimated to rise at a somewhat more modest pace compared to the prior decades, as the land uses become more mature and available land becomes scarcer. Washington, DC is estimated to continue rising in population, regaining the population lost since 1970 and exceeding it by 2030. **Figure 4-17** shows the estimated growth by Traffic Analysis Zone (TAZ) between 2015 and 2040. Areas with the greatest population growth (shown in darker shades) are generally clustered around I-270 and I-495, in Washington, DC, and along other major roadway corridors such as I-95 and I-66.

Much of the housing growth occurred as farmland in the jurisdictions surrounding Washington, DC were converted to suburban residential uses. The growth in housing has gradually tapered off as developable land has been depleted in these areas; new housing growth primarily comes from infill, densification, and redevelopment of existing land uses.

Employment growth projections were obtained from MWCOG Round 9.1 Cooperative Forecasts and shows that employment is projected to grow between 2015 and 2040 for all jurisdictions in the ICE Analysis Area. Washington, DC is the greatest concentration of employment in the ICE Analysis Area, followed by Fairfax County and Montgomery County.

Figure 4-18 shows the total estimated change in employment by TAZ for the ICE Analysis Area between 2015 and 2040, with greater employment growth forecast for darker shaded areas. The forecasts predict growth clustered in central Washington, DC as well as other urban centers primarily located along major transportation infrastructure corridors such as I-495, I-270, I-95 and I-66. Similar to population growth, several growth areas are located along I-495 and I-270.

Figure 4-17: Projected Population Growth 2015 – 2040 by TAZ

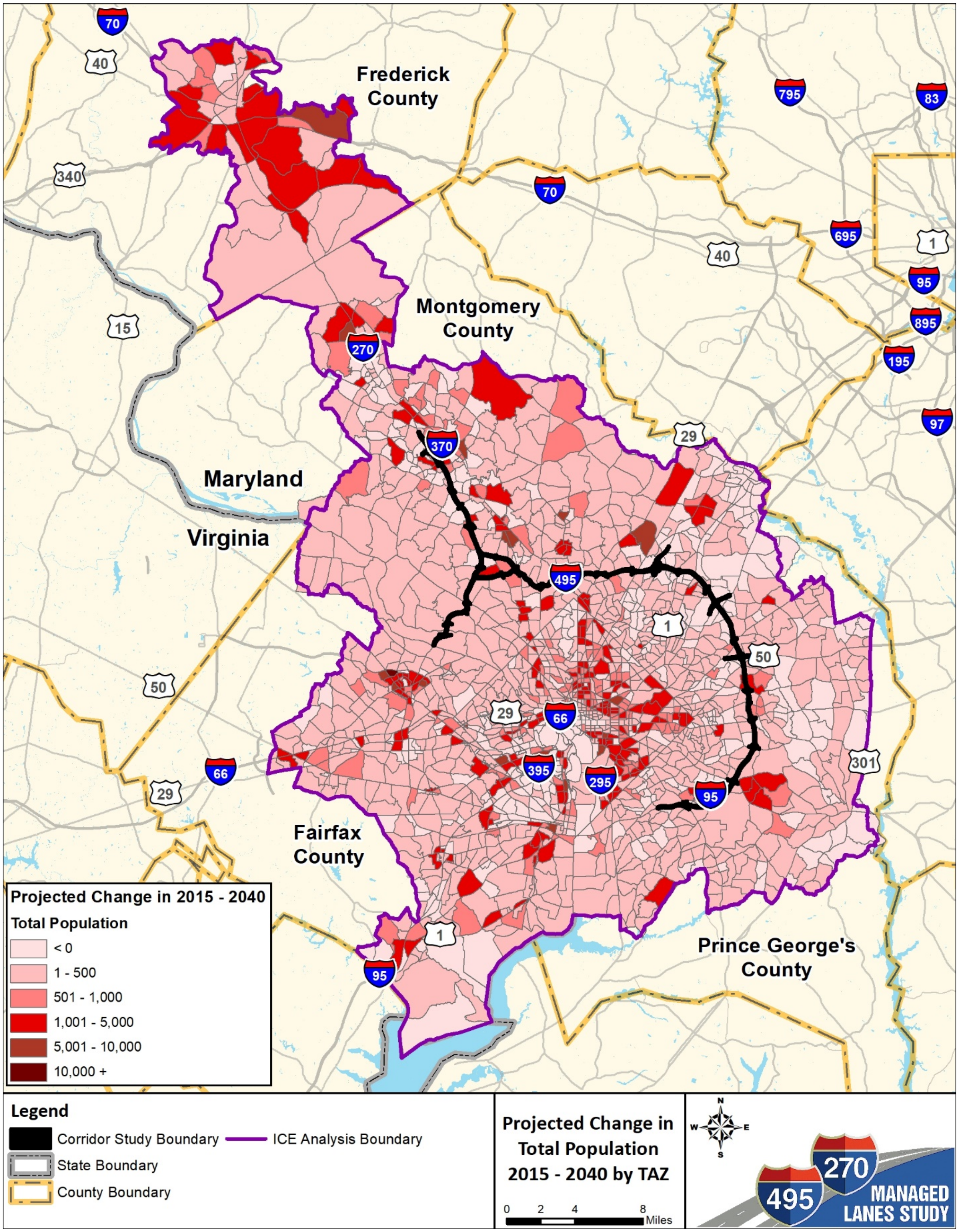
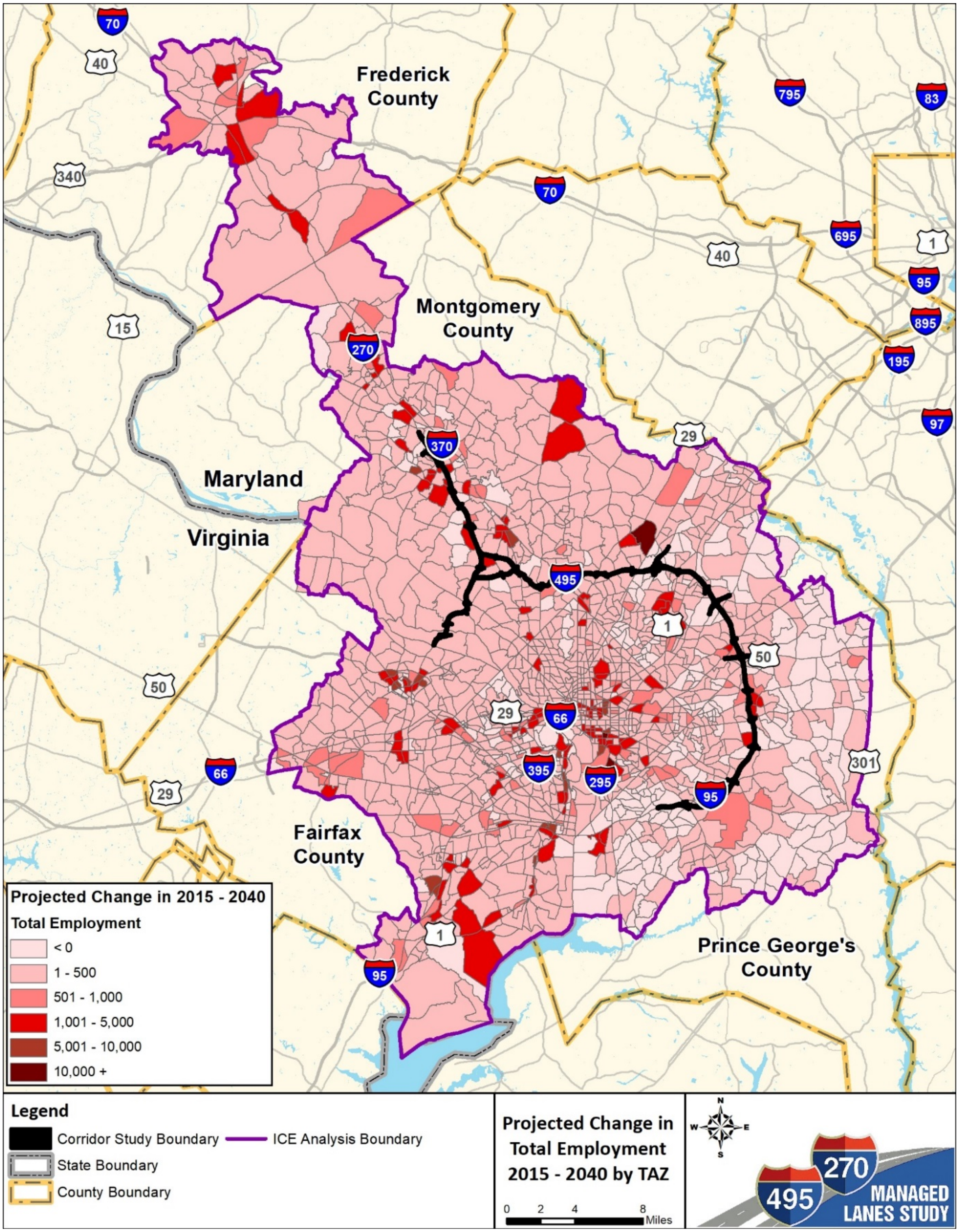


Figure 4-18: Projected Employment Growth 2015 -2040 by TAZ



Source: MWCOG Round 9.1 Cooperative Forecasting

MWCOG member jurisdictions include all the ICE Analysis Area jurisdictions and more. According to MWCOG's Round 9.1 Cooperative Forecast, the Metropolitan Washington Region will add more than 633,000 households between 2015 and 2040, for a total of 2.6 million households. Fairfax County, the District of Columbia, and Montgomery County would have more than half of the expected household growth in the ICE Analysis Area. Commercial development in the MWCOG region declined by seven percent in 2017 compared to 2016 (MWCOG, 2018d). Seven of the ten largest development projects in the MWCOG region, by square footage, are located within the ICE Analysis Area. None of the future projects identified are known to be dependent upon the I-495 & I-270 Managed Lanes Study. Refer to the *Indirect and Cumulative Effects Technical Report* (**Appendix O**) for additional details.

4.22.3 Environmental Consequences

A. Indirect Effects

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 patterns of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR § 1508.8).

The indirect effects of worsening traffic congestion under the No Build Alternative could include loss of economic productivity, changes in community cohesion resulting from reduced access and delays, effects on the desirability of communities, and potential changes to individual decisions about where to live and work. While no resources are anticipated to be directly impacted by a No Build Alternative, the No Build Alternative does include currently planned and programmed infrastructure projects that may affect the ICE Analysis Area. Moreover, under the No Build Alternative, motor vehicle volumes are forecasted to increase over time and with them are anticipated increases in travel times and delays related to growing traffic congestion. Worsening traffic congestion could have potential negative effects on motor vehicle-reliant activities, such as; emergency response services, supply chain/commercial trucking and deliveries, school bus schedules, and workforce commuters.

The indirect effects of the Build Alternatives in the ICE Analysis Area are summarized in **Table 4-40.**

Table 4-40: Indirect Effects in the ICE Analysis Area

Resource	Indirect Effects of the Build Alternatives
Socioeconomic Resources (communities, residences, businesses, parks and recreation)	Roadway improvements, such as those proposed under the Build Alternatives, can be an attraction to commercial or real estate development. The possibility of induced growth in this ICE analysis area would be lessened by the long-term presence of the existing highway, as well as the mature land uses and developments that have occurred in the ICE Analysis Area. As a result, the likelihood of induced commercial or residential development is reduced substantially by the built-out environment that has been in existence for many years. Moreover, much of the undeveloped land within the ICE Analysis Area is designated by comprehensive plans for preservation. The Build Alternatives could change travel patterns by providing increased capacity along existing facilities. More rural, less-developed portions of the ICE Analysis Area and other locations where undeveloped land exists would be most likely to experience pressure for new development from improved access along the I-270 and I-495 corridors. Noise impacts could occur to communities from greater traffic volumes on connecting roadways. Indirect impacts would be minimized by adherence to existing master plans and zoning regulations pertaining to new development.

Resource		Indirect Effects of the Build Alternatives
Cultural Resources (historic structures /districts and archeological sites)		Potential indirect effects could occur to historic properties resulting from increased population growth and development in the APE. However, these areas are subject to many greater economic and demographic pressures producing increased population and development that are not caused by the Study. Development of new land uses or more intensive land uses could lead to destruction or altering the integrity of historically important characteristics of archeological and architectural historic properties.
Natural Resources	Surface Water	Indirect impacts of the Build Alternatives would result from effects related to changes in facility-related run-off quality and quantity associated with the conversion of land from rural to urban and suburban uses as well as changes in drainage patterns and imperviousness. Indirect downstream impacts to surface water would be minimized through the development and application of approved erosion and sediment control plans and stormwater-related best management practices (BMPs). In addition, coordination with state and local agencies overseeing water resources in the ICE Analysis Area will continue throughout the study to determine appropriate mitigation for impacts
	Wetlands	Indirect impacts to wetlands and waterways from the Build Alternatives could result from roadway runoff, sedimentation, and changes to hydrology. All indirect impacts would lead to a decrease in available wetland and waterway habitat within the ICE Analysis Area and ultimately a decrease in plant and animal species inhabiting these areas. Any wetlands impacts associated with proposed public or private development would require permitting by the USACE and state regulatory agencies, as well as review and approval by county governments to ensure consistency with environmental protection guidelines.
	Floodplains	Floodplain encroachment could alter the hydrology of the floodplain, which could indirectly result in more severe flooding in terms of flood height, duration, and erosion. Indirect impacts from the Build Alternatives would be limited as they are confined to widening in existing corridors and impacts to floodplains would be minimized through adherence to existing regulatory requirements.
	Forest	Indirect impacts to forests from any of the Build Alternatives could result from roadway runoff, sedimentation, and the introduction of non-native plant species within disturbed areas. Increased demand for land development resulting from greater access provided by the Build Alternatives could result in pressure for conversion of forest land to residential or commercial use.
	Wildlife and Wildlife Habitat	The potential negative indirect effects to terrestrial and aquatic wildlife and wildlife habitat would be limited as the Build Alternatives would improve existing roadways in highly urbanized areas which are already highly fragmented and affected by the existing transportation facilities
	Sensitive Species	Loss of protected species' habitat and fragmentation of such habitat related to an increased demand for land use changes could indirectly affect protected and other wildlife species.
Air Quality		No substantial indirect effects to air quality are anticipated from the Build Alternatives and would not cause or contribute to any violation of NAAQS. The quantitative assessments conducted for the project-specific CO and MSATs impacts were considered analyses of indirect effects because they address air quality impacts attributable to the project that occur at a later time in the future. Those assessments demonstrate that in the future: (1) air quality impacts from CO would not cause or contribute to violations of the CO NAAQS; (2) MSATs emissions from the affected network would be significantly lower than they are today; and (3) the mobile source emissions budgets established for the region for purposes of meeting the ozone NAAQS would not be exceeded.

B. Cumulative Effects

Cumulative effects are defined as impacts on the environment that result from the incremental impact of the action when added to past, present, and reasonably-foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR § 1508.7).

Past actions that have impacted resources include the numerous infrastructure and land development activities that occurred in the ICE Analysis Area throughout the ICE time frame. As described in the *Indirect* *and Cumulative Effects Technical Report* (**Appendix O**, **Section 3.1.2)** jurisdictions in the ICE Analysis Area have experienced substantial growth of population, housing, and employment since 1970. For example, Montgomery County's population nearly doubled between 1970 and 2016; and Prince George's County grew by over 35 percent according to US Census 2016 five-year estimates. This growth and development in the ICE Analysis Area has entailed continuous expansion and intensification of urban and suburban land uses into previously rural landscapes. Similarly, the network of transportation infrastructure has been continually expanded to accommodate the transportation needs of the growing regional economy and population.

Present and future actions impacting resources include noise, land development, and infrastructure improvements required to accommodate existing and future populations and economic activity. MWCOG estimates show ICE Analysis Area jurisdictions growing in population and employment through 2040. Demand from existing populations and economic activity has created substantial traffic congestion in the region, and many currently planned projects are intended to accommodate this existing demand. Future projects, as described in the *Indirect and Cumulative Effects Technical Report* (**Appendix O, Section 3.1.3**) will continue to expand infrastructure capacity to meet the needs of the growing population.

The past, present and future actions have had both beneficial and adverse impacts. Past and present growth and development have improved local economies and led to provision of community facilities, transportation infrastructure, and recreational resources benefiting residences and businesses. Construction and expansion of transportation facilities has facilitated economic growth by providing access to employment and community facilities and allowing for more efficient movement of goods and services.

Increased population and employment in the ICE Analysis Area is expected to increase traffic volumes and create eventual need for more transportation improvement projects. The proposed action is one of many reasonably-foreseeable future transportation projects designed to address both existing volumes, as well as anticipated growth. The Build Alternatives alone would provide improved access, mobility, and traffic conditions. Combined with the other projects identified in the *Indirect and Cumulative Effects Technical Report* (**Appendix O**, **Section 3.1.3B**) it is anticipated that there would be a greater overall benefit to local communities. The proposed action, along with other future transportation projects would cause noise impacts, with potential cumulative effects on communities in the vicinity of improved and new roadways.

The No Build Alternative, considered in the context of growth and development occurring throughout the ICE Analysis Area, would result in potentially negative socioeconomic impacts from increasing traffic congestion. The effects of worsening traffic congestion could include loss of economic productivity, changes in community cohesion resulting from reduced access and delays, effects on the desirability of communities, and potential changes to individual decisions about where to live and work.

The cumulative effects of the Build Alternatives in the ICE Analysis Area are summarized in **Table 4-41.**

Table 4-41: Cumulative Effects in the ICE Analysis Area

Resource		Cumulative Effects of the Build Alternatives
Socioeconomic Resources (communities, residences, businesses, parks and recreation)		• The continual expansion of transportation facilities in the region, while providing benefits of increased access and mobility, also has detrimental effects on communities adjacent to these facilities, including potential loss of community cohesion. • The Build Alternatives would add to the impacts from other past, present and future projects to parklands in communities adjacent to the I-495 and I-270 corridors, often in well-developed areas where replacement parkland could not be easily located.
Cultural Resources (historic structures /districts and archeological sites)		• Past actions in the ICE Analysis Area have already resulted in destruction or degradation of resources, including demolition for new construction or changes in land use context surrounding cultural resource areas, where proximal replacement of resources may not be possible. • Present and future actions, including transportation projects and land development activity, would likely continue to impact cultural resources in similar ways.
Natural Resources	Surface Water	• Cumulative impacts to water quality could occur from stream loss and the incremental increase of impervious surfaces that may increase runoff from past, present, and future development projects. • These would be minimized through the use of BMPs during construction and use of SWM facilities. • The incremental effect would be minimized by the required permitting process, which would identify avoidance, minimization, and mitigation as needed to offset wetland losses.
	Wetlands	• Past land use development and transportation projects have had impacts on wetlands, particularly those that occurred prior to the passage of state and Federal laws that regulate wetland impacts. • The incremental effect would be minimized by the required permitting process, which would identify avoidance, minimization, and mitigation as needed to offset wetland losses.
	Floodplains	• The incremental impact of the Build Alternatives to floodplains, considered in light of past, present and future impacts, is expected to be relatively minimal due to existing regulatory controls and regulations.
	Forest	• While future development and transportation projects would be regulated in a manner that minimizes forest impacts, the past losses of forest in the ICE Analysis Area have been extensive. The incremental effect of the Build Alternatives on forested land in the ICE analysis area would be potentially substantial. • The required 1:1 mitigation would help offset the incremental effect of this impact; however, it may not be possible to find suitable replacement land within close proximity of the build corridors. Additionally, this may result in replacement of mature forest areas with new, smaller trees.
	Wildlife and Wildlife Habitat	• Overall, the cumulative effects of past transportation and development projects have been adverse to wildlife and wildlife habitat, but present and future impacts would be reduced by applicable Federal, state, and local laws and regulations requiring potential adverse effects to be avoided, minimized, or mitigated. • The Build Alternatives would contribute to the incremental effect on wildlife habitat in the ICE Analysis Area in light of other past, present and future projects.
	Sensitive Species	• The overall impacts of past actions in the ICE Analysis Area have had adverse effects on sensitive species due to the conversion of wildlife habitat to urbanized land. • Present and future development could potentially impact protected species, though such effects would likely be minimized by adherence to Federal and state laws and regulations for protected species.

Resource	Cumulative Effects of the Build Alternatives
Air Quality	• The Study is currently included in the NCRTPB FY 2019 – 2024 TIP [TIP ID 6432 and Agency ID AW0731 (planning activities)] and the NCRTPB Visualize 2045 Long-Range Plan (CEID 1182; CEID 3281; and Appendix B, page 56). This project (adding two managed lanes in each direction) is included in the Air Quality Conformity Analysis that accompanies the Visualize 2045 Plan. This analysis demonstrates that the incremental impact of the proposed project on mobile source emissions, when added to the emissions from other past, present, and reasonably-foreseeable future actions, is in conformance with the TIP and will not cause or contribute to a new violation, increase the frequency or severity of any violation, or delay timely attainment of the NAAQS established by EPA. Therefore, the cumulative impacts of the project to air quality are not expected to be significant. Prior to the ROD being signed, the selected alternative will be included in the TIP and Long-Range Plan along with a transportation conformity determination. (See Appendix I– Air Quality Technical Report for more information.)

4.23 Consequences of Construction

The LODs of the Build Alternatives account for areas needed for construction. The assumed areas for construction staging and materials storage are identified on the *Environmental Resource Mapping* (**Appendix D**). The quantified impacts presented in this DEIS are assumed to be permanent or long-term effects. As design is advanced on the Preferred Alternative, the long-term effects will be refined and short-term, construction-related effects of the Preferred Alternative will be quantified and documented in the FEIS. Impacts associated with construction that will be further evaluated for the Preferred Alternative include, traffic congestion associated with construction maintenance of traffic, impacts to business and residential access, utility disruptions, vibrations, sediment erosion and stormwater management, and construction related noise and visual impacts, among others.

Due to the magnitude of the Study, MDOT SHA would need to construct any Build Alternative in phases. Phase 1 of the P3 Program would include that portion of the MLS along I-495 from the vicinity of the George Washington Memorial Parkway in Virginia, across and including the ALB, to its interchange with I-270 at the West Spur, and I-270 from its interchange with I-495 to its interchange with I-370. A Phase 1 P3 Agreement would also include I-270 up to I-70 which would be advanced through a separate, independent NEPA study.

It is anticipated that construction of any phase will last approximately four to five years. Details related to when construction related activities will occur will be determined in final design; however, the project will likely require night work to occur when activities could not be completed safely during the day. Advanced notice of construction related activities would be provided and all reasonable efforts to minimize impacts to residential communities would be undertaken. MDOT SHA will continue to coordinate with the neighboring communities through design and construction, should a Build Alternative be selected.

4.23.1 Visual and Aesthetic Resources

Construction would require the removal of vegetation to varying degrees throughout the study corridors. As a result of the vegetation removal, the wider interstates, added ramps, retaining walls, and noise barriers would become more visible and prominent from both the dynamic and static views. The static views from adjacent properties, including residential properties, commercial enterprises, parkland/ open space properties, and a number of community resources would experience an impact; however, impacts would generally be consistent with existing views of the study corridors as the surrounding area is adjacent to the existing interstate facilities and the surrounding area is urban in nature. Temporary visual impacts from both dynamic and static views will occur from the addition of construction equipment including cranes, heavy vehicles, trucks, borrow material and equipment stockpiling, safety signage, temporary barriers, etc.

4.23.2 Hazardous Materials

Prior to construction, the Preliminary Site Investigations (PSIs) would be conducted based on the proposed construction schedule and phases of design in order to identified sites with contamination that may require mitigation prior to construction. The PSIs will include subsurface sampling for those properties where additional soil and/or groundwater analysis (beyond the information documented in detailed regulatory records) is needed. The Developer would be required to use best management practices to minimize the release of any hazardous materials during construction.

4.23.3 Air Quality

The construction duration of the project is not anticipated to exceed five years in any single location; thus, most emissions associated with construction are considered short-term or temporary in nature. The primary air quality concerns during construction would be a potential short-term localized increase in the concentration of fugitive dust (including airborne $PM_{2.5}$ and PM_{10}), as well as mobile source emissions, including pollutants such as CO. To minimize the amount of emissions generated, efforts would be made during construction to limit traffic disruptions, especially during peak travel hours. A quantitative analysis of the construction-related GHG emissions for the Preferred Alternative will be conducted using FHWA's Infrastructure Carbon Estimator tool. The results of that analysis will be included in the FEIS.

Mobile source emissions include pollutants such as CO. Since CO emissions from motor vehicles generally increase with decreasing vehicle speed, disruption of traffic during construction (such as temporary reduction of roadway capacity and increased queue lengths) could result in short-term elevated concentrations of CO. To minimize the amount of emissions generated, efforts would be made during construction to limit traffic disruptions, especially during peak travel hours.

Construction and subsequent maintenance of the project would also generate GHG emissions. Preparation of the roadway corridor (e.g., earth-moving activities) involves a considerable amount of energy consumption and resulting GHG emissions; manufacture of the materials used in construction and fuel used by construction equipment also contribute to GHG emissions; and on-road vehicle delay during construction would also increase fuel use, resulting in GHG emissions. A quantitative analysis of the construction related GHG emissions for the Preferred Alternative will be conducted using FHWA's Infrastructure Carbon Estimator tool. The results of that analysis will be included in the FEIS.

During construction the contractor may use the following dust control measures, to minimize and mitigate, to the greatest extent practicable, impacts to air quality:

- Minimize land disturbance;
- Cover trucks when hauling soil, stone, and debris (MDE Law);
- Use water trucks to minimize dust;
- Use dust suppressants if environmentally acceptable;
- Stabilize or cover stockpiles;
- Construct stabilized construction entrances per construction standard specifications;
- Regularly sweep all paved areas including public roads;

- Stabilize onsite haul roads using stone; and
- Temporarily stabilize disturbed areas per MDE erosion and sediment standards.

4.23.4 Noise

Noise would be generated from the construction of the highway improvements and the noise barriers. The Developer would be responsible for developing a construction work sequence that minimizes the duration of time without a noise barrier in place.

4.24 Commitment of Resources

4.24.1 Irreversible and Irretrievable Commitment of Resources

Implementation of any of the Build Alternatives in this DEIS would require the commitment of a range of natural, physical, human, and fiscal resources. Under the implementing regulations for NEPA, any expenditure of these resources that would be considered irreversible or irretrievable is required to be included in the discussion of potential environmental impacts of the alternatives (40 CFR §1502.16). The term irreversible refers to the loss of future options; it applies primarily to the impacts or use of nonrenewable resources, such as cultural resources, or to those factors, such as soil productivity, that are renewable only over long periods of time. The term irretrievable applies to the loss of production (via land use) or use of natural resources. The production lost is irretrievable, but the action is not irreversible. Therefore, an irreversible or irretrievable commitment of resources results in a permanent loss of a resources for future uses (or alternative purposes) as they cannot be replaced or recovered.

Under the No Build Alternative there would be no study-related construction. The No Build Alternative would result in the irreversible loss of financial resources for maintaining the existing infrastructure in the study corridors.

The construction of any of the Build Alternatives would result in the commitment of natural, physical, and financial resources that would be irreversible and irretrievable. The irreversible dedication of land to transportation use for the construction of any of the Build Alternatives would render the land unusable for any other use. The range in impacts of land converted to transportation use under the Build Alternatives varies by the specific alternative and would range from 362.4 to 388.5 acres (refer to **Section 4.1.3, Table 4-2**). Land used in the construction and operation of the proposed facility (right-of-way) is considered an irreversible commitment during the time period that the land is used for a transportation facility. However, if a greater need arises for use of the land or if the transportation facility is no longer needed, the land can be converted to another use. At present, it is not anticipated such a conversion would be necessary or desirable.

As part of this permanent land alteration, approximately 1,477 to 1,515 acres of forest canopy (refer to **Section 4.16.3, Table 4-25**), 16.1 to 16.5 acres of wetlands, and 155,229 to 156,984 linear feet of streams (refer to **Section 4.12.3, Table 4-20**) have the potential to be affected, depending on the Build Alternative. While forest, stream and wetland mitigation could account for some of these losses, these individual distinct ecosystems could be irreversibly impacted.

Significant amounts of fossil fuels, electricity, labor, and highway construction materials would be irretrievably expended for the construction of any of the Build Alternatives. Anticipated construction materials would include aggregates, asphalt, cement, gravel, and sand. Concrete and steel would be required for bridges and other structures such as retaining walls and noise walls. Fuel, electricity, and labor required to manufacture, transport, and install these materials would be irretrievably lost. As of the time of this document these construction materials are not in short supply and their use would not have an adverse effect upon the continued availability of these resources. The resources used to construct any of the Build Alternatives would be similar; however, Alternative 9M may require slightly less resources due to the narrower LODs of these Build Alternatives. No long-term construction-related resources are anticipated with any of the Build Alternatives.

Since the managed lanes would generate toll revenue, the costs would be recouped over time. Projects that include a future revenue source such as tolls may be constructed with no direct state and Federal funding upfront. The I-495 & I-270 P3 Program has a goal to implement the improvements at no net cost to the State. However, if a state subsidy is required, it would typically be paid to the Developer at the beginning of the contract, whereas if positive excess cashflows are anticipated, they could be paid to the State at the beginning of the contract and/or as revenue sharing payments to the State during the operation of the facility.

The commitment of these resources is based on the concept that residents in the immediate area, state, and region would benefit from the improved quality of the transportation system. These benefits would consist of reduced congestion, enhanced trip reliability, additional roadway choices, and improved movement of goods and services, as described in **Chapters 1 and 2**, which are expected to outweigh the commitment of the irreversible and irretrievable resources.

4.24.2 Short-Term Effects/Long-Term Effects

Short-term impacts to resources in relation to long-term productivity have been evaluated in accordance with (42 U.S.C. 4332(C)(iv)) and guidelines published by CEQ on implementing NEPA (40 CFR 1502.16). This analysis qualitatively discusses the relationship between short-term impacts to and use of resources, and the long-term benefits and productivity of the environment. For this analysis, short-term refers to the estimated three-to-five-year period of construction, the time when the largest number of temporary environmental effects is most likely to occur. Long-term refers to the more than 100-year life span estimated for the proposed improvements. This section discusses whether the short-term uses of environmental resources by the proposed improvements would affect (either positively or negatively) the long-term productivity of the environment.

A. Short-Term Impacts

Construction of any Build Alternative would result in short-term impacts, as described in **Chapter 2**, **Section 2.7.3.**

An increase in employment and job opportunities for future permitting and design, construction workers, suppliers, and inspectors would result during construction of a Build Alternative. In addition, short-term employment, use of materials to construct the improvements, and purchases of goods and services generated by construction could create a short-term improvement in the local economy that would diminish once the construction is completed. Workers who live in the region may fill these new positions or it is possible that people may move to the area as a result of the job opportunities created by the project. The concentration of workers within the area would stimulate the local economy by increasing business at area commercial and retail establishments. Increased sales tax would be derived from the commercial sales and from the sales of materials required for construction.

During construction, detours may be required rerouting travelers to other area roadways. Some travelers may choose to take alternate routes to avoid construction areas and further delays. The use of alternate routes may increase fossil fuel usage and could result in loss of business for commercial establishments thereby lowering sales tax revenues. Rerouting may lead to increased congestion and delays on the detour routes.

Expanding roadway alignments, materials storage areas, and movement of construction vehicles may result in the removal of existing vegetation. A temporary increases in air quality and noise impacts are expected. Water resources would also be needed for construction activities including mixing aggregate materials, road wetting, and landscaping.

Construction activity resulting from the project would impact different sectors of the region's economy. Specifically, the total jobs generated under each Build Alternative scenario would add value to the gross regional product.

B. Long-Term Impacts

The long-term impacts and benefits of the implementation of the Build Alternatives would remain for the duration of the facility's life. The increased capacity and reduced traffic congestion would result in more efficient use of fossil fuels.

Reduced congestion, enhanced trip reliability, and additional roadway choices would result in quicker trips and commutes for drivers. Improved movement of goods and services would benefit the local and regional economy. Generally, logistics costs decrease as trucks and commercial vehicles travel in less congested conditions, spending less time en route, thus improving supply chain fluidity for regional industries dependent on truck traffic.

Improving congestion and reducing the amount and duration of idle traffic would result in decreased air pollution, (refer to **Section 4.8** for more detail). Together, these effects would result in an enhanced overall environment for the many communities in Maryland along I-495, I-270, and the greater National Capital area.

The implementation of any of the Build Alternatives would require permanent conversion of property to transportation uses. Real estate taxes paid of those properties would be eliminated. These long-term loses may be offset by areas adjacent to the improvements that experience induced growth.

5 DRAFT SECTION 4(F) EVALUATION

5.1 Introduction

Section 4(f) of the US Department of Transportation (USDOT) Act of 1966 as amended (49 U.S.C. 303(c)) (Section 4(f)) is a Federal law that protects significant publicly-owned parks, recreation areas, wildlife and/or waterfowl refuges, or any significant public or private historic sites. Section 4(f) applies to all transportation projects that require funding or other approvals by the USDOT. As a USDOT agency, FHWA must comply with Section 4(f) and its implementing regulations at 23 CFR 774. The *Draft Section 4(f) Evaluation* (**Appendix F**) in this Draft Environmental Impact Statement (DEIS) follows established USDOT regulations at 23 CFR 774, FHWA's *2012 Section 4(f) Policy Paper*, and 23 U.S.C. 138 and 39 U.S.C. 303.

Regulations at 23 CFR 774.17 define a Section 4(f) property as "publicly-owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or land of an historic site of national, state, or local significance." 23 CFR 774.17 further defines "Historic site" to include any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP).

Section 4(f) stipulates that the USDOT, including the FHWA, cannot approve a transportation project that uses Section 4(f) property, unless FHWA determines that:

- There is no feasible and prudent avoidance alternative to the use of land from the property, and the action includes all possible planning to minimize harm to the property resulting from such use (23 CFR 774.3(a)(1) and (2)); or
- The use of the Section 4(f) properties, including any measures to minimize harm (such as avoidance, minimization, mitigation, or enhancements measures) committed to by the applicant, will have a *de minimis* impact on the property (23 CFR 774.3(b)).

The *Draft Section 4(f) Evaluation* found in **Appendix F** and summarized below describes Section 4(f) properties identified within the corridor study boundary; discusses potential impacts or use of the properties; evaluates potential feasible and prudent avoidance alternatives; analyzes least overall harm alternatives; and through a discussion of all possible planning, presents measures to minimize harm and mitigate for impacts to and the use of Section 4(f) properties.

5.2 Use of Section 4(f) Properties

Pursuant to 23 CFR 774.17, a "use" of Section 4(f) property occurs:

When land is **permanently incorporated** into a transportation facility;

(ii) When there is a **temporary occupancy** of land that is adverse in terms of the statute's preservation purpose as determined by the criteria in 23 CFR 774.13(d); that is, when one of the following criteria for temporary occupancy are not met:

The duration of the occupancy must be less than the time needed for the construction of the project, and no change of ownership occurs;

Both the nature and magnitude of the changes to the Section 4(f) land are minimal;

No permanent adverse physical changes, nor interference with activities or purposes of the resources on a temporary or permanent basis, are anticipated;

The land must be returned to a condition that is at least as good as existed prior to the project; and

There is documented agreement with the appropriate Federal, State, or local officials having jurisdiction over the land that the above conditions have been met.

(iii) When there is a **constructive use** of a Section 4(f) property.

As defined in 23 CFR 774.15, a constructive use occurs when the transportation project does not incorporate land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. The degree of impact and impairment must be determined in consultation with the Officials with Jurisdiction in accordance with 23 CFR 774.15(d)(3).

Refer to **Appendix F**, **Section 1.2.2 A**. for a preliminary analysis of constructive use.

5.2.1 Exceptions to Section 4(f) Use

FHWA has identified various exceptions to the requirement of Section 4(f) approval. Exceptions to Section 4(f) use are found in 23 CFR 774.11 and 774.13 and are discussed in the *Draft Section 4(f) Evaluation* (**Appendix F, Section 1.2.6**). Ten Section 4(f) properties listed in **Table 5-3**, including six archaeological sites, would experience an impact from the Study and meet the exception to Section 4(f) use criteria. Additional information on the impacts to these properties and why they qualify as exceptions to Section 4(f) is located in **Appendix F, Section 2**.

5.2.2 De Minimis Impact

An impact to a significant public park, recreation area, or wildlife and waterfowl refuge may be determined to be *de minimis* if the use of the Section 4(f) property, including incorporation of any measure(s) to minimize harm (such as any avoidance, minimization, mitigation, or enhancement measures), will not adversely affect the activities, features, or attributes that qualify the resource for protection under Section 4(f) (23 CFR 774.3(b), 23 CFR 774.5(b), and 23 CFR 774.17).

For historic sites, a *de minimis* impact means that FHWA has received written concurrence from the pertinent State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Officer (THP), and from the Advisory Council on Historic Preservation (ACHP) if participating, a finding of "no adverse effect" or "no historic properties affected" in accordance with 36 CFR Part 800. FHWA is required to inform these officials of its intent to make a *de minimis* impact determination based on their concurrence in the finding (36 CFR 774.5(b)(1)(ii). On March 12, 2020, Maryland Historical Trust (MHT) concurred with MDOT SHA's determination of effects on historic properties. MHT also provided written acknowledgement of FHWA's intent to make *de minimis* impact determinations.

A *de minimis* impact determination does not require analysis to determine if avoidance alternatives are feasible and prudent, but consideration of avoidance, minimization, mitigation or enhancement measures should occur. Upon fulfilling the requirements set forth in 23 CFR 774.5(b), FHWA intends to make Section 4(f) *de minimis* impact findings for the 36 properties listed in **Table 5-2**. A full description and analysis of the 36 Section 4(f) properties that would experience a *de minimis* impact is found in **Appendix F, Sections 2.1, 2.2, and 2.4**.

5.3 Proposed Action

For purposes of the *Draft Section 4(f) Evaluation*, the ***Proposed Action*** includes the six Build Alternatives retained for detailed study in the DEIS: Alternatives 8, 9, 9M, 10, 13B, and 13C. These alternatives, as described in **Chapter 2, Section 2.6**, include managed lanes that differ in the manner in which the proposed travel lanes would be designated and configured. The limits of disturbance (LOD) are the same on I-495 for each of the Build Alternatives, except for Alternative 9M between I-270 West Spur and the I-95 Interchange. Therefore, the Section 4(f) use will be the same for each of these Build Alternatives on I-495, except along the top side of I-495 under Alternative 9M. The difference in Section 4(f) use for resources along I-495 is described in the evaluation, when applicable. The LODs for the Build Alternatives differ slightly on I-270 due to the existing High Occupancy Vehicle (HOV) system. The differences in Section 4(f) use for resources along I-270 is described in the evaluation, where applicable.

5.4 Officials with Jurisdiction

In the case of public parks, recreation areas, and wildlife and waterfowl refuges, the Officials with Jurisdiction are the officials of the agency or agencies that own or administer the property in question and who are empowered to represent the agency on matters related to the property. There are eight Officials with Jurisdiction over parkland in the study corridor: National Park Service (NPS); Maryland-National Capital Park and Planning (M-NCPPC), Montgomery Parks; Maryland-National Capital Park and Planning, Prince George's County; Montgomery County Public Schools Board of Education; City of Gaithersburg; City of Greenbelt; City of New Carrollton; and City of Rockville. The Officials with Jurisdiction over historic sites are the MHT in Maryland and the Virginia Department of Historic Resources (VDHR) in Virginia. The ACHP is also an official with jurisdiction over historic sites when they are involved in Section 106 consultation. NPS is the official with jurisdiction over National Historic Landmarks (NHL).

Some public parks, recreation areas, and wildlife and waterfowl refuges are also historic properties that are either listed in or eligible for listing in the NRHP. In other cases, historic sites are located within the property boundaries of public parks, recreation areas, and wildlife and waterfowl refuges. When either of those situations exists, there will be more than one Official with Jurisdiction. **Appendix F**, **Section 1.2.1** provides more information on the Officials with Jurisdiction including roles and responsibilities.

5.5 Section 4(f) Properties

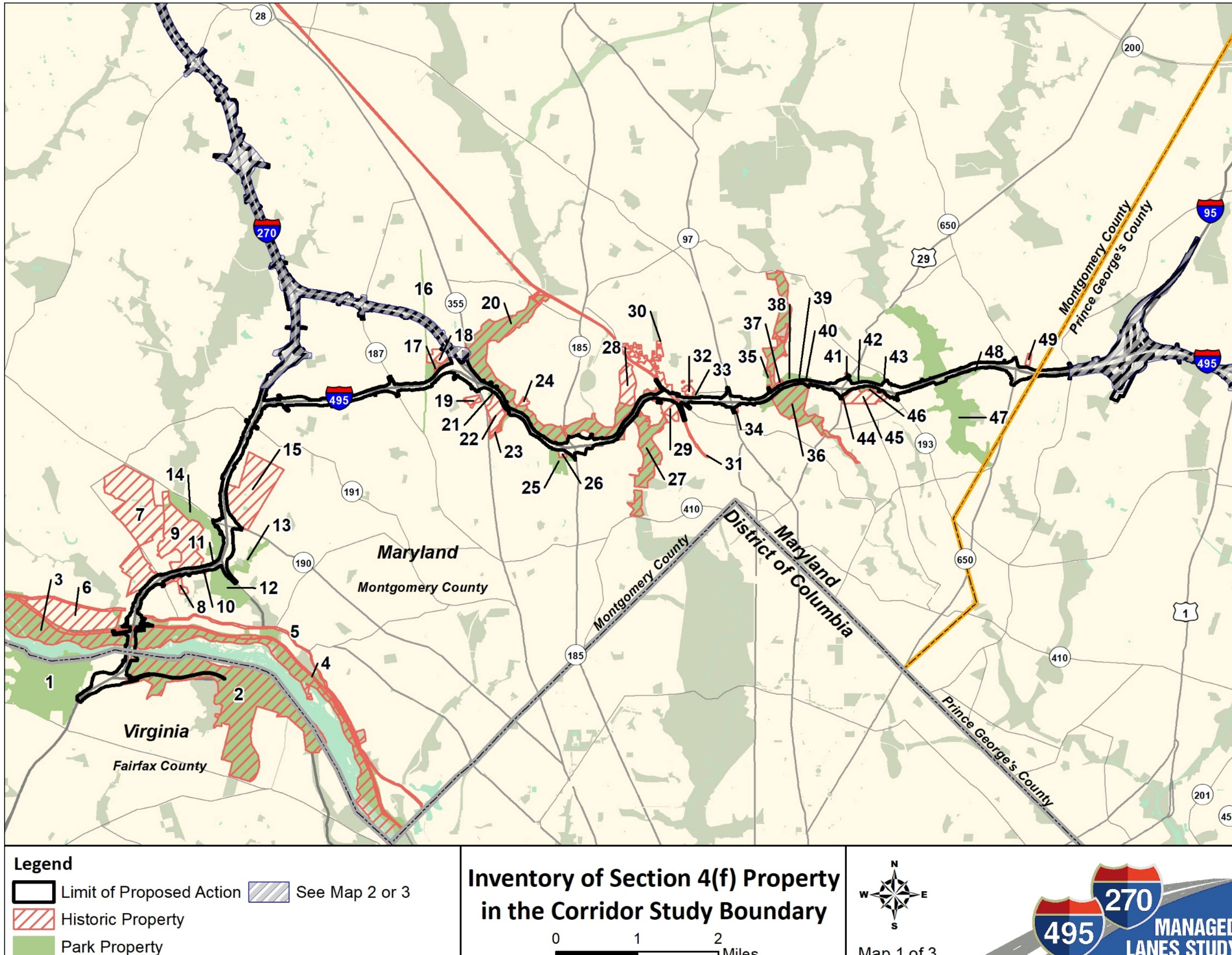
MDOT SHA established a corridor study boundary that extends 300 feet to either side of the existing right-of-way along I-495 and I-270. Within the corridor study boundary, 111 Section 4(f) properties were inventoried consisting of national parks, county and local parks, parkways, stream valley units of larger park facilities, local neighborhood parks, and historic sites that are listed in or eligible for listing in, the NRHP (refer to **Figures 5-1** through **5-3**).

Of the 111 Section 4(f) properties identified in the corridor study boundary, 43 would be avoided (**Table 5-1**) 68 would experience an impact as a result of the Proposed Action. Those impacted Section 4(f) properties that do not qualify as exceptions to a Section 4(f) use are listed in **Table 5-2**. Of these 68 properties, 22 would experience a use that warrants an Individual Section 4(f) Evaluation. FHWA intends to apply *de minimis* impact findings at 36 properties because many of the anticipated uses of Section 4(f) properties consist of minor impacts along the edge of the properties in question adjacent to the existing transportation facility. Such impacts would not affect characteristics that contribute to the significance of historic sites or recreational amenities and features of those properties. The impacts to the ten Section

4(f) properties listed in **Table 5-3** meet the criteria of exceptions to a Section 4(f) use. Descriptions of the Section 4(f) properties that would experience an impact from the Proposed Action are provided in the *Draft Section 4(f) Evaluation* (**Appendix F, Section 2.1, page 28**).

During final design, certain uses of Section 4(f) property may be determined to be temporary in nature, as related solely to the construction phase of the proposed action. Currently there is not enough information to make such a determination. For purposes of the *Draft Section 4(f) Evaluation*, all impacts to Section 4(f) property are assumed to be permanently incorporated into the transportation facility.

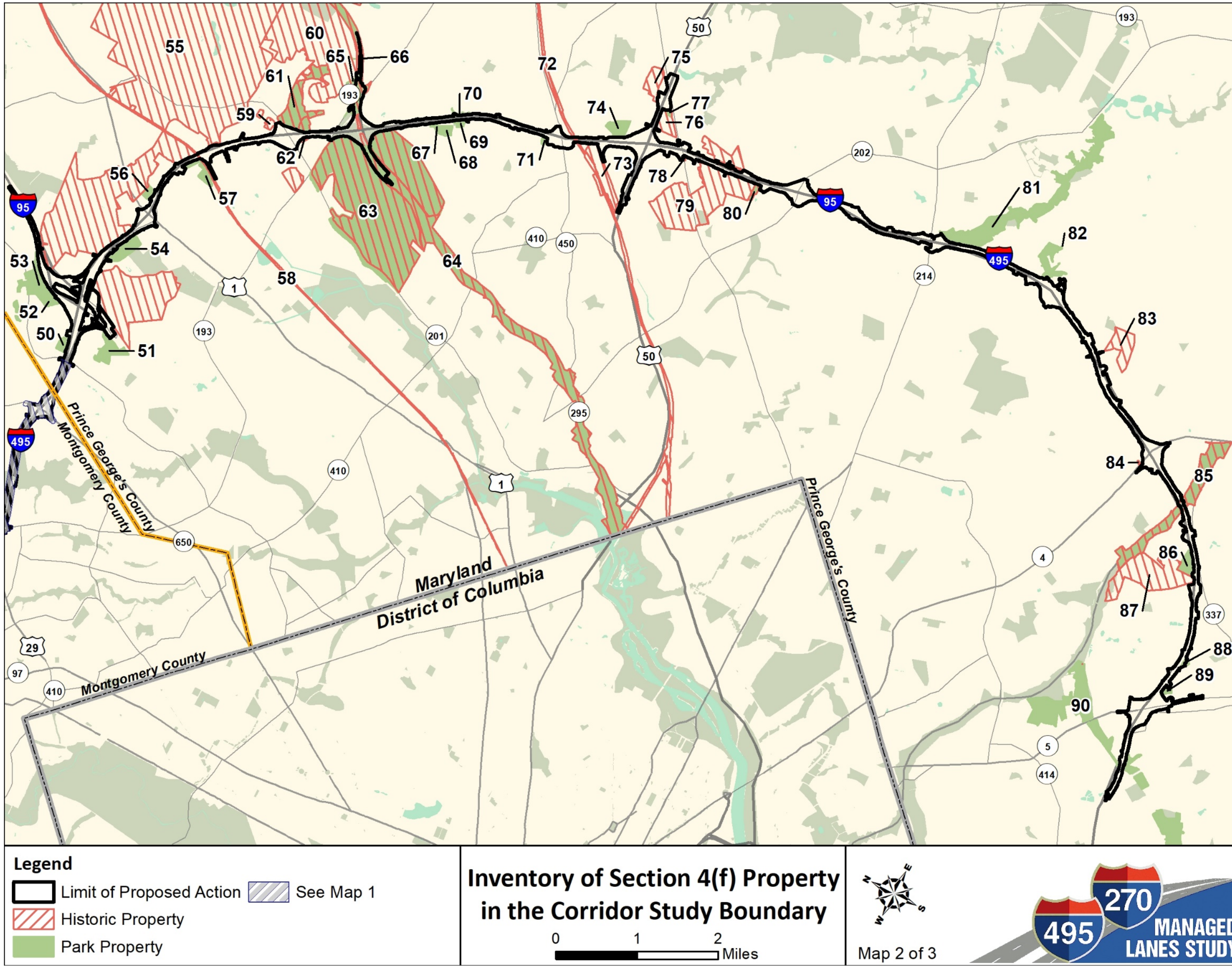
Figure 5-1: Inventory of Section 4(f) Property in the Corridor Study Boundary (Map 1 of 3)



Section 4(f) Property

1. Scott's Run Nature Preserve
2. George Washington Memorial Parkway
3. Chesapeake and Ohio Canal National Historical Park
4. Clara Barton Parkway
5. Washington Aqueduct
6. Naval Surface Warfare Center Carderock Division Historic District
7. Congressional Country Club
8. Carderock Springs South
9. Carderock Springs Historic District
10. Morningstar Tabernacle No. 88 Moses Hall and Cemetery
11. Gibson Grove A.M.E. Church
12. Cabin John SVP, Unit 2
13. Booze Creek SVP
14. Cabin John SVP, Unit 3
15. Burning Tree Club
16. Bethesda Trolley Trail
17. Fleming Local Park
18. Grosvenor Estate (Wild Acres)
19. Federation of American Societies for Experimental Biology
20. Rock Creek SVP, Unit 3
21. Locust Hill Neighborhood Park
22. Locust Hill Estates
23. Elmhirst Parkway NCA
24. Cedar Lane Unitarian Universalist Church
25. North Chevy Chase Local Park
26. In the Woods
27. Rock Creek SVP, Unit 2
28. Washington D.C. Temple
29. National Park Seminary Historic District / Forest Glen
30. Capitol View Park Historic District
31. Metropolitan Branch, B&O Railroad
32. Forest Glen Historic District
33. Forest Glen Neighborhood Park
34. Calvary Evangelical Lutheran Church
35. Forest Grove Neighborhood Park
36. Sligo Creek Parkway
37. Greater Washington Boys and Girls Club
38. Argyle Local Park
39. Margaret Schweinhaut Senior Center
40. South Four Corners Neighborhood Park
41. Polychrome Historic District
42. Montgomery Blair High School Athletic Fields
43. Blair Local Park
44. Hastings NCA
45. Indian Spring Club Estates and Indian Spring Country Club
46. Indian Springs Terrace Local Park
47. Northwest Branch SVP, Unit 3
48. Brookview Local Park
49. Washington Coca-Cola Bottling Plant (Silver Spring)

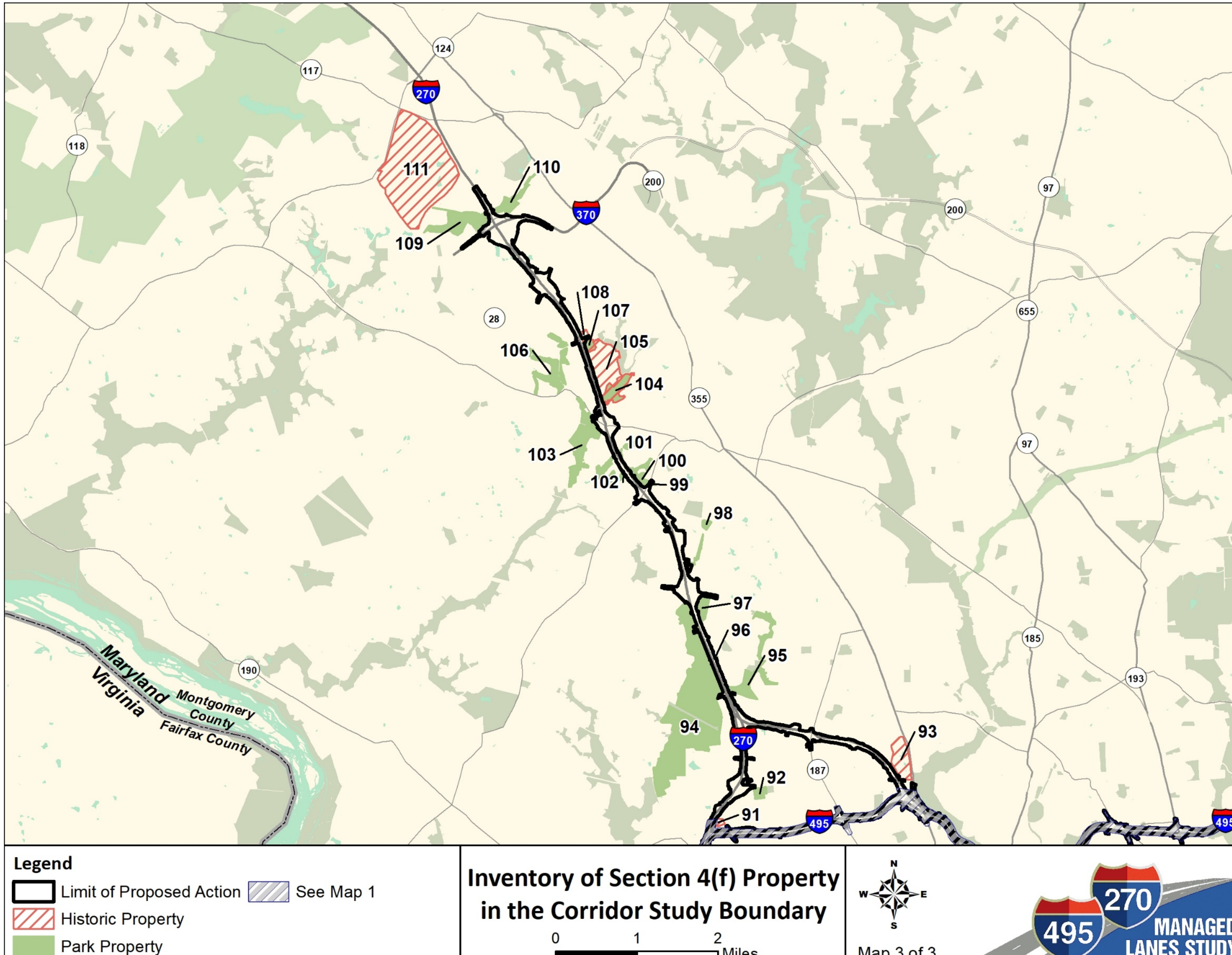
Figure 5-2: Inventory of Section 4(f) Property in the Corridor Study Boundary (Map 2 of 3)



Section 4(f) Property

50. Knollwood Park
51. Buck Lodge Park
52. Edgefield Drive Park
53. Paint Branch SVP, Unit 3
54. Cherry Hill Road Park
55. Beltsville Agricultural Research Center (BARC)
56. Sunnyside Park
57. Hollywood Park
58. B & O Railroad, Washington Branch
59. SHA District 3 Headquarters Building
60. Greenbelt Historic District
61. Buddy Attick Lake Park
62. Indian Springs Park
63. Greenbelt Park
64. Baltimore Washington Parkway
65. McDonald Field
66. Spellman Overpass
67. Good Luck Estates Park
68. Youth Memorial Sports Park
69. Robert Frost Park
70. Dresden Green Park
71. Beckett Field
72. B & P Railroad, Washington City Branch
73. New Carrollton Metro Station
74. Whitfield Chapel Park
75. Capitol Car Distributors
76. Carsondale
77. Carsondale Park
78. Street Railway Service Building
79. Glenarden Historic District
80. Henry P. Johnson Park
81. Southwest Branch SVP
82. Heritage Glen Park
83. Little Washington
84. Percy Benson Sansbury Property
85. Suitland Parkway
86. Douglas E. Patterson Park
87. Morningside Historic District
88. Andrews Manor Park
89. Manchester Estates Park
90. Henson Creek SVP

Figure 5-3: Inventory of Section 4(f) Property in the Corridor Study Boundary (Map 3 of 3)



Section 4(f) Property

91. Academy Woods
92. Stratton Local Park
93. Grosvenor Park
94. Cabin John Regional Park
95. Tilden Woods SVP
96. Old Farm NCA
97. Cabin John SVP, Unit 6
98. Cabin John SVP (Rockville)
99. Millennium Garden Park
100. Julius West Middle School Athletic Fields
101. Bullards Park and Rose Hill SVP
102. Rockmead Park
103. Woottons Mill Park
104. Woodley Gardens Park
105. Woodley Gardens
106. Fallsgrove SVP
107. Rockville Senior Center Park
108. Ward Building
109. Malcolm King Park
110. Morris Park
111. National Institute of Standards and Technology (NIST) Headquarters

Table 5-1: Inventory of Section 4(f) Properties that Would Not Experience a Use

Map ID	Section 4(f) Property	Size (Acres)	Official with Jurisdiction	Type of Section 4(f) Property
1	Scott's Run Nature Preserve	336.0	Fairfax County	Public Park
5	Washington Aqueduct	163.0	MHT, NPS	Historic Site (NHL)
6	Naval Surface Warfare Center Carderock Division Historic District	30.3	MHT	Historic Site
7	Congressional Country Club	31.8	MHT	Historic Site
8	Carderock Springs South	18.6	MHT	Historic Site
9	Carderock Springs Historic District	146.0	MHT	Historic Site
11	Gibson Grove A.M.E. Church	0.4	MHT	Historic Site
13	Booze Creek SVP	24.1	M-NCPPC	Public Park
14	Cabin John SVP, Unit 3	50.0	M-NCPPC	Public Park
19	Federation of American Societies for Experimental Biology	11.4	MHT	Historic Site
22	Locust Hill Estates	47.0	MHT	Historic Site
23	Elmhirst Parkway Neighborhood Conservation Area (NCA)	7.6	M-NCPPC	Public Park
24	Cedar Lane Unitarian Universalist Church	6.3	MHT	Historic Site
25	North Chevy Chase Local Park	30.9	M-NCPPC	Public Park
26	In the Woods	1.9	MHT	Historic Site
28	Washington DC Temple	31.7	MHT	Historic Site
30	Capitol View Park Historic District	124.0	MHT	Historic Site
35	Forest Grove Neighborhood Park	7.0	M-NCPPC	Public Park
38	Argyle Local Park	8.8	M-NCPPC	Public Park
39	Margaret Schweinhaut Senior Center	8.9	M-NCPPC	Public Park
41	Polychrome Historic District	1.1	MHT	Historic Site
44	Hastings Neighborhood Conservation Area (NCA)	0.4	M-NCPPC, MHT	Public Park
48	Brookview Local Park	12.4	M-NCPPC	Public Park
49	Washington Coca-Cola Bottling Plant (Silver Spring)	4.6	MHT	Historic Site
50	Knollwood Park	12.4	M-NCPPC	Public Park
51	Buck Lodge Park	40.0	M-NCPPC	Public Park
52	Edgefield Drive Park	7.2	M-NCPPC	Public Park
53	Paint Branch SVP, Unit 3	51.9	M-NCPPC	Public Park
56	Sunnyside Park	8.7	M-NCPPC	Public Park
59	SHA District 3 Headquarters Building	7.5	MHT	Historic Site
67	Good Luck Estates Park	6.6	M-NCPPC	Public Park
68	Youth Memorial Sports Park	3.9	City of New Carrollton	Public Park
69	Robert Frost Park	5.9	M-NCPPC	Public Park
70	Dresden Green Park	2.1	M-NCPPC	Public Park
73	New Carrollton Metro Station	71.7	MHT	Historic Site
74	Whitfield Chapel Park	26.2	M-NCPPC	Public Park
75	Capitol Car Distributors	38.7	MHT	Historic Site
77	Carsondale Park	2.9	M-NCPPC	Public Park
78	Street Railway Service Building	0.4	MHT	Historic Site
83	Little Washington	63.0	MHT	Historic Site
84	Percy Benson Sansbury Property	0.8	MHT	Historic Site
87	Morningside Historic District	191.0	MHT	Historic Site
92	Stratton Local Park	11.0	M-NCPPC	Public Park
93	Grosvenor Park	57.4	MHT	Public Park

Map ID	Section 4(f) Property	Size (Acres)	Official with Jurisdiction	Type of Section 4(f) Property
100	Julius West Middle School Athletic Fields	22.0	Montgomery Board of Ed.	Public Park
104	Woodley Gardens Park	37.5	City of Rockville, MHT	Public Park
106	Fallsgrove SVP	50.2	City of Rockville	Public Park
111	National Institute of Standards and Technology (NIST) Headquarters	578.0	MHT	Historic Site

Notes: [1]All units are in acres unless otherwise noted. [2]The size of Section 4(f) properties is sourced from data or documentation provided by the Officials with Jurisdiction.[3]The Section 4(f) properties in **Table 5-1** are sorted from west to east along I-495 and from south to north along I-270.

Table 5-2: Inventory of Section 4(f) Properties with Use

Map ID	Section 4(f) Property	Size (Acres)	Potential Impacts from Proposed Action (Acres)	Officials with Jurisdiction	Type of Section 4(f) Property	Type of Section 4(f) Approval
2	George Washington Memorial Parkway	7,146.0	12.2	ACHP, NPS, VDHR	Public Park, Historic Site	Individual Evaluation
3	Chesapeake and Ohio Canal National Historical Park	~19,575	15.4	ACHP, NPS, MHT	Public Park, Historic Site	Individual Evaluation
4	Clara Barton Parkway	96.2	1.8	ACHP, NPS, MHT	Public Park, Historic Site	Individual Evaluation
10	Morningstar Tabernacle No. 88 Moses Hall and Cemetery	1.5	0.3	ACHP, MHT	Historic Site	Individual Evaluation
12	Cabin John SVP, Unit 2	105.0	1.1	M-NCPPC	Public Park	*de minimis*
15	Burning Tree Club	221.0	0.8	MHT	Historic Site	*de minimis*
17	Fleming Local Park	24.0	0.1	M-NCPPC, MHT	Public Park, Historic Site	*de minimis*
18	Grosvenor Estate (Wild Acres)	34.7	0.1 0.2 (Alt 10)	MHT	Historic Site	*de minimis*
20	Rock Creek SVP, Unit 3	326.6	3.3 2.5 (Alt 9M)	M-NCPPC, MHT, ACHP	Public Park, Historic Site	Individual Evaluation
21	Locust Hill Neighborhood Park	5.0	0.3 0.2 (Alt 9M)	M-NCPPC	Public Park	*de minimis*
27	Rock Creek SVP, Unit 2	277.0	0.4 0.2 (Alt 9M)	M-NCPPC, ACHP, MHT	Public Park, Historic Site	Individual Evaluation
29	National Park Seminary Historic District/ Forest Glen	23.0	1.2	ACHP, MHT	Historic Site	Individual Evaluation
31	Metropolitan Branch, B&O Railroad	405.7	8.8	ACHP, MHT	Historic Site	Individual Evaluation
32	Forest Glen Historic District	10.3	0.2 0.1 (Alt 9M)	MHT	Historic Site	*de minimis*
33	Forest Glen Neighborhood Park	3.7	0.3 0.2 (Alt 9M)	M-NCPPC	Public Park	*de minimis*
34	Calvary Evangelical Lutheran Church	1.8	< 0.1	MHT	Historic Site	*de minimis*

Map ID	Section 4(f) Property	Size (Acres)	Potential Impacts from Proposed Action (Acres)	Officials with Jurisdiction	Type of Section 4(f) Property	Type of Section 4(f) Approval
36	Sligo Creek Parkway	543.0	4.1 3.3 (Alt 9M)	M-NCPPC, ACHP, MHT	Public Park, Historic Site	Individual Evaluation
40	South Four Corners Neighborhood Park	3.6	0.1 < 0.1 (Alt 9M)	M-NCPPC	Public Park	*de minimis*
42	Montgomery Blair High School Athletic Fields	30.0	1.4 1.1 (Alt 9M)	M-NCPPC; Montgomery County Public Schools Board of Education	Public Park	*de minimis*
43	Blair Local Park	10.2	0.4 0.3 (Alt 9M)	M-NCPPC	Public Park	*de minimis*
45	Indian Spring Club Estates and Indian Spring Country Club	51.0	1.2 1.1 (Alt 9M)	ACHP, MHT	Historic Site	Individual Evaluation
46	Indian Springs Terrace Local Park	30.0	1.4 1.2 (Alt 9M)	M-NCPPC	Public Park	Individual Evaluation
47	Northwest Branch SVP, Unit 3	144.0	3.2	M-NCPPC	Public Park	Individual Evaluation
54	Cherry Hill Road Park	43.1	1.8	M-NCPPC	Public Park	Individual Evaluation
55	Beltsville Agricultural Research Center (BARC)	6,852	0.5	MHT	Historic Site	*de minimis*
57	Hollywood Park	22.3	<0.1	M-NCPPC	Public Park	*de minimis*
60	Greenbelt Historic District	789.0	0.3	NPS, MHT	Historic Site (NHL)	*de minimis*
61	Buddy Attick Lake Park	85.3	0.1	City of Greenbelt, NPS, MHT	Public Park, Historic Site (NHL)	*de minimis*
62	Indian Springs Park	3.0	0.1	City of Greenbelt, NPS, MHT	Public Park, Historic Site (NHL)	*de minimis*
63	Greenbelt Park	1,100	0.6	ACHP, MHT, NPS	Public Park, Historic Site	Individual Evaluation
64	Baltimore Washington Parkway	~1,400	69.3	ACHP, MHT, NPS	Public Park, Historic Site	Individual Evaluation
65	McDonald Field	2.1	<0.1	City of Greenbelt	Public Park	*de minimis*
71	Beckett Field	7.0	0.2	City of New Carrollton	Public Park	*de minimis*
76	Carsondale	35.1	0.1	ACHP, MHT	Historic Site	Individual Evaluation
79	Glenarden Historic District	306.0	0.8	ACHP, MHT	Historic Site	Individual Evaluation
80	Henry P. Johnson Park	7.1	<0.1	M-NCPPC, ACHP, MHT,	Public Park	Individual Evaluation
81	Southwest Branch SVP	264.0	0.3	M-NCPPC	Public Park	*de minimis*
82	Heritage Glen Park	38.2	0.5	M-NCPPC	Public Park	*de minimis*

Map ID	Section 4(f) Property	Size (Acres)	Potential Impacts from Proposed Action (Acres)	Officials with Jurisdiction	Type of Section 4(f) Property	Type of Section 4(f) Approval
85	Suitland Parkway	419.0	0.3	ACHP, MHT, NPS	Public Park, Historic Site	Individual Evaluation
86	Douglas E. Patterson Park	26.2	0.7	M-NCPPC	Public Park	*de minimis*
88	Andrews Manor Park	4.1	2.6	M-NCPPC	Public Park	Individual Evaluation
89	Manchester Estates Park	4.6	0.5	M-NCPPC	Public Park	*de minimis*
90	Henson Creek SVP	1103.0	0.1	M-NCPPC	Public Park	*de minimis*
91	Academy Woods	6.4	0.2	MHT	Historic Site	*de minimis*
94	Cabin John Regional Park	514.0	5.7 7.2 (Alt 10) 4.5 (Alt 13B) 5.2 (Alt 13C)	M-NCPPC	Public Park	Individual Evaluation
95	Tilden Woods SVP	67.4	0.2	M-NCPPC	Public Park	*de minimis*
96	Old Farm Neighborhood Conservation Area	0.8	0.1	M-NCPPC	Public Park	*de minimis*
97	Cabin John SVP, Unit 6	19.8	0.4 0.3 (Alt 10)	M-NCPPC	Public Park	*de minimis*
98	Cabin John SVP (Rockville)	33.1	2.1	City of Rockville	Public Park	Individual Evaluation
99	Millennium Garden Park	1.3	0.2	City of Rockville	Public Park	*de minimis*
101	Bullards Park and Rose Hill SVP	16.8	0.3	City of Rockville	Public Park	*de minimis*
102	Rockmead Park	27.4	0.2 0.3 (Alt 10)	City of Rockville	Public Park	*de minimis*
103	Woottons Mill Park	95.3	0.2	City of Rockville	Public Park	*de minimis*
105	Woodley Gardens	200.0	0.7 1.1 (Alt 10) 1.0 (Al 13C0	MHT	Historic Site	*de minimis*
107	Rockville Senior Center Park	12.2	0.7 0.9 (Alt 10) 0.8 (Alt 13C)	City of Rockville, MHT	Public Park, Historic Site	*de minimis*
108	Ward Building	4.8	0.1 <0.1(Alt 13B)	MHT	Historic Site	*de minimis*
109	Malcolm King Park	78.5	0.1	City of Gaithersburg	Public Park	*de minimis*
110	Morris Park	30.7	0.1	City of Gaithersburg	Public Park	*de minimis*
Total Potential Impacts of Section 4(f) Properties by Build Alternative			**144.7 (Alt 9M)** **145.5 (Alt 13B)** **146.7 (Alt 13C)** **146.8 (Alts 8 & 9)** **149.0 (Alt 10)**			

Notes: [1]The size of Section 4(f) properties is sourced from data or documentation provided by the Officials with Jurisdiction. [2]Section 4(f) properties in **Table 5-2** are sorted from west to east along I-495 and from south to north along I-270. [3]The size of the Baltimore-Washington Parkway in **Table 5-2** is only the area within the historic boundary, which ends at the Anne Arundel County border. The full size of the Baltimore-Washington Parkway is larger.

Table 5-3: Inventory of Properties that Qualify as Section 4(f) Exemptions

Map ID	Section 4(f) Property	Size (Acres)	Potential Impacts from Proposed Action (Acres)	Officials with Jurisdiction	Type of Section 4(f) Property	Exception Criteria
16	Bethesda Trolley Trail	4 miles	0.2	Montgomery County Department of Transportation	Public Park/Trail	23 CFR 774.13(f)(3)
58	Baltimore & Ohio Railroad, Washington Branch	146.4	0.6	MHT	Historic Site	23 CFR 774.13(a)(3)
66	Spellman Overpass	1.0	<0.1	City of Greenbelt	Public Park	23 CFR 774.13(f)(3)
72	Baltimore & Potomac Railroad, Washington City Branch	284.4	1.0	MHT	Historic Site	23 CFR 774.13(a)(3)
N/A	Site 18MO749	N/A	N/A	MHT, NPS	Historic Site	23 CFR 774.13(b)
N/A	Site 18MO751	N/A	N/A	MHT, NPS	Historic Site	23 CFR 774.13(b)
N/A	Site 44FX0374	N/A	N/A	VDHR, NPS	Historic Site	23 CFR 774.13(b)
N/A	Site 44FX0379	N/A	N/A	VDHR, NPS	Historic Site	23 CFR 774.13(b)
N/A	Site 44FX0381	N/A	N/A	VDHR, NPS	Historic Site	23 CFR 774.13(b)
N/A	Site 44FX0389	N/A	N/A	VDHR, NPS	Historic Site	23 CFR 774.13(b)

Note: To protect location information, archaeological sites are not inventoried on Section 4(f) mapping.

5.6 Avoidance Alternatives and Analysis

A *feasible and prudent avoidance alternative* is one that avoids using any Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweigh the importance of protecting the Section 4(f) property (23 CFR 774.17). In assessing the importance of protecting Section 4(f) properties, it is appropriate to consider the relative value of the resource to the preservation purpose of the statute. The preservation purpose of Section 4(f) is described in 49 U.S.C. § 303(a), which states: "It is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites."

The presence of linear, mostly north-south oriented, Section 4(f) properties such as Cabin John Stream Valley Park, Rock Creek Stream Valley Park, Sligo Creek Stream Valley Park, Northwest Branch Stream Valley Park, Southwest Stream Valley Park, Henson Creek Stream Valley Park, George Washington Memorial Parkway, Clara Barton Parkway, Baltimore Washington Parkway, Sligo Creek Parkway, and Suitland Parkway, in contrast to the largely east-west oriented interstate corridors, limits the potential for feasible and prudent avoidance alternatives to exist in this corridor. Each of these park properties extends perpendicular to the alignment of I-495 or I-270. Additionally, the area in the vicinity of the study limits is a densely populated, urban area with large residential communities, business complexes, large governmental institutions, numerous community facilities, and hundreds of sensitive cultural and natural resources. Since I-495 and I-270 are existing interstate systems that serve local and regional traffic and connect to major arterials in each county, addressing the need on a system level is critical to achieving the overall purpose of the Study.

Six alternatives that would completely avoid the use of any Section 4(f) properties have been developed and are discussed below. They are evaluated in accordance with the definition of a *feasible* and *prudent* avoidance alternative found in 23 CFR 774.17.

- **Alternative 1: No Build Alternative** would include routine maintenance and safety improvements, but there would be no changes to the existing lane configuration on I-495 and I-270. There would be no operational improvements or increased capacity along I-495 and I-270; existing and future traffic volumes would not be accommodated at this location. The No Build Alternative would not meet Purpose and Need and would cause other severe problems that substantially outweigh the importance of protecting Section 4(f) properties. I-495 and I-270 are the two most heavily traveled freeways in the National Capital Region, each with an Average Annual Daily Traffic volume of up to 260,000 vehicles per day in 2018. On both of these interstate systems, congestion within the study area lasts between 7 and 10 hours per day resulting in the second highest congestion in the United States. In 2040, under the no build condition, the average daily traffic is estimated to increase by 7-17%, depending on the roadway segment along the 48-mile study corridor. Alternative 1 would not accommodate existing and long-term traffic growth, enhance trip reliability, or improve the movement of goods and services. Alternative 1 would not provide the much-needed capacity improvements to serve both existing and future traffic growth on these interstate systems.
- **Increased Bus Transit** would include expansion of the existing bus transit services within the limits of the study on both I-270 and I-495 and the additional surrounding roadway network. This could be in the form of an increase in bus service on existing I-495 and I-270 within the study limits, or consideration of dedicated facilities such as bus rapid transit systems on existing infrastructure. To avoid impacting Section 4(f) property, the Increased Bus Transit Alternative would not include any capacity improvements to I-495 and I-270 within the limits of the study and therefore the bus transit would be subject to the same existing delays on both interstate corridors that are expected to worsen in the future.

  A 2017 study by the National Capital Region TPB, Long-Range Plan Task Force, titled, *An Assessment of Regional Initiatives for the National Capital Region - Draft Technical Report on Phase II of the TPB Long-Range Plan Task Force*[1], studied a series of regional transportation initiatives compared to the baseline of the Financially Constrained Long Range Plan (CLRP). This study showed that an extensive, regionwide network of BRT and transitway facilities would result in a one percent reduction in average travel times for transit, HOV and single-occupancy vehicle commute trips relative to the 2040 CLRP scenario. Daily vehicle hours of delay would be reduced by two percent, and transit commute mode share would increase four percent. Daily VMT and daily VMT per capita would be reduced by less than one percent. Share of passenger miles on reliable modes would increase by six percent.

[1] https://www.mwcog.org/documents/2017/12/20/long-range-plan-task-force-reports-projects-regional-transportation-priorities-plan-scenario-planning-tpb/

The Increased Bus Transit Alternative would not meet the Purpose and Need and would cause other severe problems that outweigh the importance of protecting Section 4(f) properties. Given the modest improvements to travel times and vehicle hours of delay expected from an extensive regionwide network of BRT and transitways, dedicated BRT facilities along only I-495 and I-270 would not achieve the Study's Purpose and Need as it would not address existing and long-term traffic growth, would not enhance trip reliability along I-495 or I-270, and would not accommodate Homeland Security. Under this alternative, fares would be collected, but additional analysis would be needed to determine financial feasibility based on ridership and operations and maintenance costs. In addition, improvement in the movement of goods and services would be limited to commuter benefits and not the movement of freight or services that require vehicular movement (i.e., mechanical, electrical, etc. services). Additional discussion of the Increased Transit Alternative can be found in **Appendix F**, **Section 3.1.2**.

- **Transportation Systems Management (TSM)/Transportation Demand Management (TDM) Alternative** would improve the operation and coordination of transportation services and facilities through strategies such as ramp metering, modifications to turn lanes, reconfiguring interchanges, changing driver behavior to provide the most efficient and effective use of existing transportation services and facilities. TSM/TDM strategies would only be implemented where no impacts to Section 4(f) properties would occur. Some TSM/TDM strategies have been incorporated into the Proposed Action, such as ramp metering and signal timing optimization. Other TSM/TDM measures have been determined infeasible because they would result in additional impacts to Section 4(f) properties or would not meet the Purpose and Need.

  TSM/TDM Alternatives, by their nature, do not include the addition of roadway capacity, and could not address the large-scale challenges with existing capacity along the existing interstate systems. Therefore, because of the limited scope of these types of improvements, TSM/TDM improvements alone would not address the existing or future capacity needs. The TSM/TDM Alternative is therefore not prudent because it would be unreasonable to proceed with the alternative in light of the stated Purpose and Need and it would result in unacceptable operational problems.

  Because the actions that would be included as part of TSM/TDM solutions would only address a small fraction of congestion challenges and only do so in the short-term, the TSM/TDM Alternative would not accommodate existing and future long-term traffic, nor would these measures enhance trip reliability. In addition, TSM/TDM Alternative does not directly provide an additional travel choice, accommodate Homeland Security, improve the movement of goods and services, nor enhance multimodal connectivity; and it does not provide a revenue source. Additional discussion of the TSM/TDM Alternative can be found in **Chapter 2, Section 2.5.2 and Appendix F, Section 3.1.3**.

- **Section 4(f) Avoidance Alternative 1** would construct four, new managed lanes off-alignment between George Washington Memorial Parkway and MD 4. The managed lanes would be constructed in Montgomery and Prince George's Counties, outside the alignment of existing I-495 between the American Legion Bridge and the MD 202 interchange. The alignment of Section 4(f) Avoidance Alternative 1 would cross from outside to inside the existing I-495 at the MD 202 interchange and continue south until rejoining existing I-495 at the limit of the study area between the interchanges with MD 4 and MD 5. To avoid the use of any Section 4(f) property on I-270, four managed lanes would be constructed off alignment to the west of existing I-270. The alignment of Section 4(f) Avoidance Alternative 1 would rejoin existing I-270 at the MD 200 interchange, the limit of the study area.

The proposed improvements would avoid impacts to all Section 4(f) properties inventoried in the corridor study boundary, including by bridging over long linear Section 4(f) properties such as stream valley parks. This alternative would construct a new roadway on new alignment that would require a LOD 200 feet wide by 50 miles long at an estimated construction cost of $25 billion. By comparison, the estimated range of costs for the Proposed Action is between $8.7 billion and $10 billion. This area has not been subject to a detailed, technical inventory of Section 4(f) properties or other environmental resources. However, desktop review of the alignment indicates it would likely result in significant impacts to neighborhoods causing many relocations and impacts to natural resources. After reasonable mitigation, it would still cause severe social, economic and environmental impacts. Avoidance Alternative 1 would cause severe problems that outweigh the importance of protecting Section 4(f) properties. A map and additional discussion of Section 4(f) Avoidance Alternative 1 can be found in **Appendix F, Section 3.1.4.**

- **Section 4(f) Avoidance Alternative 2** would construct four, new managed lanes off-alignment between George Washington Memorial Parkway and MD 4. The managed lanes would be constructed in Montgomery and Prince George's Counties, inside the alignment of existing I-495 through nearly full the limits of the study: from the Potomac River crossing and between interchanges with MD 4 and MD 5. To avoid the use of any Section 4(f) property on I-270, four managed lanes would also be constructed off-alignment to the east of existing I-270. The alignment of Section 4(f) Avoidance Alternative 2 would rejoin existing I-270 at the MD 200 interchange, the limit of the study area.

  This alternative is similar to Avoidance Alternative 1 in that all Section 4(f) properties in the corridor study boundary would be avoided, but it would build a new highway on new alignment, having similar severe impacts to socioeconomic and natural resources. Constructing a new roadway on new alignment would require a LOD 200 feet wide along a distance of approximately 40 miles at an estimated construction cost of $20 billion. By comparison, the estimated range of costs for the Proposed Action is between $8.7 billion and $10 billion. This area has not been subject to a detailed, technical inventory of Section 4(f) properties or other environmental resources. However, desktop review of the alignment plainly indicates it would likely result in significant impacts to neighborhoods causing many relocations and impacts to natural resources. After reasonable mitigation, it would still cause severe social, economic and environmental impacts. Avoidance Alternative 2 would cause severe problems that outweigh the importance of protecting Section 4(f) properties. A map and additional discussion of Section 4(f) Avoidance Alternative 2can be found in **Appendix F, Section 3.1.5.**

- **Section 4(f) Avoidance Alternative 3** would construct four, new managed lanes as proposed in the Proposed Action but incorporate alignment shifts or bridges to avoid impacts to Section 4(f) properties at 15 different locations to avoid impacts to all Section 4(f) properties inventoried within the corridor study boundary. The estimated cumulative cost of the location specific alignment shifts would be $18 billion. By comparison, the estimated range of costs for the Proposed Action is between $8.7 billion and $10 billion. The avoidance alignment shifts would involve construction on new location adjacent to I-495 and I-270 disrupting communities from relocations and resulting in significant additional impacts to natural resources. After reasonable mitigation, it would still cause severe social, economic and environmental impacts. Avoidance Alternative 3 would cause operational challenges to access and egress between the managed and general purpose lanes. Avoidance Alternative 3 would cause other severe problems that outweigh the importance of protecting Section 4(f) properties. Additional discussion of Section 4(f) Avoidance Alternative 1 can be found in **Appendix F, Section 3.1.6, Page 157**.

The orientation of multiple linear parks perpendicular to the study alignments presents significant challenges to complete avoidance of all Section 4(f) properties. The analysis summarized above and presented in greater detail in **Appendix F** was not able to identify an alternative that totally avoids the use of any Section 4(f) property while addressing the Purpose and Need and without causing other severe problems of a magnitude that substantially outweighs the importance of protecting Section 4(f) properties. The final determination of whether there is no feasible and prudent avoidance alternative to the use of land from Section 4(f) properties will be presented in the Final Section 4(f) Evaluation. Refer to **Appendix F, Section 3** for a detailed discussion of these avoidance alternatives.

5.7 All Possible Planning to Minimize Harm

FHWA may not approve the use of Section 4(f) property unless there is no feasible and prudent avoidance alternative and the action includes all possible planning to minimize harm to the property resulting from such use. "All possible planning," as defined in 23 CFR 774.17, includes all reasonable measures to minimize harm or mitigate for adverse impacts and effects. Measures to avoid and minimize harm have been incorporated into the Proposed Action, as discussed in **Chapter 2, Section 2.7.4** of this DEIS. These measures include but are not limited to:

- Minimization of visual impacts (i.e. removing flyover ramps, consolidating and reducing fixed and dynamic signing along historic parkways)
- Reducing the typical section width by varying type of stormwater control (i.e. undergrounding stormwater management facilities, removing or limiting stormwater management facilities in parks)
- Widening toward the existing median wherever possible
- Alignment shifts
- Use of retaining walls to avoid or minimize property impacts due to additional grading or filling.
- Landscaping
- Minimizing vegetation disturbance
- Mitigation

MDOT SHA has engaged in extensive coordination with the majority of the Officials with Jurisdiction over Section 4(f) properties through existing regulatory processes (such as Section 106 consultation), regularly scheduled coordination meetings, and meetings requested by stakeholders. Additional coordination took place via written letter, over the phone, and via electronic communication. This coordination resulted in minimizing harm to Section 4(f) properties through a variety of means, such as: eliminating or relocating stormwater management facilities; shifting the centerline of the transportation facility; developing alternative interchange configurations; relocating slip ramps; refining construction access locations; and limiting the number, type, and configuration of signage. The results of coordination and descriptions of the minimization efforts resulting from such coordination are discussed in detail throughout **Appendix F, Section 2**.

Minimization of harm may entail both alternative design modifications that reduce the amount of Section 4(f) property used, such as those described in the preceding paragraphs, and mitigation measures that compensate for residual impacts. For Section 4(f) uses that cannot be avoided or further minimized, mitigation would be considered. The level of mitigation considered would be commensurate with the severity of the impact on the Section 4(f) property. Final mitigation and minimization measures would be determined through continued consultation with the officials having jurisdiction over each Section 4(f) property and presented in the Final Section 4(f) Evaluation. MDOT SHA and FHWA have committed to providing meaningful benefit to impacted Section 4(f) properties by improving the values, services, attributes and functions that may be compromised. The goal of mitigation is net benefit to the property impacted. To date, preliminary mitigation discussions with many of the Officials with Jurisdiction have included replacement land, completing additional cultural and natural resource surveys, reconfiguring recreational facilities, relocating recreational facilities out of environmentally compromised areas (i.e. floodplains), restoring streams, and funding of cultural and park related buildings and amenities.

Potential mitigation measures for the Section 4(f) use of historic sites would be identified within a Section 106 Programmatic Agreement that would be developed with FHWA, MDOT SHA, ACHP, NPS, MHT, VDHR, and the Section 106 consulting parties (refer to **Appendix H** for the Draft Section 106 Programmatic Agreement). Mitigation measures will be developed on a case by case basis. By signature, agencies will assure that the mitigation measures would be completed.

All minimization and mitigation measures will be documented in the Final Section 4(f) Evaluation.

Pursuant to 23 CFR 774.17, a determination of Section 4(f) *de minimis* impacts inherently includes the requirement for all possible planning to minimize harm because impacts have already been reduced to a *de minimis* level.

5.8 Least Overall Harm

If the avoidance analysis concludes there is no feasible and prudent avoidance alternative, then FHWA may approve, from among the remaining alternatives that use Section 4(f) property, only the alternative that causes the least overall harm in light of the statute's preservation purpose. This analysis is required when multiple alternatives that use Section 4(f) property remain under consideration.

The least overall harm to Section 4(f) property is determined by balancing the following factors set forth in 23 CFR 774.3(c)(1)):

(i) The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property);
(ii) The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection;
(iii) The relative significance of each Section 4(f) property;
(iv) The views of the official(s) with jurisdiction over each Section 4(f) property;
(v) The degree to which each alternative meets the purpose and need for the project;

(vi) After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f); and
(vii) Substantial differences in costs among the alternatives.

By balancing the seven factors, four of which concern the degree of harm to Section 4(f) properties, FHWA will be able to consider all relevant concerns to determine which alternative would cause the least overall harm in light of the statute's preservation purpose. For the *Draft Section 4(f) Evaluation*, location specific alignment shifts were developed that would avoid one or more of the 22 Section 4(f) properties that would experience a non-*de minimis*. The location specific alignment shifts primarily follow the alignment of the Proposed Action, but incorporate alignment shifts or design changes that locally avoid specific Section 4(f) properties. In general when compared to the Proposed Action, these location specific alignment shifts would result in additional use of other Section 4(f) properties, cause a severe magnitude of adverse impacts to resources not protected by Section 4(f), and/or result in additional construction, maintenance, or operational costs of extraordinary magnitude. The alignment shift alternatives are described and evaluated in **Appendix F**, **Section 5.1, Page 166.**

The Least Overall Harm section also evaluates two additional alternatives that would potentially reduce impacts to Section 4(f) properties: Alternative 5 and the MD 200 Diversion Alternative. Analysis shows that these two alternatives would result in less impact to Section 4(f) property; however, they would not meet the Purpose and Need of the Study.

The final section of the Least Overall Harm analysis evaluates the Proposed Action. This analysis balances the seven factors to determine which alternative would cause the least overall harm in light of the preservation purpose of Section 4(f). Refer to **Appendix F**, **Section 5** for the detailed discussion of the least overall harm analysis.

5.9 Coordination

Many of the Officials with Jurisdiction have been active Cooperating or Participating Agencies in the development of the DEIS and through consultation in the Section 106 process. Coordination with the Officials with Jurisdiction have included letters, calls, emails, in-person meetings, and other written correspondence throughout the Study. Consultation and coordination with these agencies is ongoing and will continue with the review of the *Draft Section 4(f) Evaluation*. For detailed information on the coordination to-date (refer to **Appendix F, Section 6**).

The public has an opportunity to review and comment on the *Draft Section 4(f) Evaluation* concurrently with the DEIS. For parks, recreation areas, or wildlife and waterfowl refuges, the Officials with Jurisdiction over Section 4(f) property must be informed of the intent to make a *de minimis* impact determination, after which an opportunity for public review and comment must be provided. For historic sites, FHWA and MDOT SHA will consult with the parties participating in the Section 106 process, but is not required to provide additional public notice or provide additional opportunity for review and comment of *de minimis* impact findings. Comments from the public related to the Draft Section 4(f) analysis will be addressed in the Final Section 4(f) Evaluation.

Table 5-4 summarizes the coordination with Officials with Jurisdiction and other regulatory agencies to date. FHWA will complete coordination prior to making Section 4(f) approvals under 23 CFR 774.3. **Appendix F**, **Section 6** details coordination completed with Officials with Jurisdiction to date.

Table 5-4: Section 4(f) Officials with Jurisdiction Coordination Summary

Officials With Jurisdiction	Subject	Discussion Topic	Upcoming Coordination
Advisory Council on Historic Preservation	Participating Agency	FHWA notified ACHP about the study. ACHP replied to FHWA they are participating in Section 106 consultation	Determination of eligibility and finding of effect review, PA execution, Draft Section 4(f) Evaluation review of historic properties
City of Gaithersburg	Briefing Mayor and City Council, Scoping, Property Access, Consulting Party	Project status, Scoping comments, property access, cultural resources study overview and schedule	Draft Section 4(f) Evaluation review of City properties
City of Greenbelt	Purpose and Need, Alternatives, Impacts; Impacts to Historic Properties	Section 106 Consulting Party acceptance, Project status briefing, comments on preliminary list of adversely and potentially adversely affected historic properties, PA Development	Draft Section 4(f) Evaluation review of City properties
City of New Carrollton	Purpose and Need, Alternatives, Impacts	Project status briefing	Draft Section 4(f) Evaluation review of City properties
City of Rockville	Section 106 Consulting Party; Impacts to Parks and Historic Properties	Section 106 Consulting Party acceptance, Project status briefing	Section 106 review; Draft Section 4(f) Evaluation review of City properties
DOI/HUD			Draft Section 4(f) Evaluation review
Maryland Historical Trust	Participating Agency, Section 106 approach, APE Concurrence, Gap Analysis, Inventory, NRHP Eligibility, Historic Property Effect Determination	Participating agency, concurrence with Section 106 initiation letter, cultural resources information gap concurrence, revised APE concurrence, NRHP eligibility review and comment; Concurrence on Section 106 effects on historic properties	Coordination on Draft Programmatic Agreement; Review of Draft Section 4(f) Evaluation
MNCPPC-Montgomery County	Cooperating Agency, Property Access, Impacts, Avoidance, Minimization Mitigation	Cooperating Agency and Section 106 Consulting Party invitation and acceptance, impacts to park properties, avoidance, minimization, mitigation	Draft Section 4(f) Evaluation review Montgomery County M-NCPPC parks
MNCPPC- Prince George's County	Cooperating Agency, Property Access,	Cooperating Agency and Section 106 Consulting Party	Draft Section 4(f) Evaluation review

Officials With Jurisdiction	Subject	Discussion Topic	Upcoming Coordination
	Impacts, Avoidance, Minimization, Mitigation	invitation and acceptance, impacts to park properties, avoidance, minimization, mitigation	Prince George's County M-NCPPC parks
NPS	Cooperating Agency, Property Access, Cultural Resources, Parks, Impacts, Avoidance, Minimization, Mitigation	Cooperating Agency and Section 106 Consulting Party invitation and acceptance, property access, cultural resources inventory permitting, determinations of NRHP eligibility for NPS properties, impact avoidance, minimization and mitigation	Section 106 consultation for NPS properties, Draft Section 4(f) Evaluation of NPS properties
USDA	Participating Agency, Section 106 Consultation, Property Impacts, Minimization, Mitigation	Participating Agency and Section 106 Consulting Party invitation and acceptance, BARC property impacts, minimization, mitigation	Preliminary finding of effect, Section 106 consultation, Draft Section 4(f) Evaluation review
Virginia Department of Historic Resources	Participating Agency, Section 106 Approach, APE Definition Concurrence, Archaeological Scope; Concurrence and comments on MDOT SHA eligibility determinations	Participating Agency invitation and acceptance, Section 106 initiation, APE definition and revised APE concurrence, archaeological scope of investigations in Virginia; Concurrence and comments on MDOT SHA eligibility determinations	Preliminary finding of effect and Draft Section 4(f) historic properties review

5.10 Mitigation

To determine meaningful mitigation for impacts to parkland resources, MDOT SHA has engaged in ongoing discussions with Officials with Jurisdiction and received substantive input from them concerning potential mitigation measures. Pursuant to those discussions and a review of best practices to address parkland impacts, possible mitigation measures may include:

- Replacement with lands of at least comparable value, and of reasonably equivalent usefulness and location
- Replacement of facilities impacted by the project, including sidewalks, paths, benches, lights, trees, fields, courts, stormwater facilities, parking lots, trails, swales, buildings, and other facilities
- Relocation of recreational facilities outside of environmentally compromised areas (i.e. floodplains)
- Restoration and landscaping of disturbed areas
- Incorporation of design features and habitat features where necessary
- Payment of fair market value for the land
- Rehabilitation of deteriorating facilities and assets on nearby parkland

- Relocation of impacted facilities and assets to allow for use similar to that which existed pre-impact
- Design and construction of new facilities
- Non-native invasive species management
- Environmental enhancements with the goals of habitat and/or water quality improvements
- Any additional measures recommended during consultation with the official with jurisdiction that are relevant to and commensurate with the impacts.

6 ONE FEDERAL DECISION

6.1 Background

Executive Order 13807: Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects[1] requires Federal agencies to process environmental reviews and authorization decisions for major infrastructure projects as "One Federal Decision (OFD)." The Executive Order 13807 (EO) sets a goal of reducing the average time to complete environmental reviews under the National Environmental Policy Act (NEPA) and authorization decisions for major infrastructure projects within an agency average two years from the publication of the Notice of Intent (NOI). The EO also directs that, except under certain circumstances,[2] the Federal lead agency and all Cooperating and Participating agencies shall "record any individual agency decision in one Record of Decision (ROD)" and prepare a single Environmental Impact Statement (EIS). Provided the EIS includes adequate detail to inform the agency decisions, the EO requires obtaining permits and approvals within 90 days of the issuance of the ROD[3]. The EO also requires major infrastructure projects to be managed under a single permitting timetable covering environmental review and authorizations.

6.2 Agency Roles

In accordance with 40 CFR 1501.6 and 23 U.S.C. § 139(d)(5), agencies with jurisdiction by law should be invited to serve as Cooperating Agencies for an EIS. Other agencies with special interest or expertise with respect to any environmental impact involved in the proposed project or project alternative may also be invited.

The Federal Highway Administration (FHWA) is the lead Federal agency for the Study. The Cooperating Agencies for this Study include those Federal and state agencies that would ultimately be responsible for Federal authorization decisions. In addition, other key Federal, state, regional, and local agencies with regulatory or management jurisdiction over sensitive resources were invited to act as Cooperating Agencies. There are eight Cooperating Agencies (four Federal, three state, and one regional), 18 Participating Agencies (ten Federal, six state, and two county), and seven Notified Agencies (three Federal, one state, and three regional) for the Study. An overview of the Federal, state, and regional Cooperating Agencies is provided below. Refer to **Chapter 7, Table 7-1** and the *Public Involvement and Agency Coordination Technical Report* (**Appendix P**), for a complete listing of the Lead, Cooperating, Participating, and Notified Agencies for the Study.

The following are the Federal Cooperating Agencies with authorization decision responsibilities, and thus are subject to the OFD requirement for this Study:

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[1] Exec. Order No. 13807, 82 Fed. Reg. 40463 (August 15, 2017), https://www.whitehouse .gov/presidential-actions/presidential-executive-order-establishing-discipline-accountability-environmental-review-permitting-process-infrastructure/

[2] The EO provides that a single ROD shall be issued, "unless the project sponsor requests that agencies issue separate NEPA documents, the NEPA obligations of a cooperating or participating agency have already been satisfied, or the lead Federal agency determines that a single ROD would not best promote completion of the project's environmental review and authorization process."

[3] The lead Federal Agency may extend the 90-day deadline if it determines Federal law prohibits the agency from issuing its approval within 90 days or an extension would better promote completion of the project's environmental review and authorization process or the project sponsors requests a different timeline. Exec. Order No. 13807, 82 Fed. Reg. 40463 (August 15, 2017). https://www.whitehouse.gov/wp-content/uploads/2018/04/MOU-One-Federal-Decision-m-18-13-Part-2-1.pdf

- US Army Corps of Engineers (USACE) Baltimore District
- US Environmental Protection Agency (EPA)
- National Park Service (NPS)
- National Capital Planning Commission (NCPC)[4]

The state Cooperating Agencies for the Study are:

- Maryland Department of Environment (MDE)
- Maryland Department of Natural Resources (MDNR)
- Virginia Department of Transportation (VDOT)

The one regional Cooperating Agency is Maryland-National Capital Park and Planning Commission (M-NCPPC) covering both Montgomery and Prince George's Counties.

6.3 Concurrence Points

The 2018 *Memorandum of Understanding Implementing One Federal Decision Under Executive Order 13807*[5] issued by the Office of Management and Budget (OMB) and the Council on Environmental Quality (CEQ) provides a framework for implementation of EO 13807. The Memorandum of Understanding (MOU) identifies three concurrence points in the environmental review process where the lead Federal agency must request the concurrence of Cooperating Agencies with authorization decision responsibilities:

- Purpose and Need (generally prior to the issuance of the notice of intent for an infrastructure project);
- Alternatives to be carried forward for evaluation (prior to detailed analysis in the Draft EIS); and
- Identified preferred alternative (prior to identification in the Draft EIS or the Final EIS).

A Coordination Plan[6] was developed during the scoping phase of the Study, which served as a schedule of concurrence points for the Purpose and Need, Alternatives Retained for Detailed Study (ARDS), and the Preferred Alternative. Coordination with the Cooperating Agencies on the concurrence points for the Study occurred at Interagency Working Group (IAWG) Meetings and other resource specific coordination meetings.

Written concurrence was received[7] on the Purpose and Need on May 16, 2018, on the ARDS on June 5, 2019, and on the Revised ARDS on October 16, 2019. Concurrence on the Preferred Alternative will occur during the development of the Final EIS.

[4] NCPC is not subject to the One Federal Decision Memorandum of Understanding (MOU) but has agreed to the "spirit" of the Executive Order 13807 through coordination with FHWA.
[5] Memorandum of Understanding Implementing One Federal Decision Under Executive Order 13807, https://www.whitehouse.gov/wp-content/uploads/2018/04/MOU-One-Federal-Decision-m-18-13-Part-2-1.pdf
[6] Pursuant to 23 U.S.C. 139(g)
[7] NCPC concurred on the Purpose and Need only; M-NCPPC did not concur on Purpose and Need or ARDS, including revised ARDS

6.4 Federal Cooperating Agencies Authorization

6.4.1 Ongoing Coordination with National Park Service (NPS)

The NPS authorization decision relates to consideration of a Special Use Permit for the temporary use of land under its administration for construction staging and execution of a highway deed easement by FHWA, pursuant to the authority of 23 U.S.C. 107(d) for the proposed permanent use of a portion of that land for the project.

Assuming selection of a Build Alternative, the NPS action would be taken in response to FHWA's request for land for highway purposes from the following NPS park properties: George Washington Memorial Parkway, Chesapeake and Ohio Canal National Historical Park, Clara Barton Parkway, Baltimore-Washington Parkway, Greenbelt Park, and Suitland Parkway and their accompanying administered properties, as expressed in statute, regulation, and policies.

After conclusion of the NEPA process and NPS agrees to the use of the impacted lanes, FHWA would officially request land for highway purposes via execution of a highway deed easement. NPS authorization or consent of the request would be required to advance the transfer of land for permanent incorporation into transportation use. The execution of a highway deed easement would be done in compliance with 23 U.S.C. 107(d) which authorizes the FHWA to arrange with Federal agencies to provide rights-of-way to state DOT's whenever such rights-of-way are required for the Interstate System and NPS Director's Order (DO) #87D: Non-NPS Roads, which sets forth NPS operational policies and procedures for responding to requests for use of national parks for non-NPS highway projects partially or fully funded under Title 23 of the United States Code. The project would also require NPS to issue a Special Use Permit for the temporary use of land under its administration for construction staging.

A. Specific Impacts to NPS Properties

In coordination with NPS and to assist NPS' decision making, impacts occurring on NPS properties have been called out specifically, and the impacts to NPS resources are quantified. All quantified impacts presented below and in Chapter 4 of the DEIS (and in referenced technical reports) are assumed to be permanent or long-term effects. As design is advanced on a Preferred Alternative, the long-term effects will be refined and short-term, construction-related effects will be quantified and documented in the FEIS and Final Section 4(f) Evaluation. The following text summarizes the potential, specific impacts to resources on NPS properties. Further details on these impacts are available in Chapter 4 and the referenced technical reports.

The potential impacts from the Build Alternatives to the six NPS park and historic properties are identical as shown in **Table 6-1**. Additional details on these potential impacts are included in **Chapter 5** of this DEIS and the *Draft Section 4(f) Evaluation* (**Appendix F**).

Table 6-1: Potential Impacts to NPS Properties

NPS Property	Total Size (Acres)	Potential Impacts from the Alternatives 8, 9, 9M, 10, 13B, 13C (Acres)
George Washington Memorial Parkway	7,146	12.2
Chesapeake and Ohio Canal National Historical Park	19,575	15.4
Clara Barton Parkway	96.2	1.8
Baltimore-Washington Parkway[1]	~1,400	69.3
Greenbelt Park	1,176	0.6
Suitland Parkway	419	0.3

Note: [1]The size of the Baltimore-Washington Parkway in Table 5-2 is only the area within the historic boundary, which ends at the Anne Arundel County border. The full size of the Baltimore Washington Parkway is larger.

NPS wetlands subject to NPS DO #77-1: Wetland Protection include: three palustrine emergent (PEM), nine palustrine forested (PFO), one palustrine scrub-shrub (PSS), four riverine lower perennial, two riverine upper perennial, and 22 riverine intermittent wetlands. The impacts to wetland features on NPS properties is summarized in **Table 6-2**. (Refer to **Table 4-21** and *Appendix I of the Natural Resources Technical Report* (**Appendix K**) for details on specific wetland impacts on NPS properties.) NPS requires avoidance, minimization, and compensation for unavoidable adverse impacts to wetlands via restoration of degraded wetlands on NPS property at a minimum of a 1:1 restoration/replacement ratio that can be adjusted upward to ensure functional replacement. NPS requires that a Wetland Statement of Findings (WSOF) be prepared in accordance with the procedural manual during NEPA documenting compliance with DO #77-1 for proposed actions that would result in adverse impacts to wetlands. The draft WSOF will be developed once a Preferred Alternative has been identified and temporary and permanent impacts have been determined. The FEIS and the draft WSOF will be advertised for public comment and will have a concurrent 30-day comment period. The final, signed WSOF will be attached to the ROD.

Work within floodplains on NPS lands must adhere to NPS DO #77-2: Floodplain Management, unless exempted, which calls for the avoidance of long- and short-term environmental effects associated with the occupancy and modification of floodplains. The Floodplain Statement of Findings will be prepared and may be combined with the WSOF in the FEIS.

Table 6-2: Summary of NPS Wetland Impacts on NPS Properties within the Corridor Study Boundary

NPS Property	Potential Impacts to NPS Wetlands from the Alternatives 8, 9, 9M, 10, 13B, 13C (Acres)
George Washington Memorial Parkway	0.09
Chesapeake and Ohio Canal National Historical Park	1.37
Clara Barton Parkway	0.02
Baltimore-Washington Parkway	0.39
Greenbelt Park	0.13
Suitland Parkway	0.29
TOTAL NPS WETLAND IMPACTS ON NPS PROPERTIES	**2.29**

Note: The impacts indicated in this table are only those occurring on NPS property as defined in the NPS DO #77-1: Wetland Protection and Procedural Manual #77-1: Wetland Protection.

In a letter dated March 12, 2020, the Maryland Historical Trust (MHT) concurred with the eligibility and effects determination for the Study as well as the need for further Phase I and II archaeological investigation in the specified areas to which access was denied. **Table 6-3** summarizes the NPS historic properties that would incur an adverse effect from the Build Alternatives (refer to **Tables 4-11 and 4-12** and **Appendix G** for specific details on the adverse effects to historic properties). Due to the complexity of the Study and current state of design, MDOT SHA and FHWA will conclude the Section 106 process through execution of a Programmatic Agreement (PA). MDOT SHA and FHWA will work with NPS to resolve the adverse effect through development of appropriate mitigation measures that will be captured in the PA.

Table 6-3: NPS Historic Properties with Adverse Effect

MIHP#/DHR#	Name	Period of Significance	NRHP Criteria[2]
PG:69-26	Baltimore-Washington Parkway	1942-1954	A, C
M: 12-46	Chesapeake and Ohio Canal National Historical Park	1828-1924	A, C, D
M: 35-61 and 029-0228 (Virginia)	George Washington Memorial Parkway/Clara Barton Memorial Parkway	1930-1966	B, C
PG:67-69	Greenbelt Park	Unspecified	A, C, D
18MO749	C&O Canal Site 1	Early Woodland	D
18MO751	C&O Canal Site 3	1828-1924	D
(N/A)	Dead Run Ridges Archaeological District[1]	Late Archaic-Woodland	D

Note: [1] On February 14, 2020, Virginia DHR did not concur with characterizing the resources as an archaeological district and recommended four sites as individually eligible for listing on the NRHP.
[2]The NRHP Criteria are:

A. 2 - The characteristics of an historic property qualifying it for inclusion in or eligibility for the NRHP (36 CFR Part 800.16[i]), include A: Associated with events that have made a significant contribution to the broad patterns of our history; or
B. Associated with the lives of persons significant in our past; or
C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. Have yielded or may be likely to yield, information important in prehistory or history.

NPS has identified state and globally rare plants and invertebrates from NPS property within the Potomac Gorge on both sides of the Potomac River through numerous distributional surveys over the past ten to twenty years. Some of these areas lie adjacent to the corridor study boundary. **Table 6-4** includes the list of these state-listed rare plant and invertebrate species from the NPS Potomac Gorge park surveys.

Table 6-4: Virginia and Maryland State Listed Species From the Potomac Gorge Known or Potentially Occurring[3] (VDCR/NPS/MDNR) Within the Corridor Study Boundary

Scientific Name	Common Name	Organism	Global Rank[2]	State Rank/Status[3]
Stygobromus phreaticu	Northern Virginia Well Amphipod	Amphipod	G1	S1
Stygobromus pizzinii[1]	Pizzini's Amphipod	Amphipod	G3G4	S1S2
Fontigens bottimer	Appalachian Springsnail	Snail	G2	S1S2
Hydropsyche brunneipenni	Caddisfly	Caddisfly	G3G4	S1S3
Cordulegaster erronea	Tiger Spiketail	Dragonfly	G4	S3
Gomphus fraternus	Midland Clubtail	Dragonfly	G5	S2
Acronicta radcliffei	Radcliffe's Dagger Moth	Moth	G5	S2S4
Acronicta spinigera	Nondescript Dagger Moth	Moth	G4	S1S3
Sphinx frankii	Frank's Sphinx	Moth	G4G5	S2S3
Arabis patens	Spreading Rock Cress	Vascular Plant	G3	S1
Baptisia australis	Blue Wild Indigo	Vascular Plant	G5T5	S2
Boechera dentata	Short's Rock Cress	Vascular Plant	G5	S1
Cirsium altissimum[1]	Tall Thistle	Vascular Plant	G5	S1
Clematis viorna	Vase-vine Leatherflower	Vascular Plant	G3	S3
Coreopsis tripteris	Tall Tickseed	Vascular Plant	G5T5	S1
Cuscuta polygonorum[1]	Smartweed Dodder	Vascular Plant	G5	S1
Echinocystis lobata[1]	Wild Cucumber	Vascular Plant	G5	SH
Erigenia bulbosa	Harbinger-of-Spring	Vascular Plant	G5	S1
Eryngium yuccifolium var. *yuccifolium*[1]	Northern Rattlesnake-Master	Vascular Plant	G5T5	S2
Galactia volubilis	Downy Milkpea	Vascular Plant	G5	S3
Helianthus occidentalis	McDowell's Sunflower	Vascular Plant	G5	S1/T
Hibiscus laevis	Halberd-leaf Rosemallow	Vascular Plant	G5	S3
Hybanthus concolor	Green Violet	Vascular Plant	G5	S3
Lipocarpha micrantha	Small-flower Halfchaff Sedge	Vascular Plant	G5	S2
Maianthemum stellatum	Starry Solomon's-Plume	Vascular Plant	G5	S2
Monarda clinopodia	Basil Beebalm	Vascular Plant	G5	S3S4
Orthilia secunda[1]	One-sided Shinleaf	Vascular Plant	G5	SH
Phacelia covillei	Covilli's Phacelia	Vascular Plant	G3	S1
Phaseolus polystachios	Wild Kidney Bean	Vascular Plant	G5	S3
Polygala polygama	Racemed Milkwort	Vascular Plant	G5	S1/T
Sida hermaphrodita	Virginia Sida	Vascular Plant	G3	S1
Silene nivea	Snowy Campion	Vascular Plant	G4*	S1

Notes: [1]Historically occurred within the Potomac Gorge Conservation Site crossed by the corridor study boundary.
[2]G1 = Highly Globally Rare, G2 = Globally Rare, G3 = Very Rare and Local or Range Restricted, G4 = Apparently Secure Globally, G5 = Demonstrably Secure Globally, GNR = Not Yet Ranked, G* = Species has not yet been Ranked or additional analysis is needed
[3]Rank: S1 = Highly State Rare, S2 = State Rare, S3 = Watch List, S4 = Apparently Secure; Status: E = Endangered, T = Threatened
Sources: VDCR July 31, 2019 letter, Steury et al. 2007, NPS Coordination

Coordination with NPS will continue and targeted plant species surveys within the corridor study boundary are occurring or are planned between Spring and Fall 2020. The result of these surveys will be presented in the FEIS. Additional information on state listed rare plant and invertebrate species documented by NPS is included in the *Natural Resources Technical Report* (**Appendix L, Section 2.10**).

Using the 2013/2014 GIS forest cover data from the Chesapeake Conservancy Conservation Innovation Center's High Resolution Land Cover Data for tree canopy cover[8] and the Virginia Department of Forestry (VDOF) 2005 Virginia Forest Cover dataset (VDOF, 2014), the potential impacts to tree canopy cover on NPS properties were calculated and summarized in **Table 6-5**. As the Study progresses and once a Preferred Alternative is identified, a detailed tree survey on NPS properties will be conducted.

Table 6-5: Tree Canopy Cover Impacts on NPS Properties in Acres

NPS Property	Potential Impacts from the Alternatives 8, 9, 9M, 10, 13B, 13C (Acres)
George Washington Memorial Parkway	9.3
Chesapeake and Ohio Canal National Historical Park	16.6
Clara Barton Parkway	1.2
Baltimore-Washington Parkway	47.0
Greenbelt Park	0.8
Suitland Parkway	1.3
TREE CANOPY COVER TOTAL[1] IMPACTS ALL NPS PROPERTIES (ACRES)	**76.2**

Note: [1] The total reflects tree canopy cover areas by individual property within the LODs.

B. Ongoing Coordination with NPS Regarding Avoidance and Minimization Measures to NPS Properties

MDOT SHA and FHWA recognize the importance of the NPS properties that would be impacted by the Build Alternatives. Since initiation of the study, NPS has actively participated as a Cooperating agency in the NEPA process and as a consulting party in the Section 106 consultation. MDOT SHA and FHWA have met with NPS staff on a regular basis and this coordination will continue through project development, design and construction stages of the project. One of the challenges with this consultation has been in locating and interpreting the various formal and informal agreements for the use of the NPS properties for transportation use, some of which are over 50 years old. The following discussions summarize the avoidance and minimization efforts made to-date by MDOT SHA and FHWA regarding NPS properties. The effort to avoid, minimize and mitigate unavoidable impacts will continue through ongoing and future coordination with NPS staff.

a. American Legion Bridge Area: George Washington Memorial Parkway, C&O Canal, and Clara Barton Parkway

As part of the *Draft Section 4(f) Evaluation*, MDOT SHA and FHWA developed and presented several options for avoiding the George Washington Memorial Parkway (GWMP), Chesapeake and Ohio (C&O) Canal, and Clara Barton Parkway while replacing the American Legion Bridge. These avoidance options included a suspension bridge and a tunnel and are fully described in the *Draft Section 4(f) Evaluation*, (**Appendix F, Section 5.1.2**).

In response to NPS comments seeking no direct access to GWMP from the managed lanes, MDOT SHA completed a traffic analysis to determine traffic implications of no direct access on I-495 and GWMP.

[8] https://chesapeakeconservancy.org/conservation-innovation-center-2/high-resolution-data/land-cover-data-project/

Results showed that direct access was needed to meet the Study's purpose and need. NPS asked for additional information and MDOT SHA provided a supplemental analysis of options including providing slip ramps on the American Legion Bridge and GWMP for outbound direct access only. MDOT SHA also developed five additional interchange options at GWMP to avoid or minimize visual and physical impacts to GWMP. The option of nested ramps as opposed to flyover ramps was chosen to minimize visual impacts to the historic parkway and is included in the current design (**Appendix D, Map Sheet 1**).

Replacement of the American Legion Bridge will be required under any of the Build Alternatives. In order to minimize the potential construction impacts, MDOT SHA minimized areas of impact along C&O Canal by working with NPS to determine suitable locations for construction areas and temporary access roads on both the east and west sides of the bridge. Construction areas were adjusted to avoid a sensitive historic lock east of I-495. Additionally, MDOT SHA committed to using barges in the Potomac River for construction to further minimize impacts at GWMP and C&O Canal.

Other minimizations options were also considered and discussed with NPS such as a double deck bridge, top-down construction and reduced typical sections and pier locations (**Appendix F, Section 2.1.2.C**).

In response to NPS comments, all stormwater management surface facilities were removed from NPS property except for scuppers on the American Legion Bridge, which are needed due to the profile change from the Clara Barton Parkway to the Potomac River. MDOT SHA explained that a much longer bridge would be needed to avoid the use of scuppers but committed to planning the locations of the scuppers to minimize impact to NPS property.

These minimization efforts have resulted in a reduction of impacts at GWMP from 17.6 acres in June 2019 to 12.2 acres in December 2019. Most of the current LOD is due to area needed on a temporary basis for construction of the American Legion Bridge.

b. Greenbelt Park, Baltimore-Washington Parkway, and Suitland Parkway

As part of the Draft Section 4(f) Evaluation, MDOT SHA and FHWA developed and presented several options for avoiding Greenbelt Park, Baltimore-Washington (BW) Parkway, and Suitland Parkway.

To address NPS comments about having no direct access to BW Parkway, a traffic analysis was completed to determine traffic implications of no direct access on I-495 and BW Parkway. Results showed that direct access was needed to meet the Study's Purpose and Need. Six options for direct access were developed and presented to NPS to further reduce physical and visual impacts to Greenbelt Park and BW Parkway. In addition to further reduce visual impacts to BW Parkway and Greenbelt Park, two proposed flyover ramps were removed from the current interchange design (**Appendix D, Map Sheet 80**).

Minimization of physical impacts at Greenbelt Park was achieved by placing a retaining wall along the relocated ramp at BW Parkway and removing stormwater management facilities from this NPS property. These minimization efforts have resulted in a reduction of impacts to Greenbelt Park from 2.0 acres in June 2019 to 0.6 acre in December 2019, and at BW Parkway (Parkland) from 69.9 acres in June 2019 to 69.3 acres in December 2019.

6.4.2 Ongoing Coordination with US Army Corps of Engineers (USACE) Regarding Avoidance and Minimization to Jurisdictional Features

The proposed transportation upgrades to the I-495 and I-270 corridors being evaluated in the Study will result in discharges of dredged/fill material into Waters of the US, including jurisdictional wetlands and structures built in/over navigable waters. Therefore, the project will require USACE authorization under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Concurrent with the NEPA Process, MDOT SHA has prepared a Joint Federal/State Permit Application and supporting documentation for the Alteration of Any Floodplain, Waterway, Tidal or Non-Tidal Wetland within the LODs of the Build Alternatives of the Study. This application was prepared pursuant to the requirements of the Code of Maryland Regulations, Sections 26.17 and 26.23, and Section 404 of the Clean Water Act and supported by the DEIS. The *Joint Permit Application* (JPA) is included in **Appendix R**.

The JPA is further supported by the *Avoidance, Minimization and Mitigation Report* (AMR) (**Appendix M**) and the *Draft Compensatory Mitigation Plan* (**Appendix N**). The AMR describes the process of avoiding and minimizing impacts to wetlands, their buffers, waterways, and the Federal Emergency Management Agency (FEMA) 100-year floodplain to the greatest extent practicable and presents justifications for impacts that were unavoidable. The *Draft Compensatory Mitigation Plan* presents the approach to compensatory mitigation for the unavoidable impacts from the Build Alternatives and includes Phase I Mitigation Design Plans for permittee-responsible mitigation. Phase II Mitigation Design Plans will be developed for approved sites and included in the Final Compensatory Mitigation Plan (Final CMP).

Section 14 of the Rivers and Harbors Act of 1899, as amended and codified in 33 US Code (USC) 408 (Section 408) regulates alteration of USACE civil work's projects, such as dams, levees, or flood channels. The Section 408 review process typically includes review of engineering, environmental, legal, and safety issues associated with the requested alteration(s). USACE Engineering Circular No. 1165-2-220 issued on September 10, 2018 provides procedural guidance for processing Section 408 requests. MDOT SHA coordinated with USACE to determine applicability of Section 408 to the proposed Study. USACE identified one Section 408 resource within the corridor study boundary, the Washington Aqueduct, located adjacent to Clara Barton Parkway near the Potomac River. This feature would not be impacted by any of the Build Alternatives.

6.4.3 Ongoing Coordination with US Environmental Protection Agency (EPA)

Under Section 309 of the Clean Air Act, the EPA is charged with reviewing EISs of all Federal agencies and to comment on the adequacy of the analysis, and identification and recommendation of appropriate measures to avoid and mitigate significant environmental impacts of the proposed action.[9] The EPA also serves as the repository (EIS database) for EISs prepared by Federal agencies and provides notice of its availability in the Federal Register. The EPA also has veto power over the Section 404 permits issued by the USACE. It is anticipated that EPA will provide comments on the EIS in fulfillment of their statutory duty under the Clean Air Act and coordinate with the lead Federal Agency and state proponents consistent with that authority.

6.4.4 Ongoing Coordination with National Capital Planning Commission (NCPC)

The Capper-Cramton Act (CCA) of 1930 (46 Stat. 482), as amended, states that lands purchased with funds appropriated under the CCA for the park, parkway, and playground system in Maryland shall be developed

[9] https://www.epa.gov/nepa

and administered by M-NCPPC in accordance with plans approved by the National Capital Park and Planning Commission (predecessor of NCPC). NCPC also has responsibility under NEPA and is participating as a Cooperating agency to fulfill their NEPA responsibility for CCA-related stream valley parks and in the spirit of EO 13807 as NCPC was not a signatory of the MOU. MDOT SHA and FHWA will continue to coordinate with NCPC on their authority over Capper-Cramton properties.

MDOT SHA and FHWA have been actively coordinating with staff from NCPC throughout the Study to date including two informational presentations to the full Commission on July 11, 2019 and November 7, 2019. Concerns raised by the NCPC Commission focused on the need for additional efforts to analyze alternatives that would limit or avoid Capper-Cramton funded park impacts. MDOT SHA studied the MD 200 Diversion Alternative, which would avoid impacts to sensitive environmental resources on the topside of I-495, including significant Capper-Cramton funded parkland. The results of the analysis demonstrated that the MD 200 Diversion Alternative performed the worst of all the Build Alternatives under consideration in the majority of traffic metrics, and therefore was not carried forward as an Alternative Retained for Detailed Study. Refer to **Chapter 2, Section 2.5.3** and **Appendix B** for additional details.

However, consideration of an alternative which minimizes Capper-Cramton parkland on the topside of I-495 is under review in this DEIS. MDOT SHA has incorporated Alternative 9 Modified (9M) as a Build Alternative in the DEIS which provides a one-lane, managed lane system along the top side of I-495 between I-270 West Spur and I-95. Alternative 9M includes a two-lane, managed lane system within the portion of the study area outside of the I-495 topside limits mentioned above. An analysis to the same level as the Screened Alternatives has been done for Alternative 9 Modified and is included in the DEIS for public review and comment. Refer to **Chapter 2, Section 2.6.4** and **Appendix B** for additional details.

MDOT SHA has worked extensively with NCPC and M-NCPPC on minimization measures to reduce environmental impacts, including significantly reduced impacts to sensitive resources including Capper-Cramton funded parkland. A summary of the minimization of impacts to park properties acquired with Capper-Cramton funding is included in **Table 6-6**. For example, Rock Creek and Rock Creek Stream Valley Park experienced the most significant reduction in impact including a 74 percent reduction in park impacts, 45 percent reduction in wetland impacts and an 88 percent reduction in stream impacts. This reduction in impacts was coordinated with both NCPC and M-NCPPC and presented to the full NCPC and M-NCPPC Commissions in November 2019.

Table 6-6: Summary of Minimization of Impacts to Parks Acquired with Capper-Cramton Funding Implemented Between June 2019 and May 2020

Park Property Acquired with Capper-Cramton Funding	June 2019 Impacts in acres	May 2020 Impacts in acres	Change in Impacts in acres
George Washington Memorial Parkway	17.6	12.5	- 5.1
Chesapeake and Ohio Canal National Historical Park	15.1	15.4	+ 0.3
Clara Barton Parkway	1.8	1.8	No Change
Cabin John Stream Valley Park, Unit 2	0.1	< 0.1	Negligible
Rock Creek Stream Valley Park, Unit 3	4.9 4.6 (Alt 9M)	3.3 2.5 (Alt 9M)	- 1.6 - 2.1 (Alt 9M)
Rock Creek Stream Valley Park, Unit 2	9.6 9.5 (Alt 9M)	0.4 0.2 (Alt 9M)	- 9.2 - 9.3 (Alt 9M)
Locust Hill Neighborhood Park (previously part of Rock Creek Park)	0.3 0.3 (Alt 9M)	0.3 0.2 (Alt 9M)	No Change - 0.1
Sligo Creek Parkway	5.0 4.1 (Alt 9M)	4.1 3.3 (Alt 9M)	- 0.9 - 0.8 (Alt 9M)
Northwest Branch Stream Valley Park, Unit 3	3.2	3.0	- 0.2
Cabin John Regional Park	5.4 (Alt 8, 9, 9M) 6.9 (Alt 10) 5.2 (Alt 13B) 6.7 (Alt 13C)	5.7 (Alts 8,9, 9M) 7.2 (Alt 10) 4.5 (Alt 13B) 5.2 (Alt 13C)	+ 0.3 (Alts 8, 9, 9M) + 0.3 (Alt 10) - 0.7 (Alt 13B) - 1.5 (Alt 13C)

MDOT SHA and FHWA will continue to coordinate with NCPC and M-NCPPC on additional minimization measures and appropriate mitigation measures for the remaining unavoidable impacts.

6.5 Permits, Approvals and Authorizations Required

In addition to NEPA compliance, several permits, approvals and authorizations are being coordinated concurrently preparation of this EIS. Federal agency authorizations would be obtained within 90 days of issuance of a Record of Decision consistent with Section 5 of EO 13807 or would be obtained prior to construction of any improvements. **Table 6-7** summarizes the Federal, state, and local permits, authorizations and approvals that will likely be required based on the current Study design assumptions and associated impacts.

Table 6-7: Likely Permits and Approvals

	Permit/ Approval	Responsible/Permitting Agency
Concurrent with NEPA or within 90 days from the Record of Decision	National Environmental Policy Act (NEPA) Approval – Record of Decision[1]	Federal Highway Administration
	Section 4(f) Approval	Federal Highway Administration
	Endangered Species Act Consultation	US Fish and Wildlife Service / NOAA-NMFS
	Section 106 Programmatic Agreement	Federal Highway Administration
	Clean Water Act Section 404 and Section 10	US Army Corps of Engineers
	Maryland/Virginia State Waters (Section 401)	US Army Corps of Engineers / Maryland Department of Environment / Virginia Department of Environmental Quality
	Maryland Nontidal Wetlands and Waterways Permit	Maryland Department of Environment
	Virginia Wetland Protection Permit	Virginia Department of Environmental Quality
Prior to Construction	Special Use Permit - Construction in VA and MD	National Park Service
	Capper-Cramton Park Permits	National Capital Planning Commission
	Park Construction Permit - M-NCPPC	Maryland National Capital Park and Planning Commission
	Maryland Reforestation Law Approval	Maryland Department of Natural Resources
	State and County Forest Conservation Easement Revision Approvals	Maryland Department of Natural Resources / Maryland National Capital Park and Planning Commission
	General Permit for Stormwater Associated with Construction Activity - MD	US Environmental Protection Agency / Maryland Department of the Environment
	General Permit for Stormwater Associated with Construction Activity - VA	US Environmental Protection Agency / Virginia Department of Environmental Quality
	Stormwater Management/Erosion and Sediment Control	Maryland Department of Transportation - State Highway Administration Plan Review Division / Maryland Department of the Environment
	Stormwater Management/Erosion and Sediment Control	US Environmental Protection Agency / Maryland Department of the Environment / Virginia Department of Environmental Quality
	Clean Water Act Section 402 (MS4)	Maryland Department of the Environment
	Water Appropriation and Use Permit	Maryland Department of the Environment

Note: [1]The lead agency is responsible for preparing and publishing a single ROD for all Federal agencies with authorization responsibility for the project to support any necessary authorization decisions. The ROD will incorporate the decisions of each such agency, unless an exception to a single ROD is met as set forth in Section XIII or where Federal law provides for the lead agency to issue a combined FEIS/ROD. Memorandum of Understanding Implementing One Federal Decision Under Executive Order 13807, https://www.whitehouse.gov/wp-content/uploads/2018/04/MOU-One-Federal-Decision-m-18-13-Part-2-1.pdf

7 PUBLIC INVOLVEMENT AND AGENCY COORDINATION

7.1 Introduction

A comprehensive public involvement and agency coordination program has been conducted throughout the I-495 and I-270 Managed Lanes Study (Study). This chapter summarizes that program, including regulatory agency consultation, conducted during the NEPA process from the initial scoping in March 2018 to the publication of this Draft Environmental Impact Statement (DEIS). Public and agency engagement will continue during the remainder of the Study and will include, but is not limited to, the solicitation of comments on this document; avoidance, minimization, and mitigation measures; and permitting decisions. Additional detail on the public involvement efforts, outreach materials, summaries from the public meetings, and agency coordination, summarized in the subsequent sections, is provided throughout the *Public Involvement and Agency Coordination Technical Report* (**Appendix P**).

7.2 Public Involvement

7.2.1 Public Workshops and Comment Periods

The Study's public involvement efforts began immediately after the publication of the Notice of Intent (NOI) in the *Federal Register* on March 16, 2018 to announce the initiation of the Study. Following the NOI, public involvement efforts were organized by subsequent engagement stages: Scoping, Preliminary Alternatives, and Alternatives Retained for Detailed Study (ARDS). Following publication of this DEIS, a full range of public engagement activities will be conducted during the remainder of the Study, leading to the publication of a Record of Decision (ROD). These outreach stages correspond to three Study milestones and associated Public Workshops: Scoping, Preliminary Alternatives and Alternatives Retained for Detailed Study (ARDS).

Since publication of the NOI, 16 Public Workshops with over 2,100 attendees have been held along the study corridors in Montgomery and Prince George's Counties. Specifically, four (two in each County) Scoping Public Workshops were held between April 17, 2018 and April 24, 2018; four (two in each County) Preliminary Alternatives Public Workshops were held between July 17, 2018 and July 25, 2018; and eight (four in each County) ARDS Public Workshops were held between April 11, 2019 and May 16, 2019. A wide range of approaches were employed to notify travelers, commuters, residents, and workers along the study corridors about the 16 Public Workshops. These included:

- Newsletters, postcards, and announcements mailed and emailed to the Study mailing list, including the public, community organizations, and other stakeholders
- Notifications via the I-495 & I-270 P3 Program website (https://495-270-p3.com/),
- MDOT SHA press releases
- Local and regional newspaper advertisements and flyers
- Geographically-targeted digital banner advertisements and social media promotion
- Local and regional radio station advertisements
- Emails to Federal, state, and local elected officials in Montgomery, Prince George's, and Frederick Counties

At the Public Workshops, attendees were able to assess Study information and to ask questions and to provide agency officials comments through multiple methods:

- Review display boards and a handout
- View and listen to a presentation with opportunities for Q&A
- Interact with technical staff at small working group tables, interactive online mapping stations; tables of roll maps, and at the display boards
- Comment on the Study via hard copy comment cards, an online comment form, an online contact form, e-mail, mail, and court reporter

Spanish and American Sign Language interpreters were available to assist attendees, as needed. The display boards (in English and in Spanish), narrated presentations/videos of the display boards, and handouts were uploaded to the program website concurrently with the Public Workshops (https://495-270-p3.com/your-participation/upcoming-events/). Materials from these Public Workshops are still available on the Program website.

Comment periods were assigned for each series of Public Workshop. Specifically, the public could submit comments related to the Scoping Public Workshops from March 16, 2018 to May 1, 2018, the Preliminary Alternatives Public Workshops from July 17, 2018 to August 27, 2018, and the Alternatives Retained for Detailed Study (ARDS) Public Workshops from April 11, 2019 to June 14, 2019. Over 3,900 comment submissions were received during the Study comment periods and were organized into relevant comment themes and summarized respectively in the *Scoping Report*, the *Summary of July 2018 Alternatives Public Workshops*, and the *Summary of Public and Stakeholder Engagement for the Recommended ARDS* posted to the program website (https://495-270-p3.com /environmental/resources/). Comments received outside of the formal comment periods are continuously encouraged, accepted, reviewed, and recorded for the study record.

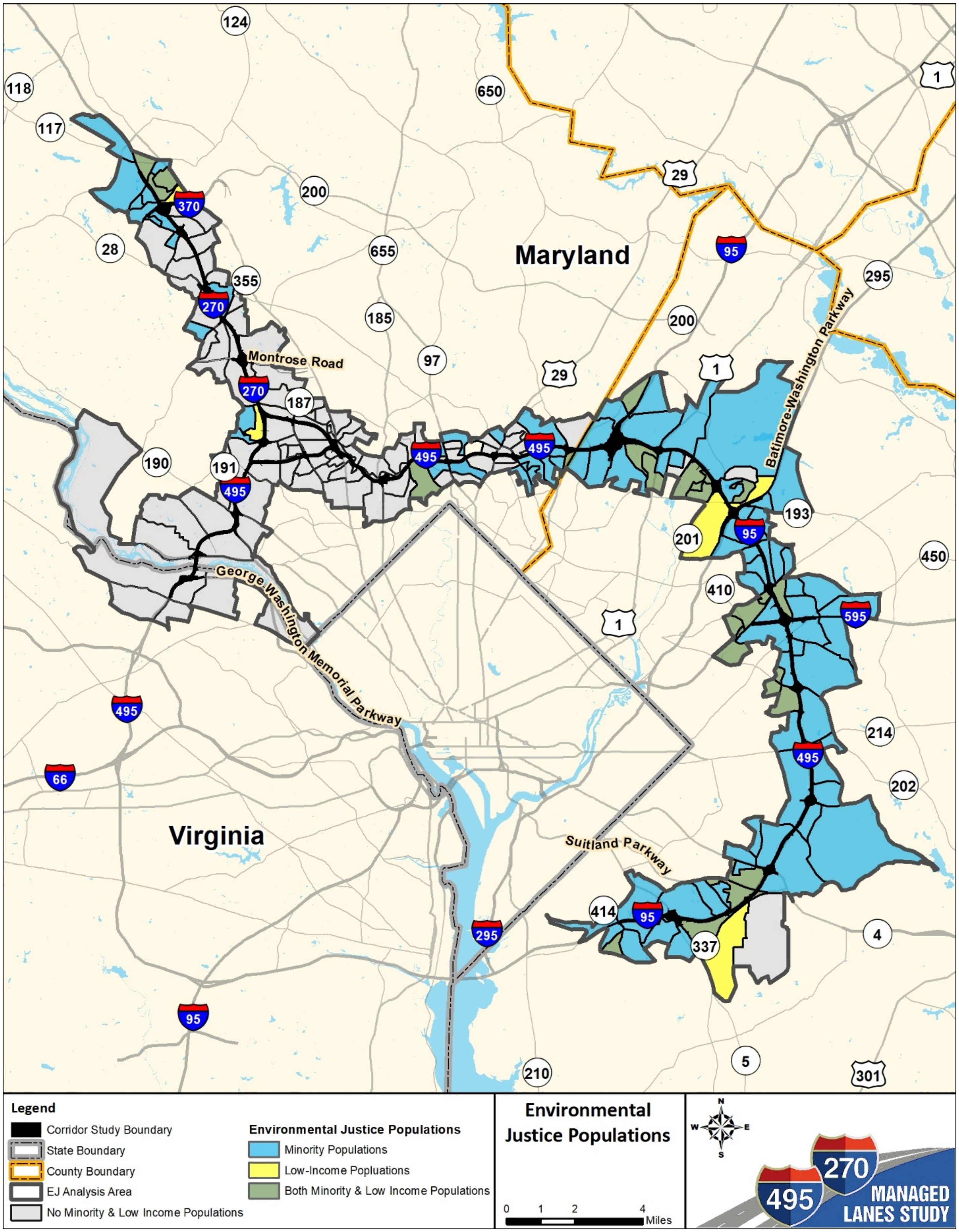
Some common themes emerged in the comments received at the Public Workshops:

- Acknowledgement of problems associated with congestion;
- Environmental considerations, such as natural resources, wildlife habitat, traffic noise levels and sound barriers, air quality, and quality of life;
- Support for transit;
- Bicycle and pedestrian interest, infrastructure, and safety;
- Questions or concerns about tolling;
- Support for additional HOV lanes;
- Concerns about utilizing private industry for public transportation improvements; and
- Public outreach and notification methodology.

7.2.2 Public Outreach with Environmental Justice Populations

An Environmental Justice (EJ) population is a population concentration of minority race and ethnicity individuals and/or low-income households that meets federal definitions. Through the EJ Analysis in the **Chapter 4, Section 21,** EJ populations have been identified along the study corridor and are shown in **Figure 7-1**.

Figure 7-1: EJ Populations along the Study Corridors



Providing full and fair access to meaningful involvement by low-income and minority populations in project planning and development is an important aspect of EJ. Meaningful involvement means the Lead Agencies invite participation from populations typically underrepresented, throughout all the project stages. Due to the highly diverse demographics composing the population adjacent to and using the study corridors, much of the corridor-wide public involvement efforts conducted for the Study were aimed at reaching this socioeconomically diverse audience.

Over 30 outreach events held between March 2018 and December 2019 were held or attended in communities that contain one or more EJ populations, in locations adjacent to EJ populations, or at events generally serving EJ populations along the study corridors. Refer to **Table 4-25** in **Chapter 4, Section 21.4** for a list of these outreach events and additional information on how public involvement efforts aimed to provide full and fair access to meaningful involvement by EJ populations in the Study process.

Based on initial low attendance at Prince George's County events and receipt of fewer public comments compared to Montgomery County, MDOT SHA reached out to the M-NCPPC Prince George's County Planning Department to enhance local engagement during the ARDS Public Workshop outreach campaign. Coordinated local outreach efforts with M-NCPPC Prince George's County Planning Department included, but were not limited to: distribution of the Public Workshops' announcement flyer via Office of Municipalities' community outreach database for display at 45 County community centers; distribution of the Public Workshops' announcement flyer via WMATA Office of Communications for their community update posting; and forwarding of study e-mail blasts to the Community Association database and Office of Planning database. Additional local outreach included distribution of Public Workshops' announcement flyer through Prince George's County Department of Public Works and Transportation e-mail blast; and distribution of Public Workshops' announcement flyer to several large places of worship along the study corridor, including First Baptist Church of Glenarden, the Collective Empowerment Group (an umbrella group for more than 300 churches in the County), Prince George's County Liaison for Faith Connections/Relationship Building, People's Community Baptist Church, Sanctuary at Kingdom Square, and the Transforming Neighborhoods Initiative.[1]

While study awareness, meeting attendance, and the volume of comments received was consistently strong in Montgomery County; additional outreach was conducted that included distribution of the Public Workshops' announcement flyer through the Montgomery County Department of Transportation email blasts.

To further enhance engagement of the Study's identified EJ populations and other underserved populations, and consistent with recommendations in NCHRP Report 710, *Practical Approaches for Involving Traditionally Underserved Populations in Transportation Decisionmaking*, demographic data was used to identify locations for targeted mailing outreach. These locations included EJ Analysis Area schools

[1] The Transforming Neighborhoods Initiative was an effort by Prince George's County to provide additional services and resources to six underserved communities within the County.

with above-average participation in the Free and Reduced-price Meals Program;[2] places of worship[3] in EJ Analysis Area Communities containing EJ populations; and all affordable-housing complexes[4] in the EJ Analysis Area. In early April 2019, an introductory cover letter asking recipients to display an enclosed Public Workshops' announcement flyer wherever community information is displayed was mailed to the 174 affordable-housing complexes, schools, and places of worship listed in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 4.2**). English and Spanish versions of the flyer were included with the cover letter.

7.2.3 Small-Scale Meetings and Outreach Events

The geographic scope of the study corridors has resulted in a wide variety of stakeholder interests across the region. Therefore, in addition to the Public Workshops, the I-495 & I-270 P3 Program Director, Deputy Director, and technical experts conducted meetings or conference calls with at least 114 community associations, elected officials and legislators, stakeholder organizations, and large, potentially-impacted landowners to present detailed Study information and hold question-and-answer sessions. To provide Study information and capture feedback on community interests and concerns, MDOT SHA staffed 14 several "pop-up" informational booths in Montgomery, Prince George's, and Frederick Counties. The pop-up/informational booth captured attention with project-branded tablecloth, and branded giveaways. The table contained informational boards, and project media which detailed the project scope and timelines. Refer to *the Public Involvement and Agency Coordination Technical Report* (**Appendix P, Sections 3.4 and 7.1**) for additional information on these meetings.

7.2.4 Public Hearings

MDOT SHA will continue to solicit public and agency feedback through a variety of methods as the Study is advanced. The public is invited to stay connected to the Study via the Program website (https://495-270-p3.com/), e-mail (MLS-NEPA-P3@mdot.maryland.gov), toll-free telephone (833-858-5960), and through signing up for the Study mailing list via the Study website.

After the release of the DEIS, Public Hearings will be held to obtain input and comments from the public on the results presented in this DEIS. All comments received during the associated comment period will be reviewed and considered, and all substantive comments will be formally responded to in the Final Environmental Impact Statement (FEIS).

[2] The MDOT SHA Office of Equal Opportunity collects public feedback surveys to ensure compliance with Title VI of the Civil Rights Act of 1964. Maryland State Department of Education (*Free and Reduced-Price Meal Statistics for School Year 2017-2018.* http://marylandpublicschools.org/programs/pages/school-community-nutrition/freereducedpricemealstatistics.aspx).

[3] Geographic Information Systems (GIS) data sourced from Maryland iMap (data.imap.maryland.gov/datasets/maryland-land-use-land-cover-land-use-land-cover-2010); Prince George's County Open Data Portal (gisdata.pgplanning.org/metadata/); Montgomery County Planning Department Open Data Portal (Montgomery County Planning Department. Open Data Portal). Corresponding mailing addresses gathered using Google Search.

[4] Sourced from Housing and Urban Development Multifamily Assistance & Section 8 Database, Montgomery County Housing Opportunities Commission, Prince George's County Housing Authority, and Fairfax County Redevelopment and Housing Authority websites. Corresponding mailing addresses gathered using Google Search.

MDOT SHA will perform extensive outreach to notify the public of the upcoming Public Hearings, including the location of the DEIS and Joint Permit Application[5] for public review. MDOT SHA's advertising approach to notify the public includes the following (note: due to COVID-19, these advertising approaches are subject to change):

- Press Release;
- Elected Official E-mail Blast;
- Program-wide E-mail Blast;
- Single-page flyer via US Mail;
- Newspaper Print Ads via:
  - *The Washington Post* Print Ad (Daily),
  - *Frederick News-Post* (Daily),
  - *Laurel Leader* (Thursday),
  - *Howard County Times* (Thursday),
  - *El Tiempo Latino* (Friday),
  - *Washington Hispanic* (Friday),
  - *Sun Gazette Fairfax* (Thursday),
  - *Fairfax County Times* (Friday),
  - *Prince George's Post* (Thursday),
  - *The Enquirer-Gazette* (Thursday);
- Single-page flyer in *The Washington Post* (Thursday);
- Radio Ads via (iHeart and TTWN);
- Pop-up Events at Transit Centers;
- Online Digital Ads with geographic and demographic programmatic targeting:
  - Washingtonpost.com,
  - WTOP.com,
  - DCBlack.com,
  - Afro.com,
  - Eltiempo.com,
  - Faifaxtimes.com;
- Facebook and Instagram;
- Media promotions (interviews, media kits, word-of-mouth, etc.);
- MDOT SHA News Release and Social Media Channels (Facebook, Twitter, etc.); and
- P3 Program Website (495-270-p3.com).

7.3 Agency Coordination

The FHWA and MDOT SHA actively engaged the Federal, state, regional, and local agencies, as well as the adjacent counties, Metropolitan Planning Organizations (MPO), and other stakeholders throughout the Study process, simultaneously with other public involvement efforts. At the initiation of the Study, an Agency Coordination Plan was developed. The plan facilitated the structured coordination with federal, state and local agencies to ensure participation in the Study, including the development of the Purpose

[5] State and federal permits are required for unavoidable impacts to wetlands, wetland buffers, waterways, and the FEMA 100-year floodplain from the I-495 & I-270 Managed Lanes Study. The federal permit decision for these impacts is required to be made within 90 days of the NEPA Record of Decision, per Executive Order 13807-One Federal Decision. The United States Army Corps of Engineers (USACE) and the Maryland Department of the Environment (MDE) are soliciting comments from the public; Federal, State, and local agencies; Native American Tribes; and other interested parties on the impacts as part of the permitting process.

and Need and the range of alternatives, as well as identification of environmental issues. This section categorizes agency coordination into three broad and concurrent efforts: Scoping engagement, Interagency Working Group (IAWG) meetings, and on-going regulatory and resource agency consultation. Additional detail on agency coordination is provided throughout the *Public Involvement and Agency Coordination Technical Report* (**Appendix P**).

7.3.1 Scoping Outreach

During the Scoping process, potential Cooperating, Participating, and Notified Agencies at the Federal, state, local, and regional levels were initially identified by FHWA and MDOT SHA, in accordance with 40 CFR 1501.6 and 23 U.S.C. § 139. The list of two Lead (Federal Agency and Local Project Sponsor), eight Cooperating, 18 Participating, and seven Notified agencies is provided in **Table 7-1**.

By e-mail, dated February 21, 2018, FHWA and MDOT SHA invited potential Cooperating and Participating Agencies to attend the kickoff Interagency Working Group (IAWG) meeting on March 14, 2018, initiating the Agency Scoping period and inviting input regarding IAWG coordination and the proposed schedule. Throughout the Study process as new information was received and the status of several agencies was revised, these changes were reflected in updates to the Agency Coordination Plan. Refer to *Public Involvement and Agency Coordination Technical Report* (**Appendix P, Chapter 2**) for additional information.

7.3.2 Interagency Working Group Meetings

IAWG Meetings were convened monthly, or as needed, by MDOT SHA and FHWA, and attended by the Cooperating and Participating Agencies and other notified agencies. IAWG Meetings focused on sharing and discussing information and seeking feedback from attendees on the Study approach and results of major study findings at key milestones. Key information discussed and shared at the IAWG meetings included Study process and schedule, methodologies and results from traffic analyses, review of existing environmental resources, development of alternatives, potential environmental and property impacts, permitting schedule, and avoidance, minimization and mitigation strategies. Throughout the Study, all Cooperating and Participating Agencies were encouraged to provide both data and comments to help support analyses and decision-making. Cooperating Agencies were requested to provide concurrence at certain milestones, as outlined in the Agency Coordination Plan, including Purpose and Need and Alternatives Retained for Detailed Study. A total of 12 IAWG meetings have been held since the Study initiation in March 2018. During development of this DEIS, monthly Study updates were emailed to the IAWG participants to keep the agencies up-to-date on the Study's progress. **Table 7-2** provides a summary of the IAWG meetings held to date for the Study. Additional details on the IAWG meetings are provided throughout the *Public Involvement and Agency Coordination Technical Report* (**Appendix P**).

Table 7-1: Lead, Cooperating, Participating, and Notified Agencies for the Study

Role	Federal Agencies	Maryland / State Agencies	Local Agencies and Regional Stakeholders
Lead Agency - As codified in 23 U.S.C. Section 139, manages the coordination process; prepares EIS; provides opportunity for public & participating/ cooperating agency involvement. Defined as the Department of Transportation (DOT) and, if applicable, any State or local governmental entity serving as a joint lead agency	• FHWA – Maryland Division	• MDOT SHA	
Local Project Sponsor - a State or local governmental entity receiving funds under 23 U.S.C. Section 139 for the project shall serve as a joint lead agency with the Department for purposes of preparing any environmental document under NEPA		• MDOT SHA	
Cooperating Agencies	• US Army Corps of Engineers (USACE), Baltimore District • US Environmental Protection Agency (EPA) • National Park Service (NPS) • National Capital Planning Commission (NCPC)	• MD Department of Environment (MDE) • Maryland Department of Natural Resources (MDNR) • Virginia DOT (VDOT)	• Maryland-National Capital Park and Planning Commission (M-NCPPC)
Participating Agencies	• Federal Transit Administration (FTA) • US Fish and Wildlife Service (USFWS) • Federal Railroad Administration (FRA - Amtrak) • National Oceanic and Atmospheric Administration (NOAA)- National Marine Fisheries Service (NMFS)	• Maryland Historical Trust (MHT) • Maryland Department of Planning (MDP) • MDOT Maryland Transit Administration (MTA) • MDOT Maryland Transportation Authority (MDTA) • Virginia Department of Historic Resources (VDHR)	• Prince George's County Department of Public Works and Transportation (DPW&T) • Montgomery County Department of Transportation

Role	Federal Agencies	Maryland / State Agencies	Local Agencies and Regional Stakeholders
	• US Department of Defense – Joint Base Andrews (JBA) • US Postal Service (USPS) • Natural Resources Conservation Service (NRCS) • US Navy • US Department of Agriculture Beltsville Agricultural Resources Center (USDA BARC) • US Coast Guard (USCG)	• Virginia Department of Conservation and Recreation (VDCR)	
Notified Agencies	• National Institute of Standards and Technology (NIST) • Federal Emergency Management Agency (FEMA) • Advisory Council on Historic Preservation (ACHP)	• Maryland Commission on Indian Affairs	• Frederick County • MWCOG TPB • WMATA

Table 7-2: Summary of Interagency Working Group (IAWG) Meetings

Meeting	Date/Timeframe	Public or Agencies Involved	Key Topic(s)
IAWG #1	March 14, 2018	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	Introduce study to agencies, including limits, IAWG framework, summary of preliminarily-identified needs.
IAWG #2	April 12, 2018	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	Present preliminary purpose and need, Agency Coordination Plan and Schedule, public scoping materials, and discuss status of Cooperating and Participating Agency Letter responses. **Cooperating and Participating Agency invitation acceptance due 4/23-4/26.**
IAWG #3	May 16, 2018	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	Summarize scoping meetings and comments; present environmental inventory; present full range of preliminary alternatives. **Concurrence on Agency Coordination Plan and Purpose and Need. Agency and public scoping period closes.**
IAWG #4	July 11, 2018	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	Present preliminary range of alternatives and screening criteria; present materials for July Preliminary Alternatives Public Workshops; present agency and public comments on Purpose and Need received post concurrence
IAWG #5	September 28, 2018	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	Agency Field Review/Tour of I-495 & I-270 within the study area and significant environmental resources.
IAWG #6	October 10, 2018	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	Present Issue Resolution Process, Executive Order 13807, summary of public comments from July Preliminary Alternatives Public Workshops; revisit IAWG Framework including purpose and protocol; discuss Issue Resolution Process; present list of permits/approvals for the Permitting Timetable.
IAWG #7	February 13, 2019	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	Present recommended Screened Alternatives
IAWG #8	March 13, 2019	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	Discuss agency comments on recommended Screened Alternatives; present public outreach approach for April and May Alternatives Retained for Detailed Study Public Workshops
IAWG #9	April 10, 2019	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	Present recommended Alternatives Retained for Detailed Study
IAWG #10	May 8, 2019	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	Discuss comments on recommended ARDS; present public comment themes received to-date.
IAWG #11	June 12, 2019	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	**Request verbal and written agency concurrence on ARDS;** present additional public comment themes received to-date (ARDS public comment period April 11th through June 14th)
IAWG #12	October 16, 2019	Lead, Cooperating, Participating Agencies and other Federal, state agencies and MPO	Discuss dropping of Alternative 5; present methodology and results of MD 200 Diversion Alternative analysis.

7.3.3 Regulatory and Resource Agency Consultation

Concurrent with the efforts described previously, consultation with regulatory and resource agencies with jurisdiction and/or special expertise over environmental resources potentially affected by the Study was conducted to discuss resource-based issues and to obtain their input on existing resources, potential impacts, avoidance, minimization and mitigation strategies. Resource-specific agency consultation is an ongoing effort that will continue through the FEIS and Record of Decision to the extent appropriate through development and will focus on impact avoidance and minimization strategies and mitigation opportunities for unavoidable impacts. Details on consultation and related correspondence are provided in the respective resource-specific technical reports appended to this DEIS and referenced below.

A. Natural Resource Agency Coordination

As documented in the *Natural Resources Technical Report* (**Appendix L**), permitting programs required agency consultation for a number of natural resource review processes, including:

- Jurisdictional Determination (JD);
- Permitting strategy;
- Avoidance, minimization, and mitigation;
- Wetland delineation; and
- Rare, Threatened, and Endangered (RTE) Species coordination.

Between April 2018 and May 2020, MDOT SHA has held 56 natural resources-related agency consultation office and field meetings with:

- FHWA
- US Army Corps of Engineers
- US Department of Agriculture- Beltsville Agricultural Research Center
- US Environmental Protection Agency
- National Park Service
- US Fish and Wildlife Service
- National Capital Planning Commission
- US Navy
- Maryland Department of Natural Resources
- Maryland Department of the Environment
- Maryland-National Capital Park and Planning Commission

B. Section 106 Agency Coordination

Volume 1 of the *Cultural Resources Technical Report* (**Appendix G**) documents agency consultation conducted in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 that considers the effects of the proposed action on historic properties. FHWA notified the Advisory Council on Historic Preservation (ACHP) of the Study on March 26, 2018, and the Section 106 process was initiated on April 12, 2018 with a letter to the MHT, the Virginia DHR, and other consulting parties. MDOT SHA met with MHT on April 18, 2018 to discuss the project, the APE, and the proposed Section 106 consultation process. Additional parties, including tribal, Federal, state, and local governments, were invited in 2018 and 2019 to participate as Section 106 consulting parties. Consulting parties have received and continue to receive Study cultural resources documents for review and comment. FHWA and MDOT SHA held three consulting parties' meetings, on May 3, 2018, November 13, 2018, and June 17, 2019. A fourth consulting parties meeting is anticipated in the summer of 2020. Note that Section 106 public involvement is being fulfilled through the same processes used for general public involvement and NEPA compliance. Refer to **Appendix G** for additional information on the Section 106 Coordination.

C. Section 4(f) Agency Coordination

Section 4(f) of the US Department of Transportation Act of 1966 mandates that use of a publicly-owned park, recreation area, wildlife/waterfowl refuge, or historic site for a transportation project cannot be approved unless certain conditions are applied. Section 4(f) regulations require the *Draft Section 4(f) Evaluation* be made available for coordination and comment to officials with jurisdiction over the Section 4(f) resource and to the USDA and the Department of Housing and Urban Development (HUD) (23 C.F.R. §774.5). Between March 2018 and May 2020, MDOT SHA has conducted conference calls, meetings, and field reviews with or sent letters to the following agencies with jurisdiction over parkland along the study corridors: NPS, M-NCPPC- Montgomery County, M-NCPPC- Prince George's County, National Capital Planning Commission, City of Rockville, City of Gaithersburg, City of Greenbelt, City of New Carrollton, and Montgomery County Department of Education. FHWA and MDOT SHA have also held meetings and coordinated with the agencies with jurisdiction over historic sites, including NPS, the ACHP, MHT, and the Virginia DHR. Coordination with USDA and HUD is ongoing; the USDA is a participating agency under NEPA and MDOT SHA has notified HUD via letter of the Draft Section 4(f) Evaluation for the MLS. Details on ongoing official with jurisdiction consultation under Section 4(f) are provided in *of the Draft Section 4(f) Evaluation* (**Appendix F, Section 6**).

7.4 Incorporation of Public and Agency Input into the Study

In response to comments received through the public and agency engagement processes conducted up to this point, MDOT SHA and FHWA enhanced the Study and included many additional elements for review in this DEIS:

Purpose and Need:

- Amended to include *enhance existing and planned multimodal mobility and connectivity* in the purpose statement;
- MDOT SHA committed to working in good faith with its regulatory agency partners to plan worthwhile mitigation based on identified priorities that would, at a minimum, bring no net loss to impacted resources with a goal of net benefit.

Alternatives:

- Retained alternatives that support high occupancy vehicle travel (Alternatives 8, 10, and 13C); retained alternatives that support no toll for eligible high occupancy vehicles (Alternatives 9M, 9, and 13B).
- Allowed free bus usage of all Build Alternatives.
- Developed a Transit Work Group to further explore opportunities for new or expanded transit service on managed lanes.

- Included additional direct access that would support direct and indirect access to transit stations and transit-oriented development; added direct access in Equity Emphasis Areas; modified direct access to support priority development and facilities including the University of Maryland (UMD) Capital Region Medical Center/downtown Largo redevelopment in Prince George's County and the new Federal Drug Administration (FDA) center in Montgomery County.

- Committed to constructing a shared-use path on the south side of a new American Legion Bridge to support pedestrian and bicycle connectivity, regardless of the build alternative.

- Analyzed two new alternatives to the same level as the Screened Alternatives to identify opportunities to avoid or minimize sensitive environmental resources and property relocations (MD 200 Diversion Alternative and Alternative 9 Modified). Refer to **Chapter 2, Section 2.5.3** and *Alternatives Technical Report* (**Appendix B**).

Environmental and Property Impacts

- Incorporated a closed roadway section with retaining walls where feasible to avoid and minimize environmental and property impacts.

- Included underground stormwater management vaults to avoid and minimize environmental and property impacts.

- Removed the existing Collector-Distributor system on I-270 to largely stay within the existing roadway footprint on I-270 to avoid and minimize environmental and property impacts.

- Reconfigured direct access ramps and designed signage at the George Washington Memorial Parkway and the Baltimore Washington Parkway to reduce visual intrusions to these important historic parkways.

- Removed or relocated stormwater management facilities from sensitive resources including parks, where feasible.

- Shifted I-495 and added retaining walls to eliminate the need to relocation Rock Creek thus significantly reducing park, stream, and wetland impacts.

8 LIST OF PREPARERS

This Draft EIS was prepared by FHWA and MDOT SHA with assistance from technical professionals. Key preparers of this document are included below.

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Tracy Seymour	BS Civil Engineering	Noise
WILSON T. BALLARD COMPANY		
Dale Topper	AA Engineering	Concept Development
WRA		
Melanie Ernest	BS Civil Engineering	Traffic

9 DISTRIBUTION LIST

9.1 Federal Agencies

Advisory Council on Historic Preservation
Department of Defense, Joint Base Andrews
Federal Emergency Management Agency Region III
Federal Highway Administration
Federal Railroad Administration
Federal Transit Administration, Region 3
General Services Administration
National Capital Planning Commission
National Institute of Standards & Technology, Office of Facilities and Property Management
National Marine Fisheries Service, Greater Atlantic Regional Office
National Oceanic Atmospheric Administration
National Park Service, National Capital Regional Office
Naval Support Activity Bethesda
US Army Corps of Engineers, Baltimore District
US Coast Guard
US Department of Agriculture
US Department of Housing and Urban Development
US Department of the Interior, Office of Environmental Policy & Compliance
US Environmental Protection Agency, Region 3
US Postal Service, Westlake Carrier Annex Post Office/Capital Heights Post Office
US Fish and Wildlife Service, Chesapeake Bay Field Office

9.2 Federally Recognized Tribes

Absentee-Shawnee Tribe of Oklahoma
Delaware Nation
Delaware Tribe of Indians
Chickahominy Indian Tribe
Chickahominy Indians Eastern Division
Eastern Shawnee Tribe of Oklahoma
Monacan Indian Nation
Nansemond Indian Tribe
Oneida Indian Nation
Onondaga Nation
Pamunkey Indian Tribe
Rappahannock Tribe, Inc.
Saint Regis Mohawk Tribe
Seneca-Cayuga Nation
Shawnee Tribe
Tuscarora Nation
Upper Mattaponi Indian Tribe

9.3 State of Maryland Agencies

Maryland Department of Business and Economic Development

Maryland Department of the Environment, Wetlands and Waterways Program
Maryland Department of Natural Resources
Maryland Department of Planning Clearinghouse
Maryland Department of Transportation, Maryland Transit Administration
Maryland Department of Transportation, Maryland Transportation Authority
Maryland Department of Transportation, Office of Planning & Capital Programming
Maryland Historical Trust

9.4 Commonwealth of Virginia Agencies

Virginia Department of Conservation and Recreation
Virginia Department of Environmental Quality, Office of Environmental Impact Review
Virginia Department of Forestry
Virginia Department of Game and Inland Fisheries
Virginia Department of Health
Virginia Department of Historic Resources
Virginia Department of Transportation, Northern Virginia District
Virginia Marine Resources Commission

9.5 State Recognized and Other Tribal Groups

Piscataway Conoy Tribe of Maryland (PCT)
PCT - Cedarville Band of Piscataway
PCT - Choptico Band of Piscataway
Piscataway Conoy Confederacy and Subtribes of Maryland
Piscataway Indian Nation

9.6 County and Local Agencies

City of College Park
City of Gaithersburg
City of Greenbelt
City of New Carrollton
City of Rockville
Maryland-National Capital Park and Planning Commission, Montgomery County Department of Parks
Maryland-National Capital Park and Planning Commission, Montgomery County Planning Board
Maryland-National Capital Park and Planning Commission, Montgomery County Planning Department
Maryland-National Capital Park and Planning Commission, Prince George's County Parks and Recreation
Maryland-National Capital Park and Planning Commission, Prince George's County Planning Board
Maryland-National Capital Park and Planning Commission, Prince George's County Planning Department
Maryland-National Capital Park Police, Montgomery County
Maryland-National Capital Park Police, Prince George's County
Metropolitan Washington Council of Governments, Department of Environmental Programs
Montgomery County, Department of Transportation
Montgomery County Executive's Office
Prince George's County Department of Public Works and Transportation
Prince George's County Executive's Office
Washington Metropolitan Area Transit Authority

9.7 DEIS Availability

The DEIS and technical reports can be viewed and downloaded from the project website at: https://495-270-p3.com/DEIS/. Hard copies of the DEIS are available for review at public locations. Visit the project website to find where hard copies of the DEIS are available due to the uncertainties related to COVID-19.

10 REFERENCES

7 Code of Federal Regulations (CFR) § 658.2. *Farmland Protection Policy Act*.

23 Code of Federal Regulations (CFR) § 772. *Procedures for Abatement of Highway Traffic Noise and Construction Noise.*

23 Code of Federal Regulations (CFR) § 774.3(a, b, c). *Section 4(f) Approvals*.

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