

I-495 & I-270 MANAGED LANES STUDY

FINAL ENVIRONMENTAL IMPACT
STATEMENT AND
FINAL SECTION 4(f) EVALUATION

June 2022



STATE HIGHWAY
ADMINISTRATION



I-495 & I-270 MANAGED LANES STUDY

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

FINAL ENVIRONMENTAL IMPACT STATEMENT and FINAL 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, Maryland Department of Environment
Virginia Department of Transportation, and Maryland-National Capital Park and Planning Commission

06/07/2022

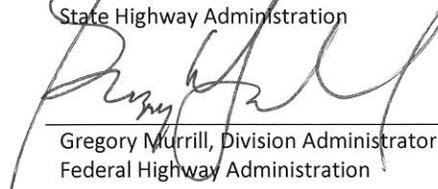
Date of Approval



Tim Smith, P.E., Administrator
Maryland Department of Transportation
State Highway Administration

6/7/2022

Date of Approval



Gregory Murrill, Division Administrator
Federal Highway Administration

The following persons may be contacted for additional information concerning this document:

Mr. Jeffrey T. Folden, P.E., DBIA
Maryland Department of Transportation,
State Highway Administration, I-495 & I-270 P3 Office
707 North Calvert Street, Mail Stop P-601
Baltimore, MD 21202
410-637-3320

Mr. Jitesh Parikh
Federal Highway Administration
George H. Fallon Building
31 Hopkins Plaza, Suite 1520
Baltimore, Maryland 21201
410-962-4440

This Final Environmental Impact Statement (FEIS) has been prepared in accordance with 23 CFR 771.125 and presents the final analyses completed for the Preferred Alternative, design refinements since the Supplemental Draft Environmental Impact Statement (SDEIS), as well as responses to comments on the Draft Environmental Impact Statement (DEIS) and SDEIS. The Preferred Alternative focuses on constructing two high-occupancy toll (HOT) managed lanes in each direction on I-495 from the George Washington Memorial Parkway in Virginia to west of MD 187 on I-495, including the American Legion Bridge, and on I-270 from I-495 to north of I-370 and on the I-270 east spur from east of MD 187 to I-270. No action or no improvements are proposed east of the I-270 East Spur as part of the Preferred Alternative. The FEIS responds to the over 5,000 public and agency comments received on the DEIS and SDEIS. The FEIS includes the results of the final analyses of environmental impacts based on extensive avoidance and minimization efforts and presents final mitigation and commitments for unavoidable impacts.



I-495 & I-270 Managed Lanes Study

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

June 2022



U.S. Department
of Transportation

**Federal Highway
Administration**

M&D MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

TABLE OF CONTENTS

EXECUTIVE SUMMARY ES-1

1 PURPOSE AND NEED1-1

1.1 Background and Context.....1-1

1.2 Purpose and Need.....1-2

1.3 Accommodate Existing Traffic and Long-Term Traffic Growth.....1-3

1.3.1 Population and Employment Growth1-3

1.3.2 Traffic Growth1-4

1.4 Enhance Trip Reliability.....1-6

1.5 Provide Additional Roadway Travel Choices.....1-7

1.6 Accommodate Homeland Security1-8

1.7 Improve Movement of Goods and Services.....1-9

1.7.1 Movement of Freight Goods.....1-9

1.7.2 Movement of Commuting Employees1-11

1.8 Other Goals and Objectives1-11

1.8.1 Incorporate Alternative Funding Sources to Achieve Financial Viability1-11

1.8.2 Environmental Responsibility1-13

2 ALTERNATIVES DEVELOPMENT AND EVALUATION2-1

2.1 Preliminary Alternatives2-2

2.2 Screening Criteria.....2-4

2.3 Screened Alternatives2-5

2.4 Alternatives Retained and Evaluated in DEIS.....2-6

2.5 Identification of Preferred Alternative2-7

3 PREFERRED ALTERNATIVE3-1

3.1 Elements of the Preferred Alternative.....3-2

3.1.1 Alignment and Cost.....3-3

3.1.2 Limit of Disturbance3-5

3.1.3 Interchanges and HOT Managed Lanes Access.....3-7

3.1.4 Transit-Related Elements.....3-12

3.1.5 Pedestrian and Bicycle Facilities3-13

3.1.6 Stormwater Management Considerations3-14

3.1.7 Cross Culverts.....3-21

3.1.8 Construction and Short-term Effects.....3-22

- 3.1.9 Tolling..... 3-25
- 3.2 Transportation Commitments 3-28
 - 3.2.1 Transit 3-28
 - 3.2.2 Pedestrian and Bicycle Facilities 3-29
- 3.3 Phase 1 P3 Agreement and Predevelopment Work 3-30
 - 3.3.1 Selection of the Phase Developer 3-31
 - 3.3.2 NEPA and the Developer Work Together 3-31
- 3.4 Economic Benefits of Managed Lanes and the Preferred Alternative..... 3-32
- 4 TRANSPORTATION AND TRAFFIC 4-1**
 - 4.1 Introduction 4-1
 - 4.1.1 Traffic Analysis Data Collection and Modeling Methodology..... 4-2
 - 4.1.2 Traffic Analysis Area..... 4-3
 - 4.1.3 Traffic Modeling Assumptions 4-3
 - 4.2 Forecasting..... 4-8
 - 4.2.1 Baseline Conditions..... 4-8
 - 4.2.2 2045 Volumes 4-9
 - 4.3 Traffic Analysis for No Build and Preferred Alternatives 4-9
 - 4.3.1 Delay 4-10
 - 4.3.2 Travel Time..... 4-10
 - 4.3.3 Speed..... 4-12
 - 4.3.4 Level of Service 4-14
 - 4.3.5 Throughput 4-15
 - 4.3.6 Local Network 4-15
 - 4.3.7 Summary 4-17
 - 4.4 MDOT SHA’s Draft Application for Interstate Access Point Approval 4-18
 - 4.4.1 Operations of Interchanges, Cross Streets and Termini 4-18
 - 4.4.2 Safety Evaluation..... 4-19
 - 4.5 COVID-19 Considerations and Plan Results 4-20
 - 4.5.1 Monitoring 4-20
 - 4.5.2 Research..... 4-22
 - 4.5.3 Sensitivity Analysis 4-24
- 5 ENVIRONMENTAL RESOURCES, CONSEQUENCES & MITIGATION 5-1**
 - 5.1 Land Use and Zoning, Planning and Development 5-5

- 5.1.1 Introduction5-5
- 5.1.2 Affected Environment.....5-6
- 5.1.3 Environmental Consequences.....5-9
- 5.2 Population and Demographics.....5-12
 - 5.2.1 Introduction5-12
 - 5.2.2 Affected Environment.....5-12
 - 5.2.3 Environmental Consequences.....5-14
- 5.3 Communities & Community Facilities.....5-14
 - 5.3.1 Introduction5-14
 - 5.3.2 Affected Environment.....5-15
 - 5.3.3 Environmental Consequences.....5-17
 - 5.3.4 Mitigation.....5-21
- 5.4 Parks and Recreational Facilities.....5-22
 - 5.4.1 Introduction5-22
 - 5.4.2 Affected Environment.....5-22
 - 5.4.3 Environmental Consequences.....5-22
 - 5.4.4 Mitigation.....5-31
- 5.5 Property Acquisitions.....5-36
 - 5.5.1 Introduction5-36
 - 5.5.2 Affected Environment.....5-36
 - 5.5.3 Environmental Consequences.....5-36
 - 5.5.4 Mitigation.....5-39
- 5.6 Visual and Aesthetic Resources5-39
 - 5.6.1 Introduction5-39
 - 5.6.2 Affected Environment.....5-41
 - 5.6.3 Environmental Consequences.....5-43
 - 5.6.4 Mitigation.....5-51
- 5.7 Historic Architectural and Archaeological Resources5-54
 - 5.7.1 Introduction5-54
 - 5.7.2 Affected Environment.....5-55
 - 5.7.3 Environmental Consequences.....5-59
 - 5.7.4 Mitigation.....5-65
- 5.8 Air Quality5-66

5.8.1 Introduction5-66

5.8.2 Affected Environment.....5-66

5.8.3 Environmental Consequences.....5-67

5.8.4 Mitigation.....5-71

5.9 Noise5-72

5.9.1 Introduction5-72

5.9.2 Affected Environment.....5-73

5.9.3 Environmental Consequences.....5-73

5.9.4 Mitigation.....5-74

5.9.5 Statement of Likelihood.....5-74

5.10 Hazardous Materials5-77

5.10.1 Introduction5-77

5.10.2 Affected Environment.....5-78

5.10.3 Environmental Consequences.....5-78

5.10.4 Mitigation.....5-80

5.11 Topography, Geology, and Soils.....5-80

5.11.1 Introduction5-80

5.11.2 Affected Environment.....5-80

5.11.3 Environmental Consequences.....5-80

5.11.4 Mitigation.....5-82

5.12 Waters of the US and Waters of the State, Including Wetlands.....5-82

5.12.1 Introduction5-82

5.12.2 Affected Environment.....5-83

5.12.3 Environmental Consequences.....5-83

5.12.4 Mitigation.....5-85

5.13 Watersheds and Surface Water Quality5-92

5.13.1 Introduction5-92

5.13.2 Affected Environment.....5-92

5.13.3 Environmental Consequences.....5-93

5.13.4 Mitigation.....5-100

5.14 Groundwater Hydrology5-101

5.14.1 Introduction5-101

5.14.2 Affected Environment.....5-102

5.14.3 Environmental Consequences.....5-102

5.14.4 Mitigation.....5-102

5.15 Floodplains.....5-102

5.15.1 Introduction5-102

5.15.2 Affected Environment.....5-103

5.15.3 Environmental Consequences.....5-103

5.15.4 Mitigation.....5-104

5.16 Vegetation and Terrestrial Habitat5-105

5.16.1 Introduction5-105

5.16.2 Affected Environment.....5-106

5.16.3 Environmental Consequences.....5-106

5.16.4 Mitigation.....5-108

5.17 Terrestrial Wildlife5-111

5.17.1 Introduction5-111

5.17.2 Affected Environment.....5-112

5.17.3 Environmental Consequences.....5-114

5.17.4 Mitigation.....5-115

5.18 Aquatic Biota.....5-115

5.18.1 Introduction5-115

5.18.2 Affected Environment.....5-116

5.18.3 Environmental Consequences.....5-118

5.18.4 Mitigation.....5-119

5.19 Rare, Threatened, and Endangered Species5-120

5.19.1 Introduction5-120

5.19.2 Affected Environment.....5-121

5.19.3 Environmental Consequences.....5-126

5.19.4 Mitigation.....5-128

5.20 Unique and Sensitive Areas5-129

5.20.1 Introduction5-129

5.20.2 Affected Environment.....5-129

5.20.3 Environmental Consequences.....5-130

5.20.4 Mitigation.....5-130

5.21 Environmental Justice (EJ) Analysis5-130

- 5.21.1 Environmental Justice Regulatory Context5-130
- 5.21.2 Environmental Justice Analysis Methodology5-132
- 5.21.3 Historical Context.....5-135
- 5.21.4 Existing Conditions of Environmental Justice Populations5-136
- 5.21.5 Public Outreach with Environmental Justice Populations5-146
- 5.21.6 Identification of Beneficial and Adverse Effects to Environmental Justice Populations5-152
- 5.21.7 Determination of whether Disproportionately High and Adverse Impacts would Occur to Environmental Justice Populations (Block Groups) under the Preferred Alternative5-161
- 5.22 Indirect and Cumulative Effects5-164
 - 5.22.1 Introduction5-164
 - 5.22.2 Affected Environment.....5-167
 - 5.22.3 Environmental Consequences.....5-171
- 5.23 Consequences of Construction5-179
 - 5.23.1 Visual and Aesthetic Resources5-180
 - 5.23.2 Hazardous Materials5-180
 - 5.23.3 Air Quality5-181
 - 5.23.4 Noise5-182
 - 5.23.5 Natural Resources5-182
- 5.24 Commitment of Resources5-183
 - 5.24.1 Irreversible and Irretrievable Commitment of Resources5-183
 - 5.24.2 Short-Term Effects/Long-Term Effects5-184
- 5.25 Permits, Approvals and Authorizations Required.....5-185
 - 5.25.1 Federal Cooperating Agency Authorizations5-185
 - 5.25.2 Permits and Approvals5-187
- 6 FINAL SECTION 4(F) EVALUATION6-1**
 - 6.1 Introduction6-1
 - 6.1.1 Purpose and Background6-2
 - 6.1.2 Description of Preferred Alternative.....6-2
 - 6.1.3 Changes Since the Draft Section 4(f) Evaluation, DEIS and SDEIS.....6-3
 - 6.2 Use of Section 4(f) Properties6-7
 - 6.2.1 De Minimis Impact6-8
 - 6.3 Officials with Jurisdiction6-8
 - 6.4 Section 4(f) Inventory6-9

- 6.4.1 Overview6-9
- 6.4.2 Section 4(f) Properties Avoided6-13
- 6.5 Avoidance Alternatives and Analysis6-14
- 6.6 All Possible Planning6-18
 - 6.6.1 Mitigation.....6-18
- 6.7 Least Overall Harm.....6-26
 - 6.7.1 Draft Section 4(f) Least Overall Harm Evaluation6-26
 - 6.7.2 Final Least Overall Harm Analysis6-27
- 6.8 Coordination6-28
- 6.9 Conclusion.....6-29
- 7 MITIGATION AND COMMITMENTS7-1**
 - 7.1 Introduction7-1
 - 7.2 Mitigation and Commitments.....7-4
 - 7.3 P3 Agreement Commitments7-22
- 8 PUBLIC INVOLVEMENT AND AGENCY COORDINATION8-1**
 - 8.1 Introduction8-1
 - 8.2 Public Involvement.....8-2
 - 8.2.1 DEIS Notice of Availability and Comment Period.....8-2
 - 8.2.2 SDEIS Notice of Availability and Comment Period.....8-4
 - 8.2.3 Public Outreach with Environmental Justice (EJ) Populations.....8-6
 - 8.2.4 Other Community Meetings and Stakeholder Outreach Events8-12
 - 8.3 Agency and Stakeholder Coordination8-15
 - 8.3.1 Natural Resource Agency Coordination.....8-21
 - 8.3.2 Section 106 Consultation8-24
 - 8.3.3 Section 4(f) Agency Coordination8-25
 - 8.4 Incorporation of Public and Agency Input into the Study.....8-26
- 9 DEIS AND SDEIS COMMENTS AND RESPONSES9-1**
 - 9.1 Introduction9-1
 - 9.2 Formal DEIS and SDEIS Comment Periods9-1
 - 9.2.1 DEIS Comments Received9-1
 - 9.2.2 SDEIS Comments Received9-2
 - 9.3 Responses to Common Theme Comments Received on the DEIS and SDEIS.....9-2
 - 9.3.1 Purpose and Need.....9-2
 - 9.3.2 Screening of Preliminary Alternatives.....9-8

9.3.3	Analysis of Alternatives Retained for Detailed Study	9-14
9.3.4	Resource Impacts Assessment Methodology and Level of Detail	9-21
9.3.5	P3 Program.....	9-63
9.3.6	Tolling.....	9-64
9.3.7	Public Involvement.....	9-68
9.3.8	Comments Concerning Resources Outside Phase 1 South Limits	9-71
10	LIST OF PREPARERS	10-1
11	DISTRIBUTION LIST.....	11-1
11.1	Federal Agencies	11-1
11.2	Federally Recognized Tribes	11-1
11.3	State of Maryland Agencies	11-1
11.4	Commonwealth of Virginia Agencies.....	11-2
11.5	State Recognized and Other Tribal Groups.....	11-2
11.6	County and Local Agencies	11-2
12	REFERENCES	12-1

LIST OF TABLES

Table 1-1:	Regional Population Growth.....	1-4
Table 1-2:	Regional Employment Growth.....	1-4
Table 1-3:	2017 and Projected 2045 No Build TTI for Most Congested Segments in AM Peak.....	1-7
Table 1-4:	2017 and Projected 2045 No Build TTI for Most Congested Segments in PM Peak.....	1-7
Table 3-1:	Interchange Improvements/HOT Managed Lane Access Locations under Preferred Alternative ..	3-9
Table 3-2:	Pedestrian and Bicycle Facilities in the Preferred Alternative.....	3-15
Table 3-3:	Stormwater Management Requirements for the Preferred Alternative.....	3-17
Table 3-4:	Stormwater Management Provided Under the Preferred Alternative.....	3-19
Table 3-5:	Preferred Alternative Compensatory SWM Potential	3-21
Table 3-6:	Compensatory SWM Potential Environmental Impacts	3-21
Table 3-7:	Approved Toll Rate Ranges, Soft Rate Caps, and Discounts (Free Passage) for Passenger Vehicle (2-axle) by Payment Type	3-27
Table 4-1:	Existing Average Daily Traffic (ADT)	4-8
Table 4-2:	2045 Average Daily Traffic (ADT)	4-9
Table 4-3:	2045 System-Wide Delay for Entire Study Area	4-10
Table 4-4:	2045 Travel Time Index (TTI) for Entire Study Area.....	4-10
Table 4-5:	2045 Travel Time Index (TTI) Results for General Purpose Lanes from VISSIM Model	4-11
Table 4-6:	2045 Average Speed – Entire Study Area	4-12
Table 4-7:	2045 Corridor Travel Speed (mph) Results from VISSIM Model.....	4-13
Table 4-8:	2045 Percent of Lane-Miles Operating at LOS F for Entire Study Area	4-14
Table 4-9:	2045 Vehicle Throughput at Key Locations	4-15
Table 4-10:	2045 Vehicle Throughput Results from VISSIM Model.....	4-16

Table 4-11: 2045 Local Network Results from MWCOG Model 4-17

Table 4-12: TTI Monitoring Summary 4-22

Table 4-13: 2045 Sensitivity Analysis - System-Wide Delay for Entire Study Area 4-25

Table 5-1: Summary of Quantifiable Impacts for the Preferred Alternative 5-4

Table 5-2: Land Use Permanently Converted to Transportation Right-of-Way for the Preferred Alternative within the CEA Analysis Area 5-11

Table 5-3: Property Impacts in CEA Analysis Area Communities..... 5-18

Table 5-4: Property Impacts to Community Facilities from the Preferred Alternative 5-21

Table 5-5: Potential Public Park Impacts (Acres) 5-23

Table 5-6: Summary of NPS Wetland and Floodplain Impacts on NPS Properties from the Preferred Alternative 5-25

Table 5-7: NPS Historic Park Properties with Adverse Effect..... 5-25

Table 5-8: RTE Plant Species Surveyed within the Potomac River Gorge Portion..... 5-26

Table 5-9: Surveyed Trees on NPS Properties and Impacts from the Preferred Alternative..... 5-27

Table 5-10: Summary of Impacts from the Preferred Alternative to Park Property Acquired..... 5-30

Table 5-11: M-NCPPC Parkland and Resource Impacts (Acres) 5-33

Table 5-12: City of Rockville Parkland and Resource Impacts (Acres) 5-34

Table 5-13: City of Gaithersburg Parkland and Resource Impacts (Acres) 5-35

Table 5-14: Summary of Property Acquisitions and Impacts from the Preferred Alternative 5-37

Table 5-15: Property Impacts by Geographic Area 5-38

Table 5-16: Historic Architectural Properties within the APE for the Preferred Alternative..... 5-56

Table 5-17: Known Eligible Archaeological Resources within the APE of the Preferred Alternative 5-58

Table 5-18: Historic Architectural Properties with Adverse Effect 5-59

Table 5-19: Archaeological Resources with a Known Adverse Effect..... 5-63

Table 5-20: Summary of Noise Sensitive Area (NSA) Impacts and 5-75

Table 5-21: Sites of Potential Concern Summary 5-78

Table 5-22: Impact to Soils by Type in Acres 5-81

Table 5-23: Impacts to Steep Slopes and Highly Erodible Soils in Acres..... 5-82

Table 5-24: Summary of Impacts to USACE/MDE Wetlands and Waterways within the Preferred Alternative LOD..... 5-84

Table 5-25: Summary of Impacts to Wetland Buffers by Classification..... 5-84

Table 5-26: Summary of Delineated NPS Wetland Features and Impacts on NPS Properties within the Preferred Alternative LOD 5-86

Table 5-27: Maryland Wetland and Stream Mitigation Requirements 5-89

Table 5-28: Preferred Alternative Mitigation Sites and Credits..... 5-90

Table 5-29: Summary of Impacts to Waterways by Classification within USGS HUC8 Watersheds..... 5-94

Table 5-30: Summary of Impacts to Wetlands and Waterways by Classification within MD 8-Digit Watersheds 5-94

Table 5-31: Impacts to Wetland Buffers by Classification within MD 8-Digit Watersheds 5-95

Table 5-32: Summary of Impacts to Wetlands and Waterways by Classification 5-95

Table 5-33: Summary of Impacts to Wetland Buffers by Classification within MD 12-Digit Watersheds..... 5-96

Table 5-34: Additional Impervious Surfaces by MD 12-Digit Watersheds..... 5-99

Table 5-35: Additional Impervious Surface by MD 8-Digit Watersheds 5-99

Table 5-36: Waterways and Associated Floodplains within the Preferred Alternative LOD5-103

Table 5-37: Impacts to FEMA 100-Year Floodplain in Acres5-104

Table 5-38: Impacts to Forests in Acres within the Preferred Alternative LOD.....5-107

Table 5-39: NPS Tree Survey Results and Impacts on NPS Properties.....5-107

Table 5-40: M-NCPPC Tree Survey Results and Impacts on M-NCPPC Properties5-107

Table 5-41: Impacts to Potential FIDS Habitat Within the Preferred Alternative LOD in Acres5-115

Table 5-42: Summary of Aquatic Habitat Ranking Results by Watershed5-117

Table 5-43: Summary of Benthic Macroinvertebrate Scores and Ranking Results by Watershed.....5-117

Table 5-44: Summary of Fish IBI Scores and Ranking Results by Watershed5-117

Table 5-45: RTE Plant Species Surveyed within the Potomac River Gorge Portion5-123

Table 5-46: SSPRA Impact Acreage within the Preferred Alternative LOD5-128

Table 5-47: Impacts to Unique and Sensitive Areas (acres).....5-130

Table 5-48: HUD 2019 Low-Income Limit for the Washington-Arlington-Alexandria, DC-VA-MD FMR Area5-135

Table 5-49: Total Environmental Justice Populations (Block Groups)5-137

Table 5-50: Environmental Justice Working Group Meetings and Coordination5-149

Table 5-51: Comparison of Effects to EJ Populations versus Non-EJ Populations5-153

Table 5-52: ICE Analysis Data Sources and Methodology.....5-167

Table 5-53: Indirect Effects in the ICE Analysis Area5-175

Table 5-54: Cumulative Effects in the ICE Analysis Area.....5-178

Table 5-55: Permits and Approvals.....5-188

Table 6-1: Comparison of Total Section 4(f) Impacts for Study Milestones6-4

Table 6-2: Comparison of DEIS, SDEIS and Final Section 4(f) Evaluation Impacts6-5

Table 6-3: Summary of Section 4(f) Property Use6-9

Table 6-4: Avoided Section 4(f) Use by the Preferred Alternative6-13

Table 6-5: Avoidance Alternatives6-15

Table 6-6: Least Overall Harm Analysis.....6-30

Table 8-1: SDEIS Viewing Locations8-5

Table 8-2: EJ Working Group Meetings and Coordination8-10

Table 8-3: Additional EJ Engagement8-11

Table 8-4: Stakeholder and Community Meetings Since Publication of the DEIS8-13

Table 8-5: Agency & Stakeholder Coordination Meetings Post-DEIS Publication8-16

Table 8-6: IAWG Meetings Post-DEIS Publication.....8-20

Table 8-7: City of Rockville and City of Gaithersburg Meetings Post-DEIS Publication8-21

Table 8-8: Natural Resource Related Meetings Since Publication of the DEIS8-21

Table 8-9: Section 106 Consultation Meetings Post-DEIS Publication.....8-25

Table 9-1: Traffic Benefits of Preferred Alternative vs. No Build Alternative-Entire Study Area9-28

LIST OF FIGURES

Figure 1-1: I-495 & I-270 Managed Lanes Study Corridors – Preferred Alternative..... 1-2

Figure 1-2: Average Annual Daily Truck Traffic..... 1-10

Figure 1-3: Residents’ Home and Employment Commute Destinations 1-12

Figure 2-1: Alternatives Screening Process..... 2-2

Figure 3-1: I-495 & I-270 Managed Lanes Study Corridors – Preferred Alternative.....3-2

Figure 3-2: Alternative 9 - Phase 1 South Typical Sections (HOT Managed Lanes Shown in Yellow).....3-3

Figure 3-3: Operations & Maintenance Facility Location Map3-6

Figure 3-4: Example At-Grade Exchange Ramp Configuration3-7

Figure 3-5: Example Direct Access Interchange.....3-8

Figure 3-6: Proposed Preferred Alternative HOT Managed Lanes Access Locations3-11

Figure 4-1: Limits of VISSIM Model Network and Interchange Locations Included along I-495 and I-270.....4-4

Figure 4-2: Daily Traffic Volume Changes on I-495 and I-270 During COVID-19 Pandemic vs. 20194-21

Figure 4-3: VMT Growth Trends in Maryland (2007 – 2017).....4-23

Figure 5-1: Land Use within the CEA Analysis Area5-7

Figure 5-2: CEA Analysis Area Land Use Composition5-8

Figure 5-3: CEA Analysis Area Communities5-16

Figure 5-4: Proposed Rendering of the I-495 and George Washington Memorial Parkway Interchange.....5-45

Figure 5-5: Chesapeake and Ohio Canal National Historical Park & Clara Barton Parkway – Aerial View5-46

Figure 5-6: Chesapeake and Ohio Canal Towpath Rendering.....5-47

Figure 5-7: -495 Inner Loop Driver’s View Rendering – Looking North5-48

Figure 5-8: View from Existing Trail south of I-495 in Cabin John Stream Valley Park, Unit 2,5-49

Figure 5-9: Cabin John Regional Park.....5-50

Figure 5-10: Existing and Proposed Views from Morningstar Tabernacle No.88 Moses Hall and Cemetery5-53

Figure 5-11: Preferred Alternative Wetland and Stream Mitigation Sites5-91

Figure 5-12: EJ Populations Adjacent to the Preferred Alternative LOD5-138

Figure 5-13: Maryland EJSCREEN EJScore for Census Tracts in the Analysis Area.....5-143

Figure 5-14: Overall ICE Analysis Boundary5-166

Figure 5-15: Maryland Smart Growth Priority Funding Areas5-172

Figure 5-16: Projected Population Growth 2015-2045 by TAZ within the ICE Analysis Area5-173

Figure 5-17: Projected Employment Growth 2015-2045 by TAZ within the ICE Analysis Area5-174

Figure 6-1: I-495 & I-270 Managed Lanes Study Corridors – Preferred Alternative.....6-3

Figure 6-2: Inventory of Section 4(f) Properties (Map 1 of 2).....6-11

Figure 6-3: Inventory of Section 4(f) Properties (Map 2 of 2).....6-12

Figure 8-1: EJ Populations along the Study Corridors.....8-8

LIST OF APPENDICES

- A. FINAL TRAFFIC ANALYSIS TECHNICAL REPORT
- B. MDOT SHA'S DRAFT APPLICATION FOR INTERSTATE ACCESS POINT APPROVAL
- C. FINAL COVID-19 TRAVEL ANALYSIS & MONITORING PLAN
- D. COMPENSATORY STORMWATER MITIGATION PLAN
- E. ENVIRONMENTAL RESOURCES MAPPING
- F. FINAL COMMUNITY EFFECTS ASSESSMENT & ENVIRONMENTAL JUSTICE ANALYSIS TECHNICAL REPORT
- G. FINAL SECTION 4(F) EVALUATION
- H. FINAL VISUAL IMPACT ASSESSMENT

- I. FINAL CULTURAL RESOURCES TECHNICAL REPORT
- J. SECTION 106 PROGRAMMATIC AGREEMENT
- K. FINAL AIR QUALITY TECHNICAL REPORT
- L. FINAL NOISE ANALYSIS TECHNICAL REPORT
- M. FINAL NATURAL RESOURCES TECHNICAL REPORT
- N. FINAL AVOIDANCE, MINIMIZATION AND IMPACTS REPORT (AMR)
- O. FINAL COMPENSATORY WETLANDS AND WATERWAYS MITIGATION PLAN
- P. JOINT PERMIT APPLICATION
- Q. FINAL INDIRECT AND CUMULATIVE EFFECTS TECHNICAL REPORT
- R. FINAL PUBLIC INVOLVEMENT AND AGENCY COORDINATION TECHNICAL REPORT
- S. SELECT AGENCY CORRESPONDENCE
- T. RESPONSES TO DEIS AND SDEIS COMMENTS
- U. ENVIRONMENTAL ASSESSMENT FORM

ABBREVIATIONS AND ACRONYMS

495 NEXT	Virginia Department of Transportation I-495 Express Lanes Northern Extension
AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway Transportation Officials
AC	Acres
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ADA	Americans with Disabilities Act
ADT	Annual Daily Traffic
ALB	American Legion Bridge
AME	African Methodist Episcopal
AMR	Avoidance, Minimization, and Impacts Report
APE	Area of Potential Effects
ARDS	Alternatives Retained for Detailed Study
ARPA	Archaeological Resource Protection Act
AST	Aboveground Storage Tank
AVE	Area of Visual Effect
BMP	Best Management Practice
BPW	Board of Public Works
BRT	Bus Rapid Transit
CAA	Clean Air Act
CAV	Connected and Automated Vehicle
CCA	Capper-Cramton Act
C-D	Collector-Distributor
CDP	Census Designated Place
CEA	Community Effects Assessment
CEEJH	Community Engagement, Environmental Justice, and Health

CEQ	Council on Environmental Quality
CFPP	Chesapeake Fish Passage Prioritization
CFR	Code of Federal Regulations
CFPP	Chesapeake Fish Passage Prioritization
CH ₄	Methane
CLRP	Constrained Long-Range Plan
CMP	Compensatory Mitigation Plan
CNE	Common Noise Environment
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
COMAR	Code of Maryland Regulations
C _{pv}	Channel Protection Volume
CSC	Customer Service Center
CTB	Consolidated Transportation Bonds
CWA	Clean Water Act
dB	Decibel
dba	A-weighted Decibel
DBE	Disadvantaged Business Enterprises
DBH	Diameter at Breast Height
DEIS	Draft Environmental Impact Statement
DOT	Department of Transportation
DPW&T	Department of Public Works & Transportation
DRPT	Department of Rail and Public
E&S	Erosion and Sediment Control
EA	Environmental Assessment
EDCs	Endocrine Disrupting Chemicals
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMS	Emergency Medical Services
EO	Executive Order
ESA	Environmental Site Assessment
ESD	Environmental Site Design
ETC	Electronic Toll Collection
ETL	Express Toll Lane
F&R	Free and Reduced-price
FCA	Forest Conservation Act
FCDPWES	Fairfax County Department of Public Works and Environmental Services
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency

FF	Functional Feet
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIDS	Forest Interior Dwelling Bird Species
FMR	Fair Market Ret
FPPA	Farmland Protection Policy Act
FSD	Forest Stand Delineation
FTA	Federal Transit Administration
FWCA	Fish and Wildlife Coordination Act
FY	Fiscal Year
GHG	Greenhouse Gases
GI	Green Infrastructure
GIA	Green Infrastructure Assessment
GIS	Geographic Information System
GP	General Purpose
GPR	Ground-penetrating Radar
GPS	Global Positioning System
GWMP	George Washington Memorial Parkway
H&H	Hydrologic and Hydraulic
HB	House Bill
HHS	Health and Human Services
HOA	Homeowners' Association
HOT	High-occupancy Toll
HOV	High-occupancy Vehicle
HSM	Highway Safety Manual
HUC	Hydrologic Unit Code
HUD	Housing and Urban Development
IAPA	Interstate Access Point Approval
IART	Impervious Area Requiring Treatment
IAT	Impervious Area Treatment
IAWG	Interagency Working Group
IB	Indiana Bat
IBI	Indices of Biological Integrity
ICC	Intercounty Connector
ICE	Indirect and Cumulative Effects
ICE	Infrastructure Carbon Estimator
ICM	Innovative Congestion Management
IPM	Integrated Pest Management
ISATe	Interchange Safety Analysis Tool
ISI	Institute for Sustainable Infrastructure
IWG	Interagency Working Group

JBA	Joint Base Andrews
JD	Jurisdictional Determination
JPA	Joint Permit Application
KLC	Keyes, Lethbridge, and Condon
LEP	Limited English Proficiency
LF	Linear Feet
LiDAR	Light Detection and Ranging
LOD	Limits of Disturbance
LOI	Lines of Investigation
LOS	Level of Service
LRP/VCP	Land Restoration Program/Voluntary Cleanup Program
LULC	Land Use/Land Cover
LUST	Leaking Underground Storage Tank
MARC	Maryland Area Regional Commuter
MBSS	Maryland Biological Stream Survey
MBTA	Migratory Bird Treaty Act
MCCC	Maryland Commission on Climate Change
MCDEP	Montgomery County Department of Environmental Protection
MCDOT	Montgomery County Department of Transportation
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MDOT SHA	Maryland Department of Transportation State Highway Administration
MDP	Maryland Department of Planning
MDSE	Maryland State Department of Education
MDTA	Maryland Transportation Authority
MEP	Maximum Extent Practicable
MERLIN	Maryland's Environmental Resources and Land Information Network
MHT	Maryland Historical Trust
MIHP	Maryland Inventory of Historic Properties
MLS	Managed Lanes Study
M-NCPPC	Maryland-National Capital Park and Planning Commission
MOU	Memorandum of Understanding
MPH	Miles per Hour
MPO	Metropolitan Planning Organization
MSATs	Mobile Source Air Toxics
MSDE	Maryland State Department of Education
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSMF	Maryland Stream Mitigation Framework Calculator
MTA	Maryland Transit Administration
MTCO _{2e}	Metric Tons per Carbon Dioxide Equivalent
MWAQC	Metropolitan Washington Air Quality Committee

MWCOG	Metropolitan Washington Council of Governments
MWG	Mitigation Working Group
N ₂ O	Nitrous Oxide
NAAQS	National Air Quality Standards
NAC	Noise Abatement Criteria
NB	Northbound
NCA	Neighborhood Conservation Area
NCPC	National Capital Planning Commission
NCR	National Capital Region
NCRTPB	National Capital Region Transportation Planning Board
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIST	National Institute of Standards and Technology
NLEB	Northern Long-eared Bat
NMFS	National Marine Fisheries Service
NNI	Non-native Invasive
NO ₂	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	Noise-sensitive Area
NTCHS	National Technical Committee for Hydric Soils
NWI	National Wetlands Inventory
NWPR	Navigable Waters Protection Rule
O ₃	Ozone
O&M	Operations and Maintenance
OFD	One Federal Decision
OWC	Organic Wastewater Contaminant
OWJ	Officials with Jurisdiction
P3	Public-Private Partnership
PA	Programmatic Agreement
Pb	Lead
PCB	Polychlorinated Biphenyl
PCT	Piscataway Conoy Tribe of Maryland
PEM	Palustrine Emergent
PFA	Priority Funding Areas
PFO	Palustrine Forested
PM	Particulate Matter

POI	Point of Investigation
POP	Persistent Organic Pollutant
PPCP	Pharmaceuticals and Personal Care Product
PPE	Personal Protective Equipment
PPM	Parts per Million
PSI	Preliminary Site Investigations
PSS	Palustrine Scrub-shrub
PTI	Planning Time Index
Q _p	Quantity Management
RBP	Rapid Bioassessment Protocol
RCRA	Resource Conservation and Recovery Act
RFP	Request for Proposals
RITIS	Regional Integrated Transportation Information System
ROD	Record of Decision
RPA	Resource Protection Areas
RTE	Rare, Threatened, and Endangered
SB	Southbound
SDEIS	Supplemental Draft Environmental Impact Statement
SDWA	Safe Drinking Water Act
SF	Square Feet
SFB	Small-footed Bat
SGCN	Species of Greatest Conservation Need
SO ₂	Sulfur Dioxide
SOF	Statement of Findings
SPA	Special Protection Area
SSPRA	Sensitive Species Project Review Areas
SVP	Stream Valley Park
SWAP	State Wildlife Action Plan
SWDA	Safe Drinking Water Act
SWM	Stormwater Management
TAZ	Traffic Analysis Zone
TCLP	Toxicity Characteristic Leaching Procedure
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
TPY	Tons per Year
TSM	Transportation System Management

TTI	Travel Time Index
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
UMD	University of Maryland
USDA	United States Department of Agriculture
USDOI	United States Department of the Interior
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USPS	United States Postal Service
UST	Underground Storage Tank
VAC	Virginia Administrative Code
VDCR	Virginia Department of Conservation and Recreation
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
VDHR	Virginia Department of Historic Resources
VDOE	Virginia Department of Education
VDOF	Virginia Department of Forestry
VDOT	Virginia Department of Transportation
VDWR	Virginia Department of Wildlife Resources
VMT	Vehicle Miles Traveled
VPDES	Virginia Pollutant Discharge Elimination System
WBFC	Washington Biologists' Field Club
WHS	Wildlife and Heritage Service
WMATA	Washington Metropolitan Area Transit Authority
WQ _v	Water Quality Volume
WQC	Water Quality Certification
WRAP	Wetland Restoration Action Plan
WSSC	Washington Suburban Sanitary Commission
WUS	Waters of the United States