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 permanent and temporary effects to those resources from the Preferred Alternative, and a preliminary assessment of measures to avoid, minimize, and mitigate unavoidable effects to those resources. This chapter follows the same format as the Draft Environmental Impact Statement (DEIS), Chapter 4 and is supported by the 19 DEIS Technical Reports which can be viewed through the following links on the program website:

DEIS, Chapter 4: https://495-270-p3.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf

The supporting DEIS, Technical Reports are available on the Program website: https://495-270-p3.com/deis/#DEIS

This Supplemental DEIS (SDEIS) Chapter includes the following updates:

- Updates on applicable resources related to the Preferred Alternative, Alternative 9 - Phase 1 South limits from George Washington Memorial Parkway to east of MD 187 and then on I-270 from I-495 to I-370 including the I-270 east spur from east MD 187 to I-270.
- The proposed effects, both permanent and temporary, from the Preferred Alternative.
- Updated agency coordination that has occurred since the DEIS related to further avoidance, minimization and mitigation of resources.

This SDEIS does not include final mitigation for the permanent and temporary impacts presented in chapter; it presents conceptual mitigation to the same level of detail as the DEIS. The final mitigation for unavoidable impacts is still being coordinated with the applicable resource and regulatory agencies and will be included in the FEIS.

This chapter provides an updated summary of existing resources, anticipated effects, and mitigation related to the Preferred Alternative. The results and analysis documented in the DEIS and the Study technical reports appended to the DEIS remain valid. Additional technical analyses and supporting documentation have been appended to support the SDEIS. All supporting documentation is cross-referenced throughout this chapter and available through the program website (https://495-270-p3.com/deis/).

Since the DEIS was published in July 2020, design has advanced (refer to **SDEIS, Chapter 2** for details). Permanent or long-term effects and temporary or short-term construction-related effects of the Preferred Alternative have been quantified. A summary of the permanent and temporary effects associated with the Preferred Alternative are shown in **Table 4-1**. The anticipated construction effects are discussed qualitatively throughout this chapter, in **Section 4.23** and in **Chapter 2, Section 2.3.4**.

Additional opportunities to avoid, minimize, and mitigate effects will be considered and the commitments will be documented in the Final Environmental Impact Statement (FEIS). All substantive comments received on the DEIS and SDEIS will be responded to in the FEIS.

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 (ALB) 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.

- ***Phase 1 South Limits*** were defined as the limits of the build improvements associated with the Preferred Alternative, Alternative 9 – Phase 1 South and includes two, new high-occupancy toll (HOT) managed lanes in each direction on I-495 from George Washington Memorial Parkway to east of MD 187 and then on I-270 from I-495 to I-370 including the I-270 east spur from east MD 187 to I-270.

- ***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. The corridor study boundary 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 established for the Preferred Alternative and includes two, new HOT managed lanes in each direction on I-495 from George Washington Memorial Parkway to east of MD 187 and then on I-270 from I-495 to I-370 including the I-270 east spur from east MD 187 to I-270. The LOD is the proposed boundary within which all mainline 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 (refer to **Chapter 2, Section 2.3.5**).

- ***Permanent impacts*** are defined as those impacts which result in long term or permanent change to the use of the land due to the Preferred Alternative. An acquisition of property in fee, a perpetual right of way easement or any other perpetual easement is considered as a permanent impact.

- ***Temporary impacts*** are those impacts that are short-term and related to the construction of the Preferred Alternative. Short-term, construction related work includes construction staging, material and equipment storage, construction easements, and other areas needed to support the construction, but not part of the long-term improvements. An acquisition of a short-term easement for construction related work is defined as a temporary impact.

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

Resource	Permanent[1]	Temporary[1]	Total[1]	Section Reference in Chapter 4
Total Potential Impacts to Park Properties (acres)	21.0	15.1	**36.1**	Section 4.4
Total Right-of-Way Required[2] (acres)	97.2	18.7	**115.9**	Section 4.5
Number of Properties Directly Affected (count)	-	-	**501**	Section 4.5
Number of Residential Relocations (count)	-	-	**0**	Section 4.5
Number of Business Relocations (count)	-	-	**0**	Section 4.5
Number of Historic Properties with Adverse Effect[3]	-	-	**11**	Section 4.7
Noise Sensitive Areas Impacted (count)	-	-	**49**	Section 4.9
Hazardous Materials Sites of Concern (count)	-	-	**255**	Section 4.10
Wetlands of Special State Concern	0	0	**0**	Section 4.12
Wetlands[4] (acres)	3.7	0.6	**4.3**	Section 4.12
Wetland 25-foot Buffer[4] (acres)	6.5	0.6	**7.1**	Section 4.12
Waterways[4] (square feet)	673,757	343,945	**1,017,702**	Section 4.12
Waterways[4] (linear feet)	43,852	2,701	**46,553**	Section 4.12
Tier II Catchments (acres)	0	0	**0**	Section 4.13
100-Year Floodplain (acres)	33.7	15.1	**48.8**	Section 4.15
Forest Canopy (acres)	479.6	20.3[5]	**500.1**	Section 4.16
Rare, Threatened and Endangered Species Habitat (acres)	33.4	23.0	**56.4**	Section 4.19
Sensitive Species Project Review Area (acres)	24.5	20.0	**44.5**	Section 4.19
Unique and Sensitive Areas (acres)	139.2	29.4	**168.5**	Section 4.20

Notes: The impacts in this table are for the mainline improvements for the Preferred Alternative. Any impacts associated with the compensatory stormwater management are preliminary and discussed in **SDEIS, Appendix C**.

[1] All values are rounded to the tenths place.

[2] The right-of-way is based on State records research and supplemented with county right-of-way, as necessary.

[3] Refer to Chapter 4, Section 4.7 for additional details on the effects to historic properties.

[4] Refer to Table 4-25, Section 4.12 for additional details on the impacts to wetlands and waterways.

[5]Temporary forest canopy impacts are cleared forest in areas that will not be permanently acquired or altered by roadway construction. Replanting will occur in these areas. Impacts will be avoided and minimized, and replanting will be maximized within the corridor as determined in final design.

4.1 Land Use and Zoning

4.1.1 Introduction

Local governments adopt plans and identify land use patterns and development goals in long-term comprehensive plans that are implemented through zoning codes. Zoning codes regulate the type and density of development that occurs within delineated land area. For details of the land use, zoning, and development patterns reviewed for the Study, as well as applicable federal and state regulations and methodology, refer to the **DEIS, Appendix E, Section 3.1** *Community Effects Assessment and Environmental Justice Analysis Technical Report* (https://495-270-p3.com/wp-content/uploads/2020/07/DEIS_AppE_CEA-EJ-Tech-Report_web.pdf).

4.1.2 Affected Environment

As documented in the DEIS, the existing land use conditions were identified through review of zoning designations because these data are consistently updated by municipalities. (Refer to **DEIS, Chapter 4, Section 4.1** and **DEIS, Appendix E, Section 3.1**) 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, 2021). All of this existing land use data was compared to the LOD of the Preferred Alternative for the SDEIS.

4.1.3 Environmental Consequences

The Preferred Alternative 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 roadway right-of-way, etc.) outside of the existing I-495 and I-270 highway footprint (**Table 4-2**).

Table 4-2: Conversion of Land Use Within the Preferred Alternative LOD (Acres)

Land Use	Perm[1]	Temp[1]	Total[1]
Transportation[2]	11.9	1.6	**13.5**
Residential	46.6	10.4	**57.0**
Planned Unit/ Planned Community	11.7	0.2	**11.9**
Park/Open Space	19.0	15.3	**34.2**
Mixed-Use	18.8	3.5	**22.3**
Industrial	2.6	0.0	**2.6**
Commercial/ Employment	3.1	0.1	**3.2**
TOTAL CHANGE IN LAND USE[3] (ACRES)	**113.6**	**31.2**	**144.8**

Notes: [1] All values are rounded to the tenths place.

[2]Transportation Land Use totals refer to transportation right-of-way outside of the existing I-495 & I-270 highway footprint, such as railway facilities, county right-of-way, and vegetated buffer zones.

[3]Total change in land use acreage differs from property acreage requirements in **Section 4.5** due to differences in GIS base layer boundaries. Property acreage requirements are calculated by applying the LOD over precise parcel/property line boundaries, while land use conversion acreage is calculated by applying the LOD over generalized land use/zoning boundaries.

Since the Preferred Alternative does not include any improvements east of MD 187, all residential and business displacements that were previously associated with the DEIS Build Alternatives have been avoided. The land use conversions under the Preferred Alternative 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. (Refer to **Section 4.5** for additional details on the property acquisitions associated with the Preferred Alternative.) The proposed expansion of the existing interstates under the Preferred Alternative would not be expected to result in a substantial land use change to the surrounding urbanized area within the Preferred Alternative LOD. The extent, pace, and location of development beyond the Preferred Alternative LOD would be influenced and controlled by the respective county land development policies and plans. The proposed improvements would accommodate future planned growth beyond the Preferred Alternative LOD; however, future growth is not dependent on these improvements. I-495 and I-270 would remain access-controlled under the Preferred Alternative LOD.

4.2 Demographics

4.2.1 Introduction

This Study evaluates potential changes to the demographics of the region. The population and demographic data from the US Census, 2015-2019 American Community Survey Five-Year Estimates was used in the DEIS and Community Effect Assessment. For details on the demographic data reviewed for the Study, as well as applicable federal and state regulations and methodology, refer to the **DEIS, Chapter 4,**

Section 4.2 and **DEIS, Appendix E, Section 3.2** *Community Effects Assessment and Environmental Justice Analysis Technical Report* (https://495-270-p3.com/wp-content/uploads/2020/07/DEIS_AppE_CEA-EJ-Tech-Report_web.pdf).

4.2.2 Affected Environment

The demographic data was presented in the **DEIS, Chapter 4, Section 4.2** and in **DEIS Appendix E, Section 3.2.1**. A review of the demographic data from the 2019 American Community Survey for 2015- 2019 will be reviewed and presented in the FEIS.

4.2.3 Environmental Consequences

The Preferred Alternative does not result in any full acquisitions or residential or business displacements. By providing additional roadway capacity through managed lanes, the Preferred Alternative, would accommodate increased traffic and congestion attributed to the projected regional population growth between 2010 and 2045. 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, and therefore, the Preferred Alternative would have a negligible impact to population growth or general demographics within the region. Those minimal demographic changes would be consistent with approved master plans and population growth projections associated with those plans.

4.3 Communities & Community Facilities

4.3.1 Introduction

For the DEIS, Census block groups were matched with the municipality or Census Designated Place in which they were primarily located to define the Analysis Area Communities. Similarly, for the SDEIS, impacts are being assessed based on the Analysis Area Communities that are located within or adjacent to the Preferred Alternative LOD. For details on the demographic data reviewed for the Study, as well as applicable federal and state regulations and methodology, refer to the **DEIS, Chapter 2, Section 4.3** and **DEIS, Appendix E, Section 3.2** *Community Effects Assessment and Environmental Justice Analysis Technical Report* (https://495-270-p3.com/wp-content/uploads/2020/07/DEIS_AppE_CEA-EJ-Tech-Report_web.pdf). A review of the demographic data from the 2015-2019 American Community Survey for 2015- 2019 will be reviewed and presented in the FEIS.

4.3.2 Affected Environment

Of the 36 Analysis Area Communities identified in the DEIS, seven (7) communities are located within or adjacent to the limits of the proposed build improvements in the Preferred Alternative LOD: Gaithersburg, Rockville, Bethesda, North Bethesda, Cabin John, and Potomac in Montgomery County, Maryland; and McLean in Fairfax County, Virginia. These Analysis Area Communities are shown in **Figure 4-1.**

4.3.3 Environmental Consequences

The Preferred Alternative requires property acquisition to accommodate the following Study elements: managed lanes, shoulders, traffic barrier, direct access at-grade auxiliary lanes or ramps, cut and fill slopes, stormwater management (SWM) facilities, retaining walls, and noise barriers along the existing highway corridor. Construction of the Preferred 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

described in **Section 4.9.3**. Impacts from the construction activities and operation of the Preferred Alternative on communities and community facilities are described below.

A. Communities

There are no residential or business relocations or displacements with the Preferred Alternative. As shown in **Table 4-3**, partial property impacts under the Preferred Alternative are dispersed throughout the seven Analysis Area Communities within the Preferred Alternative LOD.

Table 4-3: Property Impacts in Analysis Area Communities

Analysis Area Community	Number of Impacted Parcels[1]	Property Impacts (Acres)		
		Permanent[2]	Temporary[2]	Total[2]
Gaithersburg	18	4.7	0.0	**4.7**
Rockville	114	40.1	3.8	**44.0**
North Bethesda	143	16.6	2.2	**18.8**
Bethesda	101	7.6	1.9	**9.5**
Cabin John	28	6.6	2.0	**8.6**
Potomac	82	20.4	4.8	**25.2**
McLean	16	1.3	3.8	**5.0**

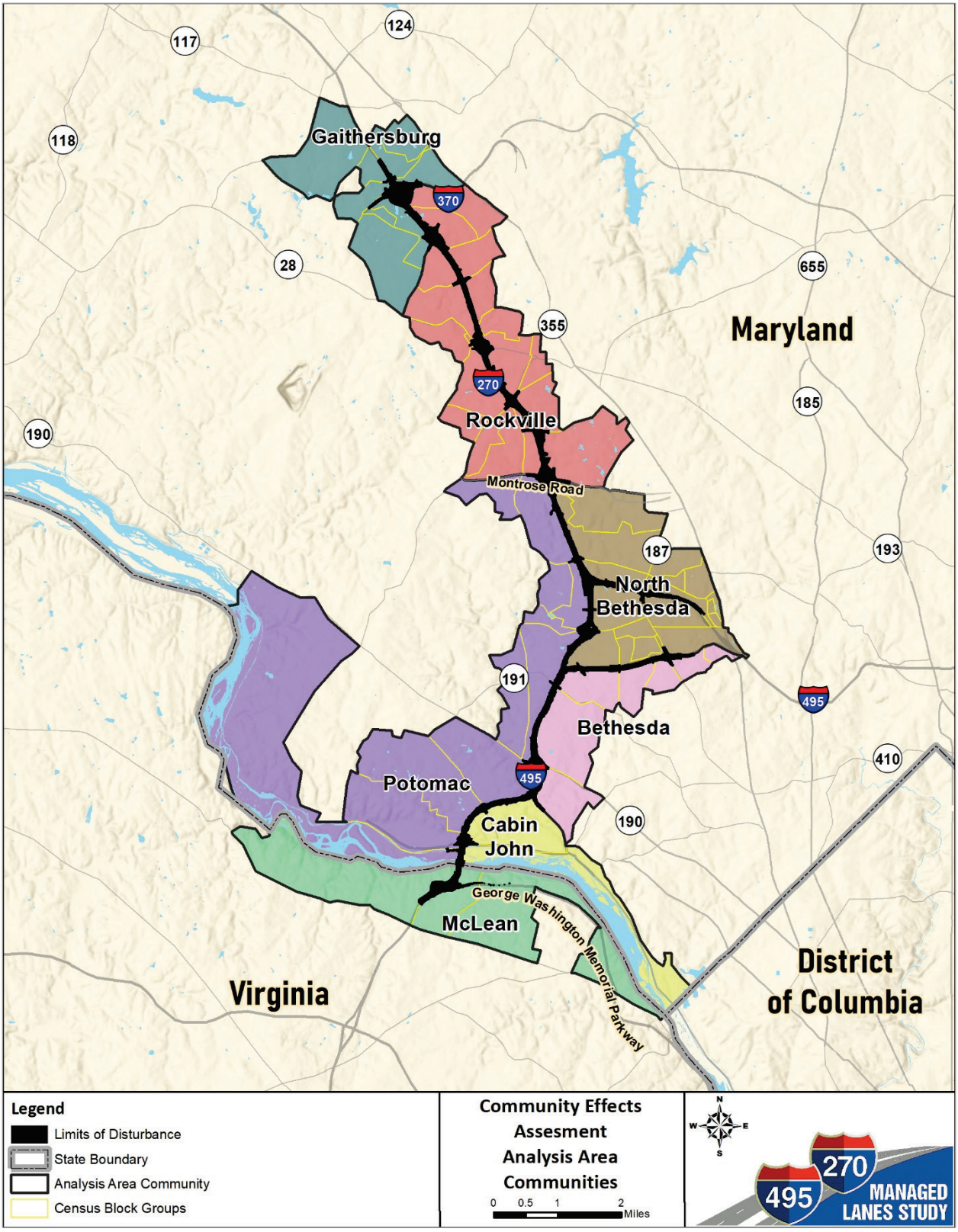
Notes: [1] One impacted parcel falls in both the Cabin John and Potomac Analysis Area Communities and is counted twice for the purpose of this table; it is only counted once in the calculation of the total number of impacted parcels.
[2]All values are rounded to the tenths place.

Of the total 115.9 acres of property required under the Preferred Alternative (refer to **Table 4-3** for details), the Rockville Analysis Area Community would experience the largest proportion (38.0 percent) of the property impacts, and the Potomac Analysis Area Community would experience the second-largest proportion (21.7 percent) of the property impacts; at 4.1 percent, the Gaithersburg Analysis Area Community would experience the smallest proportion of property impacts.

Property acquisitions under the Preferred Alternative would 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. Permanent acquisitions may also be required for the off-site stormwater management. (Offsite stormwater management locations are preliminary at this point in the Study and will be identified by the developers in coordination with property owners during final design; refer to **SDEIS, Appendix C** for additional details on the compensatory stormwater management.)

Divisions or isolation of properties, persons, or groups would not occur due to the generally parallel nature of the Preferred Alternative LOD along I-495 and I-270 and the fact that no properties would be displaced. As such, the existing sense of community cohesion of communities along the study corridors would not be impacted. The Preferred Alternative also would not eliminate access or provide new access to properties, nor would it impede access between residences, community facilities, and businesses as no properties are accessed directly from I-495 or I-270.

Figure 4-1: Analysis Area Communities



Properties immediately adjacent to the improved highway may experience an increase in noise impacts as travel lanes are moved closer to the properties; however, the increased noise experienced by properties set back from the highway would be negligible. Noise abatement will occur within all seven (7) Analysis Area Communities. For specific noise barrier locations, refer to the *Environmental Resource Mapping* (**SDEIS, Appendix D**). Details on noise impacts and proposed abatement along the study corridors is provided in **Section 4.9.4.**

Construction would require the removal of vegetation to varying degrees from strips of land adjacent to the study corridors within the Preferred Alternative LOD. 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 are visually consistent with the existing highway setting.

Additionally, the Preferred Alternative would require modifications at existing interchanges to accommodate the mainline widening, direct access, at-grade auxiliary lanes, or ramps. This would require the reconstruction of structures spanning the study corridor to lengthen or raise the elevation of these structures. In general, construction would introduce some new elements, such as direct access ramps, but they would generally be compatible with the existing visual character or qualities along the study corridor as the Preferred Alternative is expanding existing interstates.

The Preferred Alternative is 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 Preferred Alternative would also reduce traffic on local roads by three and half (3.5) percent, which would lead to better access to facilities and improved emergency response times along local roadways.

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 visual and aesthetic impacts, partial property acquisition, and temporary construction activities. Additionally, community residents could experience a benefit to quality of life due to reduced congestion along the study corridors and improved trip reliability and travel choices to destination points within the region.

B. Community Facilities

A summary of the community facilities where partial property impacts would occur is shown in **Table 4-4**. Public parks and historic properties identified in the Section 4(f) Evaluation are not included in this assessment of community facilities. Details on park impacts can be found in **Section 4.4** and **Chapter 5** of this SDEIS. Details on historic cemeteries is found in **Section 4.7.**

As previously stated, property acquisitions under the Preferred Alternative would primarily 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. There are no residential, business, community facility relocations or displacements associated with the Preferred Alternative.

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

Community Facility	Property Impacts (Acres)		
	Permanent[1]	Temporary[1]	Total[1]
St. Jane de Chantal School	< 0.1	0.0	**< 0.1**
Saint Marks United Presbyterian Church	< 0.1	0.0	**< 0.1**
Carderock Springs Elementary School	0.2	0.1	**0.2**
Gibson Grove Church	0.1	0.0	**0.1**
First Baptist Church	0.4	0.0	**0.4**
First Christ Church of Scientist	< 0.1	< 0.1	**0.1**
Montgomery County Detention Center	3.7	0.1	**3.7**
Rockville Christian Church	0.5	0.0	**0.5**
Rockville Senior Center	1.0	0.0	**1.0**
Shady Grove Medical Center, Kaiser Permanente	0.5	0.0	**0.5**
Sterling Care Rockville Nursing	0.9	0.0	**0.9**
West (Julius) Middle School	1.8	0.0	**1.8**

Note: [1] All values are rounded to the tenths place.

Refer to **Section 4.4.3** for a discussion on potential public park impacts.

The Preferred Alternative would not eliminate existing access or provide new access to impacted community facility properties, as none of these properties are currently accessed directly from I-495 or I-270.[1] No permanent impacts to the operation of community facilities would occur. MDOT SHA will continue to coordinate with the neighboring communities through design and construction.

4.3.4 Mitigation

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 by the P3 Developer in consultation with 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

Publicly-owned parks and recreation facilities within the LOD of the Preferred Alternative were reviewed in support of the SDEIS and the Updated Draft Section 4(f) Evaluation, **Chapter 5** of this document. Detailed information regarding individual, publicly-owned parks and potential impacts are addressed in the *Draft Section 4(f) Evaluation* (**DEIS, Appendix F**) https://495-270-p3.com/wp-content/uploads/2020/07/DEIS_AppF_Draft-Section-4f-Eval_web.pdf and **Chapter 5** of this SDEIS.

[1] This discussion of impacts to community facilities excludes impacts public parks and public parks with historic properties, which are described in **Section 4.4.3**.

4.4.2 Affected Environment

The Preferred Alternative would avoid the use of 37 Section 4(f) properties that were previously reported as Section 4(f) uses in the DEIS and Draft Section 4(f) Evaluation, totaling approximately 105 acres of park property avoided. The Preferred Alternative would impact 15 park properties. The impacts are described in Section 4.4.3 and in greater detail in Chapter 5 of this document.

4.4.3 Environmental Consequences

A. Park Impacts for Preferred Alternative

The Preferred Alternative would impact park/ open space land and recreational facilities. Based on the current LOD, the permanent and temporary right-of-way needed from park/ open space properties for the Preferred Alternative is shown in **Table 4-5**. The impacts to publicly-owned parks would be partial property acquisitions along adjacent interstates for roadway widening, stormwater management, augmentation of culverts, construction of retaining walls, grading, construction or reconstruction of noise barriers, 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. The detailed analysis and potential impacts to individual publicly-owned parks is represented in **Chapter 5, Table 5-1** and described in **Section 5.2** of this SDEIS.

Table 4-5: Potential Public Park Impacts (Acres)

Public Park/ Open Space/ Rec. Facility	Park Owner/ Operator	Park Size[1] (Acres)	Permanent[2]	Temporary[2]	Total[2]
Chesapeake and Ohio Canal National Historical Park[3]	NPS	~19,575	1.0	9.1	**10.1**
Clara Barton Parkway[3]	NPS	96.2	1.6	0.9	**2.5**
George Washington Memorial Parkway	NPS	7,146	0.7	3.7	**4.4**
Malcolm King Park	City of Gaithersburg	78.5	1.3	0	**1.3**
Morris Park	City of Gaithersburg	30.7	1.1	0	**1.1**
Bullards Park and Rose Hill Stream Valley Park	City of Rockville	16.8	3.3	0	**3.3**
Cabin John Stream Valley Park (Rockville)	City of Rockville	33.1	2.1	0	**2.1**
Rockmead Park	City of Rockville	27.4	0.2	0.1	**0.3**
Woottons Mill Park	City of Rockville	95.3	0.7	0	**0.7**
Rockville Senior Center Park	City of Rockville	12.2	1.0	0	**1.0**
Cabin John Regional Park	M-NCPPC Montgomery Co.	514.0	5.7	0.6	**6.3**
Cabin John Stream Valley Park, Unit 2	M-NCPPC Montgomery Co.	105.0	0.8	0.6	**1.4**
Old Farm Neighborhood Conservation Area	M-NCPPC Montgomery Co.	0.8	0.1	0	**0.1**
Tilden Woods Stream Valley Park	M-NCPPC Montgomery Co.	67.4	0.6	0.1	**0.7**

Public Park/ Open Space/ Rec. Facility	Park Owner/ Operator	Park Size[1] (Acres)	Permanent[2]	Temporary[2]	Total[2]
Cabin John Stream Valley Park, Unit 6	M-NCPPC Montgomery Co.	19.8	0.8	0	**0.8**
Total Potential Impacts to Park Properties (acres)		-	**21.0**	**15.1**	**36.1**

Notes: [1]The size of Section 4(f) properties is sourced from data or documentation provided by the Officials with Jurisdiction.
[2] All values are rounded to the tenths place.
[3] Section 4(f) impacts to C&O Canal NHP and Clara Barton Parkway as currently noted in **Chapter 5** exclude the area that currently has an existing transportation use. The area within NPS property defined as transportation use includes existing I-495 at-grade roadway sections to the toe of slope, Clara Barton Parkway Interchange ramp sections to the toe of slope, existing pier locations for the structure over the C&O Canal and eastbound Clara Barton Parkway, and existing pier locations for the American Legion Bridge. The LOD accounts for structures over NPS land; however these aerial crossings would not require a permanent acquisition of land.

B. Resource Impacts by Park Owner/Operator

The following section presents the impacts by agency with jurisdiction over park properties with the Preferred Alternative LOD.

a. National Park Service (NPS)

As part of the inter-agency coordination process, the NPS requested that resource impacts occurring on NPS properties be specifically quantified. The following text summarizes the potential, specific impacts to resources on NPS properties. Further details on these impacts are available in **Section 4.12, 4.15 4.16** and **Chapter 5** of the SDEIS. A summary of coordination with NPS is included in **Chapters 5 and 7** of this document.

Based on property information provided by NPS, MDOT SHA has now evaluated impacts to the C&O Canal NHP using a single boundary applicable to both the historic property and public park, rather than two separate boundaries as reported in the DEIS. This change to use a single boundary was made at the request of NPS. Impacts to the C&O Canal NHP and Clara Barton Parkway in the DEIS and Draft Section 4(f) Evaluation were based on readily available property information which included permits for operation and maintenance of the existing highway, including an area surrounding the highway, bridges, and ramps. While the intent to formally transfer property from NPS to MDOT SHA was noted in historical documents, neither NPS nor MDOT SHA recovered official documentation formalizing the transfer. Therefore, this SDEIS has altered the area delineated as within transportation use. MDOT SHA, FHWA, and NPS have agreed that Section 4(f) impacts to C&O Canal NHP and Clara Barton Parkway could exclude the area that currently has an existing transportation use. The area within NPS property defined as transportation use includes existing I-495 at-grade roadway sections to the toe of slope, Clara Barton Parkway Interchange ramp sections to the toe of slope, existing pier locations for the structure over the C&O Canal NHP and eastbound Clara Barton Parkway, and existing pier locations for the ALB. The Preferred Alternative LOD accounts for structures over NPS land; however these aerial crossings would not require a permanent acquisition of land.

Wetlands on NPS property are subject to NPS Director's Order #77-1: *Wetland Protection*. 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 and Floodplain Statement of Findings (SOF) be prepared in accordance with the procedural manual during the National Environmental Policy Act (NEPA) process documenting compliance with DO #77-1 for proposed actions

that would result in adverse impacts to wetlands (**Table 4-6**). The draft SOF has been developed for the Preferred Alternative, refer to **SDEIS, Appendix G**. The SDEIS and the draft SOF have been advertised for public comment and have a concurrent 45-day comment period. The final SOF will be attached to the FEIS.

Table 4-6: Summary of NPS Wetland and Floodplain Impacts on NPS Properties from the Preferred Alternative

Park Unit and Resource (unit)	Permanent	Temporary	Total
George Washington Memorial Parkway[1]			
Riverine wetlands (sq feet)	862	0	**862**
Riverine wetlands (linear feet)	69	0	**69**
Palustrine wetlands (acres)	0	0	**0**
FEMA 100-year floodplain (sq. ft/acres)	1,098/0.03	2,603.1/0.06	**3,701/0.09**
C&O Canal National Historical Park			
Riverine wetlands (sq feet)	14	7,105	7,179
Riverine wetlands (linear feet)	11	1,099	1,110
Palustrine wetlands (acres)	0.05	0.59	0.64
FEMA 100-year floodplain (sq. ft/acres)	35,541/0.82	290,892/6.68	**326,433/7.49**
Clara Barton Parkway			
Riverine wetlands (sq feet)	203	48	251
Riverine wetlands (linear feet)	45	17	62
Palustrine wetlands (acres)	0.01	0.01	0.02
FEMA 100-year floodplain (sq. ft/acres)	0/0	0/0	**0/0**

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.

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 impacts by NPS park are presented in **Table 4-6**. The Floodplain Statement of Findings has been prepared and combined with the Wetland Statement of Findings in SOF in the **SDEIS, Appendix G**.

The three NPS parks within the Preferred Alternative - Phase 1 South limits are also historic properties listed on or eligible for listing on the National Register of Historic Places. 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. **Table 4-7** summarizes the NPS historic properties that would incur an adverse effect from the Preferred Alternative. (Refer to **Section 4.7.3** and **Tables 4-18 and 4-19** for specific details on the adverse effects to historic park properties). Due to the complexity of the Study and current state of design, MDOT SHA and FHWA will conclude the Section 106 of the National Historic Preservation Act (NHPA) process through execution of a Programmatic Agreement (PA). MDOT SHA and FHWA will continue to work with NPS to resolve the adverse effects through development of appropriate mitigation measures that will be captured in the PA.

Table 4-7: NPS Historic Properties with Adverse Effect

MIHP#/DHR#	Name	Period of Significance	NRHP Criteria[1]
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
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	Late Archaic-Woodland	D
44FX0374 (Virginia)	N/A	Late Archaic- Late Woodland	D
44FX0379 (Virginia)	N/A	Late Archaic- Early Woodland	D
44FX0389 (Virginia)	N/A	Late Archaic- Late Woodland	D

Note: [1] The NRHP Criteria are:

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 4-8** includes the list of these state-listed rare plant and invertebrate species from the NPS Potomac Gorge park surveys and their state and global protected species ranking. (Refer to **Section 4.19** for additional details.) The RTE species that would be impacted by the Preferred Alternative are highlighted in green in **Table 4-8**.

Table 4-8: RTE Plant Species Surveyed within the Potomac River Gorge Portion of the Preferred Alternative LOD

Scientific Name	Common Name	Status
Maryland and Virginia		
Arabis patens	Spreading Rockcress	S3G3/S1G3
Carex careyana	Carey's Sedge	S1G4G5 Endangered/ S3G4G5
Erigenia bulbosa	Harbinger-of- Spring	S3G5/S3G5
Erythronium albidum	Small White Fawn-Lily	S2G5 Threatened/ S2G5
Maianthemum stellatum	Starry False Solomon's-Seal	S2G5 Endangered/ S2G5
Phacelia covillei	Buttercup Scorpion-Weed	S2G3 Threatened/ S1
Ripariosida hermaphrodita	Virginia Fanpetals	S1G3 Endangered/ S1G3
Solidago racemosa	Rand's Goldenrod	S1G3 Threatened/ S1G3?
Valeriana pauciflora	Large-flower Valerian	S1G4 Endangered/ S1G4

Scientific Name	Common Name	Status
Maryland Only		
Astragalus canadensis	Canadian Milk-Vetch	S1G5 Endangered
Baptisia australis	Blue Wild Indigo	S2G5 Threatened
Bromus latiglumis	Early-leaf Brome	S1G5 Endangered
Carex hitchcockiana	Hitchcock's Sedge	S1G5 Endangered
Clematis viorna	Vasevine	S3G5
Corallorhiza wisteriana	Spring Coralroot	S1G5 Endangered
Coreopsis tripteris	Tall Tickseed	S1G5 Endangered
Cubelium concolor	Green-Violet	S3G5
Cuscuta polygonorum	Smartweed Dodder	S1G5 Endangered/ S1G5
Galactia volubilis	Downy Milk-Pea	S5G3
Gentiana villosa	Striped Gentian	S1G4 Endangered
Geum aleppicum	Yellow Avens	S1G5 Endangered/ SHG5
Helianthus occidentalis	Few-leaf Sunflower	S1G5 Threatened/ S1G5T5
Hibiscus laevis	Halberd-leaf Rose-Mallow	S3G5
Homalosorus pycnocarpos	Glade Fern	S2G5 Threatened
Iresine rhizomatosa	Juda's-Bush	S1 G5 Endangered
Lipocarpha micrantha	Small-flower Halfchaff Sedge	S1G5 Endangered/ S2G5
Matelea obliqua	Climbing Milkweed	S1S2G4? Endangered
Mecardonia acuminata	Axil-Flower	S2G5 Endangered
Monarda clinopodia	White Bergamot	S3S4G5
Paspalum fluitans	Horse-tail Paspalum	S2G5 Threatened
Phaseolus polystachios	Thicket Bean	S3G5
Polygala polygama	Racemed Milkwort	S1G5 Threatened
Potamogeton foliosus	Leafy Pondweed	S2G5
Pycnanthemum verticillatum	Whorled Mountain-Mint	S2G5 Threatened
Rumex altissumus	Tall Dock	S1G5 Endangered
Sagittaria rigida	Sessile-fruit Arrowhead	S1G5 Endangered/ S1G5
Salix interior	Sandbar Willow	S1G5 Endangered/ S1G5TNR
Silene nivea	Snowy Catchfly	S1G4? Endangered/ S1G4?
Triphora trianthophoros	Threebirds	S1G4? Endangered/ S1G3G4T3T4
Virginia Only		
Borodinia dentata	Short's Rockcress	S3G5/S1G5
Senecio suaveolens	False Indian-Plantain	S1G4 Endangered/ S2G4

Source: Townsend 2019, MDNR 2021, Weakley 2012, Brown and Brown 1984
1State Rank: S1=Critically Imperiled/Highly State Rare; S2=Imperiled/State Rare; S3=Vulnerable/Watchlist; T=Subspecies/Variety Ranked Differently than Species
Global Rank: G3=Vulnerable; G4=Apparently Secure; G5=Secure; ?=Inexact Numeric Rank; NR=Not Ranked

Since the DEIS was published, a tree inventory was conducted on NPS property within the corridor study boundary. Following the guidance in the *Forest Inventory and Analysis National Core Field Guide. Volume I: Field Data Collection Procedures for Phase 2 Plots. Version 9.0, October 2019*, an inventory of all trees and standing dead trees ≥ 5 inches diameter at breast height (DBH) (4.5 feet, DBH) was completed within the survey limits, including the identification of all significant trees (trees ≥ 24 inches DBH < 30 inches) and specimen trees (≥ 30 inches DBH or 75% of the size of the state champion). The results are summarized in **Table 4-9**. Refer to **Section 4.16** for additional details on the NPS tree survey.

Table 4-9: Survey Trees on NPS Properties and Impacts from the Preferred Alternative

NPS Property	Number of Live Individual Trees Surveyed	Live Tree Impacts[1] (#/DBH)	Number of Standing Dead Trees Surveyed	Standing Dead Tree Impacts[1] (#/DBH)	Total inches of DBH
George Washington Memorial Parkway	2,175	82/1,108	154	9/113	31,900
C&O Canal NHP	1,544	815/10,148	244	115/1,339	19,345
Clara Barton Parkway	756	315/3,999	114	51/669	10,098
Totals	**4,475**	**1,212/15,255**	**512**	**175/2,121**	**61,343**

Notes: [1] Impacts to trees are only considered permanent totals; there are no temporary impacts.

Since the publication of the DEIS, considerable avoidance and minimization has been undertaken to the NPS properties around the American Legion Bridge (ALB). MDOT SHA and FHWA met with the NPS on December 8, 2020 to discuss the LOD in the vicinity of the ALB that was presented for the Build Alternatives in the DEIS. The NPS requested that MDOT SHA re-assess the LOD in the vicinity of the ALB to limit impacts to NPS land and its natural and cultural resources. MDOT SHA convened an 'ALB Strike Team' composed of national and local experts on bridge design, natural resources, and cultural resources who were charged with the following mission:

To develop and evaluate alternatives for the replacement of the ALB to avoid impacts, to the greatest extent practicable, and reduce overall acreage impacts to the C&O Canal National Historic Park (C&O Canal NHP) and George Washington Memorial Parkway units of the NPS.

The ALB Strike Team conducted an intensive investigation in January 2021 to explore alternative design solutions, project phasing solutions, site access solutions, and the potential use of specialty construction techniques to limit the LOD. The ALB Strike Team presented its results to the NPS on February 8, 2021.

MDOT SHA established the Base LOD as the "Base Option," which includes a conventionally constructed bridge structure built in two phases on the existing bridge centerline with the assumption of temporary construction access over the Potomac River via trestles and causeways. This Base Option included minor LOD reductions from the DEIS LOD to minimize impacts to Plummers Island. The Base Option also started with construction access in all four quadrants and was minimized to remove the construction access in the southwest, southeast, and northeast quadrants, which significantly reduced impacts to NPS property.

The ALB Strike Team first reviewed the avoidance and minimization options developed by MDOT SHA to date, and agreed that these options were not practicable, with the exception of the top-down construction option, which was investigated in further detail. The ALB Strike Team then reviewed the viability of the Base Option and confirmed that this on-center alignment with a conventional construction approach was a viable option. The ALB Strike Team also considered a "west shift" of the LOD to entirely

avoid impacts to Plummers Island and determined that a conventional construction approach with a west shift was also a viable option.

The ALB Strike Team then considered other bridge construction approaches to determine if any of them could limit the LOD further than the Base Option could. The Strike Team conducted detailed investigation on a top-down segmental construction approach; a top-down cable stayed approach; and a slide-in place bridge construction approach.

After field analysis and known information review, MDOT SHA and the ALB Strike Team determined that access to the site at river level could be consolidated to the north side of the river along Clara Barton Parkway, eliminating the construction access from the other three quadrants around the bridge and significantly reducing impacts to NPS land. This would be achieved by constructing a temporary construction access road entrance off of the Clara Barton Parkway in the northwest quadrant and installing a temporary bridge over the C&O Canal and a temporary access road paralleling the C&O Canal towpath.

MDOT SHA determined the LOD options for the ALB based on the results of the ALB Strike Team investigations. The bridge construction types with the smallest LOD footprint were the Base Option and the Cast-In-Place Segmental Option, both with a similar LOD requirement. Both construction types could be built with an on-center alignment or a west-shift alignment. MDOT SHA compared the NPS land impacts and those of the natural and cultural resources surrounding the ALB and determined that the on-center alignment would impact the least amount of total NPS Land; would not require re-configuration of the Clara Barton Parkway interchange; and would not require residential displacement, as the west shift alignment would. For these reasons, the on-center alignment with the reduced LOD required by the Base Option or Cast-In-Place Segmental bridge types was incorporated into the Preferred Alternative LOD.

Despite the minimization efforts, impacts to Plummers Island could not be avoided completely, but impacts have been reduced by 1.7 acres. In the DEIS, the Build Alternatives had 1.9 acres of impacts to Plummers Island. Under the Preferred Alternative, approximately 0.2 acres of impact at Plummers Island would be required for the ALB substructure, including permanent pier placement and construction activities. Construction activities may include efforts such as excavation, demolition of existing bridge foundation and piers, installation of proposed foundations, piers, abutments and slope protection. Access to the existing and proposed piers is required for these activities. Impacts were minimized by strategically locating the piers, specifically the new piers in close proximity to the existing piers such that a single access method could be used for demolition of the existing and construction of the proposed structures. However, some impact is unavoidable based on construction requirements and the structural requirements for pier locations.

b. 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 and administered by Maryland-National Capital Park and Planning Commission (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. A summary of coordination with NCPC is included in **Chapters 5 and 7** of this document. MDOT SHA and FHWA will continue to coordinate with NCPC on their

authority over Capper-Cramton properties. **Table 4-10** includes a summary of impacts from the Preferred Alternative to parks acquired with Capper-Crampton Funding.

Table 4-10: Summary of Impacts from the Preferred Alternative to Parks Acquired with Capper-Cramton Funding (Acres)

Park Property Acquired with Capper-Cramton Funding	Permanent	Temporary	Total
George Washington Memorial Parkway	0.7	3.7	**4.4**
Clara Barton Parkway	1.6	0.9	**2.5**
Cabin John Stream Valley Park, Unit 2[1]	0.8	0.6	**1.4**
Cabin John Regional Park[1]	5.7	0.6	**6.3**

Note: [1]Additional research is necessary to determine whether these specific parks were acquired with Capper-Cramton Act funding. If research reveals they were not funded through Capper-Cramton Act, the change will be reflected in the FEIS.

The Preferred Alternative avoids many significant park resources including Capper-Cramton funded parkland at: Rock Creek Stream Valley Park, Locust Hill Neighborhood Park, Sligo Creek Parkway, and Northwest Branch Stream Valley Park. In addition, MDOT SHA has worked extensively with NPS and M-NCPPC on minimization measures to reduce environmental impacts, including significantly reduced impacts to Capper-Cramton funded parkland around the American Legion Bridge by more than 50 percent from the DEIS. 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.

c. Maryland-National Capital Park and Planning Commission Parkland and Resource Impacts

Coordination is on-going with M-NCPPC on potential impacts and ways to avoid, minimize and mitigate for impacts to parkland and environmental resources within those parks. A summary of coordination with M-NCPPC is included in **Chapters 5 and 7** of this document. The Preferred Alternative avoids over 20 acres of M-NCPPC park property previously impacted under the DEIS Build Alternatives, including avoiding impacts to Rock Creek, Northwest Branch, Sligo Creek, Southwest Branch, and Henson Creek Stream Valley Parks. The Preferred Alternative parkland and resource impact totals on M-NCPPC park properties is summarized in **Table 4-11**. Refer to **Chapter 5, Section 2** for additional details on impacts to these parks. The FEIS and Final Section 4(f) Evaluation will include final park impact numbers accounting for greater avoidance and minimization, along with commitments for park mitigation.

d. City of Rockville Parkland and Resource Impacts

Coordination is on-going with the City of Rockville on potential impacts and ways to avoid, minimize and mitigate for impacts to parkland and environmental resources within those parks. A summary of coordination with the City of Rockville is included in **Chapters 5 and 7** of this document. The Preferred Alternative parkland and resource impact totals on Rockville park properties is summarized in **Table 4-12**. Refer to **Chapter 5, Section 2** for additional details on impacts to these parks. The FEIS and Final Section 4(f) Evaluation will include final park impact numbers accounting for greater avoidance and minimization, along with commitments for park mitigation.

e. City of Gaithersburg Parkland and Resource Impacts

Coordination is on-going with the City of Gaithersburg on potential impacts and ways to avoid, minimize and mitigate for impacts to parkland and environmental resources within those parks. A summary of coordination with the City of Gaithersburg is included in **Chapters 5 and 7** of this document. The Preferred Alternative parkland and resource impact totals on Gaithersburg park properties is summarized in **Table 4-13**. Refer to **Chapter 5, Section 2** for additional details on impacts to these parks. The FEIS and Final Section 4(f) Evaluation will include final park impact numbers accounting for greater avoidance and minimization, along with commitments for park mitigation.

4.4.4 Mitigation

Mitigation for impacts to publicly-owned park properties is being coordinated with the Officials with Jurisdiction (OWJ) over the impacted park properties. Potential mitigation to park and recreational facilities could be, but not limited to elements such as: landscaping; replacement land; visual and noise barriers; restoring streams; and funding of park related buildings and amenities. Refer to **Chapter 5, Section 5.4.5** of this SDEIS for the additional details. The final mitigation for impacts to publicly-owned parks will be outlined in the FEIS.

4.5 Property Acquisitions and Relocations

4.5.1 Introduction

Property acquisitions within the Preferred Alternative LOD for conversion to transportation right-of-way include only partial acquisitions with no 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 of a residence, business, or community facility is located more than 20 feet from the Preferred Alternative LOD. A full property acquisition resulting in a relocation would be assumed where a principle building is located within 20 feet of the LOD. This methodology to determine where a full property acquisition would be required was developed in coordination with the MDOT SHA Office of Real Estate based on similar project experience and engineering judgment.

The Preferred Alternative LOD was determined from the proposed roadway typical section, 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 the Preferred 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 **Chapter 2, Section 2.3.5** of this SDEIS. For details on the applicable federal and state regulations and methodology related to property acquisition, refer to the **DEIS, Chapter 4, Section 4.5** and **DEIS, Appendix E, Section 3.6** *Community Effects Assessment and Environmental Justice Analysis Technical Report* (https://495-270-p3.com/wp-content/uploads/2020/07/DEIS_AppE_CEA-EJ-Tech-Report_web.pdf).

4.5.2 Affected Environment

In the DEIS, the Build Alternatives had a range of 25-34 displacements and a range of 1,392-1,518 number of properties impacted. The Preferred Alternative avoids all displacements and has currently reduced impacts to 501 properties within the Preferred Alternative LOD; resulting in 891 to 1,017 properties avoided.

Table 4-11: M-NCPPC Parkland and Resource Impacts (Acres)

	Park/Resource	Permanent	Temporary	Total	Potential Activities to Occur on Park Property
Parkland	Cabin John Regional Park	5.7	0.6	**6.3**	• Widening of SB I-270 and construction of retaining wall along outside shoulder • Potential utility relocations • 3 SWM facilities • Potential augmentation of two storm drains and one culvert
	Cabin John SVP, Unit 2	0.8	0.6	**1.4**	• Construction of new exit ramp on structure from I-495 • Noise barrier along I-495 Inner Loop MLS Direct access ramp to River Rd. (Barrier is on structure through park) • Grading associated with new ramp from I-495 Outer Loop Managed Lanes to SB Cabin John Parkway • Pipe augmentation at 2 locations in southwest quadrant of I-495/River Road interchange
	Old Farm NCA	0.1	0.0	**0.1**	• Grading and access associated with a SWM facility adjacent to the park along NB I-270. • Construction of relocated noise barrier
	Tilden Woods Stream Valley Park	0.6	0.1	**0.7**	• Access for construction of replacement bridge along I-270 over Tuckerman Lane and potential adjustment of the profile along Tuckerman Lane under I-270 • Potential utility relocation • Potential augmentation of existing culvert conveying Old Farm Creek beneath I-270
	Cabin John SVP, Unit 6	0.8	0.0	**0.8**	• Construction of retaining wall along outside shoulder of realigned ramp from NB I-270 to EB Montrose Road • Potential augmentation of existing culvert that conveys Cabin John Creek beneath I-270
	Total Acres	**7.9**	**1.3**	**9.2**	
Natural Resources	Forest Canopy (Acres) (overlapping wetland info removed)	7.4	1.3	**8.7**	
	Area in Forest Conservation Easements (acres)	0.6	0.1	**0.6**	
	Wetlands (acres)	0.1	0.0	**0.1**	
	Wetlands 25ft Buffer (acres)	0.2	0.0	**0.2**	
	Waterways (Linear Feet)	1,631.7	21.4	**1,653.1**	

Table 4-12: City of Rockville Parkland and Resource Impacts (Acres)

	Park/Resource	Permanent	Temporary	Total	Potential Activities to Occur on Park Property
Parkland	Bullards Park and Rose Hill SVP	3.3	0	**3.3**	• Potential for grading or modification of existing joint-use SWM facility near Julius West Middle School pond to allow for additional storage of headwater pool likely removing the need for culvert augmentation • Potential modification of existing SWM facility at the north end of the park to allow for additional storage of headwater pool likely removing the need for culvert augmentation
	Cabin John SVP (Rockville)	2.1	0	**2.1**	• Recent MDOT SHA TMDL site • Retrofit potential to increase storage in upstream step pools
	Julius West Middle School Athletic Fields	0	0	**0.0**	• No impacts anticipated
	Millennium Garden Park	0	0	**0.0**	• No impacts anticipated
	Rockmead Park	0.2	0.1	**0.3**	• Provide plunge pool at downstream end of augmented culvert on southern end of park • Provide plunge pool at downstream end of augmented culvert on northern end of park • Temporary impacts due to construction of retaining wall at edge of roadway shoulder (northern end of park) and potential modifications to existing retaining wall and noise barrier
	Woottons Mill Park	0.7	0	**0.7**	• Improve drainage outfall at southern end of park • Potential stream restoration improvement resulting from culvert augmentation at northern end of park
	Rockville Senior Center Park	1	0	**1.0**	• Provide new SWM facility • Reconstruction of E Gude Drive for replacement of bridge over I-270
	Total Acres	**7.3**	**0.1**	**7.4**	
Natural Resources	Forest Canopy (Acres) (overlapping wetland info removed)	84.9	3.5	**88.4**	
	Area in Forest Conservation Easements (Acres)	4.2	0.4	**4.6**	
	Wetlands (Acres)	2.54	<0.1	**2.5**	
	Wetlands 25ft Buffer (Acres)	2.8	0.03	**2.8**	
	Waterways (Linear Feet)	6,083.8	0.0	**6,083.8**	

Table 4-13: City of Gaithersburg Parkland and Resource Impacts (Acres)

	Resource	Permanent	Temporary	Total	Potential Activities to Occur on Park Property
Parkland	Malcolm King Park	1.3	0	**1.3**	• Construct retaining wall along I-270 SB • Install auxiliary culvert under I-270 and provide outfall stabilization • Install auxiliary culvert under I-370
	Morris Park	1.1	0	**1.1**	
Natural Resources	Forest Canopy (Acres) (overlapping wetland info removed)	1.69	0.01	1.70	
	Area in Forest Conservation Easements (Acres)	0	0	**0**	
	Wetlands (Acres)	0.15	0	**0.15**	
	Wetlands 25ft Buffer (Acres)	0.26	0.0	**0.26**	
	Waterways (Linear Feet)	925.3	0	**925.3**	

4.5.3 Environmental Consequences

The Preferred Alternative does not result in any full acquisitions or residential or business displacements.

The Preferred Alternative would impact 115.9 acres of total right-of-way that is outside of the existing highway right-of-way (97.2 acres for permanent use and 18.7 acres for temporary use) from properties adjacent to the existing I-495 and I-270 roadway alignments. The number and types of properties impacted by the Preferred Alternative are shown in **Table 4-14**. 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 4-14: Summary of Right-of-Way Acquisitions and Impacts from the Preferred Alternative

Property Types (# of properties)	Total[1]
Residential Relocations	**0**
Residential Properties Impacted	**389**
Business Relocations	**0**
Business/Other Properties Impacted[2]	**112**
Total Number of Properties Impacted	**501[3]**

Notes: [1] The number of properties relocated or impacted is not broken out by permanent and temporary to avoid double-counting a property that is impacted for both permanent and temporary use. Only the total count is provided.
[2] 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.
[3] One impacted property falls in both the Cabin John and Potomac Analysis Area Communities but is only counted once for the purposes of calculating the total number of impacted properties.

The Preferred Alternative results 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 highway 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 or drainage improvements. The proposed SWM facilities are shown on the *Environmental Resource Mapping* (**SDEIS, Appendix D**).

A breakdown of partial property impacts along the study corridor is presented by areas between existing interchanges in **Table 4-15**. To provide localized context, property impacts are presented for 16 areas between existing interchanges; page references to the *Environmental Resource Mapping* **(SDEIS, Appendix D**) are provided for each area. Each individual property acquisition identified will be evaluated further during final design.

4.5.4 Mitigation

Full property acquisitions have been avoided and other property impacts minimized through a series of engineering and design refinement approaches. Approaches 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. Many of these approaches were previously studied and are described in the *Alternatives Technical Report* (**DEIS, Appendix B** https://495-270-p3.com/wp-content/uploads/2020/07/DEIS_AppB_Alts_web.pdf). Where possible, these same approaches were incorporated into the LOD for the Preferred Alternative. As the design of the Preferred Alternative progressed, property impacts have been minimized where feasible. 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 the Preferred Alternative. Ongoing coordination with area businesses would occur to prevent or minimize both short- and long-term disruptions.

Table 4-15: Property Impacts by Geographic Area

Geographic Area	Permanent	Temporary	Total[1,2]
Area 1: I-495 west side, south of George Washington Parkway (Appendix D, Map 1)			
Number of Existing Properties Impacted	—	—	**11**
Total Acreage of Partial Property Acquisitions	0.7	0.1	**0.8**
Area 2: I-495 west side, between George Washington Parkway and Clara Barton Parkway (Appendix D, Maps 1-5)			
Number of Existing Properties Impacted	—	—	**8**
Total Acreage of Partial Property Acquisitions	1.0	8.3	**9.3**
Area 3: I-495 west side, between Clara Barton Parkway and MD 190 (River Road) (Appendix D, Maps 5-10)			
Number of Existing Properties Impacted	—	—	**62**
Total Acreage of Partial Property Acquisitions	9.1	1.4	**10.5**
Area 4: I-495 west side, between MD 190 (River Road) and I-270 west spur (Appendix D, Maps 10-12)			
Number of Existing Properties Impacted	—	—	**82**
Total Acreage of Partial Property Acquisitions	10.0	1.9	**11.9**
Area 5: I-495 top side, between I-270 west spur and MD 187 (Old Georgetown Road) (Appendix D, Maps 12-16)			
Number of Existing Properties Impacted	—	—	**97**
Total Acreage of Partial Property Acquisitions	2.7	<0.1	**2.7**
Area 6: I-495 top side, between MD 187 (Old Georgetown Road) and I-270 east spur (Appendix D, Map 16)			
Number of Existing Properties Impacted	—	—	**12**
Total Acreage of Partial Property Acquisitions	1.0	0.4	**1.4**
Area 7: I-270 west spur, between I-495 and Democracy Boulevard (Appendix D, Maps 12, 17)			
Number of Existing Properties Impacted	—	—	**4**
Total Acreage of Partial Property Acquisitions	1.5	0.7	**2.1**
Area 8: I-270 west spur, between Democracy Boulevard and Westlake Terrace (Appendix D, Maps 17-18)			
Number of Existing Properties Impacted	—	—	**3**
Total Acreage of Partial Property Acquisitions	1.2	<0.1	**1.2**
Area 9: I-270 east spur, between I-495 and MD 187 (Old Georgetown Road) (Appendix D, Maps 19-20)			
Number of Existing Properties Impacted	—	—	**5**
Total Acreage of Partial Property Acquisitions	1.3	0	**1.3**
Area 10: I-270 west and east spurs, between Y-split and Westlake Terrace and MD 187 (Appendix D, Maps 18, 20-22)			
Number of Existing Properties Impacted	—	—	**22**
Total Acreage of Partial Property Acquisitions	7.3	0.9	**8.2**
Area 11: I-270 mainline, between Y-split and Montrose Road (Appendix D, Maps 22-26)			
Number of Existing Properties Impacted	—	—	**64**
Total Acreage of Partial Property Acquisitions	16.6	1.1	**17.8**

Geographic Area	Permanent	Temporary	Total[1,2]
Area 12: I-270 mainline, between Montrose Road and MD 189 (Falls Road) (Appendix D, Maps 25-29)			
Number of Existing Properties Impacted	—	—	**23**
Total Acreage of Partial Property Acquisitions	19.5	0.3	**19.8**
Area 13: I-270 mainline, between MD 189 (Falls Road) and MD 28 (W. Montgomery Ave.) (Appendix D, Maps 29-31)			
Number of Existing Properties Impacted	—	—	**48**
Total Acreage of Partial Property Acquisitions	9.0	0.7	**9.7**
Area 14: I-270 mainline, between MD 28 (W. Montgomery Ave.) and Shady Grove Road (Appendix D, Maps 31-34)			
Number of Existing Properties Impacted	—	—	**39**
Total Acreage of Partial Property Acquisitions	8.8	2.7	**11.5**
Area 15: I-270 mainline, between Shady Grove Road and I-370 (Appendix D, Maps 34-38)			
Number of Existing Properties Impacted	—	—	**10**
Total Acreage of Partial Property Acquisitions	4.4	0.2	**4.5**
Area 16: I-270 mainline, north of I-370 (Appendix D, Maps 36, 39)			
Number of Existing Properties Impacted	—	—	**12**
Total Acreage of Partial Property Acquisitions	3.2	<0.1	**3.2**
Phase 1 South - Total			
Number of Existing Properties Impacted	—	—	**502**
Total Right-of-way[3] (acres)	**97.2**	**18.7**	**115.9**

Note: [1] The number of properties impacted is not broken out by permanent and temporary to avoid double-counting a property that is impacted for both permanent and temporary use. Only the total count is provided.
[2] The total acreage may not equal the sum of the permanent and temporary impacts due to rounding.
[3] 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.

4.6 Visual and Aesthetic Resources

4.6.1 Introduction

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. Comments received during the development of the DEIS inquired about the visual changes that may impact highway travelers and the surrounding neighbors. In response to public comments and agency coordination, a Visual Impact Assessment (VIA) is in development by the project team. The VIA is being prepared in accordance with FHWA's Guidance for Visual Impact Assessment of Highway Projects.

FHWA's Guidelines describe the context of a VIA within a transportation study as:

> *A VIA is part of a larger environmental review process, which in turn is part of a still larger highway project development process. As part of this process, the VIA is intended to provide decision makers with information on the adverse and beneficial impacts on visual quality that can influence the selection of a preferred project alternative. The VIA provides designers with the information they need to most effectively mitigate adverse impacts on visual quality while implementing concepts to enhance existing visual quality (page 1-4).*

Section 3.3.2 of FHWA's Guidelines describes two methods that may be used for determining the appropriate level of VIA: 1) a VIA scoping questionnaire or 2) a comparative matrix. To determine the appropriate level of VIA, MDOT SHA completed the scoping questionnaire (refer to **SDEIS, Appendix J**). The scoping questionnaire consists of 10 questions. The questions cover two topics, environmental compatibility and viewer sensitivity. For each question, MDOT SHA selected an answer from a set of multiple-choice responses. For each response, the scope of the study, anticipated impacts, and comments received throughout the project duration were considered. The rationale for each response is documented in the completed scoping questionnaire. The total VIA scoping questionnaire score for the Study is 19[2] (refer to **Appendix J**).

Per FHWA's Guidance and based on the questionnaire score, an Abbreviated VIA will be prepared and included in the FEIS. The Abbreviated VIA includes a brief project description and a report of the findings of the VIA's establishment, inventory, analysis, and mitigation phases. Maps, aerial photography and photographs will be used to supplement the text.

4.6.2 Affected Environment

The VIA defines the area of visual effect (AVE) as the area around the corridor that has views of the corridor that could be influenced by topography, vegetation, and built structures, consistent with FHWA's Guidelines. The study corridor consists of mostly homogeneous visual resources. The typical width is variable, with I-495 between 138 and 146 feet, and I-270 between 228-256 feet. White concrete dividers separate the direction lanes. Portions of the I-495 are bifurcated, with the inner loop higher. Galvanized metal can be seen in many of the structural elements along the I-495 study corridor, including guardrails and light poles. The bridges along the I-495 study corridor are steel with concrete parapets painted green. Within I-270 study corridor, the structural elements are painted brown, including guardrails, light poles, and bridges. Throughout the study corridor, pedestrian guardrails are primarily galvanized chain link with a curved top and pedestrian bridges are steel truss structures with powder coated chain link fence. Noise barriers are present throughout the study corridor and are mostly brown, concrete formliner with the bridge-mounted noise walls being painted corrugated metal. Some sections of noise barriers are set back from the roadside to provide a planting shelf. In many areas deciduous trees, of varying density, around the highway provide a screen between the highway and adjacent development. Most of the developed land adjacent to the highway is built-out to the edge of the right-of-way fencing or noise barriers. As such, the AVE for the proposed action encompasses a 300-foot corridor study boundary within the Phase 1 South limits, including the corridor itself as well as those properties directly adjacent to the proposed improvements.

The two types of viewsheds within the AVE are dynamic and static. Dynamic viewsheds are composed of the views from travelers using the highway with "views from the road". As the traveler moves along the highway the topography, direction, and natural and built features limit the viewshed and mark the separations of a continuous viewshed. The travelers along the AVE are mostly commuting, touring, and shipping travelers, many of which regularly travel the corridor along a similar route. As defined by FHWA's

[2] An Abbreviated VIA includes a brief project description and a report of the findings of the VIA's establishment, inventory, analysis, and mitigation phases. Maps, aerial photography and photographs are used sparingly and only when such illustrations reduce the need for text. An Abbreviated VIA is typically used for an EA or EIS-level project when it has been identified during scoping that there are minimal visual concerns.
https://www.environment.fhwa.dot.gov/env_topics/other_topics/VIA_Guidelines_for_Highway_Projects.aspx#fig32

Guidance, these travelers mostly prioritize project coherence. Natural harmony and cultural order are not as emphasized and mostly aid in wayfinding or touring. The dynamic view includes wooded areas on one or both sides interrupted by noise barriers and a turf median or concrete barrier in the center. Portions of the noise barriers have no vegetation in front of the barrier and some areas have mature deciduous wooded areas in front of the noise barriers. Also, a planting shelf with vines, shrubs, and ornamental grasses as well as groupings of trees are clustered throughout the study area. Views above and beyond the noise barriers are of mature deciduous forests in good condition and more extensive in nature.

Static viewsheds consist of what neighbors can see from a single viewpoint. Neighbors of the highway are individuals or institutions that are adjacent to the study corridors and have "views of the road". Within the AVE, neighbors include residential, recreational/parks, and institutional neighbors, as defined by Section 5.3 of FHWA's Guidance. However, this VIA focuses on the views from recreational/parks neighbors at five key park locations based on agency and public comments received to date. Key park locations were identified in response to public and agency comments and coordination. These locations include public parks and facilities under the jurisdiction of the NPS and M-NCPPC.

NPS Properties:

- George Washington Memorial Parkway
- Chesapeake and Ohio Canal National Historic Park
- Clara Barton Parkway

M-NCPPC Montgomery County Locations:

- Cabin John Regional Park - Near I-270 and Campground
- Seven Locks Road - Near Cabin John Stream Valley Park, Unit 2

Visual quality, as described in the FHWA VIA Guidelines, is the experience of having visual perceptions. The FHWA VIA Guidelines recognize three types of visual perception including: natural harmony, cultural order, and project coherence. FHWA's Guidance (Section 5.4.3) clearly states that it is not necessary to analyze degrees of harmony, orderliness, and coherence for each viewer group, simply the side of the dichotomy viewers perceived the visual quality is adequate. Visual quality considers landform, landcover, viewer, and the proximity of viewer to the proposed action.

Natural harmony, one of the aspects of visual quality, is the sense of harmony viewers feel when viewing the natural environment. Natural visual resources include land, water, vegetation, animals, and atmospheric conditions. The perception of natural harmony changes based on the viewer's expectations of natural harmony. Cultural order is another aspect of visual quality and evaluates the perception of cultural order of each individual viewer within the cultural environment. The cultural environment is seen in buildings, infrastructure, structures, and art. Project coherence, the third aspect of visual quality, is the sense of coherence within the project elements within the project environment. The visual project elements include highway geometrics, grading, constructed elements, vegetative cover, and traffic control devices. Individual expectations influence viewer's perception of coherence among the elements.

4.6.3 Environmental Consequences

The construction of the Preferred 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 Preferred Alternative 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 the Preferred 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 Preferred Alternative 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 by the P3 Developer in consultation with 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** of this chapter. Under the Preferred Alternative, 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* in **SDEIS, Appendix D** for the proposed locations of the noise barriers.

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.

As design advances on a Preferred Alternative, MDOT SHA will complete the VIA in accordance with FHWA's Guidance and summarized in the FEIS. The VIA will include renderings at the key park locations to ensure the design is context sensitive. A detailed analysis of impacts and renderings at key park locations will be presented in the VIA and summarized in the FEIS.

4.6.4 Mitigation

Mitigation measures to lessen the visual impact of the improvements would be considered as appropriate. For example, MDOT SHA reduced the number of signs and considered the aesthetics of signage along the NPS and M-NCPPC parkways per NPS and M-NCPPC request. Vegetation removal would be minimized, and additional landscaping may be incorporated in other areas as well. Mitigation for tree removal will be done in accordance with the Maryland Reforestation Law and NPS and M-NCPPC agency requirements, such as on-site planting, when feasible. Mitigation for tree removal will be developed in partnership

between MDOT SHA, NPS, and M-NCPPC and documented in the FEIS. Aesthetic treatments on retaining walls and noise barriers and visual barriers are mitigation could be considered.

During final design, the P3 Developer would develop and follow aesthetic and landscaping guidelines of all highway elements in consultation with the 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, and all final mitigation will be documented in the FEIS.

4.7 Historic Architectural and Archaeological Resources

4.7.1 Introduction

The consideration of the Study's 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* (**SDEIS, 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. Direct, physical effects to historic properties were considered possible within the LOD of the Preferred Alternative. The APE includes the LOD where direct, physical effects to historic properties could occur and an additional 250-foot buffer on either side of the LOD to account for potential audible, visual, or atmospheric effects that are not considered physical impacts. Since the development of the APE as presented in the DEIS, MDOT SHA coordinated with Maryland Historical Trust (MHT), Virginia Department of Historic Resources (VDHR), and consulting parties, and provided an update to the APE by letter dated July 23, 2020. The update was prompted by the identification of potential off-site, stream and water quality mitigation sites in Maryland, and MHT agreed with the APE revision on September 4, 2020. MHT, VDHR, and consulting parties were notified by MDOT SHA of the Preferred Alternative by email on May 13, 2021. The revised APE reflecting the Preferred Alternative was provided to MHT, VDHR and consulting parties on September 8, 2021.

The revised APE reflects the reduced LOD based on the Phase 1 South limits of the Preferred Alternative, additional off-site compensatory stormwater management mitigation sites in Maryland, and incorporate minimization and avoidance efforts. The following sections describe properties and impacts within the revised APE within the Preferred Alternative LOD for the Phase 1 South limits only.

A. Section 106 Consultation

36 CFR Part 800 outlines a consultation process with specific parties to complete the required review. Since the publication of the DEIS, MDOT SHA and FHWA have invited additional parties to participate in the Section 106 consultation process for this undertaking (36 CFR Part 800.2[c][5] and 800.3[f]). Those parties include the Indian Spring Citizens Association, the National Park Seminary Master Association, the Washington Biologists' Field Club, and the National Trust for Historic Preservation. For a list of additional

consulting parties previously invited to consult in the Study refer to **DEIS, Chapter 4, Table 4-8** (https://oplanesmd.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf).

Numerous consultation activities have occurred since the publication of the DEIS in July 2020 to advance the Section 106 process and are summarized here.

MDOT SHA submitted an update to the undertaking's APE, new and revised eligibility determinations on three architectural resources, and new and revised effects determinations for six historic properties by letter dated July 23, 2020. MHT agreed with the APE revision and effects findings on September 4, 2020. MDOT SHA also recommended archaeological investigations at six stream and water quality mitigation sites within the APE.

MDOT SHA in coordination with FHWA requested a determination of eligibility from the Keeper of the National Register of Historic Places for the Dead Run Ridges Archaeological District (44FX3922). The Keeper of the National Register determined that the archaeological district was eligible for the NRHP on September 9, 2020. The district is proposed for treatment in the PA.

On February 11, 2021, MDOT SHA submitted a letter to MHT and consulting parties transmitting the results of MDOT SHA's archaeological and architectural investigations at the off-site stream and water quality mitigation sites, together with National Register of Historic Places (NRHP) eligibility and effect findings. MDOT SHA evaluated an additional six architectural resources within the expanded APE for the off-site mitigation sites, including two previously identified Maryland Inventory of Historic Properties (MIHP) and four unrecorded resources. The expanded APE includes two previously identified MIHP resources: the Carrollton Manor Rural Historic District (F-1-134) and the Hebb-Kline Farmstead (F-1-202) in Frederick County. The expanded APE also identified four unrecorded architectural resources. The Montgomery Village Golf Club (M: 20-52), in Montgomery County, and the Chesapeake Beach Railway Prism (AA-2559; PG:72-81), in Anne Arundel and Prince George's Counties, each lack integrity, and MDOT SHA determined they were not eligible for the NRHP. The remaining two resources, a single-family dwelling in Charles County (6535 Ward Place) and the Fort Washington Golf Range in Prince George's County, were determined not eligible for the NRHP and were documented on MHT's Short Form for Ineligible Properties.

MDOT SHA archaeological investigations at off-site stream and water quality mitigation sites within the APE identified two archaeological sites at the Beltsville Agricultural Research Center, sites 18PR113 and 18PR1190. MDOT SHA concluded that the two sites warrant Phase II evaluation to determine their eligibility for the NRHP, unless avoidance is feasible. Several other sites (as well as non-site artifact scatters) have been determined not eligible for the NRHP. Additionally, several, potential archeological sites located at the off-site mitigation sites, (18CH971, 18CH972, and 18PR111) could not be fully delineated by the project; it has been determined that, within the Preferred Alternative LOD, these sites do not contain significant archaeological deposits that would be NRHP-eligible or contribute to site significance.

A consulting parties' meeting took place on March 10, 2021 to present Study updates, ongoing avoidance and minimization efforts and present the first draft of a Programmatic Agreement (PA) that, when executed will be the conclusion of the Section 106 review process. Future consulting parties' meetings are

anticipated to continue with discussions related to the development of the PA, including development of commitments to avoid, minimize or mitigate adverse effects to historic properties.

On May 27, 2021, MDOT SHA transmitted a documentation and archaeological monitoring report addressing the Morningstar Tabernacle No. 88 Moses Hall and Cemetery (M: 35-212) to the MHT, VDHR, and consulting parties for their review and comment. The property had already been determined eligible for the NRHP with MHT concurrence as part of prior correspondence; the report provided additional detailed mapping of significant features and historical context to aid in minimization and avoidance planning; no formal concurrence was requested.

On September 8, 2021, MDOT SHA provided additional consultation materials including: additional ground penetrating radar results at the Morningstar Tabernacle No. 88 Moses Hall and Cemetery, a revision to the APE to reflect the Phase 1 South limits including avoidance and minimization measures, archaeological and historic architectural assessments of the proposed stormwater mitigation locations, new determinations of eligibility, and revised effect determinations to reflect the reduced APE based on the Phase 1 South limits. Additionally, a comment from VDHR was addressed to revise the effect determination on one archaeological site in Virginia. Concurrence was requested from MHT on the eligibility determinations and revised effect determinations, in accordance with each agency's jurisdictional authority.

4.7.2 Affected Environment

A. Historic Architectural Resources

The DEIS identified 51 NRHP-eligible architectural historic properties within the APE. Of those properties documented in the DEIS, 32 are outside the revised APE for the Preferred Alternative, which for the purposes of the SDEIS, is limited to the area of the build improvements within the Phase 1 South limits and does not encompasses offsite compensatory stormwater management and wetland mitigation locations.

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.

Since the publication of the DEIS, additional architectural resources were identified and evaluated for NRHP eligibility. On July 23, 2020, MDOT SHA found that Morningstar Tabernacle No. 88 Moses Hall and Cemetery (M: 35-212), the site of a late nineteenth-century African American benevolent society, is eligible for listing in the NRHP. The property had previously been identified for further research in the DEIS and MDOT SHA moved forward with that research rather than deferring to the Programmatic Agreement as proposed in the DEIS. MHT concurred with the eligibility determination on September 4, 2020.

MDOT SHA submitted several additional or revised eligibility determinations for architectural resources to MHT on September 8, 2021, based on the revised APE for the Preferred Alternative. As of that date, a total of 19 known and newly determined-eligible historic properties have been identified within the expected revised APE of the Preferred Alternative (mainline only), pending concurrence from MHT (refer to **Table 4-16** and the *Environmental Resource Mapping* in **SDEIS, Appendix D**). MDOT SHA has completed

eligibility evaluations of above-ground resources in the APE per the methodology described in the *Gap Analysis* (https://495-270-p3.com/wp-content/uploads/2020/07/CulturalResourcesTR_Volume_2.pdf). Prior to September 8, 2021, there were no eligibility findings where SHPO concurrence has not been obtained.

Table 4-16: Historic Architectural Properties within the APE for the Preferred Alternative

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	M: 35-121	Burning Tree Club	Montgomery	1922-1923	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	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 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	M: 30-39	Grosvenor Park	Montgomery	1963-1966	Eligible (Upon reaching 50 years)	A, C
MD	M: 26-89	Latvian Evangelical Lutheran Church of Washington, DC	Montgomery	1975-1979	Eligible pending concurrence	A, Criteria Consideration A
MD	M: 29-40	Magruder Blacksmith Shop	Montgomery	c. 1750-1850	Eligible pending concurrence	C
MD	M: 35-212	Morningstar Tabernacle No. 88 Moses Hall and Cemetery	Montgomery	1887-1973	Eligible	A, C
MD	M: 20-47	National Institute of Standards and Technology (NIST) Headquarters	Montgomery	1963-1969	Listed	A, C
MD	M: 29-52	Naval Surface Warfare Center Carderock Division (NSWCCD) Historic District	Montgomery	1938-1958	Eligible	A, C

State	MIHP#/ VDHR#	Name	County	Period of Significance	NRHP Status	NRHP Criteria
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: 12-46	Washington Biologists' Field Club on Plummers Island	Montgomery	1901-1971	Eligible, pending concurrence	A
MD	M: 26-71	Woodley Gardens	Montgomery	1960-1970	Eligible	A, C

B. Archaeological Resources

The DEIS identified 67 archaeological resources within the APE. Of those archaeological resources documented in the DEIS, 47 will be outside the expected revised APE for the Preferred Alternative. As of June 14, 2021, 20 archaeological resources are located within the revised APE for the Preferred Alternative, seven of those resources have been determined eligible for the NRHP (**Table 4-17**).

Phase II evaluations of sites 18MO191 and 18MO752 have been recommended, and this work has not yet been completed. In addition, design refinements would now impact portions of two other unevaluated archaeological sites (18MO190 and 18MO457), and further archaeological work is recommended at these locations to define site boundaries and determine potential impacts. It is anticipated that these additional investigations will be commitments documented in the PA.

As documented in the DEIS, VDHR did not concur with MDOT SHA's recommendation that individual archaeological sites located with the George Washington Memorial Parkway in Virginia be characterized as an archaeological district and recommended four of the five sites individually eligible for listing on the NRHP (Sites 44FX0374, 44FX0379, 44FX0381 and 44FX0389). Subsequently on July 27, 2020, MDOT SHA, in coordination with FHWA, requested a determination of eligibility from the Keeper of the National Register of Historic Places for the Dead Run Ridges Archaeological District (44FX3922). The Secretary of the Interior determined that the archaeological district was eligible for the NRHP on September 9, 2020. VDHR concurred with the finding that the Dead Run Ridges Archaeological District (44FX3922), and sites 44FX0374, 44FX0379, 44 FX0381, and 44FX0389 would be adversely affected by the MLS on October 5, 2020. The archaeological sites are proposed for treatment in the PA.

Table 4-17: Eligible Archaeological Resources within the APE of the Preferred Alternative

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
VA	44FX3922	Dead Run Ridges Archaeological District	Fairfax	Late Archaic-to Late-Woodland	Eligible	D
VA	44FX0374	N/A	Fairfax	Late Archaic to Late Woodland	Eligible	D
VA	44FX0379	N/A	Fairfax	Late Archaic to Early Woodland	Eligible	D

State	MIHP#/ VDHR#	Name	County	Period of Significance	NRHP Status	NRHP Criteria
VA	44FX0381	N/A	Fairfax	Late Archaic & Late Woodland	Eligible	D
VA	44FX0389	N/A	Fairfax	Late Archaic to Late Woodland	Eligible	D

C. Historic Cemeteries

The DEIS identified two historic cemeteries in Maryland within the APE. The two cemeteries are still located within the LOD for the Preferred Alternative. First, the Montgomery County Poor Farm Cemetery (18MO266) 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 LOD. Because the boundaries of the Poor Farm Cemetery are poorly understood and no marked graves remain, MDOT SHA expects to fully investigate areas to be impacted by construction that may be associated with the Poor Farm Cemetery as design is advanced further. This is expected to be a commitment in the project PA.

Second, the Morningstar Tabernacle No. 88 Moses Hall and Cemetery (M: 35-212) is located on the west side of Seven Locks Road, south of I-495, and was closely associated with the Gibson Grove A.M.E. Zion Church community. A detailed noninvasive study of the property documenting identifiable grave features was completed and sent to consulting parties on May 27, 2021.

As part of continuing investigations, MDOT SHA conducted a ground penetrating radar (GPR) survey at Morningstar Tabernacle No. 88 Moses Hall and Cemetery (M:35-212), including the adjoining MDOT SHA right-of-way, and provided the results to MHT and consulting parties on September 8, 2021. The results suggested the potential for additional interments outside the cemetery property boundary, MDOT SHA has adjusted LOD near the cemetery to avoid the areas where GPR indicated potential for grave features and included additional buffer around this area within right-of-way to avoid possible impacts. MDOT SHA will continue consultation with the MHT and stakeholders to determine whether additional investigations are appropriate following the design avoidance measures.

No historic cemeteries were identified in Virginia.

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]).

A. Historic Architectural Resources

Four historic architectural properties (including NRHP-eligible or listed parks and parkways) within the expected revised APE for the Preferred Alternative (mainline) fall within the LOD and would experience an adverse effect (**Table 4-18**). No properties are proposed for complete demolition or destruction but contributing features of some properties would experience physical impacts of varying degrees. The Preferred Alternative avoids many significant historic properties that were documented in the DEIS including, but not limited to: Baltimore-Washington Parkway, Greenbelt Park, Glenarden Historic District, Indian Spring Club Estates and Indian Spring Country Club, National Park Seminary/Forest Glen/Walter Reed A.M.C Annex, Rock Creek Stream Valley Park, and Sligo Creek Parkway. On September 8, 2021, MDOT SHA requested concurrence that the historic properties that are now outside the APE for the Preferred Alternative would experience no adverse effect. The four (4) properties that will have adverse effects are described below (**pages 4-37 and 4-38**).

Table 4-18: Historic Architectural Properties with Known Adverse Effect

State	MIHP#/ VDHR#	Jurisdiction	Name	Period of Significance	NRHP Criteria	Nature of Adverse Effect
MD	M: 12-46	NPS/ C&O Canal NHP	Chesapeake and Ohio Canal National Historical Park	1828-1924	A, C, D	LOD Impacts to contributing features; diminishment of setting
MD and VA	M: 35-61 and 029-0228 (Virginia)[1]	NPS/ George Washington Memorial Parkway	George Washington Memorial Parkway/Clara Barton Parkway	1930-1966	B, C	LOD Impacts to contributing features; diminishment of setting (Virginia); temporary diminishment of setting (Maryland)
MD	M: 35-212	Private	Morningstar Tabernacle No. 88 Moses Hall and Cemetery	1887-1973	A, C	Pending further consultation following avoidance measures
MD	M: 12-46-2	NPS/ C&O Canal NHP	Washington Biologists' Field Club on Plummers Island	1901-1971	A (pending concurrence)	LOD impacts; diminishment of setting (pending concurrence)

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

Based on design information available when the DEIS was published in June 2020, effects could not be fully determined on three historic properties (Carderock Springs Historic District, Gibson Grove A.M.E Zion Church, and the Washington Aqueduct). On July 23, 2020, MDOT SHA revised the effect finding for the Washington Aqueduct (M: 24-29) to no adverse effect and MHT concurred on September 4, 2020. The LOD at this location represent above-grade impacts, and no physical impacts to the historic property are anticipated. The vertical aspect of the LOD remains at the surface at this location with a crossing of an underground segment of the Aqueduct at MacArthur Boulevard, and ground disturbance that would affect the Aqueduct will be prohibited. Current design is not expected to alter the character of the property.

On September 8, 2021, MDOT SHA provided an eligibility determination for the Washington Biologists' Field Club on Plummers Island (WBFC), and found it to be eligible for the NRHP, and submitted the finding to MHT for concurrence (**Table 4-18**). The WBFC is entirely within the boundaries of the Chesapeake and Ohio Canal National Historical Park, and but has individual independent significance. Because the Preferred Alternative would diminish the setting of the property, an adverse effect finding was also made and is pending concurrence with MHT.

MDOT also revised effect findings to two historic properties: Carderock Springs Historic District and Gibson Grove A.M.E. Zion Church (**Table 4-19**). Design advancement and further analysis of the LOD have resulted in a finding of no adverse effect for the Carderock Springs Historic District property, pending MHT concurrence. The Preferred Alternative would result permanent and temporary impacts in total of less than 0.1 acres of the Carderock Springs Historic District. This impact has increased from the no impact reported in the DEIS. The increase in impact from the DEIS resulted from design refinement, including advanced design at Cabin John Parkway Interchange to minimize impacts to Morningstar Tabernacle No. 88 Moses Hall and Cemetery, as well as exchange ramps, construction of retaining and noise walls along the outer loop, and clearing and erosion and sediment control measures. The LOD adjoining Carderock Springs Historic District is almost entirely within MDOT SHA right-of-way but will impact approximately 3.2 square feet of the rear yard at 7610 Hamilton Springs Road, a contributing resource within the district. The LOD includes a ten-foot offset behind the proposed noise wall. The proposed centerline of I-495 is shifted north compared to existing conditions through this section. These actions will not disturb the original topography and natural vegetation within Carderock Springs itself, and the proposed noise wall will further screen the district from visual and audible effects already present along I-495. No diminishment of location, design, materials, association and workmanship will occur, and setting and feeling will remain consistent with the existing highway facility.

For the Gibson Grove A.M.E. Zion Church, design advancement has identified proposed construction activities at this location including outfall stabilization, culvert augmentation, bridge erection, and construction access. Some of these activities are included to improve the condition of the highway drainage on the property, as has been requested by the current church leaders. Physical impacts to the church property are limited to 0.1 acres of permanent impacts along the north side of I-495, at a steep hillside adjoining the church as compared to less than 0.1 acre in the DEIS. This slight increase in impacts is the result of advanced design at the Cabin John Parkway interchange for exchange ramps and to minimize impacts to Morningstar Tabernacle No. 88, Moses Hall and Cemetery (M: 35-212). These design changes have caused a shift in the highway alignment to the north, resulting in increased impacts to Gibson Grove A.M.E. Zion Church from construction of a new bridge over Seven Locks Road. The new bridge will be widened to the north along Seven Locks Road, resulting in increased temporary impacts to the church property during construction. In consideration of the small size of the church parcel, and the extent of construction activities on the property, there would be a long-term, but temporary diminishment of the property's integrity of setting and feeling. MDOT SHA has determined the project will adversely affect the Gibson Grove A.M.E. Zion Church, pending MHT concurrence.

Table 4-19: Historic Properties with Revised Effect Determinations Subsequent to the DEIS

State	MIHP#/ VDHR#	Jurisdiction	Name	Period of Significance	NRHP Criteria	Nature of Possible Adverse Effect
MD	M: 29-59	Private/ Multiple Owners	Carderock Springs Historic District	1962-1967	A, C	Changed to No Adverse Effect - No diminishment of location, design, materials, association or workmanship based on updated design; Pending MHT Concurrence
MD	M: 29-39	Private	Gibson Grove A.M.E. Zion Church	1923	A	Changed to Adverse Effect - a temporary but long-term diminishment of the property's setting and feeling due to construction impacts on a small sized property; Pending MHT concurrence
VA	N/A	NPS/GWMP	Archaeological Site 44FX0381	Late Archaic & Late Woodland	D	Changed to No Adverse Effect, updated LOD avoid the site; Pending VDHR concurrence

As of September 8, 2021, MDOT SHA has determined that there are 14 eligible or listed properties within the revised APE of the Preferred Alternative (mainline) that would not be adversely effected. 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.

a. 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 accommodate a temporary access road for construction vehicles and materials to build the new ALB and remove the existing structure, reconstruction and maintenance of I-495 northbound ramp to Clara Barton Parkway and the eastbound Clara Barton Parkway ramp to northbound I-495, construction of a trail connection between a multi-use path on the east side of the new ALB and the C&O Canal towpath.

Since the publication of the DEIS, minimization efforts have reduced the LOD along the northbound lanes, including significant reductions of LOD on the Plummers Island portion of the C&O Canal National Historical Park and along the C&O Canal towpath and east of the highway. Refer to **Section 4.4.3** for details on the minimization efforts to the properties around the American Legion Bridge. The Preferred Alternative includes 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.

b. 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.

Project activities in Virginia include the construction of the new American Legion Bridge including access for removal of the existing piers and superstructure, new pier construction, and superstructure erection; the construction, operation, and future maintenance of new direct access ramps to the managed lanes on I-495; the construction of a shared use path and retaining wall along the east side of I-495 and approaching the American Legion Bridge; the extension of a culvert; 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. Since the publication of the DEIS, minimization efforts have reduced the LOD for the Preferred Alternative in Virginia in the quadrant southeast of the American Legion Bridge. The LOD is now primarily confined to a small strip of land north of the westbound lanes of George Washington Memorial Parkway for the installation, operation and maintenance of conduit for signing. In addition, LOD is needed along I-495 between the inner loop and George Washington Memorial Parkway accommodate a retaining wall and shared-use path. There is a small area in the southeast quadrant for the American Legion Bridge pier and superstructure construction activities. (Refer to **SDEIS, Appendix D, Maps 2-4**.)

Project activities at this location include accommodate a temporary access road for construction vehicles and materials to build the new ALB and remove the existing structure, reconstruction and maintenance of I-495 northbound ramp to Clara Barton Parkway and the eastbound Clara Barton Parkway ramp to northbound I-495, construction of a trail connection between a multi-use path on the east side of the new ALB and the C&O Canal towpath. (Refer to **SDEIS, Appendix D, Maps 2 and 4**.)

c. Morningstar Tabernacle No. 88 Moses Hall and Cemetery

MDOT SHA has evaluated an alternative to avoid the Morningstar Cemetery and associated potential graves identified in an area of adjacent right-of-way through a GPR survey.

The proposed typical section of the Preferred Alternative along the northbound I-495 Inner Loop managed lane ramp in the vicinity of the cemetery consists of the following:

- 12-foot left shoulder (adjacent to concrete traffic barrier)
- 15-foot travel lane
- 4-foot right shoulder (adjacent to concrete traffic barrier)
- Noise barrier located five feet from the centerline of concrete traffic barrier

The proposed modification reduces the northbound I-495 Inner Loop managed lane ramp left shoulder width to 6 feet (from 12 feet). The ramp's right shoulder remains four (4) feet in width; however, the noise barrier would be relocated to the back of the concrete traffic barrier. The LOD is established five (5) feet from the centerline of the noise barrier for approximately 300 feet along the frontage of the Morningstar Cemetery property. An area similarly reducing impacts to existing right-of-way extends approximately 65 feet west of the identified potential graves to provide a buffer margin.

This alternative minimizes the overall width of the section avoiding earthwork (cuts or fills) at the nearest GPR-indicated feature that may be a grave.

Although this minimization effort has eliminated project impacts within the property and avoids associated potentially indicated burial features within right-of-way adjacent to the cemetery, MDOT SHA continues to find that the property will be adversely affected pending further consultation regarding options for future investigations and other issues raised regarding indirect and cumulative effects.

B. Archaeological Resources

The effects assessment anticipates the Preferred Alternative would have an adverse effect on all NRHP-eligible archaeological resources located within the LOD. Archaeological resources outside the LOD would not be affected and no additional investigations to determine eligibility would be conducted for those sites. MDOT SHA finds three archaeological properties are adversely affected: two archaeological sites in Maryland and Dead Run Ridges Archaeological District in Virginia listed in **Table 4-20**. As part of the materials provided on September 8, 2021, MDOT SHA, on behalf of FHWA, determined that site 44FX0381 would no longer be adversely affected as an individual site, based on the updated limits of disturbance and requested concurrence on the determination from VDHR. Some additional archaeological investigations would be required within the expected revised APE for the Preferred Alternative 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 the DEIS (https://oplanesmd.com/wp-content/uploads/2020/07/CulturalResourcesTR_Volume_4.pdf. The properties with adverse effects are described below.

Table 4-20: Archaeological Resources with a Known Adverse Effect

State	MIHP#/ VDHR#	Jurisdiction	Name	Period of Significance	NRHP Criteria	Nature of Adverse Effect
MD	18MO749	NPS/ C&O Canal NHP	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/ C&O Canal NHP	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	44FX3922	NPS/ George Washington Memorial Parkway	Dead Run Ridges Archaeological District	Late Archaic-Woodland	D	Limited portions of individual sites within the district would likely be destroyed, and the district would likely be diminished in some aspects of integrity
VA	44FX0374	NPS/ GWMP	N/A	Late Archaic-Late Woodland	D	Limited portions of the margin of this site within the district would likely be destroyed
VA	44FX0379	NPS/ GWMP	N/A	Late Archaic-Early Woodland	D	Limited portions of the margin of this site within the district would likely be destroyed
VA	44FX0389	NPS/ GWMP	N/A	Late Archaic-Late Woodland	D	Limited portions of the margin of this site within the district would likely be destroyed

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 Preferred

Alternative LOD, 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 Preferred Alternative LOD, 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 several of the investigated sites, together with previously recorded sites that were not investigated as part of the study, constitute a NRHP-eligible archaeological district of related resources (44FX3922); the district was determined eligible by the Keeper of the Register when VDHR did not concur with MDOT SHA's initial finding. Contributing sites within the proposed district boundary and inside the Preferred Alternative LOD include 44FX0379, 44FX0381, and 44FX0389; these sites are also individually eligible for the NRHP. 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 Preferred Alternative LOD, portions of individual sites within the district would likely be destroyed, and the district and sites 44FX0374, 44FX0379, and 44FX0389 would likely be diminished in some aspects of integrity by construction of the project, although impacts have been reduced from the revised Preferred Alternative LOD. Site 44FX0381 would no longer experience an adverse effect as it is outside the Preferred Alternative LOD, pending concurrence with this finding by VDHR.

C. Historic Cemeteries

The parcels containing the likely location of the Montgomery County Poor Farm Cemetery would be impacted by the LOD of the Preferred Alternative. The parcels containing the known location of NRHP-eligible Morningstar Tabernacle No. 88 Moses Hall and Cemetery would not be impacted by the LOD for the Preferred Alternative based on refinements to completely avoid the parcels.

a. Morningstar Tabernacle No. 88 Moses Hall and Cemetery

Since the publication of the DEIS, MDOT SHA has undergone efforts to continue to evaluate Morningstar Cemetery to the extent practicable through documentary and non-invasive research. On May 27, 2021, MDOT SHA submitted a technical report documenting the non-invasive investigations at Morningstar Tabernacle No. 88 Moses Hall and Cemetery to aid in the development of avoidance and minimization and treatment approaches in the PA.

Additionally, MDOT SHA conducted a GPR survey at Morningstar Tabernacle No. 88 Moses Hall and Cemetery (M: 35-212), including the adjoining MDOT SHA right-of-way, and provided the results to MHT and consulting parties on September 8, 2021. As described earlier in this section in **Section 4.7.3.A.c**, MDOT SHA has adjusted the Preferred Alternative LOD near the cemetery to avoid the areas where GPR indicated potential for grave features and included additional buffer around this area within right-of-way to avoid potential impacts. MDOT SHA will continue consultation with the SHPOs and affected communities to determine whether additional investigations are appropriate following the avoidance

measures. Any further investigations, treatment measures or other commitments to avoid impacts are expected to be a commitment in the Section 106 PA.

b. Montgomery County Poor Farm Cemetery

Because the Montgomery County Poor Farm cemetery location is unclear, with no surface features remaining or known historic maps showing the cemetery, MDOT SHA proposes to conduct archaeological delineation and treatment of any cemetery features and/or human remains as a commitment in the PA, with the treatment approach determined in consultation with MHT and affected consulting parties; the investigation and treatment would be implemented prior to construction.

4.7.4 Mitigation

A. Section 106 Programmatic Agreement

Due to the complexity and wide scope of the Study, ongoing consultation to address effects to historic properties will be necessary, 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 Advisory Council on Historic Preservation (ACHP) of this anticipated PA in March 2018, and ACHP notified MDOT SHA and FHWA in May 2018 of their participation in consultation for this undertaking (36 CFR Part 800.6[a][1][iii]). As noted in the PA outline that was appended to the DEIS, the PA would 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 (ROD).

On March 10, 2021, MDOT SHA provided a first draft of the PA for review and comment to MHT, VDHR and consulting parties. On the same day, MDOT SHA held a consulting parties meeting that presented an introduction and summary of the contents of the first draft of the PA to MHT, VDHR, and the consulting parties. MDOT SHA is currently reviewing consulting parties' comments and it is anticipated that the second draft will be developed with the consulting parties in the Fall of 2021 with a goal of having a signature ready PA in Early 2022, 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 the Preferred Alternative, 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 any historic properties for which the effects cannot be determined, 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 LOD of the Preferred Alternative, 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; these commitments are anticipated to be in a flexible treatment plan to be incorporated by reference into the PA. 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 LOD of the Preferred Alternative that require additional evaluation to determine eligibility for the NRHP, MDOT SHA would include commitments in the PA and treatment plan 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 or near the Preferred Alternative LOD, the Morningstar Tabernacle No. 88 Moses Hall and Cemetery and the location of the Montgomery County Poor Farm Cemetery, will be subject to delineation, evaluation and treatment under the PA, as determined through consultation. MDOT SHA has worked and will work to avoid or minimize impacts and coordinate with affected communities on the treatment of human remains. MDOT SHA has coordinated extensively with interested stakeholders and will continue to do so to identify appropriate mitigation measures or other context-sensitive commitments. 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; this commitment is also anticipated to be a treatment plan incorporated by reference into the PA.

4.8 Air Quality

4.8.1 Introduction

As required by the Clean Air Act and Amendments, the US Environmental Protection Agency (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. The methodologies for assessing the pollutants is summarized in the **DEIS, Chapter 4, Section 4.8** and within the *Air Quality Technical Report* (**DEIS, Appendix I**) (https://495-270-p3.com/deis/).

4.8.2 Affected Environment

The Preferred Alternative is located in Montgomery County, Maryland and a small area in Fairfax County, Virginia. The EPA Green Book[3] lists these counties as attainment for all NAAQS with the exception of the 2015 8-hour ozone standard,[4] for which the counties are nonattainment. The EPA recently redesignated the area to maintenance/attainment for the 2008 8-hour ozone standard.[5] 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.

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 PM2.5.6. 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 Study is currently included in the NCRTPB Fiscal Year (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 Study is included in the Air Quality Conformity Analysis that accompanies the Visualize 2045 Plan. The Visualize 2045 Air Quality Analysis is based upon the most current planning assumptions available for the Washington region. The analysis used MOVES2014a, the latest emission factor model specified by EPA for use in preparation of state implementation plans and conformity assessments at the time of analysis.

As part of the conformity analysis, consultation with affected agencies such as the EPA, FHWA, FTA, and the Metropolitan Washington Air Quality Committee (MWAQC), as well as with the public was completed. 23 CFR 450.324(c) requires that the Metropolitan Planning Organization review and update the transportation plan at least every four years in air quality nonattainment and maintenance areas to confirm the transportation plan's validity and consistency with current and forecasted transportation and land use conditions and trends and to extend the forecast period to at least a 20-year planning horizon.

[3] https://www.epa.gov/green-book

[4] 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).

[5] https://www.federalregister.gov/documents/2019/04/15/2019-06128/air-plan-approval-district-of-columbia-maryland-and-virginia-maryland-and-virginia-redesignation

[6] 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).

The National Capital Region Transportation Planning Board (TPB) is currently updating the Visualize 2045 plan, to be completed in 2022. The design concept and scope for the Preferred Alternative will be included in the Air Quality Conformity analysis accompanying the update to Visualize 2045 which will be approved in 2022. As the Study is included in the currently conforming long-range plan, it is not anticipated that the updated Air Quality Conformity analysis which includes the Preferred Alternative would cause an exceedance of the NAAQS or ozone.

The Air Quality Analysis Study Area (i.e., Montgomery County and Fairfax County) is in an attainment area for fine particulate matter (PM2.5), therefore, transportation conformity requirements pertaining to PM2.5 do not apply for this Project and no further analysis of PM2.5 was required.

The Study is located in a region where the maintenance period for CO has expired and the CO NAAQS no longer apply, (**DEIS, 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, the DEIS presented the results of the potential impacts for CO at worst-case intersections throughout the study corridors. The methodologies and assumptions applied for the analysis are consistent with FHWA[7] and EPA guidance.[8,9] An updated traffic analysis to determine the worst-case intersections and interchanges on Preferred Alternative throughout the corridors will be performed. If the result of this updated analysis changes the ranking of the worst-case intersections and interchanges, updated CO air quality modeling will be performed on the Preferred Alternative using the updated intersection and interchange data. The results of the traffic analysis and CO modeling, if performed, will be presented in the FEIS.

Because the Preferred Alternative includes no action/no improvements for the majority of the study area, the affected network was updated to focus on just those segments near the Phase 1 South limits using the FHWA suggested methodology for determining segments with meaningful changes resulting from the proposed improvements. Based on the Preferred Alternative, fewer links met the affected network criteria, which reduced the footprint of the affected area compared to the previous version. The updated affected network was developed using the Regional Travel Demand Forecast Metropolitan Washington Council of Governments (MWCOG) Regional Travel Demand Model for the Preferred Alternative in 2025 and 2045 analysis years. The results of an updated MSAT analysis using traffic data derived from this affected network will be presented in the FEIS.

GHG emissions are different from criteria air pollutants since their effects in the atmosphere are global rather than localized, and since they remain in the atmosphere for decades to centuries. GHG emissions from vehicles using roadways are a function of distance traveled (expressed as vehicle miles traveled (VMT)), vehicle speed, and road grade.

To date, no GHG emissions NAAQS have been established by the EPA and there is no approved regulatory requirement that has been established to analyze these emissions at a project level for transportation projects. However, recognizing the importance of GHG emissions, and consistent with CEQ's 2016 Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the

[7] https://www.environment.fhwa.dot.gov/projdev/impTA6640.asp
[8] https://www3.epa.gov/scram001/guidance/guide/coguide.pdf
[9] https://nepis.epa.gov/Exe/ZyPdf.cgi?Dockey=P100M2FB.pdf

Effects of Climate Change in National Environmental Policy Act Reviews[10], MDOT SHA utilized the best available data and EPA approved emissions model available at the time of development of the DEIS air quality analysis to estimate GHG emissions associated with the Build Alternatives. GHG emissions on the affected transportation network for all modeled Build Alternatives in the DEIS are projected to be lower in the opening (2025) and design (2040) years compared to base year conditions. All Build Alternatives are projected to slightly increase annual tailpipe GHG emissions by an average of 1.4 percent compared to the No Build Alternative in 2040. VMT derived from the affected network developed for the MSAT analysis for the Preferred Alternative will be used to characterize the VMT changes for the GHG discussions and to conduct an updated GHG analysis for the Preferred Alternative. 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 Preferred Alternative. The results of the updated GHG emissions analysis will be presented in the FEIS.

GHG emissions are also generated during roadway construction and maintenance activities. A quantitative analysis of the construction related GHG emissions of the Preferred Alternative will be conducted using FHWA's Infrastructure Carbon Estimator tool. The results of this analysis will be included in the FEIS.

Maryland is committed to reducing GHG and to preparing our State for the impacts of climate change. The Maryland Commission on Climate Change (MCCC) and its Mitigation Working Group (MWG) have demonstrated that commitment by working collaboratively with experts and stakeholders across State and local agencies, environmental, non-profit and academic institutions. The resulting body of work quantifies baseline GHG emissions by sector to understand the impacts that specific plans, policies, and programs will have on future emissions economy-wide. Statewide analyses do not indicate that the HOT lanes will impede Maryland's ability to meet our GHG emission reduction goals. In fact, the Greenhouse Gas Reduction Act Plan documents Maryland's existing and future emissions reductions under several scenarios, all of which include this project. The document illustrates that Maryland will not only meet the 40% by 2030 goal, but that we are dedicated to working together to exceed that goal and to strive for a 50% reduction by 2030.

MDOT continues to be an active partner in the MCCC and Maryland's GHG reduction efforts and is leading the way on transportation sector scenario and emissions analyses. MDOT has worked with stakeholders, communities, and our partners on the MWG to better understand the impacts of the changes within the transportation sector, ranging from technology improvements, such as the deployment of automated, connected, and electric vehicles to the importance of improving mobility and expanding telework.

4.8.4 Mitigation

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;

[10] https://ceq.doe.gov/docs/ceq-regulations-and-guidance/nepa_final_ghg_guidance.pdf

- 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

As defined in Title 23 of the CFR Part 772 (23 CFR 772), this project is classified as a Type I project[11] 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 whether noise abatement is feasible and reasonable for the Preferred Alternative along the study corridors. All prediction modeling was performed using FHWA's Traffic Noise Model (TNM) v2.5. Refer to the **DEIS, Chapter 4, Section 4.9 and DEIS, Appendix J** (https://495-270-p3.com/deis/) for the regulations and methodology used for the MLS noise analysis. The MLS study area overlaps with VDOT's I-495 Express Lanes Northern Extension Study between the Potomac River and Live Oak Drive. For the Maryland portion of the study area MDOT SHA's *Highway Noise Abatement Planning and Engineering Guidelines* (April 2020) was followed, and for the Virginia portion of the study area Virginia Department of Transportation's (VDOT) *Highway Traffic Noise Impact Analysis Guidance Manual* (February 2018) was followed.

What is a decibel?

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.

The TNM validation process confirms the model's ability to reproduce the Measured Noise Levels. Measured Noise Levels correspond to ambient measurements taken in conjunction with highway traffic counts. A difference of three decibels or less between the monitored and modeled levels is considered acceptable, since this is the limit of change detectable by typical human hearing. FHWA guidance specifies that the arithmetic difference between monitored and predicted existing noise levels is a measure of the model's accuracy.

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) [VDOT uses the term Common Noise Environment (CNE); however, for this summary, CNEs will be referred to as NSAs]. The majority of the NSAs that MDOT SHA and VDOT evaluate 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

[11] 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).

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), the MDOT SHA *Highway Noise Abatement Planning and Engineering Guidelines* (April 2020), and VDOT *Highway Traffic Noise Impact Analysis Guidance Manual* (February 2018) 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 and 2018 VDOT Manual) from existing to build condition noise levels. According to MDOT SHA's Guidelines and VDOT's Manual, for a Type I project an impact is identified when design year noise levels are predicted to equal or exceed the appropriate MDOT SHA NAC Approach Criteria or exceed the appropriate VDOT NAC Criteria[12] for each land use, or when predicted noise levels are anticipated to increase over existing year noise. No NSAs will experience a substantial increase as a result of the Preferred Alternative.

4.9.2 Affected Environment

Under the Preferred Alternative there are 64 noise sensitive areas (NSA) along the study corridors. In the DEIS, 133 NSAs were reviewed, a reduction in 69 NSAs. 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, four (4) NSAs are located along I-495 in Virginia, 20 NSAs are located along I-495 in Maryland, and 40 NSAs are located along I-270 (**Table 4-21**).

There are several existing Type I and Type II noise barriers within the study area. For this analysis, noise barriers that are anticipated to be displaced for roadway improvements or stormwater management conflicts, have been analyzed to verify that there is no decrease in performance as replacement barriers. Any barriers that are displaced, will be re-evaluated during the final design process to verify that replacement noise barriers meet or exceed the noise abatement performance of the existing noise barriers to be replaced including insertion loss and line of sight.

4.9.3 Environmental Consequences

The results of the updated noise analysis by NSA for the Preferred Alternative are presented in **Table 4-21**. Of the four (4) NSAs along I-495 in Virginia, three (3) are predicted to result in noise impacts from the Preferred Alternative. One (1) NSA location currently does not have an existing noise barrier and warrants further consideration of noise abatement due to the construction of the proposed highway improvements. (Refer to the *Environmental Resource Mapping* (**SDEIS, Appendix D**) and *Map 1* of the *Noise Analysis Technical Report Addendum* (**SDEIS, Appendix E**).

Of the 20 NSAs along I-495 in Maryland, 19 are predicted to result in noise impacts from the Preferred Alternative; with 15 having levels equal to or exceeding 75 dB(A)[13]. Seven (7) NSA locations currently do not have an existing noise barrier and warrant further consideration of noise abatement due to the

[12] VDOT defines approach as 1 dB(A) below the set FHWA noise abatement criteria.

[13] In Maryland, 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 cost effectiveness evaluation threshold.

construction of the proposed highway improvements. (Refer to the *Environmental Resource Mapping* **(SDEIS, Appendix D**) and *Maps 2 through 8* of the *Noise Analysis Technical Report* (**SDEIS, Appendix E**).

Of the 39 NSAs along I-270, 27 are predicted to result in noise impacts from the Preferred Alternative; with 14 having levels equal to or exceeding 75 dB(A). Twelve (12) 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* (**SDEIS, Appendix D**) and *Maps 9 through 18* of the *Noise Analysis Technical Report Addendum* (**SDEIS, Appendix E**).

4.9.4 Mitigation

Federal regulation (23 CFR 772), MDOT SHA *Highway Noise Abatement Planning and Engineering Guidelines* (April 2020), and VDOT *Highway Traffic Noise Impact Analysis Guidance Manual* (February 2018) require that noise abatement be investigated at all NSAs where the design year 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) and VDOT *Highway Traffic Noise Impact Analysis Guidance Manual* (February 2018). 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 (MDOT SHA requires barriers to achieve a 5 dB(A) noise reduction at 70 percent of the impacted residences, VDOT requires barriers to achieve a 5 dB(A) noise reduction at 50 percent of the impacted receptors), safety, and access. 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 (MDOT SHA requires barriers to achieve a 7 dB(A) noise reduction at a minimum of three (3)[14] or 50 percent of the impacted residences, VDOT requires barriers to achieve a 7 dB(A) noise reduction at a minimum of one (1) impacted receptor[15]), and cost effectiveness (the MDOT SHA threshold is 700-2,700 square feet per benefited residence depending on the scope of the project, the VDOT threshold is 1,600 square feet per benefitted receptor). Refer to **SDEIS, Appendix E, 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 to remain in place; existing noise barriers displaced by proposed construction to be replaced by a reconstructed barrier on a new alignment; existing noise barriers that were evaluated for extensions; and noise barriers on new alignment. **Table 4-21**is a summary of the noise barrier system mitigation based on the current design of the Preferred Alternative. The proposed and assumed locations of the existing and feasible and reasonable noise barriers are shown on the *Environmental Resource Mapping* (**SDEIS, Appendix D**).

[14] NSAs must have a minimum of three (3) impacted receptors in order to be considered for noise abatement in Maryland per MDOT SHA noise policy.

[15] A receptor is a discrete or representative location of a noise sensitive area, typically used for modeling purposes. A residence is one dwelling unit, either one single family residence or one dwelling unit in a multifamily dwelling. A receptor may represent more than one residence.

4.9.5 Statement of Likelihood

Based on the studies performed thus far, MDOT SHA and VDOT recommend installation of highway traffic noise abatement in the form of a noise barrier for the NSAs as reflected in **Table 4-21**. 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* (April 2020) and VDOT *Highway Traffic Noise Impact Analysis Guidance Manual* (February 2018). 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 based on the latest design concept (**Table 4-21**); however, final determination of noise barrier feasibility, reasonableness, dimensions and locations 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 final design phase. The views and opinions of benefited property owners and residents may be solicited through public involvement and outreach activities during final design.

Table 4-21: Summary of Noise Sensitive Area (NSA) Impacts and Preliminary Noise Barrier System Abatement

NSA	Map Number, App D	Impacted [* if => than 75 dB(A)]		Preliminary Noise Barrier Mitigation	Feasible and Reasonable?		Preliminary Barrier Dimensions (ft)	
		Yes	No		Yes	No	Length	Height
Area 1: I-495 west side, south of George Washington Parkway								
VA-01	1	Y		495 VA-1	Y		1,871	17
VA-03[16]	1	Y		495 VA-3	N/A		3,072	20
Area 2: I-495 west side, between George Washington Parkway and Clara Barton Parkway								
VA-02	1	Y*		495 VA-2	Y		2,099	19
VA-04	1		N	N/A	N/A		N/A	N/A
Area 3: I-495 west side, between Clara Barton Parkway and MD 190								
1-01	3	Y*		495 MD-1	Y		1,363	22
1-02	3	Y*		495 MD-2	Y		6,281	24
1-04	3,4	Y*						
1-05	4,5	Y*		495 MD-4	Y		3,434	24
1-03	4	Y*		495 MD-3	Y		3,980	24
2-01	4,5	Y						
Area 4: I-495 west side, between MD 190 and I-270 west spur								
1-06	5	Y*		495 MD-5	Y		6,892	29
3-01	5,6	Y*						
1-38	5	Y		495 MD-7	Y		783	32

[16] NSA VA-03 has an existing noise barrier; since it is physically impacted by the project it will be replaced in-kind in accordance with VDOT policy. Since this is a replacement barrier, cost effectiveness is not required.

NSA	Map Number, App D	Impacted [* if => than 75 dB(A)]		Preliminary Noise Barrier Mitigation	Feasible and Reasonable?		Preliminary Barrier Dimensions (ft)	
		Yes	No		Yes	No	Length	Height
4-01[17]	5	Y*		495 MD-6A		N	N/A	N/A
2-02	5,6	Y*		495 MD-6	Y		4,433	32
Area 5: I-495 top side, between I-270 west spur and MD 187								
3-02	6,7	Y*		495 MD-8	Y		2,663	31
3-04	7	Y		495 MD-11	Y		3,114	24
1-08	7	Y*						
2-03	7	Y*		495 MD-10	Y		1,678	22
2-04	8	Y*		495 MD-12	Y		4,092	24
2-05	8	Y*		495 MD-13	Y		4,507	20
Area 6: I-495 top side, between MD 187 and I-270 east spur								
2-06	8	Y		495 MD-14	Y		2,134	19
1-09A	8	Y						
1-10	8	Y*		495 MD-15	Y		1,869	28
Area 7: I-270 west spur, between I-495 and Democracy Boulevard								
5-36	9	Y*		270-11	Y		5,515	26
5-37A[18]	9	Y*		Existing Barrier to Remain	N/A		N/A	N/A
				270-12A - Replacement	Y		347	20
				270-12B - Extension		N	N/A	N/A
5-37B[19]	6,9	Y*		270-12C	Y		641	27
				270-12D		N	N/A	N/A
Area 8: I-270 west spur, between Democracy Boulevard and Westlake Terrace								
5-32A	9		N	N/A	N/A		N/A	N/A
Area 9: I-270 east spur, between I-495 and MD 187								
5-33A	10,11	Y*		270-8	Y		5,562	28
5-34A	10,11	Y*		270-9	Y		4,069	22
Area 10: I-270 west and east spurs, between Y-split and Westlake Terrace and MD 187								
5-32C[20]	12	N/A		N/A	N/A		N/A	N/A
5-32B[21]	11,12	Y		270-10	N/A		N/A	N/A
5-31	11	Y		270-7B	Y		3,755	11
5-30	12	Y*		270-7A	Y		2,860	16

[17] NSA 4-01 consists of a golf course. Barrier 6A was assessed in combination with Barrier 6; however, the combined barrier system exceeded the MDOT SHA threshold of 2,700. Therefore, each noise barrier was evaluated individually. Barrier 6A did not meet the MDOT SHA threshold of 2700, and is therefore, not feasible and reasonable.

[18] NSA 5-37A consists of single family residences. The existing noise barrier combined with an extended and relocated barrier is not feasible and reasonable; therefore, each noise barrier was evaluated individually. 270-12A was evaluated as an existing noise barrier to be replaced; however, the barrier did not meet the MDOT SHA threshold of 1700 sf-p-r. Since this is a replacement barrier and the cost effectiveness criteria cannot be met the replacement barrier, Barrier 270-12A must still be constructed and must meet or exceed the existing noise barrier performance. The extension of the noise barrier is not reasonable (>1700 sf-p-r and < 50% of impacts receive 7 dB(A) insertion loss).

[19] NSA 5-37B consists of the Bethesda Overlook townhouses and the tennis courts and golf course of the Bethesda Country Club. A combined barrier system was evaluated for this area; however, the barrier system did not meet the MDOT SHA threshold of 2700 sf-p-r; therefore, the barriers were assessed separately. Barrier 270-12C, which shields the townhouses and tennis courts is feasible and reasonable; while Barrier 270-12D, which shields the golf course is not feasible and reasonable.

[20] NSA 5-32C consists of an office building without any outdoor uses; therefore, this NSA requires no further consideration.

[21] NSA 5-32B consists of a pedestrian path. The barrier is not reasonable (>1700 sf-p-r).

NSA	Map Number, App D	Impacted [* if => than 75 dB(A)]		Preliminary Noise Barrier Mitigation	Feasible and Reasonable?		Preliminary Barrier Dimensions (ft)	
		Yes	No		Yes	No	Length	Height
Area 11: I-270 mainline, between Y-split and Montrose Road								
5-29	12,13	Y*		270-15	Y		5,885	21
5-28	12,13,14		N	N/A	N/A		N/A	N/A
Area 12: I-270 mainline, between Montrose Road and MD 189								
5-27	14		N	N/A	N/A		N/A	N/A
5-26[22]	14	N/A		N/A	N/A		N/A	N/A
5-25[23]	14,15	N/A		N/A	N/A		N/A	N/A
5-24[24]	15	Y		270-16		N	N/A	N/A
5-23	14,15		N	Existing Barrier to Remain	N/A		N/A	N/A
Area 13: I-270 mainline, between MD 189 and MD 28								
5-22	15	Y		270-06	Y		4,762	24
5-19	15	Y						
5-18	15,16	Y*						
5-21	15	Y*		270-14	Y		4,666	18
5-20	15	Y*						
5-17	15,16	Y*						
5-16	16		N	N/A	N/A		N/A	N/A
Area 14: I-270 mainline, between MD 28 and Shady Grove Road								
5-15	16	Y		270-5	Y		5,952	22
5-13	16	Y						
5-12	16,17	Y*						
5-14	16,17		N	N/A	N/A		N/A	N/A
5-11[25]	17	Y		270-13		N	N/A	N/A
5-10[26]	17	Y		270-3		N	N/A	N/A
5-09[27]	17	Y		270-2		N	N/A	N/A
5-08[27]	17	Y						
Area 15: I-270 mainline, between Shady Grove Road and I-370								
5-07[28]	18	Y*		270-1		N	N/A	N/A
5-06	18	Y						
5-05[29]	18	N/A		N/A	N/A		N/A	N/A
5-03	18		N	N/A	N/A		N/A	N/A
Area 16: I-270 mainline, north of I-370								

[22] NSA 5-26 consists of commercial, retail, medical and office space without any outdoor uses; therefore, this NSA requires no further consideration.
[23] NSA 5-25 consists of the Montgomery County Detention Center. The outdoor uses are shielded by the building. Due to the distance separation from the roadway and an estimated reduction of 25 dB(A) by the windows, interior impacts are not anticipated; therefore, this NSA requires no further consideration.
[24] NSA 5-24 consists of a school with outdoor uses. The barrier is not reasonable (>1700 sf-p-r).
[25] NSA 5-11 consists of offices, medical facilities, and an apartment building. The barrier for this area is not reasonable (>1700 sf-p-r).
[26] NSA 5-10 consists of offices, hotels, and a medical facility. The barrier for this area is not reasonable (>1700 sf-p-r).
[27] NSAs 5-08 and 5-09 consist of an apartment complex and a hotel. The barrier evaluated for this area is not feasible (<70% of impacts are benefited).
[28] 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 reasonable (>2700 sf-p-r).
[29] NSA 5-05 consists of restaurants and shops at the northern end of the Rio Washingtonian Center with no evident outdoor use areas; as such it requires no further consideration.

NSA	Map Number, App D	Impacted [* if => than 75 dB(A)]		Preliminary Noise Barrier Mitigation	Feasible and Reasonable?		Preliminary Barrier Dimensions (ft)	
		Yes	No		Yes	No	Length	Height
5-04	19		N	N/A	N/A		N/A	N/A
5-02[30]	18,20	Y*		Existing Barrier to Remain	N/A		N/A	N/A
5-01[31]	18,20	Y*		Existing Barrier to Remain	N/A		N/A	N/A
Summary of Noise Barrier System Mitigation								
Existing Noise Barriers that would remain in place as currently constructed							3	
Existing Noise Barriers recommended to be extended							2	
Existing Noise Barriers that would be displaced and replaced with a reconstructed barrier							8	
Existing Noise Barriers recommended to be reconstructed and extended							9	
New Noise Barriers recommended for construction							9	
Noise Barrier is not reasonable or feasible							8	

4.10 Hazardous Materials

4.10.1 Introduction

Since the publication of the DEIS, a detailed review of the potential for hazardous materials and contaminate mobilization during construction for the Preferred Alternative was conducted for the SDEIS. This included a review of previous files and historical records, GIS review of the proximity of the sites of concern to the LOD, site visits, interviews of regulatory personnel, and review of property information. For additional details refer to **SDEIS, Appendix I, DEIS, Chapter 4, Section 4.10** https://495-270-p3.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf and **DEIS, Appendix K** https://495-270-p3.com/wp-content/uploads/2020/07/AppK_HazMat_web.pdf .

4.10.2 Affected Environment

The DEIS identified 501 sites of concern associated with the Build Alternatives. Within or adjacent to the Preferred Alternative LOD, the number of sites identified were 255. The sites are shown on the *Environmental Resource Mapping* in **SDEIS, Appendix D**. For additional details on the 255 sites within or adjacent to the Preferred Alternative LOD refer to **SDEIS, Appendix I**.

4.10.3 Environmental Consequences

A. Sites of Potential Concern

The 255 sites of concern were assigned a risk classification (i.e., high, moderate or low) based on the potential of environmental impacts being present within or in close proximity to the Preferred Alternative LOD. To determine the risk, information including a regulatory environmental database as well as historical imagery/maps were reviewed, and a site reconnaissance was conducted. Thereafter, regulatory documentation provided by regulatory agencies (e.g., MDE and US EPA) was requested and reviewed for any site that was preliminary ranked as a high or moderate risk and the site ranking revised accordingly based on this additional information. A breakdown of the final rankings is presented in the **Table 4-22**. Prior to acquisition of right-of-way and construction, further investigation shall be conducted to evaluate

[30] Impacts were identified in NSA 5-02 behind the existing barrier; however, the existing barrier meets the feasible and reasonableness criteria. Therefore, the existing barrier will remain in place.

[31] Impacts were identified in NSA 5-01 behind the existing barrier; however, the existing barrier meets the feasible and reasonableness criteria. Therefore, the existing barrier will remain in place.

if environmental media within the LOD have been impacted by the sites of concern. Refer to the *Environmental Resource Mapping* for the sites of concern (**SDEIS, Appendix D**).

Table 4-22: Sites of Potential Concern Summary

Concern Ranking	# of Sites
High	11
Moderate	41
Low	83
De minimis	120
Total Sites	**255**

Of the 255 sites of concern, 11 sites were classified as High Concern[32] due to the potential for contaminant mobilization within or adjacent to the Preferred Alternative LOD. These properties include: a gasoline station, an auto repair facility, former auto repair facility, dry cleaning facility, various current and former commercial facilities, former photo processing plant, and residential properties. Identified high risk sites of concern require additional investigation to determine if the impacts to environmental media within the LOD exist, 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 potential environmental concerns 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.

There are 41 sites identified as Moderate Concern[33], meaning the sites have hazardous materials or contaminant documentation related to their current or historical use, but is not expected to impact the Preferred Alternative LOD. These sites include the following: both closed and active underground storage tanks (UST); active aboveground storage tanks; USTs that contain products other than gasoline, kerosene, heating oil, etc.; dry cleaning facilities; current and former auto repair facilities; gasoline stations; distressed vegetation and ground staining; and hazardous materials storage sites. If the LOD were to change, 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 83 Low Concern[34] sites identified within the within or adjacent to the Preferred Alternative LOD. 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 corridor 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 encountered during construction, identification of these potential sites of concern may help to identify the contaminant source.

The remaining 120 sites were determined to be of De minimis Concern. Sites were classified as de minimis risk as they were judged to be unlikely for potential contamination based on review of the environmental

[32] Sites that fell under the high concern ranking are sites where releases are documented and are located within or adjacent to the LOD and thus, have the greatest potential to have impacted environmental media within the LOD.
[33] Moderate concern sites are sites that are known to have environmental issues but are either located at a sufficient distance from the LOD or were hydraulically separated from the LOD where impacts to the LOD are not anticipated.
[34] Low concern sites are sites that either had no documented releases or prior releases were documented to be adequately remediated.

database listings, and/or site reconnaissance. In general, de minimis sites were listed in a regulatory database but had no history of contamination or spills, no current or previous RCRA generator permits, air emission permits, national pollutant discharge elimination system (NPDES) permits; or had active/closed petroleum storage tanks, land restoration program/ voluntary cleanup program (LRP/VCP) sites, but were determined to be hydrologically downgradient/crossgradient and a reasonable distance from the LOD, whereas any environmental concerns associated with the site were determined to have no impact on the LOD. Additionally, the site reconnaissance did not identify hazardous materials or evidence of contamination at de minimis sites visited.

B. Stormwater Management Facilities of Concern

Recognizing that non-point source pollution may contribute to the overall degradation of environmental media over time, areas where significant volumes of non-point source pollution from runoff were evaluated. Storm sewers can act as conduits that carry pollutants (sediments, metals, petroleum constituents) to receiving bodies, such as SWM facilities. Over time, the concentrations of certain pollutants that are deposited can accumulate. When concentrations of certain pollutants (e.g., petroleum hydrocarbons, lead) increase in the sediments of the SWM facilities, regulatory disposal requirements take effect when they are excavated and removed as they are now considered a regulated material that requires disposal per Federal and state regulations. Existing stormwater facilities located within or partially within the Preferred Alternative LOD were identified with the use of GIS, aerial photography, stormwater drainage maps, as well as site reconnaissance of the basins. In total, 11 SWM facilities identified within the Preferred Alternative LOD were categorized as high concern.

4.10.4 Mitigation

Prior to acquisition of right-of-way and construction, it is recommended that Phase II Environmental Site Investigation (ESI) activities be conducted to characterize the soils within the LOD nearest to each of the 11 high concern sites listed in **Section 8.2.1 of SDEIS, Appendix I**, as well as sediments located in the 11 SWM basins of concern listed in **Section 8.2.5 of SDEIS, Appendix I**. Proposed investigation for the high concern sites should adequately characterize surficial and subsurface soils, as well as groundwater, if anticipated to be encountered. Sample locations should take into account locations of previous releases, former/current/abandoned storage tanks, and inferred groundwater flow, as well as proposed soil/groundwater disturbance during construction (refer to **Section 4.23.2**). The laboratory analytical suite should be tailored to the contaminant(s) potentially present. Proposed investigation for the SWM basins of concern listed in Section 8.2.5 of the Limited Phase I ESA should adequately characterize deposited sediments present near each outfall as well as in each basin. Should contaminants be present at levels potentially indicative of hazardous waste, subsequent sampling utilizing Toxicity Characteristic Leaching Procedure (TCLP) is recommended.

4.11 Topography, Geology, and Soils

4.11.1 Introduction

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). Refer to the **DEIS, Chapter 4, Section 4.11** (https://oplanesmd.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf)

and **DEIS, Appendix L, Section 2.1** (https://oplanesmd.com/wp-content/uploads/2020/07/DEIS_App-L_NRTR_web.pdf) for the applicable federal and state regulations and methodology.

4.11.2 Affected Environment

The USDA-NRCS Web Soil Survey (2018) identified 44 soil map units within the Preferred Alternative LOD; 151 mapped soil units were identified in the DEIS with the Build Alternatives. Refer to the **DEIS, Appendix L, Section 2.1** for a detailed description of soil types and hydrologic groups.

4.11.3 Environmental Consequences

Topography within the Preferred Alternative LOD 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 Preferred Alternative would be soil removal or alterations to the soil profile and structure due to construction activities. Additional impacts could potentially 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.

Within the Preferred Alternative, two soil units are classified as hydric[35], one soil unit is classified as predominantly hydric, zero soil units are classified as partially hydric, 13 soil units are classified as predominantly non-hydric, and 26 soil units are classified as non-hydric. Nine (9) soil units are classified as Prime Farmland Soils and seven soil units are classified as Farmland of Statewide Importance.

Impacts to soils from the Preferred Alternative construction are presented in **Table 4-23** and **Table 4-24.** The impacts to "hydric soils" listed in the tables are based upon the NRCS Web Soil Survey and do not correspond with the specific hydric soil acreage delineated as jurisdictional wetlands in accordance with the Clean Water Act (CWA). As noted in **Table 4-23**, most evaluated categories of soils will be permanently and/or temporarily impacted, with the exception of Prime Farmland and Partially Hydric soils, which will not be impacted.

Table 4-23: Impact to Soils by Type in Acres

	Perm	Temp	Total
Farmland of Statewide Importance[1]	1.8	<0.1	**1.8**
Prime Farmland[2]	0.0	0.0	**0.0**
Hydric	23.2	0.2	**23.4**
Predominantly Hydric	63.6	1.2	**64.8**
Partially Hydric	0.0	0.0	**0.0**
Predominantly Non-Hydric	414.1	7.1	**421.2**
Non-Hydric	640.5	28.3	**668.8**

Notes: [1] All of the Farmland of Statewide Importance are located within Virginia.
[2] Prime farmland soils exclude acres that are parkland or waterways.

Highly erodible soils are potentially more prone to erosion from wind, rain, and disturbance (USDA NRCS, 2010). The Code of Maryland Regulations (COMAR) defines "highly erodible soils" as soils with a slope

[35] The National Technical Committee for Hydric Soils (NTCHS) defines hydric soils as soils that are saturated or inundated long enough during the growing season to become anaerobic in their upper layer and support the growth and reproduction of hydrophytic vegetation (59 FR 16835, proposed July 13, 1994).

greater than 15 percent, or those soils with a soil erodibility factor (K factor) greater than 0.35 and with slopes greater than 5 percent (COMAR 26.17.01). Based on this definition, 35 soil units within the Preferred Alternative are highly erodible. Highly erodible soils are located throughout the Preferred Alternative, with higher concentrations along I-270, and I-495 west of New Hampshire Avenue. **Table 4-24** lists the anticipated impacts to steep slope and highly erodible soils.

Table 4-24: Impacts to Steep Slopes and Highly Erodible Soils in Acres

	Perm	Temp	Total
Steep Slopes > 5, K Factor > 0.35	232.9	5.1	**238.0**
Steep Slopes 15	288.5	8.9	**297.4**

4.11.4 Mitigation

Construction of the Preferred Alternative 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 will be implemented 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

Wetlands and waterways are protected by several federal and state regulations. Refer to the **DEIS, Chapter 4, Section 4.12** (https://oplanesmd.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf) and **DEIS, Appendix L, Section 2.3** (https://oplanesmd.com/wp-content/uploads/2020/07/DEIS_App-L_NRTR_web.pdf) for the applicable federal and state regulations and methodology.

On June 22, 2020, the EPA and Department of the Army implemented the Navigable Waters Protection Rule (NWPR). The definition of “Waters of the United States” became effective in 49 states (including Maryland and Virginia) and all US territories. The NWPR established the scope of federal regulatory

authority under the Clean Water Act. The NWPR includes four simple categories of jurisdictional waters and provides specific exclusions for many water features that traditionally have not been federally regulated.

The four jurisdictional waters categories are: territorial seas and waters which are currently used, formerly used, or could be used for commerce which are subject to ebb and flow of the tide; tributaries; lakes and ponds; or adjacent wetlands. The 12 exclusions are detailed in the full NWPR[36] document. The rule eliminates the USACE jurisdiction of ephemeral channels, ditches that do not meet the definition of a tributary, and isolated wetlands. The USACE jurisdiction of delineated features was updated for this SDEIS based on the NWPR[37].

Executive Order (EO) 11990, "Protection of Wetlands," issued May 24, 1977, directs all federal agencies to avoid to the maximum extent possible the long- and short-term adverse impacts associated with the occupancy, destruction, or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. In the absence of such alternatives, NPS must modify actions to preserve and enhance wetland values and minimize degradation. According to the Procedural Manual #77-1: Wetland Protection (NPS 2016), wetlands are defined as all shallow water habitats including riverine wetlands (streams) and palustrine wetlands. Therefore, the acreage of wetlands calculated on NPS property includes some of the features that are considered waterways by USACE and MDE.

The NPS Wetland Statement of Findings (SOF) characterizes the wetland and floodplain resources that may be adversely impacted within NPS managed lands as a result of implementing the Preferred Alternative, describes adverse impacts that the project would likely have on these resources, and documents the steps that would be taken to avoid, minimize, and offset these impacts. (Refer to **SDEIS, Appendix G**.) To comply with EO 11990 within the context of the agency's mission, the NPS has developed a set of policies and procedures found in Director's Order 77-1: Wetland Protection (NPS 2012a) and Procedural Manual #77-1: Wetland Protection (NPS 2012a). These policies and procedures emphasize: 1) exploring all practical alternatives to building on, or otherwise adversely affecting, wetlands; 2) reducing impacts to wetlands whenever possible; and 3) providing direct compensation for any unavoidable wetland impacts by restoring degraded or destroyed wetlands on other NPS properties. If a preferred alternative would have adverse impacts on wetlands, a SOF must be prepared that documents the above steps and presents the rationale for choosing an alternative that would have adverse impacts on wetlands. The methodology for wetlands and waterways delineated within the corridor study boundary is discussed in **Section 2.3.1.B** of the *Natural Resources Technical Report* (**DEIS, Appendix L**).

In addition to wetland methodology detailed in **Section 2.3** of the *Natural Resources Technical Report* (**DEIS, Appendix L**), wetlands and waterways located on NPS parkland were identified by Cowardin

[36] https://www.epa.gov/wotus/current-implementation-waters-united-states

[37] While the Navigable Waters Protection Rule defined jurisdiction of Waters of the US under the Clean Water Act during the development of the SDEIS, that rule was vacated on August 30, 2021. As a result, the EPA and USACE are interpreting the jurisdictional limits of Waters of the US consistent with the pre-2015 regulatory regime following the Solid Waste Agency of Northern Cook County (SWANCC) and Rapanos Supreme Court decisions. Jurisdiction of delineated features and impact quantities will be updated to the current regulatory interpretation and reported in the FEIS.

classification including the system, subsystem, class, subclass, and any applicable modifiers (Cowardin, 1979). SOF includes a detailed mitigation plan proposed to compensate for impacts to wetlands on NPS land.

4.12.2 Affected Environment

A total of 49 nontidal wetland and/or wetland buffer features and 172 waterway segments were identified within the Preferred Alternative LOD. This is a significant reduction from the 407 nontidal wetland features and 1,075 waterway segment features delineated in the 48-mile corridor study boundary in the DEIS. Not only has the impact area been significantly reduced in the Preferred Alternative, but the 2020 NWPR removed 109 ephemeral channels from USACE jurisdiction within the 48-mile corridor study boundary and 113 ephemeral channels from USACE jurisdiction within Alternative 9 – Phase I South limits. The jurisdictional wetlands and waterways features within the Preferred Alternative are shown on the *Environmental Resource Mapping* (**SDEIS**, **Appendix D**).

4.12.3 Environmental Consequences

Direct impacts to wetlands and waterways associated with construction of the Preferred Alternative include: roadway improvements (i.e., widening, grading, etc.), bridge expansions or rehabilitations, culvert extensions or augmentations, relocation of impacted channels, SWM facility outfalls, and construction-related access. Additional LOD has been added since the DEIS to accommodate the augmented culverts, based on modeling and field assessment. This has resulted in increased impacts to wetlands and waterways in areas that require increased upstream storage to avoid augmentation or stream stabilization downstream of augmented culverts. Indirect impacts to wetlands and waterways from the Preferred Alternative could result from roadway runoff, sedimentation, and changes to hydrology. A detailed assessment of hydrologic effects will occur once final limits of cut and fill are determined in the final phase of engineering design.

Detailed impact tables are included in **SDEIS, Appendix F**. **Table 4-25**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 Preferred Alternative LOD by classification. **Tables 1 through 9** in **SDEIS, Appendix F** summarize the potential direct impacts to wetlands and waterways by classification in total, by county, by federal HUC8, or USGS designated hydrologic unit code (HUC), Maryland 8-digit watersheds, and Maryland Department of Natural Resources (MDNR) 12-digit watersheds. No Maryland Wetlands of Special State Concern would be impacted within the Preferred Alternative LOD.

Table 4-25: Summary of Impacts to USACE/MDE Wetlands and Waterways within Preferred Alternative

Type	Classification	PERM		TEMP		TOTAL	
		AC	SF	AC	SF	AC	SF
Wetlands	PEM	2.58	112,103	0.34	15,188	**2.92**	**127,291**
	PFO	1.06	46,196	0.30	12,902	**1.36**	**59,098**
	PSS	0.01	481	0	0	**0.01**	**481**
	Total	**3.65**	**158,780**	**0.64**	**28,090**	**4.29**	**186,870**
Waterways		**LF**	**SF**	**LF**	**SF**	**LF**	**SF**
	Intermittent	12,907	109,148	1,172	7,801	**14,079**	**116,949**
	Perennial	30,256	713,765	1,591	182,725	**31,847**	**896,490**
	Ephemeral	26	358	0	0	**26**	**358**
	Total	**43,852**	**673,757**	**2,701**	**343,945**	**46,553**	**1,017,702**

PEM – Palustrine Emergent; PFO – Palustrine Forested; PSS – Palustrine Scrub-shrub

A draft SOF has been developed to document practical alternatives to adversely affecting wetlands, efforts to reduce impacts to wetlands and mitigation for any unavoidable wetland impacts by restoring degraded or destroyed wetlands on NPS properties. The draft SOF has been developed concurrently with the SDEIS, refer to **SDEIS, Appendix G**. The SDEIS and the draft SOF will be advertised for public comment and will have a concurrent 45-day comment period. The final, signed SOF will be attached to the ROD. Impacts to, full Cowardin classification of, and the function and value of these features are summarized for each NPS property in **Table 4-26**.

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 the Preferred 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) (**DEIS, Appendix M** https://oplanesmd.com/wp-content/uploads/2020/07/DEIS_AppM_AMR-Appendices_print.pdf), which will be updated to reflect all avoidance and minimization efforts with the FEIS. 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 three-year period. The AMR describes the targeted avoidance and minimization of impacts to resources in specific areas of the study corridor and presents impact reductions resulting from the avoidance and minimization process and provides justifications for unavoidable impacts.

Table 4-26: Summary of Delineated NPS Wetland Features and Impacts on NPS Properties within the Preferred Alternative LOD

Park Unit and Feature Name	Cowardin Classification	Sq ft			Acres			Linear feet (Streams)			Functions and Values
		Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	
George Washington Memorial Parkway											
Riverine Wetlands											
22WW	R4SB4	862	-	**862**	0.02	-	**0.02**	69	-	**69**	Habitat; Flow Stability; Riparian Vegetation
Clara Barton Parkway											
Riverine Wetlands											
22Q_1	R3UB2H	203	48	**251**	<0.01	<0.01	**0.01**	45	17	**62**	Bank Stability; Channel Stability
Palustrine Wetlands											
22R	PFO1E	338	307	**645**	0.01	0.01	**0.02**	NA	NA	**NA**	Nutrient Removal; Wildlife Habitat
C&O Canal National Historic Park											
Riverine Wetlands											
22NN	R4SB4	-	3,474	3,474	-	0.08	**0.08**	-	275	**275**	Minimal
22NN_B	R4SB4	10	1,465	1,475	<0.01	0.04	**0.04**	8	153	**161**	Minimal
22QQ	R4SB5	-	466	466	-	0.02	**0.02**	-	105	**105**	Minimal
22V	R4SB3d	-	190	190	-	<0.01	**<0.01**	-	76	**76**	Minimal
22V_1	R4SB3d	2	90	92	<0.01	<0.01	**<0.01**	1	40	**41**	Minimal
22V_2	R4SB3d	-	1,083	1,083	-	0.03	**0.03**	-	255	**255**	Minimal
22V_B	R4SB3d	-	331	331	-	0.01	**0.01**	-	168	**168**	Minimal
22V_B1	R4SB3d	2	6	68	<0.01	<0.01	**<0.01**	2	27	**29**	Minimal
Palustrine Wetlands											
22OO	PFO1B	1,708	10,429	12,137	0.04	0.24	**0.28**	NA	NA	**NA**	Nutrient Removal; Production Export; Habitat
22PP	PFO1A	490	-	490	0.01	-	**0.01**	NA	NA	**NA**	Groundwater Recharge; Production Export
22W	PEM1A/C	-	15,113	15,113	-	0.35	**0.35**	NA	NA	**NA**	Floodflow Alteration; Habitat; Uniqueness

Notes:
1. These impact calculations are based on the NPS GIS Park Boundaries received via email from NPS personnel on 4/29/2021 (Tammy Stidham).
2. MDOT SHA Preferred Alternative includes the Centerline ALB Alignment from March 4, 2021 with additional refinements to the design and constructability assumptions.
3. A "-" symbol indicates that no impacts to the resource occurs within that category.

Since the DEIS, considerable additional avoidance and minimization has been undertaken. Impacts to several waterways, wetlands and wetland buffers were reduced following public and agency comments received during the DEIS public comment period. All noise barrier locations were reviewed and revised, as needed, to avoid impacts to wetlands and waterways. MDOT SHA and FHWA coordinated closely with M-NCPPC in a series of office and field meetings to avoid and minimize impacts to wetlands and waterways within all M-NCPPC parks located within the Preferred Alternative. (Refer to **Chapter 7, Section 7.3.1** for a summary of the natural resource related agency meetings.) In addition, as described in **Section 4.4.3** of this chapter considerable effort to avoid and minimize impacts to NPS parkland including wetlands and waters resources on their property was undertaken since the publication of the DEIS. Specifically, minimization efforts at NPS park properties and resources included:

- Convening an ALB Strike Team to investigate potential design options, structure types, construction methods, and construction access routes to reduce the LOD and therefore reduce overall impact to NPS land and to wetlands, streams, and floodplains.
- Reducing the number of access roads, which were originally proposed in all four quadrants of the ALB and were limited to a single proposed access road in the northwest quadrant, thereby reducing impact to wetlands and streams.
- Selecting the on-center alignment, which has fewest wetland impacts and lowest impact to NPS land, while also eliminating the need to re-configure the CBP interchange or cause residential displacement.

B. Mitigation

In Maryland, wetland mitigation requirements were developed based on MDE's *Maryland Nontidal Wetland Mitigation Guidance, Second Edition January 2011*. The MDE guidelines include standard replacement ratios based on the wetland type (e.g., emergent, forested, etc.) being impacted. Stream mitigation requirements in Maryland were determined based on the USACE's *Maryland Stream Mitigation Framework Calculator Beta Version May 11, 2020* (MSMF). The MSMF provides an accounting tool based upon functional assessments, stream size, and length of impacts to determine appropriate mitigation, with the goal of achieving "no net functional loss." The new method provides a consistent and transparent process for stream impacts and mitigation quantification based on resource type, reach length, stream quality, drainage area, site sensitivity, and several other input values, resulting in a stream mitigation requirement that is recorded in functional feet.

Based on the Preferred Alternative direct and indirect impacts, the current mitigation requirement estimate in Maryland includes 7.22 acres of wetland mitigation credits and 7,295 functional feet of stream credits that are detailed in **Table 4-27**. No mitigation bank credits within an appropriate service area, or in-lieu fee programs were identified in Maryland, and therefore MDOT SHA decided to pursue permittee-responsible mitigation for the requirements. A two-tiered approach was used to identify potential off-site, permittee-responsible mitigation sites that included a traditional mitigation site search on public lands and developer proposals on private lands. Permittee-responsible mitigation sites were chosen based on their potential for functional uplift, construction feasibility, proximity to the study area, mitigation credits, and replacement of lost functions, values, and services resulting from the roadway improvements. For further details on the permittee-responsible mitigation site selection process refer to the Draft Compensatory Mitigation Plan (CMP) (**DEIS, Appendix N**).

Table 4-27: Maryland Wetland and Stream Mitigation Requirements

Wetlands			
Impact Type	**Impact (AC)**	**Replacement Ratio**	**Mitigation Requirement (AC)**
PFO	2.92	2:1	5.84
PSS	0.01	2:1	0.02
PEM	1.36	1:1	1.36
Total	**4.29**		**7.22**
Waterways			
Impact Type	**Impact (LF)**	**Mitigation Requirement (FF)**	
Perennial	32,454	7,036	
Intermittent	14,063	259	
Total	**46,402**	**7,295**	

Note: All impacts requiring mitigation in the Phase 1-South limits are within the Middle Potomac-Catoctin watershed.

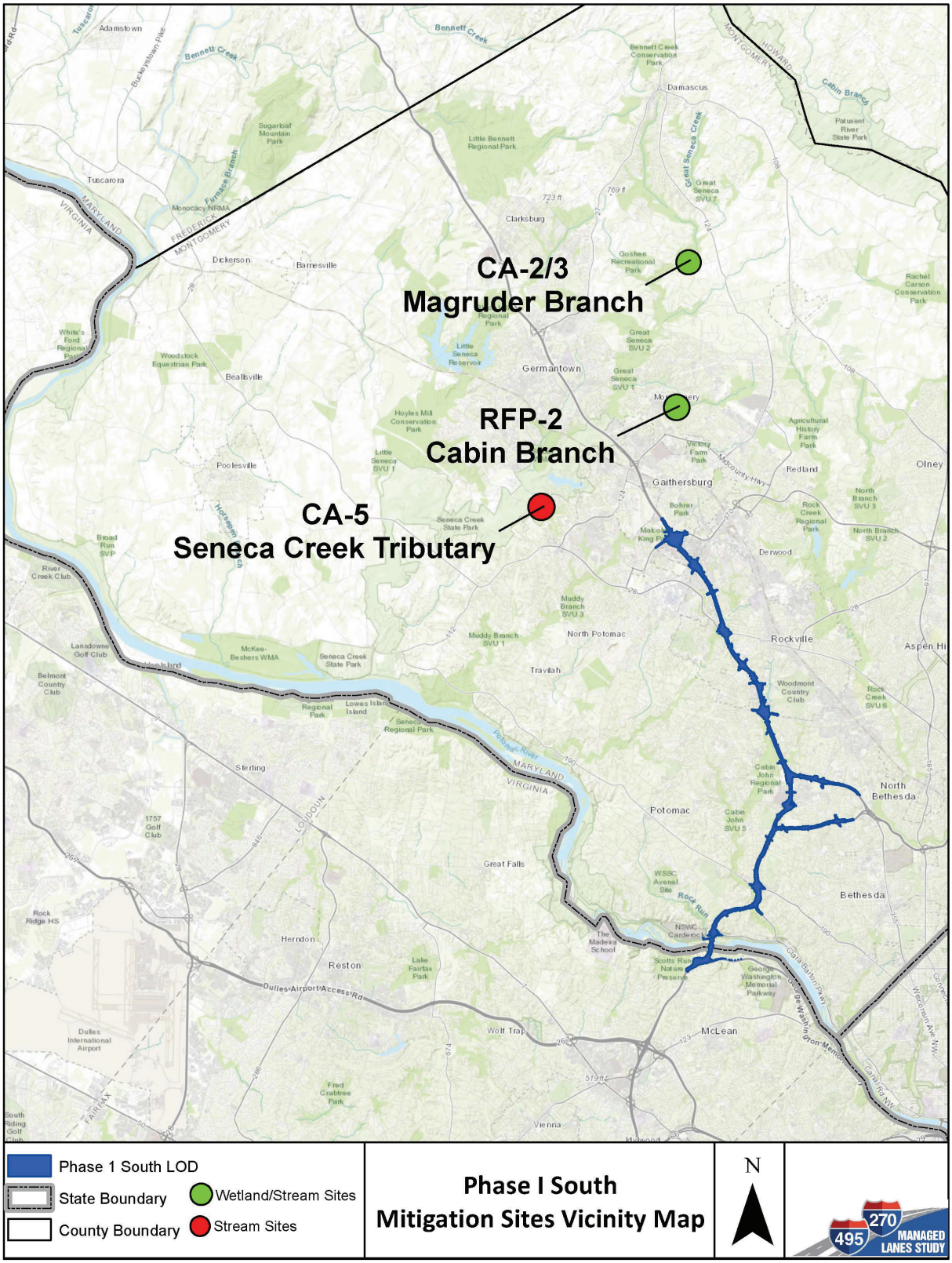
The current proposed permittee-responsible, off-site mitigation in Maryland consists of three (3) mitigation sites, including a total of 20.57 acres of potential wetland mitigation credits and 10,460 functional feet of potential stream mitigation credits. **Table 4-28** includes details on the proposed mitigation sites and a location map of the mitigation sites is included in **Figure 4-2**. Further details on the Preferred Alternative impacts, mitigation requirements, proposed mitigation sites, and Phase II Mitigation Plans will be included in the Final CMP, which will be available with the FEIS.

Table 4-28: Proposed Mitigation Sites

Site ID	Site Name	Mitigation Type (Credit Ratios)	Proposed Wetland Credit (AC)	Proposed Stream Credit (FF)
CA-2/3	Magruder Branch	Stream Restoration (MSMF) Wetland Creation/Restoration (1:1) Wetland Enhancement (4:1)	15.97	3,468
CA-5	Seneca Creek Tributary	Stream Restoration (MSMF)	0.00	918
RFP-2	Cabin Branch	Stream Restoration (MSMF) Wetland Creation (1:1) Wetland Buffer Enhancement (15:1)	4.60	6,074
		Total:	**20.57**	**10,460**

Note: All proposed mitigation sites are located in the Middle Potomac-Catoctin watershed.

Figure 4-2: Phase 1 South Wetland and Stream Mitigation Sites



Based on the Preferred Alternative impacts, in Virginia, wetland mitigation requirements were determined based on replacement ratios in the Virginia Administrative Code (9VAC25-680-70), and stream mitigation requirements were developed based on the USACE's *Unified Stream Methodology for use in Virginia, January 2007*. Privately-owned mitigation banks will be used to fulfill the current mitigation requirement estimate of 0.26 wetland mitigation credits and 506 riverine mitigation credits in the Fairfax County Middle Potomac-Catoctin watershed. 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.

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 SOF 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 current NPS wetland mitigation requirement estimate includes a total of 1.24 acres of NPS wetland mitigation based on the functional impact replacement ratios that are described in the SOF. MDOT SHA has worked with NPS to identify mitigation opportunities on NPS property for unavoidable impacts to wetlands. Based on coordination with NPS, one mitigation site (CHOH-13) is proposed that includes approximately 1.49 acres of potential wetland mitigation. The site was identified in the NPS *Environmental Assessment (EA) for the Wetland Restoration Action Plan (WRAP) for Catoctin Mountain Park, Chesapeake & Ohio Canal National Historical Park, Harpers Ferry National Historical Park, Monocacy National Battlefield, April 2017* and is considered a high priority site due to its location within one of the NPS wetlands being impacted by the project. The CHOH-13 mitigation site is not included in the proposed MDE and USACE mitigation credit totals and has been identified for the sole purpose of fulfilling the NPS mitigation requirement. A concept design of the proposed mitigation site is included in the SOF, **SDEIS, Appendix G**.

4.13 Watersheds and Surface Water Quality

4.13.1 Introduction

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. Refer to the **DEIS, Chapter 4, Section 4.13** (https://oplanesmd.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf) and **DEIS, Appendix L, Section 2.4** (https://oplanesmd.com/wp-content/uploads/2020/07/DEIS_App-L_NRTR_web.pdf) for the applicable federal and state regulations and methodology.

Like all surface waters, surface drinking water supplies are protected under Section 401 and Section 402 of the Federal CWA (33 U.S.C. 1341 and 1342), which regulate water quality and the introduction of contaminants to waterbodies based on designated use classes. Surface drinking water supplies are also protected under the Safe Drinking Water Act (SDWA), which was enacted to protect public health by regulating the nation's public drinking water supply. The SDWA sets enforceable maximum contaminant levels and post-treatment testing requirements that are enforced during water treatment and delivery. It

also sets up a framework for source water protection and prevention to provide multiple barriers to pollution of waterways that provide raw water for drinking water use.

4.13.2 Affected Environment

The Preferred Alternative in Virginia and Maryland falls within the Potomac River drainage basin. More specifically, the Preferred Alternative crosses the Middle Potomac-Catoctin (USGS HUC8 02070008) and Middle Potomac-Anacostia-Occaquan (USGS HUC8 02070010) watersheds. The USGS HUC8 watersheds are divided into smaller subwatersheds determined by USGS, Maryland, and Virginia. Within Virginia, the USGS HUC12 Nichols Run – Potomac River subwatershed includes two streams that cross the Preferred Alternative, Scotts Run and Dead Run. Within Maryland, MDNR 12-digit watersheds are third order stream drainage watersheds determined by USGS contours in a joint state and Federal effort. MDNR 12-digit watersheds with streams that cross the Preferred Alternative include Potomac River/Rock Run, Cabin John Creek, Watts Branch, and Muddy Branch. Note that while the Preferred Alternative LOD crosses the Rock Creek watershed, the stream of Rock Creek is not within the Preferred Alternative LOD and is not impacted by the build improvements included in the Preferred Alternative.

The Potomac River is classified as Use I-P and is protected for Water Contact Recreation, Protection of Aquatic Life, and Public Water Supply due to its role as the primary source of drinking water for the District of Columbia, and many of the surrounding communities. The Washington Aqueduct, which is operated by the USACE, withdrawals and treats approximately 150 million gallons of water per day on average from the Potomac River to provide drinking water to the District of Columbia, as well as Fairfax and Arlington Counties, Virginia. The Aqueduct's primary water intake is located above Great Falls, several miles upstream of the Preferred Alternative's crossing of the Potomac River on the American Legion Bridge. However, the Aqueduct system also has an intake at the dam at Little Falls, approximately 3 miles downstream of the Preferred Alternative, and is used intermittently for drinking water supplies according to the National Pollution Discharge Elimination System (NPDES) permit for the Aqueduct (NPDES Permit No. DC0000019). In addition, the Preferred Alternative crosses the Source Water Protection Area for the Aqueduct. Within the corridor study boundary, the Source Water Protection Area includes the river itself and the landward area on either side of the river to the watershed boundary, but overall encompasses the entire Potomac River watershed in Maryland and Virginia.

Virginia's Chesapeake Bay Preservation Act designates Resource Protection Areas (RPA) as: tidal wetlands; certain non-tidal wetlands; tidal shores; and a 100-foot vegetated buffer area located adjacent to and landward of these features and along both sides of any perennial waterway. Impacts to RPAs require a Water Quality Impact Assessment and a Revegetation Plan. RPAs are typically regulated under the General VPDES Permit for Discharges of Stormwater from Construction Activities (VAR10), however VDEQ has exempted the I-495 & I-270 Managed Lanes Study from this regulatory requirement since it is a public roadway "construction, installation, operation, and maintenance" project. As a condition of this exemption, VDEQ requires the optimization of the road alignment and design to prevent or otherwise minimize (1) encroachment into locally-designated Resource Protection Areas and (2) adverse effects on water quality.

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 and its tributaries are state-designated as Scenic under the Maryland Scenic and Wild Rivers

Program. No waterways within the Virginia portion of the Preferred Alternative are state-designated as Scenic Rivers.

4.13.3 Environmental Consequences

The Preferred Alternative would affect surface waters, surface water quality, and watershed characteristics within the Preferred Alternative LOD due to direct and indirect impacts to 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 4-25** of this chapter. The impacts to jurisdictional surface waters by MDNR 12-digit and USGS HUC8 watersheds are provided in **SDEIS, Appendix F** and **Tables 4-29 to 4-32.**

Table 4-29: Summary of Impacts to Waterways by Classification within USGS HUC8 Watersheds

Classification	Permanent		Temporary		Total[1]	
	LF	SF	LF	SF	LF	SF
Middle Potomac-Anacostia-Occoquan						
Intermittent	204	635	0	0	**204**	**635**
Perennial	430	4,741	0	0	**430**	**4,741**
Middle Potomac-Catoctin						
Intermittent	12,416	100,592	1,453	14,611	**13,869**	**115,203**
Perennial	30,776	567,431	1,248	329,334	**32,024**	**896,765**
Ephemeral	26	358	0	0	**26**	**358**

Note: All impacts to wetlands and their buffers are in the Middle Potomac-Catoctin USGS HUC8 Watershed, therefore refer to **Table 4-27** for wetland and wetland buffer impacts. 1 Totals are rounded to the tenths place.

Table 4-30: Summary of Impacts to Wetlands and Waterways by Classification within MD 8-Digit Watersheds

Type	Classification	AC	SF	AC	SF	AC	SF
		Permanent		Temporary		Total	
Wetlands	**Cabin John Creek**	**1.31**	**56,964**	**0.00**	**0**	1.31	56,964
	PEM	1.01	44,020	0.00	0	1.01	44,020
	PFO	0.30	12,944	0.00	0	0.30	12,944
	Potomac River Montgomery County	**2.27**	**98,492**	**0.59**	**25,924**	2.85	124,416
	PEM	1.57	68,083	0.34	15,188	1.91	83,271
	PFO	0.69	29,928	0.25	10,736	0.93	40,664
	PSS	0.01	481	0.00	0	0.01	481
	Grand Total	**3.57**	**155,456**	**0.59**	**25,924**	**4.16**	**181,380**
Waterways		**LF**	**SF**	**LF**	**SF**	**LF**	**SF**
		Permanent		**Temporary**		**Total**	
	Cabin John Creek	**31,243**	**490,868**	**186**	**4,644**	**31,429**	**495,512**
	Intermittent	7,096	48,496	10	78	7,106	48,574
	Perennial	24,147	442,372	176	4,566	24,323	446,938
	Potomac River Montgomery County	**9,118**	**145,581**	**2,253**	**332,652**	**11,371**	**478,233**
	Intermittent	4,655	43,984	1,181	7,884	5,836	51,868
	Perennial	4,463	101,597	1,072	324,768	5,535	426,365
	Rock Creek	**634**	**5,376**	**0**	**0**	**634**	**5,376**
	Intermittent	204	635	0	0	204	635
	Perennial	430	4,741	0	0	430	4,741
	Grand Total	**40,995**	**641,825**	**2,439**	**337,296**	**43,434**	**979,121**

Table 4-31: Impacts to Wetland Buffers by Classification within MD 8-Digit Watersheds

Classification	AC	SF	AC	SF	AC	SF
	Permanent		Temporary		Total	
Cabin John Creek	**3.49**	**152,141**	**0.00**	**71**	**3.49**	**152,212**
PEM	2.25	97,825	0.00	54	**2.25**	**97,879**
PFO	1.25	54,316	0.00	17	**1.25**	**54,333**
Potomac River Montgomery County	**3.00**	**130,506**	**0.61**	**26,655**	**3.61**	**157,161**
PEM	1.64	71,444	0.46	20,180	**2.10**	**91,624**
PFO	1.24	54,221	0.15	6,475	**1.39**	**60,696**
PSS	0.11	4,841	0.00	0	**0.11**	**4,841**
Grand Total	**6.49**	**282,647**	**0.61**	**26,726**	**7.10**	**309,373**

Table 4-32: Summary of Impacts to Wetlands and Waterways by Classification within MDNR 12-Digit Watersheds

MDNR Watershed and Classification	AC/LF[1]	SF[1]	AC/LF[1]	SF[1]	AC/LF[1]	SF[1]
	Permanent[2]		Temporary[2]		Total[2]	
Cabin John Creek						
Waterway	**31,243**	**490,868**	**186**	**4,644**	**31,429**	**495,512**
Perennial	24,147	42,372	176	4,566	**24,323**	**46,938**
Intermittent	7,107	48,565	10	78	**7,117**	**48,643**
Wetland	**1.31**	**56,964**	**0.00**	**0**	**1.31**	**56,964**
PEM	0.26	11,422	0.00	0	**0.26**	**11,422**
PFO	1.05	45,542	0.00	0	**1.05**	**45,542**
Muddy Branch						
Waterway	**2,808**	**47,952**	**0**	**0**	**2,808**	**47,952**
Perennial	2,108	42,223	0	0	**2,108**	**42,223**
Intermittent	700	5,729	0	0	**700**	**5,729**
Wetland	**0.14**	**6,307**	**0.00**	**0**	**0.14**	**6,307**
PEM	0.04	1,532	0.00	0	**0.04**	**1,532**
PFO	0.11	4,775	0.00	0	**0.11**	**4,775**
Potomac River/Rock Run						
Waterway	**1,631**	**21,506**	**2,253**	**332,652**	**3,884**	**354,158**
Perennial	745	15,472	1,072	324,768	**1,817**	**340,240**
Intermittent	886	6,034	1,181	7,884	**2,067**	**13,918**
Wetland	**0.16**	**6,846**	**0.59**	**25,850**	**0.75**	**32,696**
PEM	0.05	2,028	0.35	15,114	**0.39**	**17,142**
PFO	0.11	4,818	0.25	10,736	**0.36**	**15,554**
Rock Creek						
Waterway	**634**	**5,376**	**0**	**0**	**634**	**5,376**
Perennial	430	4,741	0	0	**430**	**4,741**
Intermittent	204	635	0	0	**204**	**635**
Watts Branch						
Waterway	**4,668**	**76,054**	**0**	**0**	**4,668**	**76,054**
Perennial	1,610	43,902	0	0	**1,610**	**43,902**
Intermittent	3,058	32,152	0	0	**3,058**	**32,152**
Wetland	**1.96**	**85,339**	**0.00**	**74**	**1.96**	**85,413**
PEM	1.48	64,330	0.00	74	**1.48**	**64,404**
PFO	0.35	15,147	0.00	0	**0.35**	**15,147**
PSS	0.13	5,862	0.00	0	**0.13**	**5,862**
Cabin John Creek						
Waterway	31,254	490,937	186	4,644	**31,440**	**495,581**
Perennial	24,147	442,372	176	4,566	**24,323**	**446,938**
Intermittent	6,992	47,738	0.00	0	**6,992**	**47,738**

MDNR Watershed and Classification	AC/LF[1]	SF[1]	AC/LF[1]	SF[1]	AC/LF[1]	SF[1]
Ephemeral	115	827	10.00	78	**125**	**905**
Wetland	1.31	56,964	0.00	0	**1.31**	**56,964**
PEM	0.26	11,422	0.00	0	**0.26**	**11,422**
PFO	1.05	45,542	0.00	0	**1.05**	**45,542**
Muddy Branch						
Waterway	2,808	47,952	0	0	**2,808**	**47,952**
Perennial	2,108	42,223	0	0	**2,108**	**42,223**
Intermittent	700	5,729	0	0	**700**	**5,729**
Wetland	0.14	6,307	0.00	0	**0.14**	**6,307**
PEM	0.04	1,532	0.00	0	**0.04**	**1,532**
PFO	0.11	4,775	0.00	0	**0.11**	**4,775**
Potomac River/Rock Run						
Waterway	1,631	21,506	2,253	332,652	**3,884**	**354,158**
Perennial	745	15,472	1,072	324,768	**1,817**	**340,240**
Intermittent	886	6,034	1,181	7,884	**2,067**	**13,918**
Wetland	0.16	6,846	0.59	25,850	**0.75**	**32,696**
PEM	0.05	2,028	0.35	15,114	**0.39**	**17,142**
PFO	0.11	4,818	0.25	10,736	**0.36**	**15,554**
Rock Creek						
Waterway	634	5,376	0	0	**634**	**5,376**
Perennial	430	4,741	0	0	**430**	**4,741**
Intermittent	204	635	0	0	**204**	**635**
Watts Branch						
Waterway	4,668	76,054	0	0	**4,668**	**76,054**
Perennial	1,610	43,902	0	0	**1,610**	**43,902**
Intermittent	3,058	32,152	0	0	**3,058**	**32,152**
Wetland	1.96	85,339	0.00	74	**1.96**	**85,413**
PEM	1.48	64,330	0.00	74	**1.48**	**64,404**
PFO	0.35	15,147	0.00	0	**0.35**	**15,147**
PSS	0.13	5,862	0.00	0	**0.13**	**5,862**

Notes: 1. Wetlands are presented in acres and square feet; waterways are presented in linear feet and square feet. 2. Totals are rounded to the tenths place. 3. If a classification does not appear under the wetlands or waters category, no features with that classification were identified within that watershed. (e.g., No wetlands were identified in the Rock Creek watershed within the Preferred Alternative.)

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. There are no delineated tributaries within the Preferred Alternative LOD that drain to Tier II waters.

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, and could potentially increase

contaminants in the raw water for the drinking water supply. Direct stream channel impacts associated with the Preferred Alternative are compared and quantified in **SDEIS, Appendix F**. 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). Sediment loads caused by the construction could eventually enter the intermittent drinking water intake at Little Falls Dam. These increased sediment loads can destroy or damage fish spawning areas and macroinvertebrate habitat and could increase maintenance and sediment removal cycles for the drinking water supply system. 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).

Initial roadway construction would result in is the removal of trees and other riparian buffer vegetation. The removal of riparian vegetation, including forest and tree cover, greatly reduces the buffering of nutrients and other runoff 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 raise the water temperature of the affected stream. In addition to tree removal, stormwater discharges also have the potential to increase surface water temperatures in nearby waterways. The effects of the temperature change depend on stream size, existing temperature regime, volume and temperature of stream baseflow, and the degree of shading.

Forest impacts associated with the Preferred Alternative LOD would encompass 500 acres (permanent and temporary) in both Maryland and Virginia. Forest impacts in Maryland total 463 acres within the Washington Metropolitan Watershed (MDE 6-Digit Watershed 021402) and 40 acres in Virginia within the Middle Potomac Watershed (HUC 8-digit Watershed 02070008). Unavoidable impacts to forest from construction of the Preferred Alternative in Maryland will be regulated by MDNR under Maryland Reforestation Law. Any forest mitigation planting in Maryland will be conducted within the affected county and/or affected MDE 6-Digit Watershed to meet the Maryland Reforestation Law mitigation requirements, if possible. Impacts to Forest Conservation Act easements in Maryland, including state and county-owned easements, would encompass a total of 14.7 acres within the Preferred Alternative LOD. Unavoidable impacts to forest from construction of the Preferred Alternative in Virginia would require specific coordination with regulatory agencies including NPS and VDCR. In Virginia, impacts to vegetation within the RPA must be avoided and minimized to the greatest extent practicable to avoid impacts to surface water quality as required by VDEQ.

Impacts associated with the use of the road after construction are mainly based on the potential for contamination of surface waters and related drinking water supplies by runoff from new impervious roadway surfaces. Potential contaminants to surface waters include heavy metals, deicing compounds, organic pollutants, contaminants of emerging concern, hazardous chemical spills, pathogens, and sediment.

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 are used during the winter on commercial and residential properties and for highway safety maintenance. The deicing compounds from commercial and residential properties wash into roadways and flow along with compounds applied directly to the road into streams, posing 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. Applications of deicing materials can also cause several issues with drinking water systems including altered taste and odor, pipe corrosion, modification of treatment, mobilization of harmful nutrients, and potential loss or need to mitigate drinking water sources.

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). Non-point sources such as agricultural farms and lawn fertilizer also contribute organic pollutants to streams via roadways. 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).

New impervious surfaces may result in an increase in the presence of contaminants of emerging concern in surface waters, including the downstream water supply. These include contaminants such as pharmaceuticals and personal care products (PPCPs), endocrine disrupting chemicals (EDCs), organic wastewater contaminants (OWCs), persistent organic pollutants (POPs), microconstituents, and nanomaterials. There is evidence indicating that even low levels of some contaminants of emerging concern in the environment may affect wildlife, but no indication that they pose a threat to human health from consuming water treated to current EPA standards. According to DC Water, the levels at which these chemicals have currently been detected in water treated from the Washington Aqueduct are very small.

Surface water contamination may also occur due to sudden hazardous spills on new impervious surfaces from the Preferred Alternative that could affect aquatic life and the water supply. The Potomac River Basin Drinking Water Source Protection Partnership Early Warning and Emergency Response Workgroup works with the local utilities and response agencies to prepare, practice, and respond to spills of hazardous materials to minimize effects from hazardous spills on Potomac River drinking water sources.

Sediments are also a primary pollution concern associated with an increase in impervious areas. The Preferred Alternative would add the most impervious surface to the Cabin John Creek watershed with 98.2 acres added. The least additional impervious surface would be added to the Rock Creek and Watts Branch watersheds, with 2.6 and 6.8 acres added, respectively. Refer to **Table 4-33** for additional impervious surface anticipated under the Preferred 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 best management practices (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.

Table 4-33: Additional Impervious Surfaces by MDNR 12-Digit Watershed

Watershed Name	MDNR 12-Digit Watershed	Total	
		AC	SF
Potomac River/Rock Run	021402020845	17.7	770,788
Cabin John Creek	021402070841	98.2	4,276,484
Rock Creek[1]	021402060836	2.6	112,088
Muddy Branch	021402020848	12.0	522,982
Watts Branch	021402020846	6.8	297,506
Nichols Run - Potomac River (Virginia)[2]	N/A	20.7	903,116

Notes: [1] Rock Creek stream is not within the Preferred Alternative LOD and is not impacted by the Preferred Alternative. [2] Part of the additional impervious surface area is in the Nichols Run - Potomac River HUC12 Watershed in Virginia and is not associated with an MDNR 12-digit Watershed.

Table 4-34: Additional Impervious Surface by 8-Digit Watershed

Watershed Name	MD 8-Digit Watershed	Total	
		AC	SF
Potomac River - Montgomery County	02140202	37.5	1,635,527
Rock Creek	02140206	0.9	38,535
Cabin John Creek	02140207	95.6	4,162,181
Virginia: Nichols Run - Potomac River	-	20.7	902,589

Culverts were evaluated throughout the study corridor to determine flood risk potential and the need for auxiliary culverts. Additional culvert pipes running alongside the existing culverts are proposed in those areas where flood risk potential was identified. Refer to **Chapter 2, Section 2.3.3** of this document for additional details on culverts.

The Preferred Alternative will affect the Potomac River in Montgomery County and its tributaries, which is designated as Scenic under the Maryland Scenic and Wild Rivers Program (MDNR, 2018a). Any aesthetic impacts to scenic streams would be mostly temporary, during construction activities. However, replacement or major modification of the American Legion 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 4.13.2 of this document, MDNR will assist the MDOT SHA with coordination for Maryland Scenic Rivers.

4.13.4 Mitigation

Impacts to surface waters will be unavoidable under the Preferred Alternative. However, continual efforts to avoid and minimize impacts have occurred throughout the planning process in consultation with the regulatory agencies and will continue as the Study moves forward. MDOT SHA continues to 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: 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, shifting the location of noise barriers, 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* (**DEIS, Appendix M**). Any unavoidable impacts would be mitigated as required under state and Federal wetlands and waterways permits that would be issued for the Preferred Alternative. Avoidance and minimization efforts to reduce impacts to wetlands and waterways are described in **Section 4.12.4**. In Virginia, impacts to vegetation within RPAs have been avoided to the greatest extent practicable, as required by VDEQ.

Impacts to the state-designated Scenic Rivers have been 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 Preferred Alternative LOD.

The Study requires a Section 401 water quality certification from MDE indicating that anticipated discharges from the Study will comply with federally-mandated water quality standards. The submission of the request for water quality certification is anticipated in early 2022 with MDE issuance anticipated in late 2022. Minimization efforts for potential water quality impacts that could result from road crossings may include the proper maintenance of flood-prone flows through proposed structures using flood relief culverts to avoid increased scour and sedimentation. Most of the stream systems within the corridor study boundary currently have floodplain access; this should be retained as much as possible to preserve benefits such as velocity dissipation, storage, and sedimentation/stabilization. Other efforts would consider retaining or adding riparian buffers, as well as aquatic life passage through structures. 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.

Erosion and sediment control, as well as SWM techniques, are the most important minimization efforts in relation to water quality. Impacts to water quality would be minimized through adherence to erosion and sediment control procedures and MDE storm water management regulations. In 2012, MDE revised erosion and sediment control regulations in adherence with the 2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control (MDE, 2014). These revisions include the establishment of a grading unit criteria, along with stricter stabilization requirements to more thoroughly protect water quality. SWM would be developed in compliance with all applicable MDE regulations and guidance and designed in accordance with MDE's 2000 Maryland Stormwater Design Manual (MDE, 2009) and MDE's SWM Act of 2007.

Consideration of providing effective SWM for all the build alternatives has been considered throughout the planning process and allows for identification of the right-of-way needs for the most effective SWM solutions, and avoidance of additional natural resource impacts from SWM to the maximum extent practicable. Refer to **Chapter 2, Section 2.3.2** for details on the conceptual SWM analysis for the Preferred

Alternative. Water quantity treatment would be met onsite or through waiver requests in specific areas. The project would attempt to meet water quality treatment requirements onsite, where practicable. Where this is not practicable, water quality requirements would be met offsite in accordance with MDE regulations. Other measures may also be considered in particularly sensitive watersheds after further coordination with resource agencies, such as redundant erosion and sediment control measures in especially sensitive watersheds and/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. These measures will also minimize potential impacts of contaminants on downstream drinking water supplies. Contaminants entering the Washington Aqueduct are also treated by the Dalecarlia and McMillan treatment plants, which must meet EPA's drinking water standards prescribed in the Aqueduct's NPDES Permit.

4.14 Groundwater Hydrology

4.14.1 Introduction

With federal oversight from the EPA, MDE and VDEQ are the regulatory agencies responsible for regulating the public drinking water supply Maryland and Virginia through wellhead protection programs, respectively. Refer to **the DEIS, Chapter 4, Section 4.14** (https://oplanesmd.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf) and **DEIS, Appendix L, Section 2.5** (https://oplanesmd.com/wp-content/uploads/2020/07/DEIS_App-L_NRTR_web.pdf) for the applicable federal and state regulations and methodology.

4.14.2 Affected Environment

The Preferred Alternative LOD 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. Refer to **DEIS, Appendix L, Section 2.5.** for the detailed description of the crystalline-rock and undifferentiated sedimentary-rock aquifer within the Piedmont and Blue Ridge Physiographic Province.

4.14.3 Environmental Consequences

The Preferred Alternative may affect groundwater and hydrology, 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. The entire Preferred Alternative falls within the service area of the Washington Suburban Sanitary Commission (WSSC) in Maryland and Fairfax County Water Authority in Virginia, which receive their drinking water supply from the Potomac River and/or the Patuxent River. 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 from groundwater resources 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 the Preferred Alternative, erosion and sediment (E&S) plans with the most appropriate 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. Environmental site design SWM features would be developed to maintain current infiltration rates to the greatest extent practicable. This will ensure that recharge of the local water table and shallow aquifers is maintained, to preserve local groundwater quantities. 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

Floodplains are governed by local Flood Insurance Programs and supervised by the Federal Emergency Management Agency (FEMA). Refer to **the DEIS, Chapter 4, Section 4.15** (https://495-270-p3.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf/) and **DEIS, Appendix L, Section 2.6** (https://oplanesmd.com/wp-content/uploads/2020/07/DEIS_App-L_NRTR_web.pdf) for the applicable federal and state regulations and methodology. Work within floodplains on NPS lands must adhere to NPS Floodplain Management D.O. #77-2 unless exempted. The NPS Wetland and Floodplain Statement of Findings (SOF) is included in **SDEIS, Appendix G**.

4.15.2 Affected Environment

The Preferred Alternative LOD overlaps the FEMA 100-year floodplains of ten stream systems to varying degrees. **Table 4-35**lists each stream and the location where its associated floodplain crosses or enters the Preferred Alternative LOD. All FEMA 100-year floodplains within the Preferred Alternative LOD are depicted on the *Environmental Resource Mapping* (**SDEIS, Appendix D**) of this document.

Table 4-35: Waterways and Associated Floodplains within the Preferred Alternative LOD

Name of Associated Waterway	Location Where Floodplain Crosses Preferred Alternative LOD
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
Unnamed Tributary to Muddy Branch	Northeast of I-270/I-370 interchange

4.15.3 Environmental Consequences

The 100-year floodplain impacts presented in **Table 4-36** represent the estimated footprint of fill areas associated with construction of the Preferred Alternative. 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. Construction of roadway improvements across drainageways and in floodplains may lead to increases in floodplain elevation and size, which must be addressed. Detailed analysis and design solutions will be required to accommodate increased flood volumes to eliminate impacts to insurable properties. MDOT SHA conducted an assessment to determine where culvert augmentations are likely necessary to limit upstream increases in floodplain elevation related to culvert extensions and included these in the Preferred Alternative LOD. The proposed expansion of the roadway would increase the size of existing floodplain encroachments but would not result in new significant floodplain encroachments.

Table 4-36: Impacts to FEMA 100-Year Floodplain in Acres

Resource	Perm	Temp	Total
FEMA 100-Year Floodplain (acres of fill)	33.7	15.1	**48.8**

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. No Section 408 resources were identified by USACE within the Preferred Alternative LOD.

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. There are two FEMA 100-year floodplains that cross NPS lands within the Phase 1 South limits: Potomac River and Rock Run. Under the Preferred Alternative, there would be 3.98 acres of floodplain impacts on NPS lands. The Floodplain Statement of Findings has been prepared and combined in SOF in the **SDEIS, Appendix G**.

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 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. All hydraulic structures would be designed to accommodate flood flows 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 and limit adjacent flood risk (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, 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 EO 11988. Improvements at existing culverts are required to maintain existing 100-year high water elevations. 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 to complete location hydraulic studies for floodplain encroachment areas will be complied with at later stages of design. 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.

4.16 Vegetation and Terrestrial Habitat

4.16.1 Introduction

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.

NPS requested a tree inventory on their lands within the corridor study boundary. Following the guidance in the *Forest Inventory and Analysis National Core Field Guide. Volume I: Field Data Collection Procedures for Phase 2 Plots. Version 9.0, October 2019*, an inventory of all trees and standing dead trees ≥ 5 inches DBH (4.5 feet, DBH) was completed within the survey limits, including the identification of all significant trees (trees ≥ 24 inches DBH < 30 inches) and specimen trees (≥ 30 inches DBH or 75% of the size of the state champion).

Refer to **the DEIS, Chapter 4, Section 4.16** (https://oplanesmd.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf) and **DEIS, Appendix L, Section 2.7** (https://oplanesmd.com/wp-content/uploads/2020/07/DEIS_App-L_NRTR_web.pdf) for the applicable federal and state regulations and methodology.

4.16.2 Affected Environment

Forest is the most common terrestrial habitat within the corridor study boundary. Within the Preferred Alternative LOD larger forested areas are found on parkland and within stream valleys, with smaller areas of mostly disturbed vegetation occurring in residential and commercial areas. In Maryland, there are 45 forest conservation easements with the Preferred Alternative LOD. In Virginia, there are resource protection areas (RPA) that will be affected by the project. Vegetation within RPAs is subject to regulation under the Chesapeake Bay Protection Act. Refer to **Section 4.13.2** for more information regarding RPAs.

Since the DEIS was published, a tree inventory was conducted on NPS property within the extent of the DEIS Build Alternatives LOD plus 50-feet, to ensure that all critical root zones within the LOD would be included. NPS Tree Survey Limits include NPS properties located in C&O Canal National Historical Park, Clara Barton Parkway, and George Washington Memorial Parkway. Species, DBH, and condition were recorded for each of the inventoried trees. A total of 1,788 trees in C&O Canal Historical Park, 870 trees in Clara Barton Parkway, and 2,329 trees in George Washington Memorial Parkway were inventoried during the survey.

4.16.3 Environmental Consequences

Construction of the Preferred Alternative 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 total impacts within the Preferred Alternative LOD would encompass 500 acres (permanent and temporary). Impacts to Forest Conservation Act easements, including state and county-owned easements, would encompass a total of 14.7 acres within the Preferred Alternative LOD. **Table 4-37** summarizes impacts to forested areas based on forest cover and **Table 4-38** summarizes the tree survey results and permanent tree impacts on NPS properties.

Table 4-37: Impacts to Forests in Acres

Resource	Perm	Temp	Total
Forest Canopy	479.6	20.3[1]	**500.1**
Forest Conservation Act Easements[2]	13.9	0.8	**14.7**
TMDL Reforestation Sites[3]	0.9	0.0	**0.9**
ICC Reforestation Sites	2.8	0.0	**2.8**

Notes: [1]Temporary forest canopy impacts are cleared forest in areas that will not be permanently acquired or altered by roadway construction. Replanting will occur in these areas. Impacts will be avoided and minimized, and replanting will be maximized within the corridor as determined in final design.
[2]Forest Conservation Easement impacts include both county and state forest conservation easements. Data provided from Montgomery County, M-NCPPC.
[3]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 4-38: NPS Tree Survey Results and Impacts on NPS Properties

NPS Property	Number of Live Individual Trees Surveyed	Live Tree Impacts[1] (#/DBH)	Number of Standing Dead Trees Surveyed	Standing Dead Tree Impacts[1] (#/DBH)	Total inches of DBH
George Washington Memorial Parkway	2,175	82/1,108	154	9/113	31,900
C&O Canal	1,544	815/10,148	244	115/1,339	19,345
Clara Barton Parkway	756	315/3,999	114	51/669	10,098
Totals	**4,475**	**1,212/15,255**	**512**	**175/2,121**	**61,343**

Notes: [1] Impacts to trees are only considered permanent totals; there are no temporary impacts.

Direct forest and tree impacts would include tree removal, critical root zone disturbance, tree canopy clearing/limb removal, 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.

Forest resources within the Preferred Alternative LOD in Virginia include forest on VDOT property, private property, and on NPS property. Mitigation for any impacts to these forests would require specific coordination with NPS, Virginia Department of Conservation and Recreation (VDCR), and VDEQ. No

Virginia Department of Forestry open space easements or Agricultural/Forested Districts are located within the Preferred Alternative LOD.

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 have occurred during development of the Preferred Alternative. Every reasonable effort was made to minimize disturbance to or removal of forest and trees by minimizing the LOD of the Preferred Alternative. Additional avoidance and minimization efforts will continue through final design, although opportunities for additional avoidance and minimization of impacts to roadside forest and tree resources are limited due to constrained right-of-way and adjacent urban and suburban land uses.

Unavoidable impacts to forest from construction of the Preferred Alternative in Maryland 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 affected 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 affected 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 that is used by MDNR to plant replacement trees. Forest mitigation banking must be conducted in accordance with the Maryland Forest Conservation Act (Forest Conservation Act [FCA]; MD Natural Resources Code Ann. §5-1601-1613).

A reforestation mitigation site search was conducted from June 2019 to December 2020 to identify potential off-site mitigation opportunities on public lands for the entire corridor study boundary in Maryland, prior to the identification of the Preferred Alternative. The site search included outreach to public property owners in the affected counties (Montgomery and Prince George's Counties) and watersheds (Washington Metropolitan and Patuxent River MDE 6-Digit Watersheds) to identify potential reforestation sites. MDOT excess lands were also reviewed for potential reforestation sites and to identify

opportunities for creation of forest retention mitigation banks that could be used for mitigation based on a 1:2 credit ratio. Nearly 240 off-site reforestation mitigation opportunities were reviewed on public lands in the affected counties and watersheds, resulting in 79 recommended off-site reforestation mitigation sites that could provide 352.6 acres of credit, including 295.3 acres of reforestation planting on public lands and 114.6 acres (57.3 credit acres) of forest retention on MDOT SHA excess lands. The methodology and results of this site search are documented in the *I-495/I-270 MLS Maryland Reforestation Law Mitigation Site Search Report*, which was submitted to MDNR for review in December 2020.

The Maryland 2021 Legislative Session House Bill 991 (HB0991; *Tree Solutions Now Act*) passed on May 30, 2021 and enacted June 1, 2021 updates the Maryland Forest Conservation Act to allow for "qualified conservation" as a form of "forest mitigation banking," but defines "qualified conservation" as conservation of existing forest that "was approved on or before December 31, 2020 by the appropriate State or local forest conservation program for the purpose of establishing a forest mitigation bank." Approved forest mitigation banks that protect existing forest may continue to sell credits until June 30, 2024, but no new banks can be established via conservation of existing forest. Therefore, the retention sites previously proposed as MLS forest mitigation bank sites are no longer viable and have been removed from the proposed mitigation approach.

MDOT SHA revised the proposed forest mitigation approach in August 2021 based on the identification of the Preferred Alternative, passage of HB0991, and identification of additional reforestation sites on MDOT SHA excess lands. The revised site search results include 68 recommended off-site mitigation sites that could provide 39.96 acres of reforestation planting on public lands within the affected county and watershed of the RPA. An additional 268.48 acres of potential reforestation could potentially be planted outside of the affected county and watershed but would require a variance from DNR. In addition, forest impacts may be mitigated by purchasing credits from approved forest mitigation banks in the affected county and/or watershed. Any remaining mitigation required may be fulfilled through payment into the Reforestation Fund, as approved by DNR. The results of the revised site search are documented in the addendum to the *I-495/I-270 MLS Maryland Reforestation Law Mitigation Site Search Report* dated August 2021.

Specific mitigation for impacts to Forest Conservation Easement areas, Reforestation Areas, State Parks, county parks, or NPS lands in both Maryland and Virginia is under development and will be determined through coordination with the appropriate regulatory agency (e.g., MDNR, NPS, NCPC, VDCR, VDEQ, City of Rockville, and City of Gaithersburg). Mitigation requirements for these agencies may be more stringent than those of the Maryland Reforestation Law and, where appropriate, MDOT SHA will provide mitigation according to these requirements. As an initial step in the development of tree mitigation for these agencies, MDOT SHA preliminarily identified on-site and off-site planting areas to mitigate for impacts to these specific easement and park resources. Potential tree planting sites have been identified on NPS, M-NCPPC, City of Gaithersburg, and City of Rockville park properties based on mitigation site searches conducted within affected parks as well as parks within a few miles of the Preferred Alternative LOD. The mitigation site search preliminarily identified a total of 151.6 acres of potential off-site tree planting on NPS properties, 9.5 acres of potential tree planting opportunities on M-NCPPC parkland properties, 18.6 acres of potential tree planting opportunities on City of Rockville parkland properties, and 4.2 acres of potential tree planting opportunities on City of Gaithersburg parkland. The final forest mitigation plan will be developed by the P3 Developer in conjunction with MDOT SHA and the affected jurisdictions and landowners including NPS during the final design phase of the project.

Vegetation within RPAs in Virginia has been avoided and minimized to the maximum extent practicable and any unavoidable impacts will be mitigated through onsite planting to the extent feasible.

4.17 Terrestrial Wildlife

4.17.1 Introduction

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). Refer to the **DEIS, Chapter 4, Section 4.17** (https://oplanesmd.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf) and **DEIS, Appendix L, Section 2.8** (https://oplanesmd.com/wp-content/uploads/2020/07/DEIS_App-L_NRTR_web.pdf) for the applicable federal and state regulations and methodology.

4.17.2 Affected Environment

Terrestrial wildlife expected within the Phase I South limits reflect the availability of various natural and man-modified habitats. 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.

4.17.3 Environmental Consequences

There would be terrestrial wildlife impacts from construction of the Preferred Alternative, which would involve widening the existing highways and ancillary improvements. 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 Preferred Alternative LOD are early- to mid-successional (MDOT SHA, 2006) and many areas would regain functionality due to replanting requirements. The Preferred Alternative could potentially contribute contaminants to remaining wildlife habitat through pollutant runoff.

Bald eagles are not expected to be negatively affected by the Preferred Alternative, because no bald eagle nests have been identified by USFWS within the study corridor boundary. Since bald eagle populations are expanding, it is possible that additional nesting pairs may utilize areas near highways in the future. MDOT SHA will consult with the USFWS when construction begins to confirm the presence/absence of bald eagle nests in the vicinity of the Study. USFWS determined that the improvements to the ALB will require removal and replacement of the resident peregrine falcon nest box. USFWS expects disruption of the falcons for multiple nesting seasons due to long-term construction activities.

The Preferred Alternative is not located within a Critical Area; therefore, no Colonial Water Bird Nesting Areas are anticipated to appear or be affected within the Preferred Alternative LOD. There would be impacts to 11.9 acres of potential FIDS habitat within the Preferred Alternative LOD, based on 2019 land cover data, as summarized in **Table 4-39**. 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, as would occur from bisecting the FIDS habitat. **Table 4-39** also includes the historic FIDS habitat estimated within the area of the Preferred Alternative LOD in 2006 to provide context for how quickly this type of habitat is being diminished within Montgomery and Fairfax Counties with increasing urbanization and development.

Table 4-39: Impacts to Potential FIDS Habitat Within the Preferred Alternative in Acres

FIDS Habitat Source	Permanent	Temporary	Total
Potential FIDS Habitat (MDOT SHA, 2019 land cover data)	8.9	3.0	**11.9**
Historic FIDS Habitat (DNR, 2006 land cover data)	26.6	5.7	**32.3**
Potential FIDS Habitat on NPS Land	0.49	1.85	**2.19**
Historic FIDS Habitat on NPS Land	0.43	4.66	**5.09**

Most forest impacts would be to smaller, upland forest stands resulting in reductions in available edge habitat, rather than complete elimination of habitat. Therefore, some less motile 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,[38] 2008).

4.17.4 Mitigation

Impacts to terrestrial wildlife from the Preferred Alternative would be unavoidable, primarily due to reduction in available vegetated habitat. Impacts to wildlife are anticipated to be minimal since the Preferred Alternative would improve an existing roadway corridor which is already 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 ALB just prior to the nesting season when construction is scheduled to begin. Disruption for one or more nesting seasons due to long-term construction activities is anticipated. Once construction activities are nearly complete near the former nest site, USFWS recommends that the nest box be reinstalled. MDOT SHA will follow the USFWS recommended protection measures for the peregrine falcon nesting on the ALB.

4.18 Aquatic Biota

4.18.1 Introduction

Fish and shellfish species are protected through Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and MDNR Fishery Management Plans. Updated existing data on aquatic biota within the corridor study boundary were gathered from state and county agencies since the DEIS.

[38] FHWA, 2008. Wildlife-Vehicle Collision Reduction Study: Report to Congress. August 2008. FHWA-HRT-08-034.

The Chesapeake Fish Passage Prioritization (CFPP) database was reviewed for all watersheds in the vicinity of the corridor study boundary. The CFPP project is a collaboration led by The Nature Conservancy and is comprised of fish blockage data for the greater Chesapeake Bay watershed (Martin, 2019). This database includes historic blockages that have not been recently confirmed, as well as partial blockages and blockages with aquatic life passage facilities. Despite the limitations of the database, it provides useful context for the current status of fish movement and blockages within each watershed. In addition to blockage data, the CFPP project tool also includes data on migratory, or diadromous, fish habitat for American shad (*Alosa sapidissima*), hickory shad (*Alosa mediocris*), blueback herring (*Alosa aestivalis*), alewife (*Alosa pseudoharengus*), striped bass (*Morone saxatilis*), and American eel (*Anguilla rostrata*).

Following additional coordination with the National Oceanic and Atmospheric Administration, National Marine Fisheries Service in 2021, this migratory fish data was reviewed for watersheds crossed by the corridor study boundary to determine if those six migratory species have the potential to occur in study area streams. The review was based on documented or potential presence of the six migratory fish species and their potential to use the stream for migratory purposes, spawning, or during other critical life stages. The potential current usage of stream segments by diadromous species is based on the connection to streams with documented occurrence and the expectation that they could be using a certain stream segment based on stream characteristics and a lack of barriers, as determined by the Chesapeake Fish Passage Workgroup. This supplementary data is summarized by watershed below.

Refer to the **DEIS, Chapter 4, Section 4.18** (https://oplanesmd.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf) and **DEIS, Appendix L, Section 2.9** (https://oplanesmd.com/wp-content/uploads/2020/07/DEIS_App-L_NRTR_web.pdf) for the applicable federal and state regulations and methodology.

4.18.2 Affected Environment

No Essential Fish Habitat was identified within the study corridors, therefore the MSFCMA does not apply to this Study.

Three parameters were evaluated for each of the five 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* (**DEIS, 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 4-40**. The total number of waterways within each watershed that were evaluated varied depending on data availability.

Table 4-40: 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
Watts Branch	Fair – Good	Fair	Fair - Good
Muddy Branch	Fair – Good	Poor - Fair	Fair - Good

4.18.3 Environmental Consequences

The Preferred Alternative would 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 Preferred Alternative LOD are anticipated to be 45,779.67 linear feet, and wetland impacts are anticipated to be 4.3 acres. More details are provided 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. MDOT SHA has begun coordinating with MDNR regarding the request for a mussel survey in the Potomac River.

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 and genetic isolation of resident aquatic species populations 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. **Tables 4-33 and 4-34** identifies the additional impervious surface impacts by 12- and 8-digit watersheds. 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 affect 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.

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, shifting of noise barrier locations, 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 in Maryland 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.

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 steam and its aquatic biota. MDOT SHA has agreed to conduct a mussel survey in the Potomac River surrounding the ALB prior to construction. Construction approaches that minimize the temporal extent of in-water activities in the Potomac River surrounding the ALB will be considered to the extent practicable. Causeways and trestles proposed adjacent to the existing ALB will be designed to avoid impacting fish passage by maintaining river velocities below approximately 3 feet per second at commonly observed discharges (e.g., below 90 percentile) during the period in which anadromous fish are spawning (February 15 - June 15). Trestles or other non-fill accessways will be used in areas of deeper water (e.g., extending from the southern bank) to the extent practicable to minimize fill and associated flow restrictions.

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

Since the publication of the DEIS in July 2020, several species-specific surveys have occurred. This section provides an update on those survey results. Refer to the **DEIS, Chapter 4, Section 4.19** (https://oplanesmd.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf) and **DEIS, Appendix L, Section 2.10** (https://oplanesmd.com/wp-content/uploads/2020/07/DEIS_App-L_NRTR_web.pdf) for the applicable federal and state regulations and methodology.

4.19.2 Affected Environment

A. Northern Long-eared Bat and Indiana Bat

Background information about the federally threatened northern long-eared bat (NLEB) and federally endangered Indiana bat (IB) and early project coordination with the Virginia and Maryland field offices of the USFWS regarding these species within the corridor study boundary are discussed in **DEIS, Appendix L, Section 2.10.2.A**. Similarly, the results of bridge surveys for the presence of roosting bats and evening emergence surveys for bats potentially roosting on the ALB and Northwest Branch Bridge in 2019 were also provided in **DEIS, Appendix L, Section 2.10.2.B** and within the *Bridge Survey Report for the Northern Long-eared Bat (Myotis septentrionalis) and Indiana Bat (Myotis sodalis)* in **SDEIS, Appendix H**.

MDOT SHA agreed to conduct acoustic surveys for the presence of NLEB or IB within the corridor study boundary. MDOT SHA determined suitable locations for deploying the acoustic survey devices by conducting a broad mapping study within the corridor study boundary of suitable maternity roosting and foraging habitat and travel corridors for these bats. A meeting between the MDOT SHA, FHWA, USFWS, and MDNR was held on April 20, 2020, to summarize the results of the bat habitat assessments and to outline a more precise acoustic survey approach based on these results. During the meeting, MDNR also requested that MDOT SHA include acoustic surveys for the state-listed endangered small-footed bat (*Myotis leibii*) (SFB) and that bridge surveys for the presence of roosting bats be conducted on four I-495 bridge spans, two at Kenilworth Avenue North and two at Greenbelt Road, none of which were surveyed in 2019. Additionally, the USFWS requested that the bridges at Suitland Parkway and Clara Barton Parkway eastbound be surveyed since they were under construction in 2019 and could not be adequately surveyed at that time. On June 29, 2020, a diurnal survey was conducted of abutments, decking, and piers of these bridges looking for the presence of roosting bats or bat guano. No bats or bat guano were found beneath any of these seven bridges and associated ramps during the survey. The Clara Barton Parkway westbound bridge and associated ramps were resurveyed during the 2020 bridge surveys to see whether bats were again found roosting within gaps between the pier caps, as observed in 2019. Two individuals of the same species, big brown bat, found there in 2019, were again found roosting under the bridge in 2020. The results of the 2020 bridge surveys are included within the *Additional Bridge Survey Report for the Northern Long-eared Bat (Myotis septentrionalis) and Indiana Bat (Myotis sodalis)* in **SDEIS, Appendix H.**

On June 10, 2020, the USFWS approved the *I-495 & I-270 Managed Lanes Study Acoustic Surveys Technical Study Plan for Threatened and Endangered Bat Species*. This study plan (**SDEIS**, **Appendix H**) was used as a framework for conducting the acoustic surveys for threatened and endangered bat species within the corridor study boundary during summer 2020. MDOT SHA and FHWA agreed to conduct the acoustic surveys to satisfy Section 7(a)(1) of the ESA.

The survey resulted in the recording of 54,700 bat calls at 70 sites. Three of the sites had calls identified as NLEB. All of these NLEB call locations were from smaller strips of forest adjacent to residential communities between the I-495/I-95 interchange and just west of the I-495/I-270 interchange. No calls were recorded of either IB or SFB. Specific details of study methodology and results are provided within the *Natural Resources Technical Report* (**DEIS, Appendix L**) and within the *I-495 & I-270 Managed Lanes Study Threatened and Endangered Bat Habitat Assessment and Acoustic Survey Report* in **SDEIS, Appendix H**.

B. Fisheries

A response was received on August 9, 2018 from NMFS, included in *Appendix N* of the *Natural Resources Technical Report* (**DEIS, 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

A discussion of mapped sensitive species project review areas (SSPRAs) within the corridor study boundary is included in **DEIS, Appendix L, Section 2.10.2.C**.

Table 4-41 displays the impact acreage of SSPRA located within the Preferred Alternative.

Table 4-41: SSPRA Impact Acreage within the Preferred Alternative

	Permanent	Temporary	Total
Total SSPRA in Acres	24.5	20.0	**44.5**

D. State-Listed Species of Concern

a. Plants

Project coordination with the MDNR, VDCR, VDGIF, and NPS regarding the potential presence of rare, threatened, and endangered (RTE) species within the corridor study boundary is documented in **DEIS, Appendix L, Section 2.10.2.D**.

Further coordination with the NPS in late 2019 resulted in an expanded list of RTE plants from the Chesapeake and Ohio Canal National Historical Park (C&O Canal) unit that potentially occur or historically occurred within or near the Preferred Alternative. The NPS requested that MDOT SHA conduct field surveys for these species within the corridor study boundary where suitable habitat exists. In 2020, MDOT SHA performed targeted plant surveys within the C&O Canal and George Washington Memorial Parkway portions of the corridor study boundary, which encompasses the area inclusive of the Preferred Alternative LOD.

Table 4-42 provides a list of the 41 species of RTE plants that were surveyed within the C&O Canal (Maryland) and George Washington Memorial Parkway (Virginia) units of the project corridor study boundary. The RTE species that would be impacted by the Preferred Alternative are highlighted in green in **Table 4-42**. Field survey methodologies are described within the *Rare, Threatened, and Endangered Plant Survey Report I-495 & I-270 Managed Lanes Study* found within *Appendix R* of the *Natural Resources Technical Report* **DEIS, Appendix L, Section 2.10**. Methodologies for the 2020 RTE plant survey are included in **SDEIS, Appendix H**.

Table 4-42: RTE Plant Species Surveyed within the Potomac River Gorge Portion of the Preferred Alternative

Scientific Name	Common Name	Status
Maryland and Virginia		
Arabis patens	Spreading Rockcress	S3G3/S1G3
Carex careyana	Carey's Sedge	S1G4G5 Endangered/ S3G4G5
Erigenia bulbosa	Harbinger-of- Spring	S3G5/S3G5
Erythronium albidum	Small White Fawn-Lily	S2G5 Threatened/ S2G5
Maianthemum stellatum	Starry False Solomon's-Seal	S2G5 Endangered/ S2G5
Phacelia covillei	Buttercup Scorpion-Weed	S2G3 Threatened/ S1
Ripariosida hermaphrodita	Virginia Fanpetals	S1G3 Endangered/ S1G3
Solidago racemosa	Rand's Goldenrod	S1G3 Threatened/ S1G3?
Valeriana pauciflora	Large-flower Valerian	S1G4 Endangered/ S1G4
Maryland Only		
Astragalus canadensis	Canadian Milk-Vetch	S1G5 Endangered
Baptisia australis	Blue Wild Indigo	S2G5 Threatened
Bromus latiglumis	Early-leaf Brome	S1G5 Endangered
Carex hitchcockiana	Hitchcock's Sedge	S1G5 Endangered
Clematis viorna	Vasevine	S3G5
Corallorhiza wisteriana	Spring Coralroot	S1G5 Endangered
Coreopsis tripteris	Tall Tickseed	S1G5 Endangered
Cubelium concolor	Green-Violet	S3G5
Cuscuta polygonorum	Smartweed Dodder	S1G5 Endangered/ S1G5
Galactia volubilis	Downy Milk-Pea	S5G3
Gentiana villosa	Striped Gentian	S1G4 Endangered
Geum aleppicum	Yellow Avens	S1G5 Endangered/ SHG5
Helianthus occidentalis	Few-leaf Sunflower	S1G5 Threatened/ S1G5T5
Hibiscus laevis	Halberd-leaf Rose-Mallow	S3G5
Homalosorus pycnocarpos	Glade Fern	S2G5 Threatened
Iresine rhizomatosa	Juda's-Bush	S1 G5 Endangered
Lipocarpha micrantha	Small-flower Halfchaff Sedge	S1G5 Endangered/ S2G5
Matelea obliqua	Climbing Milkweed	S1S2G4? Endangered
Mecardonia acuminata	Axil-Flower	S2G5 Endangered

Scientific Name	Common Name	Status
Monarda clinopodia	White Bergamot	S3S4G5
Paspalum fluitans	Horse-tail Paspalum	S2G5 Threatened
Phaseolus polystachios	Thicket Bean	S3G5
Polygala polygama	Racemed Milkwort	S1G5 Threatened
Potamogeton foliosus	Leafy Pondweed	S2G5
Pycnanthemum verticillatum	Whorled Mountain-Mint	S2G5 Threatened
Rumex altissumus	Tall Dock	S1G5 Endangered
Sagittaria rigida	Sessile-fruit Arrowhead	S1G5 Endangered/ S1G5
Salix interior	Sandbar Willow	S1G5 Endangered/ S1G5TNR
Silene nivea	Snowy Catchfly	S1G4? Endangered/ S1G4?
Triphora trianthophoros	Threebirds	S1G4? Endangered/ S1G3G4T3T4
Virginia Only		
Borodinia dentata	Short's Rockcress	S3G5/S1G5
Senecio suaveolens	False Indian-Plantain	S1G4 Endangered/ S2G4

Source: Townsend 2019, MDNR 2021, Weakley 2012, Brown and Brown 1984
1State Rank: S1=Critically Imperiled/Highly State Rare; S2=Imperiled/State Rare; S3=Vulnerable/Watchlist; T=Subspecies/Variety Ranked Differently than Species
Global Rank: G3=Vulnerable; G4=Apparently Secure; G5=Secure; ?=Inexact Numeric Rank; NR=Not Ranked

Within the Preferred Alternative LOD in Virginia, two (2) RTE plant species were found, including Carey's sedge (*Carex careyana*) and buttercup scorpion-weed (*Phacelia covillei*). On the Maryland side, seven (7) RTE plant species were documented within the corridor study boundary. Documented RTE plants included:

- Buttercup Scorpion-Weed
- Carey's Sedge
- Tall Dock
- Halberd-leaf Rose-Mallow
- White Bergamot
- Rand's Goldenrod
- Horse-tail Paspalum

Further details of the plant survey results for Maryland are described within the 2019 *Rare, Threatened, and Endangered Plant Survey Report I-495 & I-270 Managed Lanes Study* found within **DEIS, Appendix R** of the *Natural Resources Technical Report* (**DEIS, Appendix L**) and the 2020 RTE survey results are described in *the Rare, Threatened, and Endangered Plant Survey Report I-495 & I-270 Managed Lanes Study* in **SDEIS, Appendix H**.

b. Wood Turtle

During MDOT SHA coordination with the VDEQ in October 2020 regarding its review of the DEIS, the VDEQ requested that a habitat evaluation of streams in the Virginia portion of the corridor study boundary be conducted for the presence of wood turtle (*Glyptemys insculpta*). The wood turtle is a state-threatened species in Virginia, and is known to occur in Turkey Run, a waterbody located east of the corridor study

boundary. The evaluation was to include an assessment of potential upland and aquatic habitats, the results of which would be reported to the Virginia Department of Wildlife Resources (VDWR).

To assess the potential presence of wood turtles within the Virginia portion of the corridor study boundary, qualified biologists conducted field surveys of all delineated streams in February and March 2021. Survey methodology and study results are summarized in the *Wood Turtle Habitat Assessment and Survey Report – Virginia I-495 & I-270 Managed Lanes Study* found in **SDEIS, Appendix H**. Portions of eight (8) streams, including the Virginia shoreline of the Potomac River, were assessed within the Virginia corridor study boundary. Four (4) of the streams were either intermittent or ephemeral and, thus, were not suitable overwintering habitat for wood turtles. The perennial streams within the corridor study boundary provided only marginal habitat because of their relatively small size and shallow flow. Wood turtles generally do not prefer large rivers but will use smaller tributary streams that flow into larger rivers. Therefore, while some instream habitat features were observed within the Potomac River, no turtles were found, nor would they be expected to overwinter there. No suitable tributary streams flowing into the Potomac River occur within the corridor study boundary. Upland habitats within the corridor study boundary were also determined to be suboptimal, as the habitat is primarily forested with few suitable openings for basking and egg laying. No wood turtles were found during the field surveys.

4.19.3 Environmental Consequences

The USFWS Information Planning and Consultation indicated that the NLEB may occur within the corridor study boundary and recommended that acoustic and bridge surveys be performed for NLEB in accordance with the most recent *Range-wide Indiana bat/NLEB Summer Survey Guidelines*. USFWS also recommended surveys for the Indiana bat to determine if they utilize summer habitat within the study corridors because the Indiana bat was detected near the corridor study boundary by Virginia Tech between 2017 and 2019.Additionally, the NPS, MD MDNR, and VDCR have identified rare, threatened, and endangered state-listed plant and invertebrate species that occur on NPS lands within the Potomac River Gorge. Neither NLEB or IB species were 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 ALB and bridge over Seven Locks Road, suggest that bats do occasionally roost on suitable I-495 bridges. As noted above, based on the small amount of guano observed beneath the day roosting big brown bats and guano found on other 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 within the Preferred Alternative LOD 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.

To determine potential impacts to suitable forested habitat for the NLEB and IB, acoustic surveys were conducted within the corridor study boundary during the 2020 active season (May 15 through August 15). Acoustic surveys were 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 asked that mist netting not be conducted due to concerns of transmission of COVID-19 to bats.

Informal consultation between the FHWA, MDOT SHA and the USFWS continued with submittal of the habitat assessment and acoustic study report to the USFWS and MDNR. MDOT SHA coordinated closely with USFWS and MDNR regarding NLEB and Indiana bat, and Endangered Species Act Section 7 consultation has concluded as follows.

In a letter to the FHWA dated January 13, 2021, the USFWS issued a "no effect" determination for the IB based on the absence of documented IB during bridge, emergence, and acoustic surveys. The USFWS also indicated that the project is covered by the January 5, 2016, Programmatic Biological Opinion on Final 4(d) Rule for the NLEB and Activities Excepted from Take Prohibitions since the area where forest clearing would occur does not have known maternity roost trees or hibernacula. In their letter, the USFWS stated that the project was "not likely to adversely affect" the NLEB. MDOT SHA coordinated closely with USFWS and MDNR regarding NLEB and Indiana bat, and Endangered Species Act Section 7 consultation has concluded.

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 2019 targeted species survey did not identify any of the listed species, though surveys for the buttercup scorpionweed were required to be 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 Preferred Alternative would not be anticipated to impact five of the six MDNR Wildlife and Heritage Service listed plant species of concern within the Potomac River corridor. Further surveys were 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. The 2020 RTE Plant Survey determined that the following 6 targeted plant species would be impacted by the Preferred Alternative (highlighted in green in **Table 4-42**): tall dock (*Rumex latissimus*), Carey's Sedge (*Carex caryana*), Buttercup Scorpion-Weed (*Phacelia covillei*), Horse-tail Paspalum (*Paspalum fluitans*), Halberd-leaf Rose-Mallow (*Hibiscus laevis*), and Rand's Goldenrod (**Solidago racemosa**). More details about these species can be found in the 2020 RTE survey results are described in *the Rare, Threatened, and Endangered Plant Survey Report I-495 & I-270 Managed Lanes Study* in **SDEIS, Appendix H**. MDNR, VDCR, NPS, and USFWS have reviewed the plant survey results and did not have further comments.

Based on currently available information, including targeted RTE plant species surveys during summer 2019 and 2020, there will be anticipated effects to RTE plant species from the Preferred Alternative in the vicinity of the ALB. Potential impacts, including wetlands, waterways, forests, archaeological sites, and RTE plant species, were considered in the development of the Preferred Alternative LOD in the vicinity of the ALB. While complete avoidance of these resources was not possible, impacts were minimized to the greatest extent practicable. Most RTE plant impacts will occur during the construction phase of the ALB for temporary access, equipment storage, and the building of the new bridge. For buttercup scorpionweed, the most abundant and widespread RTE plant species occurring on the Potomac's mesic upper river terraces, approximately 80 percent of its impacted area, including tens of thousands of plants, would be within the temporary limits of disturbance. While this represents a significant temporary impact,

it should be noted that this species was also widespread and abundant outside the limits of our project survey upstream and downstream of the ALB on both the Maryland and Virginia sides of the Potomac River. Impacts to other RTE plant species within the temporary limits of disturbance include 10-50 Carey's sedges, thousands of horse-tail paspalum, 10-15 tall dock, 10-50 Rand's goldenrod, and about 50 halberd-leaf rose-mallow. Horse-tail paspalum was also observed in abundance upstream of the ALB on the Maryland shoreline and both upstream and downstream of the ALB on the Virginia shoreline. While temporarily disturbed areas will be restored following construction of the replacement ALB, the duration of construction will be several years, likely resulting in permanent impacts to RTE plants within the temporary limits of disturbance. However, restored areas will be replanted with RTE plant species that were documented growing within those areas prior to construction (**Section 4.19.4, Mitigation**).

Buttercup scorpionweed and horse-tail paspalum are the only two RTE plant species with individuals located within the permanent limits of disturbance. The greatest permanent impacts to buttercup scorpionweed would occur at the northern end of the ALB, affecting thousands of individual plants within an area of about an acre. Permanent impacts would also occur to perhaps a few hundred horse-tail paspalum plants along the Potomac River shoreline and edges of Rock Run Culvert for the placement of bridge piers.

MDNR indicated in an email on February 28, 2020, included in the **SDEIS, Appendix H** 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). MDNR generally defers to the National Bald Eagle Management Guidelines. MDOT SHA has coordinated and will continue to coordinate with USFWS concerning bald eagles, in addition to peregrine falcons, as discussed in **Section 4.17**.

Surveys for the state-listed wood turtle were conducted in the Virginia portion of the Preferred Alternative LOD; no wood turtles were found and only marginally-suitable habitat was identified. Virginia Department of Wildlife Resources (DWR) determined this project is not likely to result in significant adverse impacts upon this species. However, because they may be encountered on site during work, DWR recommends the following as avoidance and minimization measures:

- Prior to the commencement of work all contractors associated with work at this site be made aware of the possibility of encountering wood turtles on site and become familiar with their appearance, status and life history. An appropriate information sheet / field observation form to distribute to contractors and employees was provided.

- If any wood turtles are encountered and are in jeopardy during the development or construction of this project, remove them from immediate harm and call DWR. If staff on site hold an appropriate Threatened and Endangered Species Scientific Collection Permit, this staff member may relocate wood turtles out of harm's way and into suitable habitat, preferably within the nearest perennial stream. Any relocations should be reported to DWR, and the wood turtle observation form should be completed and faxed to DWR.

- To minimize potential wildlife entanglements, resulting from use of synthetic/plastic erosion and sediment control matting, use matting made from natural/organic materials such as coir fiber, jute, and/or burlap.

4.19.4 Mitigation

MDOT SHA and FHWA have worked closely with USFWS and MDNR to ensure protection of listed bat species. While the Study was determined to have "no effect" on the IB and "not likely to adversely affect" the NLEB, MDOT SHA voluntarily committed to a time of year restriction for tree clearing from May 1 through July 31 of any year within a 3-mile buffer around each of the three positive NLEB detection locations within the study corridors to go above and beyond what is required to protect this bat species. IB was not detected in the acoustic or bridge surveys.

MDOT SHA commits to coordinating with NPS and MDNR to determine a mitigation plan for RTE plant species prior to construction. This will include the use of matting along access roads to minimize soil compaction during construction, replanting of appropriate RTE plants within temporarily disturbed areas following construction, and monitoring of replanted RTE plant populations to ensure successful reestablishment.

4.20 Unique and Sensitive Areas

4.20.1 Introduction

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[39]; Blackwell, 1989[40]). Refer to the **DEIS, Chapter 4, Section 4.20** (https://oplanesmd.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf), **DEIS, Appendix L, Section 2.11** (https://oplanesmd.com/wp-content/uploads/2020/07/DEIS_App-L_NRTR_web.pdf), and DEIS, Appendix Q (https://495-270-p3.com/wp-content/uploads/2020/07/DEIS_AppQ_Conceptual-Mitigation-Plan_May-2020_web.pdf) for the applicable federal and state regulations and methodology.

4.20.2 Affected Environment

A. Targeted Ecological Areas and Green Infrastructure

Four (4) GI corridors and three (3) GI hubs overlap within the limits of the Preferred Alternative LOD. In addition, TEAs overlap with the Preferred Alternative LOD between Cabin John Creek and the Potomac

[39] Montgomery Planning. 2012. Special Protection Areas (SPA). Available at: http://www.montgomeryplanning.org/environment/spa/index.shtm [Accessed 7 September 2018].
[40] 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].

River in Montgomery County.

B. Special Protection Area (SPA) and Environmental Overlay Zones

There are no SPAs or Environmental Overlay Zones within the limits of the Preferred Alternative LOD, 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 Virginia Department of Conservation and Recreation- National Heritage Natural Area Preserves within the limits of the Preferred Alternative LOD or within Fairfax County, Virginia. There are two VDCR Conservation Sites within a five-mile radius of the Preferred Alternative.

4.20.3 Environmental Consequences

Impacts to unique and sensitive areas associated with the Preferred Alternative are summarized in **Table 4-43**. There would be no impacts to SPAs or VDCR Natural Area Preserves and Conservation Sites resulting from the Preferred Alternative.

Table 4-43: Impacts to Unique and Sensitive Areas (acres)

Resource	Permanent Impacts	Temporary Impacts	Total Impacts
Targeted Ecological Areas	41.94	16.67	**58.61**
Green Infrastructure Hubs	12.96	10.85	**23.81**
Green Infrastructure Corridors	84.27	1.86	**86.13**
Special Protection Areas	0.0	0.0	**0.0**
TOTAL Unique and Sensitive Area Types	**139.17**	**29.38**	**168.55**

Construction of the Preferred Alternative 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. 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. Refer to **Sections 4.12.3, 4.13.3, 4.15.3, 4.16.3, 4.17.3, 4.18.3** for additional details on the potential impacts to habitats.

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 parkland. 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 (EJ) and Title VI Compliance

4.21.1 Introduction

All federal agencies have certain obligations under Title VI of the 1964 Civil Rights Act and EO 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,[41] age, sex, disability, or religion. EO 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."

EO 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 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 EJ analysis presented in this section of the SDEIS includes the following new information:

- An enhanced existing conditions section that includes data from the EPA and Maryland EJSCREEN websites
- The potential effects, both beneficial and potentially adverse, of the Preferred Alternative on EJ populations
- Public outreach to Environmental Justice populations since the DEIS

Coordination regarding potential mitigation and community enhancements is ongoing through the EJ Working Group. The final mitigation will be documented in the FEIS and commitments will be documented in the ROD.

4.21.2 Affected Environment

A. Review of EJ Analysis in the DEIS

The strategies developed under EO 12898, USDOT Order 5610.2(c), 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 the EO and FHWA strategies, the DEIS documented the following steps in the EJ Analysis for the Study:

1. The identification of minority race and ethnicity populations and low-income populations (EJ populations) along the study corridors (**DEIS, Chapter 4, Sections 4.21.2A and 4.21.2B** and *Community Effects Assessment and Environmental Justice Analysis Technical Report*, **DEIS, Appendix E, Section 4.2.1**);

[41] Including individuals with Limited English Proficiency.

2. The review of demographic data to determine the existing environmental and community conditions of the EJ populations (**DEIS, Chapter 4, Section 4.21.3** and *Community Effects Assessment and Environmental Justice Analysis Technical Report*, **DEIS, Appendix E, Section 4.3**);

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 (**DEIS, Chapter 4, Section 4.21.3** and *Community Effects Assessment and Environmental Justice Analysis Technical Report*, **DEIS, Appendix E, Section 4.3**); and

4. The identification of beneficial and adverse effects to EJ populations under the No Build and Build Alternatives (**DEIS, Chapter 4, Section 4.21.5**(**DEIS, Chapter 4, Section 4.21.3** and *Community Effects Assessment and Environmental Justice Analysis Technical Report*, **DEIS, Appendix E, Section 4.5**).

B. EJ Populations Update for the SDEIS

In support of the SDEIS, the Census block groups were reviewed against the Phase 1 South limits of the Preferred Alternative. In the DEIS, 111 block groups or 55 percent of the study corridor's block groups were identified as EJ populations[42]. Under the Preferred Alternative, there are 66 analysis area block groups, of which 16, or 24 percent are identified as EJ populations. Therefore, under the Preferred Alternative, 95 block groups identified as EJ populations in the DEIS are now avoided.

Of the 16 block groups identified as EJ populations approximate to the Preferred Alternative, 12 met the criteria[43] as minority race and ethnicity populations. The 12 block groups with minority populations were located in the communities of Gaithersburg, Rockville, Potomac, and North Bethesda (Refer to **Figure 4-3**).

Of the 16 block groups identified as EJ populations, one block group, in the community of North Bethesda, was identified as a low-income population. This block group was identified as having a median household income at or below $69,850[44].

Three (3) of the 16 block groups identified as EJ populations met the criteria for minority race and ethnicity as well as low-income populations. These three (3) block groups were identified in the communities of Gaithersburg and Potomac.

C. Online Environmental Justice Mapping Tools

a. EPA EJSCREEN

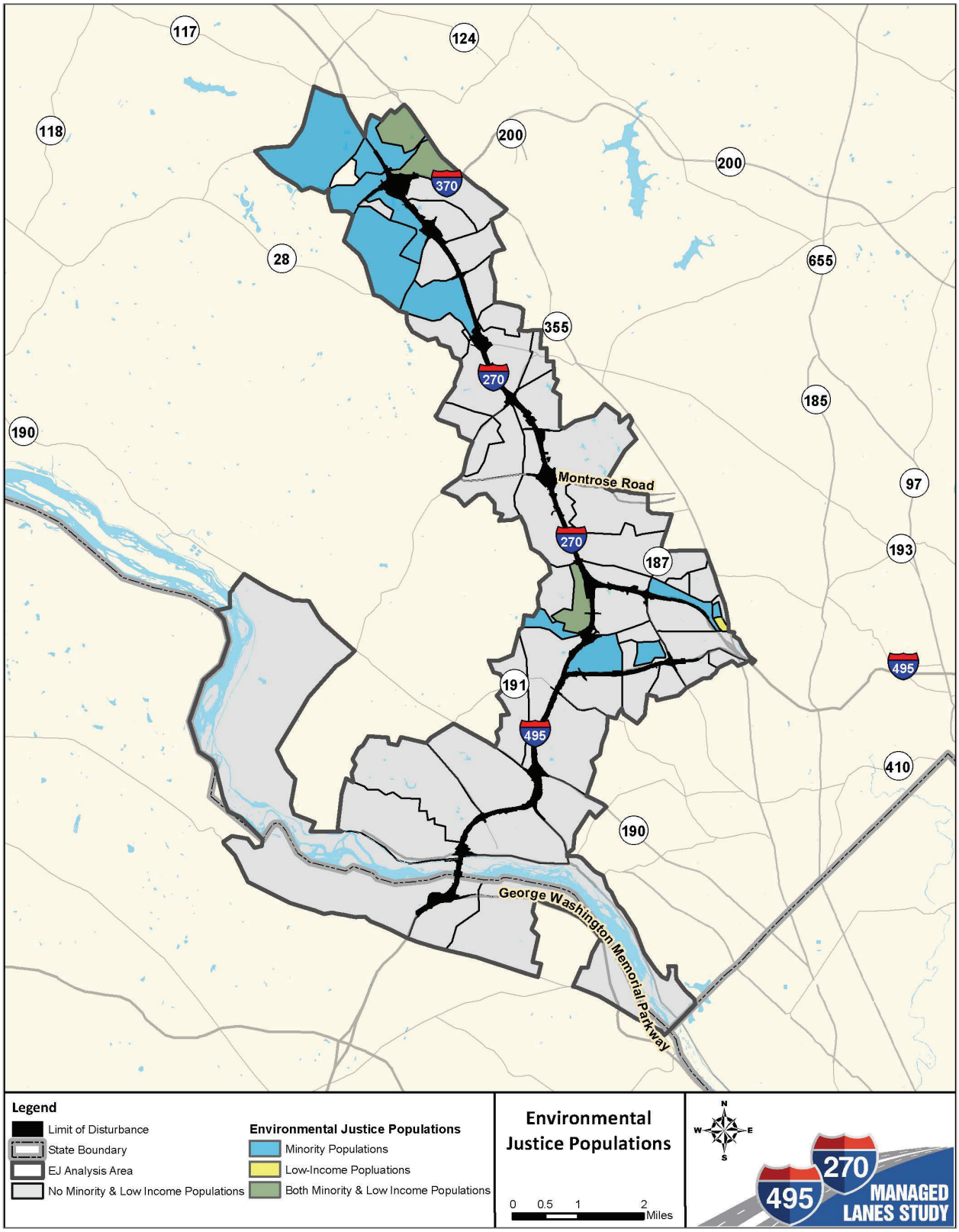
The EPA hosts an online EJ screening and mapping tool that combines environmental and demographic data for various geographies and presents them in maps and reports. The EPA uses publicly-available data and combines environmental and demographic characteristics (indicators) to produce an EJ index for a specific geography. (https://www.epa.gov/ejscreen).

[42] For the purposes of this EJ Analysis, the terms "EJ population" and "EJ block group" are interchangeable. Note that actual populations of minority race and ethnicity persons and low-income persons may not geographically conform to block group boundaries.

[43] A block group was identified as a minority population if the block group's percent of minority race/ethnicity persons was equal to or exceeded that of Maryland's state-wide percent (49 percent).

[44] The median household income of $69,850 is based on the HUD 2019 Low-Income Limit for a family of three in the Washington-Arlington-Alexandria, DC-VA, MD Fair Market Rent Area.

Figure 4-3: Environmental Justice Populations Adjacent to the Preferred Alternative LOD



For each Census block group, the demographic index (the combined average of percent minority race/ethnicity and percent low-income households) is formulaically applied to an environmental indicator. The resulting score is the EJ index[45] for a geography for each of the environmental indicators. Definitions of the EPA EJSCREEN demographic and environmental indicators, as well as the 11 heat maps showing the EJ indices for each EPA EJSCREEN[46] environmental indicator, can be found in **SDEIS, Appendix K, pages 2-4** and **15-25**.

The EPA EJSCREEN indexes presented here are percentiles comparing the environmental and demographic characteristics of the Analysis Area block groups[47] to those of all block groups within the State of Maryland. For instance, if a block group has an EJ index score of 86 for the hazardous waste proximity indicator, it means that 14 percent of block groups in Maryland have higher values. The higher the EJ index, the greater the potential for EJ concern.

A table summarizing the comparison of the Study's EJ block groups to EPA EJSCREEN indices for each environmental indicator can be found in **SDEIS Appendix K, pages 5-9**. Results from the review of EPA EJSCREEN data show that eight (8) of the Study's 16 EJ block groups are at or above the 50th percentile for the following EJ Indexes: Hazardous Waste Proximity, National Air Toxics Assessment (NATA)[48], Air Toxics Cancer Risk, NATA Diesel PM, NATA Respiratory Hazard Index, Particulate Matter (PM 2.5), Ozone, Superfund Proximity, and Traffic Proximity and Volume. Additionally, 10 of the Study's 16 EJ block groups are at or above the 50th percentile for the Lead Paint and Proximity to Risk Management Plan (RMP) sites EJ Indexes. Zero of the Study's EJ block groups are at or above the 50th percentile for the Wastewater Discharge Indicator EJ Index.

For all of the EPA EJ Indexes except the Wastewater Discharge Indicator, there are non-EJ block groups that fall at or above the 50th percentile. Out of all the Analysis Area Community block groups, those with the highest EJ Index scores are located in the Gaithersburg Analysis Area Community; one exception is the Wastewater Discharge Indicator, which has the highest EJ Index scores in the Rockville and North Bethesda Analysis Area Communities. This can be seen in 11 heat maps showing the EJ indices for each EPA EJSCREEN environmental indicator, as well as a table with the raw data for each block group, in **SDEIS Appendix K, pages 15-25**.

[45] Per EPA, an EJ Index ultimately measures *disparity*. Within EPA EJSCREEN, *disparity* is the difference between the environmental indicator's average value among minority race and ethnicity persons and low-income households in the block group versus the average values in the state. A higher EJ Index identifies a block group as contributing more toward the state's disparity in the respective environmental indicator category.

[46] See https://www.epa.gov/EJSCREEN/overview-environmental-indicators-EJSCREEN for definition details and explanations of methodology.

[47] Analysis Area block groups are all block groups that are located within one-quarter mile to either side of the Preferred Alternative LOD. There are a total of 66 Analysis Area block groups. Additionally, Analysis Area block groups are also grouped into Analysis Area Communities for ease of reader understanding: the block groups are matched with the municipality or Census-Designated Place in which they are primarily located to form the Analysis Area Communities. Overall, the 66 Analysis Area block groups can be sorted into seven Analysis Area Communities.

[48] The National Air Toxics Assessment, or NATA, is EPA's review of air toxics in the United States based on modeled air quality.

b. Maryland EJSCREEN Data

Influenced by the EPA EJSCREEN mapping tool, Maryland EJSCREEN, developed by the Community Engagement, Environmental Justice, and Health (CEEJH) Laboratory at the University of Maryland (UMD) School of Public Health, also assesses and maps EJ risks for Census tracts in Maryland (https://p1.cgis.umd.edu/ejscreen/). For each tract, the population characteristics (average of sensitive populations and socioeconomic factors) is formulaically applied to a pollution burden indicator (average of exposures and environmental effects). The resulting scores for the various pollution burden indicators are combined into a single overall EJ Score[49] for each tract. Definitions of the MD EJSCREEN population characteristics and pollution burden indicators can be found in **SDEIS, Appendix K, pages 3-4**.[50]

The MD EJSCREEN EJ Scores presented here are percentiles comparing the pollution burden indicators and population characteristics of each Analysis Area tract[51] to those of all tracts within the State of Maryland. For instance, a tract with an EJ Score of 90 is in the 90th percentile, meaning only 10 percent of tracts in Maryland have higher values. The higher the EJ index, the greater the potential for EJ concern. **Figure 4-4** is a heat map showing the overall EJ Score for each of the tracts. The raw data for each tract can be found in **SDEIS, Appendix K, page 8**.

A table summarizing the comparison of the Study's EJ tracts to MD EJSCREEN indices for each environmental indicator can also be found in **SDEIS, Appendix K, page 13-14**. Results from the review of MD EJSCREEN data show that all eight (8) of the Study's EJ tracts fall at or above the 50th percentile for Exposure. Five of the Study's eight (8) EJ tracts fall at or above the 50th percentile for the Overall EJScore, while four (4) EJ tracts fall at or above the 50th percentile for Sensitive Populations. Lastly, three (3) of the Study's eight (8) EJ tracts fall at or above the 50th percentile for both the Environmental Effects and Socioeconomic Factors. All of the indicators, except for Socioeconomic Factors, have non-EJ tracts that fall at or above the 50th percentile. When looking at all 32 of the Analysis Area tracts, Gaithersburg, Rockville, North Bethesda, Bethesda, and Potomac all have some of the highest scores for various indicators.

c. Summary of EJSCREEN Data and Mapping Tools

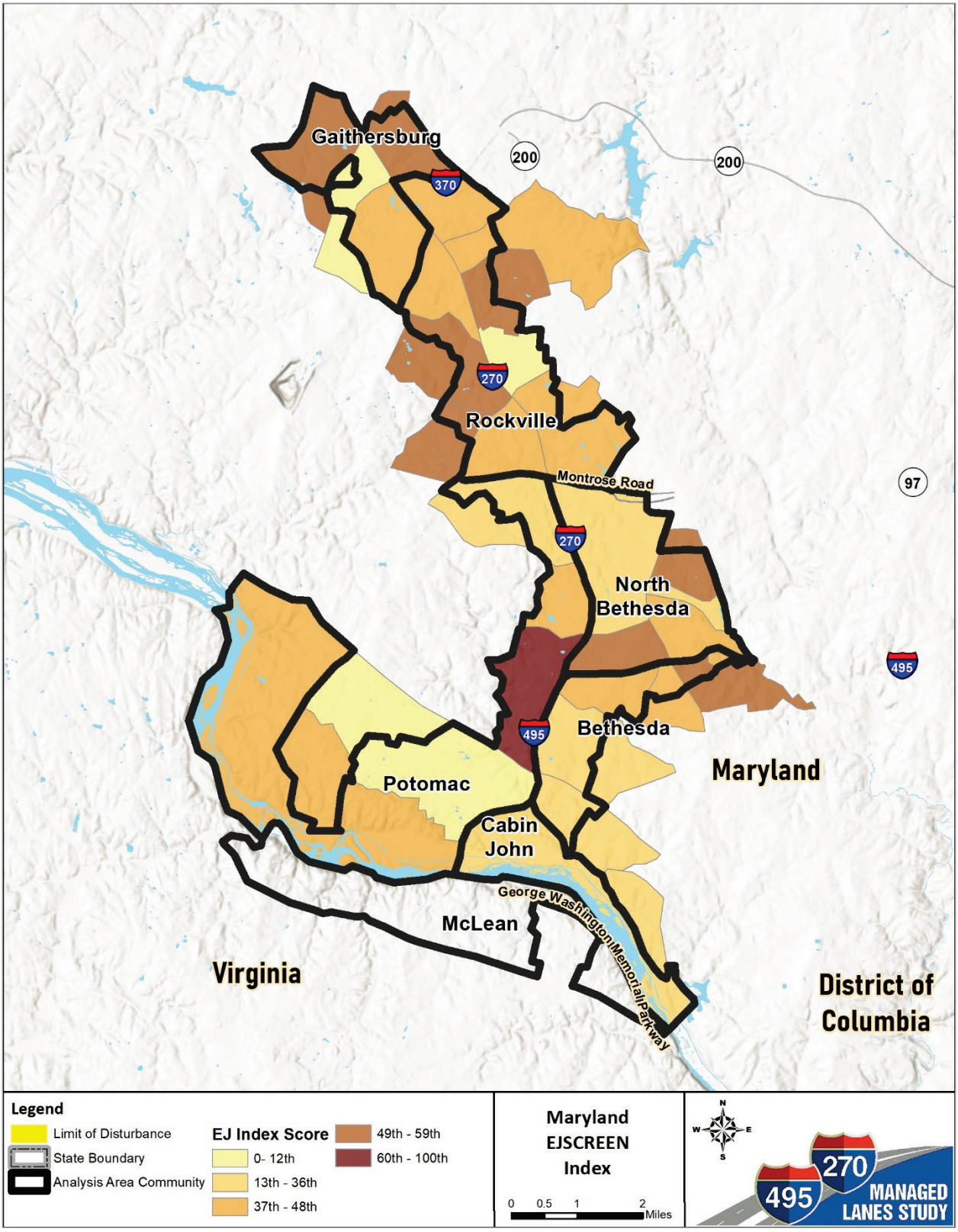
The review of the EPA EJSCREEN and MD EJSCREEN data and mapping tools confirm that the methodology and identification of EJ block groups completed to date for the Study is largely in line with similar assessments completed by outside expert institutions. The EJSCREEN tools also provide an additional layer of nuance by selecting specific, measurable, and common EJ issues faced by EJ-susceptible populations along the study corridors. Mapping is an easily digestible visual of where Analysis Area block groups and communities with higher concentrations of EJ-susceptible populations are located.

[49] See https://p1.cgis.umd.edu/mdejscreen/help.html for definition details and explanations of methodology.

[50] See https://www.epa.gov/EJSCREEN/overview-environmental-indicators-EJSCREEN for a description of each environmental indicator.

[51] MD EJSCREEN data is not available at the block group level, so data presented here is based on Census tracts within which the Analysis Area block groups are located. Note that a tract encompasses a larger area than a block group.

Figure 4-4: Maryland EJSCREEN EJScore for Census Tracts in the Analysis Area



The results of this review, in combination with the Study's formal EJ Analysis, will help inform and guide MDOT SHA and the P3 Developer where public outreach should be focused as mitigation measures and community enhancements are identified both prior to issuance of the ROD and implemented during final design and construction. Information on project mitigation, community enhancements, and outreach to EJ populations will be provided in the FEIS and ROD.

D. Public Outreach to Environmental Justice Populations Since the DEIS

In addition to standard public notifications of the availability of the DEIS and notification of the Public Hearings and associated comment period, MDOT SHA implemented additional notification methods to encourage meaningful involvement by low-income and minority race/ethnicity populations, as well as other traditionally marginalized populations in review of the DEIS and participation in the Public Hearings. These efforts include the following:

- Mailed flyers in English, Spanish, Amharic, and French[52] flyers to approximately 200 affordable housing complexes, schools, and places of worship[53] in the study area. Emailed PDFs of these flyers to the organizations that have email addresses listed online. A cover letter was sent with both forms of distribution.
- Uploaded to the project website the DEIS Executive Summary translated into Spanish, Amharic, and French.
- Provided hard copies of the translated DEIS Executive Summary at the DEIS viewing locations.
- Spanish language advertisements in *El Tiempo Latino*, *Washington Hispanic*, and on eltiempo.com.
- Additional County outreach:
    - Montgomery County News press release;
    - Inclusion in Montgomery County Executive's weekly newsletter;
    - Inclusion in Montgomery County Department of Transportation bi-weekly newsletter and social media posts;
    - Distribution of flyer via Maryland-National Capital Park and Planning Commission (M-NCPPC) Prince George's County Planning email databases;
        - Planning Department listserv with approximately 19,200 email addresses;
        - Community Association listserv with approximately 700 email addresses;
    - Inclusion in Prince George's County social media posts; and
    - Coordination with Prince George's County Faith-Based Advisory Board to distribute information to their ministry listserv with approximately 70 email addresses.
- Additional translation of flyer to Simplified Chinese, Korean, Malayalam, Punjabi, Tagalog, and Yoruba, uploaded to the project website, and distribution of hard copies to groceries largely serving immigrant communities.

[52] Spanish, French, and Amharic are the top primary languages of English for Speakers of Other Languages (ESOL) learners in both counties.

[53] Includes Environmental Justice (EJ)- area schools with above-average participation in the Free and Reduced-price Meals Program; places of worship in EJ areas; and all affordable-housing complexes within the study area.

- ALDI (Beltsville, Lanham)
- Anarkali Bazar (Greenbelt)
- Giant Food (Greenbelt, Largo, Marlow Heights)
- Global International Grocery (Silver Spring)
- Great Wall Supermarket (Rockville)
- Jumbo Food International Supermarket (Temple Hills)
- La Colonia International Supermarket (Camp Springs)
- Las Americas Market (Rockville)
- Latino Market Grocery (Gaithersburg)
- Lidl (District Heights)
- Periyar Asian Grocery (Landover Hills)
- Safeway (Greenbelt)
- Save A Lot (Forestville)
- Shoppers (College Park, Forestville, Largo, New Carrollton)

Since the DEIS publication and in response to comments from the EPA, an EJ Working Group was established to support the EJ analysis and outreach efforts to be conducted for the Study moving forward. Agency members include FHWA, EPA, MDOT SHA, Maryland Department of Planning (MDP), Montgomery County Department of Transportation (MCDOT), M-NCPPC, and Prince George's County Department of Public Works and Transportation (DPW&T). The goals of the EJ Working Group are to:

- Develop potential mitigation measures and identify additional outreach opportunities using federal, state, and local experience;
- Identify potential commitments to EJ/public health mitigation measures related to social/health vulnerability indicators; and
- Identify recommendations for additional engagement opportunities including FEIS notifications and outreach to communities during final design and construction.

Since the DEIS was published, three EJ Working Group meetings have occurred (**Table 4-44**).

Table 4-44: Environmental Justice Working Group Meetings

DATE	AGENDA ITEMS
March 2, 2021	Kick-off Meeting; introductions, goals
April 7, 2021	Data collection to support existing conditions discussion in EJ Analysis; discussion on EJ Public Outreach Plan and future opportunities; mitigation considerations
September 15, 2021	EJ Outreach and Engagement Plan Through SDEIS/FEIS/ROD

Additional Environmental Justice Working Group meetings will be held between publication of this SDEIS and publication of the FEIS. The results of the Working Group will be incorporated into the Study and documented in the FEIS and ROD.

4.21.3 Environmental Consequences

Both beneficial and adverse effects of the Preferred Alternative on identified EJ populations are considered in this EJ Analysis. Typically, potential effects of a proposed action could include physical impacts to private property, including community facility property, as well as physical impacts to existing 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. Applying those categories to the Study's proposed action, the potential effects of the Preferred Alternative between EJ block group and non-EJ block groups is summarized in **Table 4-45**.

Table 4-45: Comparison of Effects to EJ Block Groups Compared to Non-EJ Block Groups

Resource	Impacts to 16 EJ Block Groups	Impacts to 50 Non-EJ Block Groups
Property	• 49 impacted properties • 16.9 total acres of impact	• 452 impacted properties • 99.0 total acres of impact
Community Facilities	• 1 place of worship property	• 4 places of worship properties • 3 school properties • 2 healthcare facility properties • 1 correctional facility property • 1 recreation center property
Demographics	Implementation of the Preferred Alternative would not result in changes to the existing population size or demographic characteristics (age and sex, disability, household income, race and ethnicity, Limited English Proficiency, Free and Reduced Lunch program participation) of the Analysis Area, including the existing population size or demographic characteristics of EJ populations. No property relocations would occur under the Preferred Alternative.	
Traffic	The Preferred Alternative is projected to provide operational benefits to the proposed managed lanes as well as general purpose lanes on the I-495 and I-270 interstate system, plus operational benefits to the surrounding local arterial network. The Preferred Alternative would significantly increase vehicle throughput across the American Legion Bridge and on the southern section of I-270 while reducing congestion. It would also increase speeds, improve reliability, and reduce travel times and delays along the majority of I-495, I-270, and the surrounding roadway network compared to the No Build Alternative. Populations in both EJ block groups and non-EJ block groups would have the opportunity to experience these operational benefits.	
Air Quality	Montgomery County, Maryland and Fairfax County, Virginia are in attainment for all National Ambient Air Quality Standards (NAAQS) for criteria pollutants, with the exception of ozone, for which the counties are in nonattainment. However, because ozone is measured at the regional level and is not a point-source pollutant, air quality impacts associated with ozone would not differ between EJ block groups and non-EJ block groups. Additionally, while the Preferred Alternative is not predicted to increase emission burdens for Mobile Source Air Toxics (MSAT) recent research has been conducted on the benefits of roadside barriers to improve air quality.	

Resource	Impacts to 16 EJ Block Groups	Impacts to 50 Non-EJ Block Groups
	Construction-related air quality impacts of the project would be limited to short-term increased fugitive dust and mobile-source emissions, including carbon monoxide, during construction. Air quality impacts associated with construction would not differ between EJ block groups and non-EJ block groups. To minimize the amount of emissions generated, efforts would be made during construction to limit traffic disruptions, especially during peak travel hours. State and local regulations regarding dust control and other air quality emission reduction controls would be followed.	
Human Health and Safety	See text on Air Quality, above, for a description of anticipated effects to airborne pollution levels in EJ block groups and non-EJ block groups. The Preferred Alternative 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. 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.	
Noise	• 5 noise abatement measures	• 34 of noise abatement measures
Hazardous Materials	• 27 low sites of concern • 4 moderate sites of concern • 2 high sites of concern	• 37 low sites of concern • 56 moderate sites of concern • 9 high sites of concern
Natural Resources	• 105.5 acres of impacts to tree canopy • 0.3 acres of impacts to wetlands • 1.4 acres of impacts to wetland buffers • 7,430.7 linear feet of impacts to waterway	• 401.3 acres of impacts to tree canopy • 4.0 acres of impacts to wetlands • 5.7 acres of impacts to wetland buffers • 39,019.1 linear feet of impacts to waterways
Visual Landscape and Aesthetic Values	The Preferred Alternative would result in changes to viewsheds or visual impacts within the Analysis Area. The construction of managed lanes, shoulders, traffic barriers, cut and fill slopes, stormwater management facilities, retaining walls, and noise walls along the existing corridor would not introduce new elements incompatible with the existing visual character or qualities. Where managed lanes access ramps would be constructed, new interchanges and structures may be introduced that could impact the viewsheds of adjacent properties and communities.	
Economy and Employment	The Preferred Alternative would not result in business relocations and would not impact access to area businesses or employers. There would be no overall impact to the distribution of worker occupation, or major employers within EJ or non-EJ populations within the Analysis Area. Proposed improvements would help address increasing congestion, thereby maintaining mobility throughout the region, including areas with EJ populations.	

Resource	Impacts to 16 EJ Block Groups	Impacts to 50 Non-EJ Block Groups
	Through Opportunity MDOT Program, the agency will provide resources for job seekers and small, minority-, women-, and veteran-owned businesses and disadvantaged businesses to prepare for potential opportunities to work with MDOT and the I-495 & I-270 P3 Program.	
Access and Mobility	Under the Preferred Alternative, 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 would be replaced in-kind, at a minimum. The Preferred Alternative would not eliminate or impede access between residences and community facilities. An incremental enhancement to access may occur due to reduced congestion on local routes, while bus transit systems could utilize the managed lanes on I-495 and I-270. Under the Preferred Alternative, more options for travel with less congestion would be available including toll-free travel for bus transit and High Occupancy Vehicles with three or more passengers (HOV 3+) including carpools and vanpools, in the managed lanes.	
Community Cohesion/Isolation and Quality of Life	The Preferred Alternative would not result in residential or business relocations; however, partial property acquisition would occur throughout the study corridors and would generally include acquiring strips of land from undeveloped areas or areas of trees from properties adjacent to I-495 or I-270, resulting in an overall reduction of property size. These impacts would be limited to the individuals immediately affected, occurring in areas bordering the existing highway right-of-way. Divisions or isolation of properties, persons, or groups would not occur due to the generally parallel nature of the limits of disturbance along the study corridors. Residents and employees who live, work, or utilize services immediately adjacent to the study corridors may experience changes in quality of life from property acquisition or temporarily during construction; however, community residents would experience a benefit to quality of life due to reduced congestion and enhanced trip reliability and travel choices to destination points in the region.	
Tolling Considerations	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 the Preferred Alternative, all existing GP lanes would remain toll-free and would undergo travel time improvements that would benefit all road users. Additionally, under the Preferred Alternative, toll-free travel for bus transit and High Occupancy Vehicles with three or more passengers (HOV 3+) in the managed lanes, including carpools and vanpools, would be provided. Toll rate caps would be set through a public process by the Maryland Transportation Authority, and public notice of toll schedule revisions would be required.	

A final comparison of environmental resource impacts in EJ block groups and non-EJ block groups will be presented in the FEIS. 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.

4.21.4 Mitigation

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 and/or low-income populations. Strategies for mitigating potential adverse effects to EJ populations may consist of, but are not limited to:

- Ongoing public outreach and engagement directly with EJ populations
- 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 analysis area
- No toll for eligible High Occupancy Vehicles with three or more passengers
- Making cross highway pedestrian and bicycle enhancements and connections that have been impacted by the existing interstates.

To ensure equitable access to the managed lanes, MDOT SHA and MDTA are committed to the following:

- Engaging with the EJ populations in advance of implementing the MLS toll program, including education for low-income populations about the tolling program;
- Offering easy access to E-ZPass transponders for all members of the community;
- Accommodating multiple options to replenish transponders using cash, check, credit card or money order by visiting one of MDTA's conveniently located E-ZPass Maryland Customer Service Centers (CSCs). Customers can also drop off check or money order payments 24/7 in designated drop boxes outside CSCs at an MDTA toll facility or mail their check or money order to MDTA.

If no disproportionately high and adverse effects are determined to occur to EJ populations from the Study, MDOT SHA may still consider community enhancements. Mitigation and/or community enhancements to address these impacts or comments are under development in coordination with the Environmental Justice Working Group and will be documented in the FEIS and ROD.

4.22 Indirect and Cumulative Effects

4.22.1 Introduction

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's CEQ implementing regulations. The ICE analysis considers the effects of the proposed action in the context of general trends on population, employment, and general growth 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.

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).

4.22.2 Affected Environment

The ICE Analysis documented in the DEIS in **Chapter 4, Section 4.22** (https://495-270-p3.com/wp-content/uploads/2020/11/2020-06-02_DEIS_04_Environmental.pdf) and **DEIS, Appendix O** (https://495-270-p3.com/wp-content/uploads/2020/07/DEIS_AppO_ICE-Tech-Report_May-2020_web.pdf) presumed potential development of managed lanes in the entire study area, including the shorter limits of the Preferred Alternative - Phase 1 South. The analytical assumptions underlying the indirect and cumulative effects based on the Build Alternatives documented in the DEIS have not changed and remain valid. Because of the reduced Phase I South limits for the Preferred Alternative, as described below, the anticipated indirect and cumulative effects similarly are likely less than those described in the DEIS.

A. Past and Present Land Use

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.

B. Future Land Use

The availability and level of detail for future land use varies depending on the planning 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 Preferred Alternative. An updated review of the county and local master plans will be included with the FEIS.

C. Population, Housing and Employment Growth

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. The population and employment projections will be updated for 2045 in the FEIS using the latest Metropolitan Washington Council of Governments Travel Demand Model (MWCOG model).

4.22.3 Environmental Consequences

The reduced, Phase 1 South limits of the Preferred Alternative would result in a substantial reduction in the ICE analysis footprint, as a result, a reduced potential for indirect and cumulative effects. The following summary provides a broad assessment of the indirect and cumulative effects that are likely to occur with the proposed development of the Preferred Alternative. Refer to **DEIS, Chapter 4, Section 22** and **DEIS, Appendix O, Section 3** for the indirect and cumulative effects analysis of the DEIS Build Alternatives. The final indirect and cumulative effects analysis on the Preferred Alternative will be included in the FEIS.

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.

Roadway improvements, such as those proposed under the Preferred Alternative, can attract commercial or real estate development, or induced growth. The possibility of induced growth in this ICE Analysis Area would be diminished by the context for the proposed action due to the reduced Phase 1 South limits of the Preferred Alternative. On the “top side” of I-495, it was unlikely that the area would have experienced indirect effects, as it is almost entirely built out and/or preserved. For the Prince George’s portion of the MLS study corridors, by contrast, the location of managed lanes access was aimed at supporting growing areas or areas that the county wanted to target grow.

Within the Phase 1 South limits, the ICE Analysis Area includes many mature land uses and developments, with limited unoccupied land for additional development, as well as the long-term presence of the existing highway facilities. Moreover, much of the undeveloped land within the ICE Analysis Area is designated by comprehensive plans for preservation. As a result of these contextual factors, the likelihood of induced commercial or residential development is reduced substantially by the pre-existing built-out environment.

The Preferred Alternative 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.

Indirect impacts to wetlands, wetland buffers and waterways from the Preferred Alternative could result from roadway runoff, sedimentation, changes to hydrology, and 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). 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. Coordination with federal, state and local agencies overseeing water resources in the ICE Analysis Area will continue throughout the Study to determine appropriate mitigation for impacts.

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. The decades of 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.

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. Refer to **DEIS, Chapter 4, Section 22** and **DEIS, Appendix O, Section 3** for the cumulative effects analysis of the DEIS Build Alternatives.

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 Preferred Alternative alone would provide improved access, mobility, and traffic conditions. Combined with the other projects identified in the *Indirect and Cumulative Effects Technical Report* (**DEIS, 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. 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.

4.23 Consequences of Construction

The LOD of the Preferred Alternative accounts for areas needed for construction. The assumed areas for construction access, staging and materials storage are identified on the *Environmental Resource Mapping* (**SDEIS, Appendix D**). Since the DEIS, design and LOD refinements have occurred. The long-term effects and short-term, construction-related effects of the Preferred Alternative have been quantified and documented in this SDEIS. Impacts associated with construction that will be further evaluated for the Preferred Alternative in final design including, 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.

Due to the magnitude of the Study, MDOT SHA acknowledged in the DEIS the need to construct any Build Alternative in phases. Phase 1 South of the P3 Program, construction of the Preferred Alternative 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 separate, independent NEPA study would include I-270 north of I-370 up to I-70.

It is anticipated that construction 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. Construction will require maintenance of traffic throughout the duration of work to minimize the disruption to highway users.

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. MDOT SHA has also been coordinating with NPS and M-NCPPC on visual impacts and mitigation at their park properties. Final mitigation as agreed upon with these agencies will be documented in the FEIS and ROD.

4.23.2 Hazardous Materials

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 Preferred Alternative LOD that have a high potential for mitigation contaminated materials exposed during construction activities (refer to **Section 4.10** for additional details). Proposed investigation for the high concern sites should adequately characterize surficial and subsurface soils, as well as groundwater, if anticipated to be encountered. Sample locations should take into account locations of previous releases, former/current/abandoned storage tanks, and inferred groundwater flow, as well as proposed soil/groundwater disturbance during construction. 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

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 some or all of 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. (Refer to **Section 4.9** for additional details). The Developer would be responsible for developing a construction work sequence that minimizes the duration of time without a noise barrier in place.

Land uses that are sensitive to vehicular noise are also sensitive to construction noise. Despite highway construction being a short-term phenomenon, significant noise impacts can occur. The extent and severity of these impacts depend on the phase of construction and the noise characteristics of construction equipment being used. As with any major construction project, areas around the construction site are likely to experience varied periods and degrees of noise impact. This type of project will likely employ the following equipment, which could be a source of construction noise: bulldozers and earthmovers; front-end loaders; dumps and other diesel trucks; and compressors. Generally, sensitive land uses near construction zones may experience noise levels between 78 dB(A) and 83 dB(A). Maintenance and adjustments to equipment, temporary noise barriers, construction of permanent noise barriers first where possible, variation of construction activity areas, public involvement, and financial incentives to contractors are all mitigation procedures that can decrease temporary noise impacts. During final design, these mitigation measures will be considered to minimize public exposure to short-term noise impacts. Wherever possible, the Developer will be required to construct any proposed noise barrier prior to demolishing the existing sound barrier. This would reduce noise and screen neighborhoods from construction activities. Where a proposed noise barrier cannot be constructed prior to demolishing an existing noise barrier, the Developer will be required to begin construction of the new noise barrier within 60 days of beginning the existing sound barrier demolition; the developer would also be required to continue construction operations of the proposed noise barrier until it is completed. Contract provisions will allow the P3 Developer to salvage and reuse certain sound barrier materials to minimize construction duration. These provisions were added to reduce construction impacts to surrounding properties.

4.24 Commitment of Resources

4.24.1 Irreversible and Irretrievable Commitment of Resources

The construction of the Preferred Alternative 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 the Preferred Alternative would render the land unusable for any other use. Approximately 115.9 acres of land converted to transportation use under the Preferred Alternative, 97.2 acres of permanent and 18.7 temporary impacts (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.

As part of this permanent land alteration, approximately 500 acres of forest canopy (refer to **Section 4.16.3, Table 4-37**), 4.3 acres of wetlands, and 45,779.7 linear feet of streams (refer to **Section 4.12.3, Table 4-25**) have the potential to be affected by the Preferred Alternative. While forest, stream and wetland mitigation would 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 the Preferred Alternative. 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 barriers. Fuel, electricity, and labor required to manufacture, transport, and install these materials would be irretrievably lost. No long-term impacts to construction-related resources are anticipated for the Preferred Alternative.

Since the managed lanes would generate toll revenue, the anticipated construction costs could 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 USC 4332(C)(iv)) and guidelines published by the Council on Environmental Quality 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 the Preferred Alternative would result in short-term impacts, as described in **Chapter 2**, **Section 2.3.4.**

An increase in employment and job opportunities for future permitting and design, construction workers, suppliers, and inspectors would result during construction of the Preferred Alternative. As of the time of this document, more than $3 billion in private infrastructure investment will support economic development and job growth in communities and the region with over 7,500 jobs/year during construction. This 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 increase 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.

B. Long-Term Impacts

The long-term impacts and benefits of the implementation of the Preferred Alternative 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. 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 the Preferred Alternative 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.