4 ENVIRONMENTAL RESOURCES, CONSEQUENCES & MITIGATION

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

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

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

Supporting Technical Reports to the DEIS

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

1.

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

Common terms used throughout this chapter are defined below.

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

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

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

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

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

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

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

Table 4-1: Summary of Quantifiable Impacts by Alternative

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

Notes:

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

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

[3] Refer to Chapter 4, Section 4.7 and Appendix G, Volume 1 for additional details on the effects to historic properties.

[4] Based on current design information, effects cannot be fully determined on these seven historic properties. MDOT SHA will evaluate these properties further as design advances.

[5] Noise receptors are noise-sensitive land uses which include residences, schools, places of worship, and parks, among other uses. Note that these numbers include receptors that do not have an existing noise wall as well as receptors that have an existing noise wall which is expected to be replaced.

4.1 Land Use and Zoning

4.1.1 Introduction and Methodology

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

4.1.2 Affected Environment

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

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

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

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

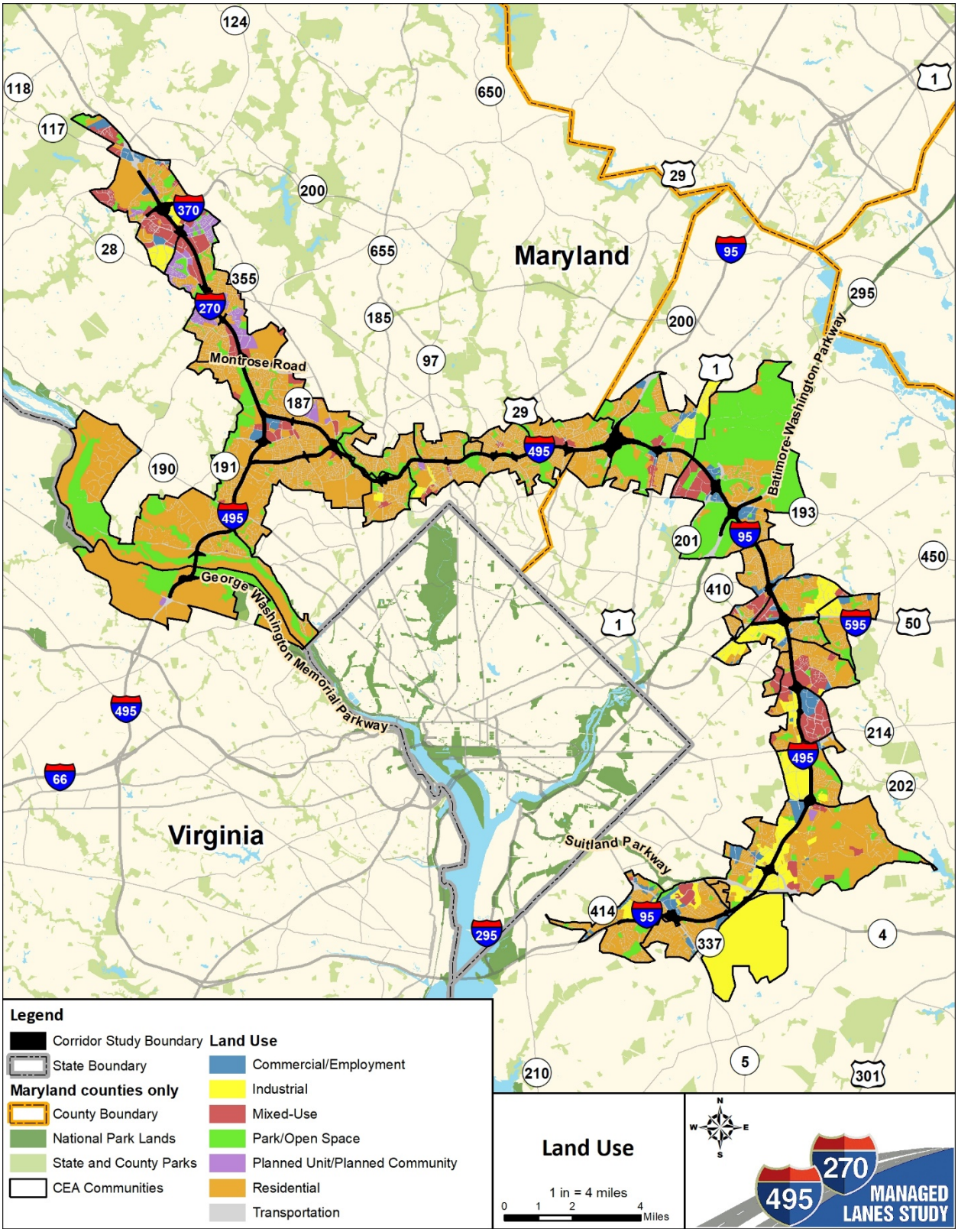
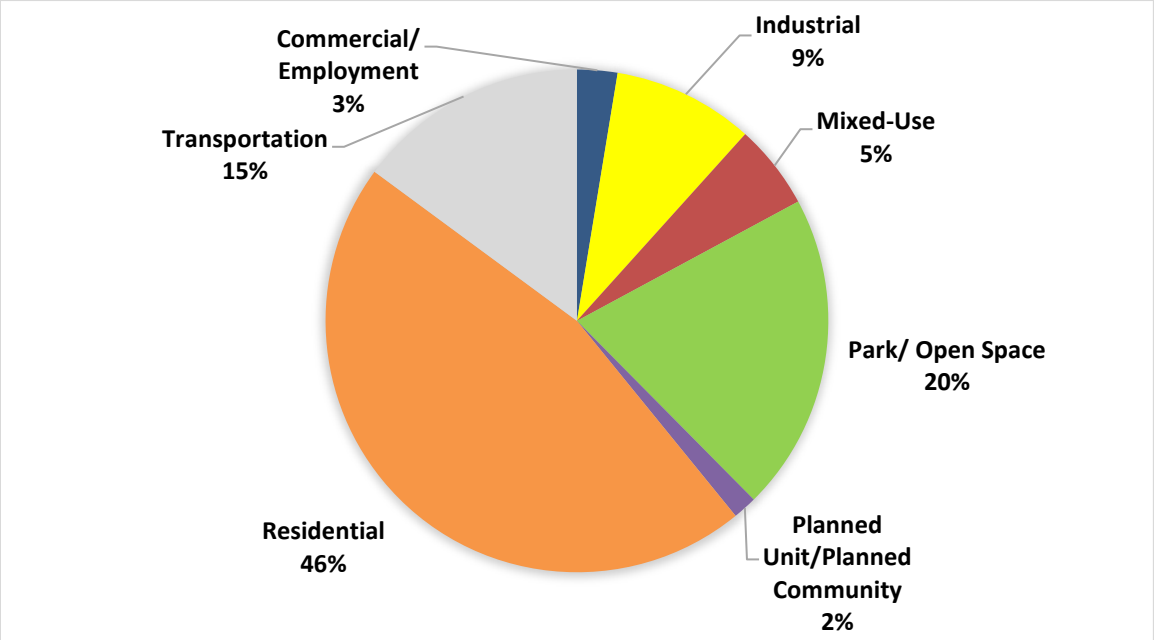


Figure 4-2: CEA Analysis Area Land Use Composition



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

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

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

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

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

4.1.3 Environmental Consequences

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

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

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

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

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

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

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

4.2 Demographics

4.2.1 Introduction and Methodology

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

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

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

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

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

4.2.2 Affected Environment

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

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

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

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

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

4.2.3 Environmental Consequences

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

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

By providing additional roadway capacity through managed lanes, the Build Alternatives, to varying degrees, would accommodate increased traffic and congestion attributed to the projected regional population growth over the 30-year period between 2010 and 2040. The maintained function of I-495 and I-270, access to travel choices, and enhanced trip reliability would maintain the area's desirability for

future economic activity. While the Build Alternatives would have a negligible impact to population growth or general demographics within the CEA Analysis Area, they would be viewed as consistent with approved master plans and population growth projections associated with those plans.

4.3 Communities & Community Facilities

4.3.1 Introduction and Methodology

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

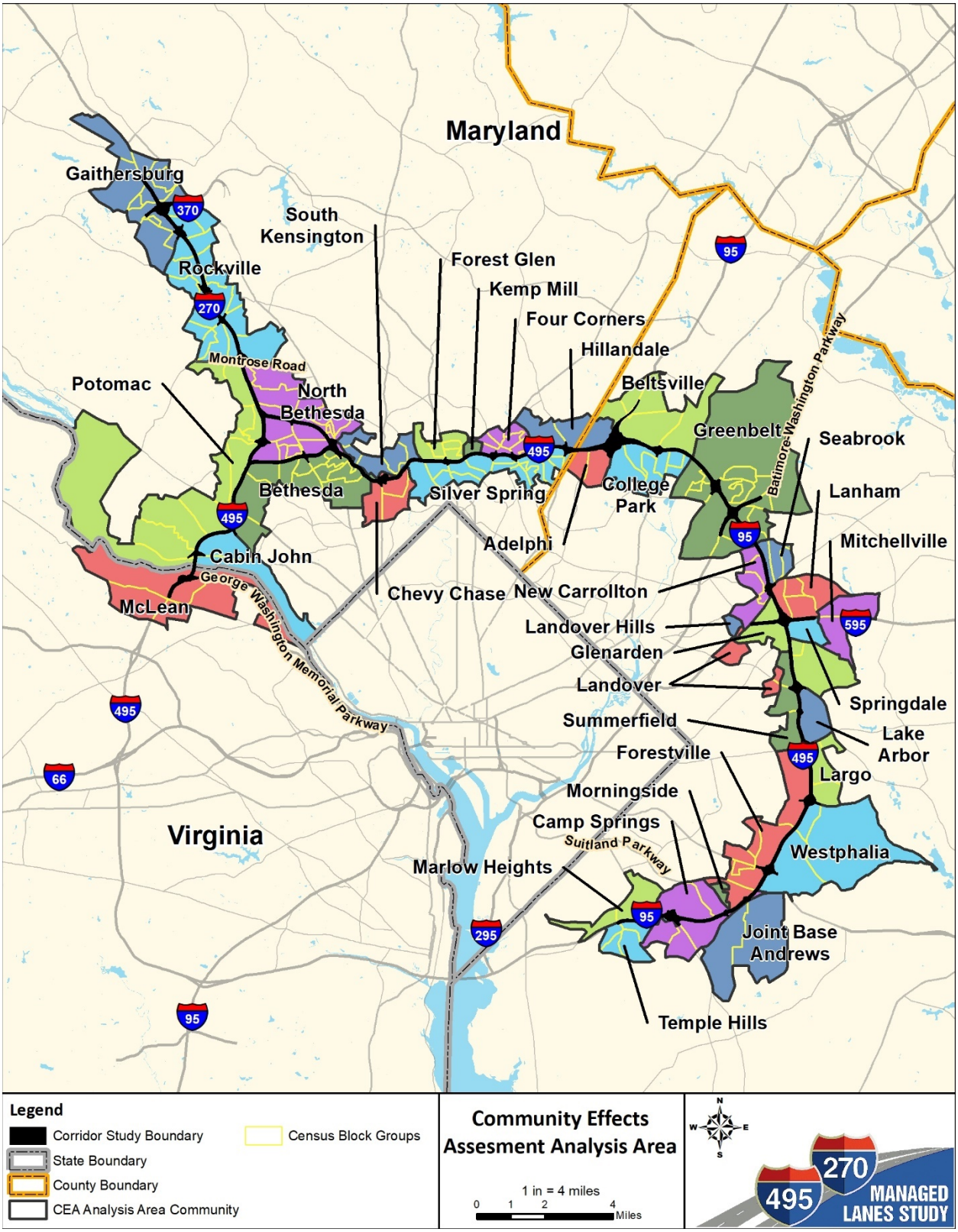
4.3.2 Affected Environment

A. Communities

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

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

Figure 4-3: CEA Analysis Area Communities



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

B. Community Facilities

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

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

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

4.3.3 Environmental Consequences

A. CEA Analysis Area Communities

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

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

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

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

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

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

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

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

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

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

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

Table 4-4: Property Relocations

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

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

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

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

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

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

B. Community Facilities

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

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

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

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

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

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

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

4.3.4 Mitigation

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

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

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

4.4 Parks and Recreational Facilities

4.4.1 Introduction and Methodology

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

4.4.2 Affected Environment

The identification of parks and recreation facilities for the *Community Effects Assessment and Environmental Justice Analysis Technical Report,* **Appendix E, Section 3.5** was completed to account for these properties and facilities within specific CEA Analysis Area Communities. The detailed analysis of individual publicly-owned parks and recreational facilities and potential impacts following the Section 4(f)

of the US Department of Transportation (USDOT) Act of 1966 regulatory framework is provided in the *Draft Section 4(f) Evaluation* (**Appendix F**) and **Chapter 5** of this DEIS.

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

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

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

4.4.3 Environmental Consequences

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

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

Larger areas of property impacts to the George Washington Memorial Parkway, Chesapeake & Ohio Canal Historic Park, Northwest Branch Stream Valley Park, and Baltimore Washington Parkway would be needed to remove and construct a new American Legion Bridge, a new bridge on I-495 over Northwest Branch and provide direct access ramps to the Baltimore Washington Parkway. Location of stormwater management within parks was sited to avoid impacting recreational facilities and sensitive environmental resources and was done in coordination with most of the park owners. Stormwater management was eliminated from NPS property to the maximum extent practicable. At certain locations stormwater management facilities are required on NPS property because there is no other viable location to treat stormwater, such as at the American Legion Bridge and Baltimore Washington Parkway. Coordination with all the park owners will continue as the Study progresses to identify stormwater management

facilities within parks. The detailed analysis and potential impacts to individual publicly-owned parks is represented in **Tables 5-1 through 5-3 in Chapter 5** and in greater detail in the *Draft Section 4(f) Evaluation* (**Appendix F**).

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

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

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

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

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

4.4.4 Mitigation

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

4.5 Property Acquisitions and Relocations

4.5.1 Introduction and Methodology

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

4.5.2 Affected Environment

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

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

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

4.5.3 Environmental Consequences

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

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

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

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

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

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

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

The LODs for the Build Alternatives result in property impacts due to roadway widening to construct additional travel lanes, reconfiguration of interchange ramps, reconstruction of significant bridges and other structures, augmentation and extension of culverts, replacement or extension of existing noise barriers, construction of new noise barriers, and utility relocation that cannot be accommodated within existing right-of-way. Generally, the proposed property acquisition for right-of-way would include acquiring strips of land, or strip takes, from undeveloped areas or areas of trees and landscaping in yards

that back to I-495 or I-270. Acquisition of larger areas would be needed for the accommodation of SWM facilities. The proposed relocations and SWM facilities are shown on the *Environmental Resource Mapping* (**Appendix D**).

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

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

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

4.5.4 Mitigation

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

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

	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Area 1: I-495 west side, south of George Washington Parkway (Appendix D, pgs. 1, 56, 123)						
Number of Existing Properties	0	0	0	0	0	0
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions No impacts to properties adjacent to existing right-of -way	0.0	0.0	0.0	0.0	0.0	0.0
Area 2: I-495 west side, between George Washington Parkway and Clara Barton Parkway (Appendix D, pgs. 1-3, 56-58, 123-125)						
Number of Existing Properties	6	7	7	7	7	7
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to replacement of the American Legion Bridge and access needs at the Potomac River	19.2	19.8	19.8	19.8	19.8	19.8
Area 3: I-495 west side, between Clara Barton Parkway and MD 190 (Appendix D, pgs. 3-5, 58-60, 125-127)						
Number of Existing Properties	54	59	59	59	59	59
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, new SWM facilities, and construction of managed lane direct access ramps	7.9	9.6	9.6	9.6	9.6	9.6
Area 4: I-495 west side, between MD 190 and I-270 west spur (Appendix D, pgs. 1, 56, 123)						
Number of Existing Properties	74	77	77	77	77	77
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, stream relocation and culvert construction along Thomas Branch	9.0	11.3	11.3	11.3	11.3	11.3
Area 5: I-495 top side, between I-270 west spur and MD 187 (Appendix D, pgs. 7, 8, 44, 62, 63, 99, 111, 129, 130, 166, 178, 190, 202)						
Number of Existing Properties	44	90	44	90	90	90
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, new SWM facilities, interchange ramp reconfiguration, and construction of managed lane direct access ramps	8.8	10.2	8.8	10.2	10.2	10.2
Area 20: I-495 east side, between MD 202 and Arena Drive (Appendix D, pgs. 33, 34, 88, 89, 155, 156)						
Number of Existing Properties	10	11	11	11	11	11
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening	0.5	1.0	1.0	1.0	1.0	1.0
Area 21: I-495 east side, between Arena Drive and MD 214 (Appendix D, pgs. 34, 35, 89, 90, 156, 157)						
Number of Existing Properties	15	15	15	15	15	15
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, noise barrier construction, and new SWM facilities	3.9	4.8	4.8	4.8	4.8	4.8
Area 22: I-495 east side, between MD 214 and Ritchie Marlboro Road (Appendix D, pgs. 35, 36, 90, 91, 157, 158)						
Number of Existing Properties	44	57	57	57	57	57
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, noise barrier construction, culvert extension and augmentation, new SWM facilities, and construction of managed lane direct access ramps	9.4	11.2	11.2	11.2	11.2	11.2
Area 23: I-495 east side, between Ritchie Marlboro Road and MD 4 (Appendix D, pgs. 36-39, 91-94, 158-161)						
Number of Existing Properties	36	39	39	39	39	39
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, culvert extension and augmentation, new SWM facilities, interchange ramp reconfiguration, and construction of managed lane direct access ramps	16.4	19.9	19.9	19.9	19.9	19.9
Area 24: I-495 east side, between MD 4 and Forestville Road / MD 337 (Appendix D, pgs. 39, 40, 94, 95, 161, 162)						
Number of Existing Properties	17	24	24	24	24	24
Number of Full Property Acquisitions (Relocations)	0	0	0	0	0	0
Total Acreage of Partial Property Acquisitions Impacts due to roadway widening, bridge replacement, noise barrier construction, culvert extension and augmentation, new SWM facilities, and construction of managed lane direct access ramps	5.1	5.8	5.8	5.8	5.8	5.8

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

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

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

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

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

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

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

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

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

4.6 Visual and Aesthetic Resources

4.6.1 Introduction and Methodology

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

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

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

4.6.2 Affected Environment

A. I-495 Viewshed

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

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

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

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

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

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

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

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

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

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

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

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

B. I-270 Viewshed

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

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

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

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

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

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

4.6.3 Environmental Consequences

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

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

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

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

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

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

4.6.4 Mitigation

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

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

4.7 Historic Architectural and Archaeological Resources

4.7.1 Introduction and Methodology

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

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

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

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

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

C. Section 106 Consultation

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

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

Table 4-8: Section 106 Consulting Parties List

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

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

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

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

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

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

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

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

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

4.7.2 Affected Environment

A. Historic Architectural Resources

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

Table 4-9: Historic Properties within the APE

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

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

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

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

B. Archaeological Resources

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

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

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

Table 4-10: Newly-Identified Eligible Archaeological Resources

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

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

C. Historic Cemeteries

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

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

4.7.3 Environmental Consequences

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

Four Evaluation Criteria for Inclusion in the NRHP

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

A. Historic Architectural Resources

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

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

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

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

Notes: [1] National Park Service-National Capital Parks-East
[2] In a letter dated February 14, 2020 VDHR did not concur with characterizing the resources as an archaeological district and recommends Sites 44FX0374, 44FX0379, 44FX0381 and 44FX0389 individually eligible for listing on the NRHP.

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

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

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

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

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

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

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

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

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

signature acknowledging a finding of *de minimis* impact. The results of ongoing coordination and Section 106 consultation will be documented in the Final Section 4(f).

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

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

a. Baltimore-Washington Parkway

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

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

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

b. Chesapeake and Ohio Canal National Historical Park

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

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

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

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

c. George Washington Memorial Parkway/Clara Barton Parkway

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

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

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

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

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

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

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

d. Glenarden Historic District

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

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

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

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

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

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

e. Greenbelt Park

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

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

The park, significant for its recreational history, would experience some diminishment of setting, due to the visibility and proximity of an enlarged interchange at the Baltimore-Washington Parkway. The property may also experience some temporary diminishment of feeling during construction. The

interchange is uniquely situated in comparison with other properties, in that Greenbelt Park has discontinuous portions bordering two quadrants of the interchange. Features within the park would not be physically affected.

f. Indian Spring Club Estates and Indian Spring Country Club

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

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

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

g. Metropolitan Branch, B&O Railroad

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

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

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

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

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

The CSX railroad and bridge would be realigned to the west of the existing alignment. The realignment of the CSX railroad over I-495 to the west would result in the removal of trees and grading, as well as the construction, operation, and maintenance of the relocated CSX railroad and bridge at the northeastern corner of the property.

The landscape of the National Park Seminary Historic District is an element that contributes to its significance; because the LODs would expand into the existing landscape and convert a portion of the property to highway use, the project would diminish the integrity of design and setting of the historic district.

i. Rock Creek Stream Valley Park, Units 2 and 3

Rock Creek Stream Valley Park (RCSVP), owned by the M-NCPPC and managed by Montgomery County Parks, consists of twelve units totaling approximately 1,832 acres. Units 2 and 3 of RCSVP follow the course of Rock Creek from East-West Highway on the south to the former B&O Railroad Stone Arch Viaduct on the north. The primary resource in Units 2 and 3 of RCSVP is the protected landscape of the Rock Creek valley which follows a serpentine path from north to south, and ultimately leads to the Potomac River. The landscape varies from wooded areas with steep slopes to grassy meadows along the creek. Other contributing resources include Beach Drive, the Rock Creek Hiker-Biker Trail, several bridges, as well as two stone culverts, playgrounds, picnic areas and other recreational resources.

The Rock Creek Stream Valley Park, Units 2 and 3, comprise a property eligible for the NRHP under Criterion A. The property would be adversely affected. Within the historic property, MDOT SHA has identified the need for a small, linear stormwater management facility east of the ramp from the outer loop of I-495 to northbound MD 355. This facility would require ground disturbance and the removal of trees from within this area of Unit 3 of Rock Creek Stream Valley Park. The repair and improvement, replacement, or augmentation of existing storm drain and stream conveyance pipes that traverse I-495 would require impacts to small, rectangular areas of the property, including ground disturbance and the removal of vegetation. At Unit 2, the LODs are concentrated along the I-495 outer loop, southwest of Jones Mill Road, consisting of the wooded area between the Rock Creek stream bank and I-495. Access to

the Rock Creek Trail, which runs along the north side of I-495 through the corridor, would be maintained during construction with limited interruption.

A portion of the park would be converted to transportation use and/or associated stormwater management use, permanently diminishing integrity of design, materials, and setting of the property. Construction impacts may also temporarily diminish the integrity of setting and feeling of the property.

j. Sligo Creek Parkway

Sligo Creek Parkway is a linear park within the National Capital Parkway System that provides a scenic transportation link between residential suburbs and neighboring metropolitan areas. Located in a stream valley, the primary feature of the Parkway is an undivided two-lane road with associated bridges, culverts, drainage features, safety devices, and signage. Other important features of Sligo Creek Parkway include pedestrian trails with associated bridges, recreation areas and playgrounds, picnic areas, parking areas, native and ornamental plantings, a monument, and scenic viewpoints focused on Sligo Creek. The eligible portion of the Parkway is approximately five miles long with an average right-of-way 300 feet wide, comprising approximately 364 acres.

Sligo Creek Parkway is eligible under criteria A and C and would be adversely affected. Activities include widening along I-495; augmenting an existing culvert beneath I-495, and the construction, operation, and maintenance of a stormwater management facility. The LODs for the Build Alternatives are concentrated at three locations: a narrow area extending approximately 1400 linear feet along the I-495 outer loop; a narrow area extending approximately 2,300 feet along the I-495 inner loop; and an oblong shape at the northeast corner of the Sligo Creek Golf Course. Work within the historic boundary includes tree removal; grading; bridge replacement; movement of construction vehicles and materials; and the construction, operation and maintenance of a stormwater management facility. The area of impact along the I-495 inner loop would require the relocation of two tee boxes parallel to their current distance from the hole in order to maintain play at the Sligo Creek Golf Course, a contributing resource within the parkway. A stormwater management facility on the golf course is necessary at this location owing to limited available space for the treatment of stormwater along this portion of I-495. Access to Sligo Creek Trail, another contributing resource, would be restricted during the bridge replacement at a construction laydown area on the north side of the outer loop and northwest of the trail.

A portion of the park would be converted to transportation use and/or associated stormwater management use, resulting in a minor loss of integrity of design, materials, and workmanship of a portion of the property. Construction impacts may also temporarily diminish the integrity of setting, feeling, and association of the property.

B. Archaeological Resources

The effects assessment anticipates the Study would have an adverse effect on all NRHP-eligible archaeological resources located within the LODs of Alternatives 8, 9, 9M, 10, 13B and 13C. Archaeological resources outside these LODs would not be affected and no additional investigations to determine eligibility would be conducted for those sites outside the LODs. MDOT SHA finds three archaeological properties are adversely affected: two archaeological sites in Maryland and the proposed Archaeological District in Virginia listed in **Table 4-14**. One previously identified archaeological property was determined eligible for the NRHP within the APE: 18PR94 (Indian Creek V site). This site was previously mitigated and largely destroyed by the construction of a Washington Metropolitan Area Transit Authority (WMATA)

facility. The Study would have no adverse effect to Indian Creek V site. Some additional archaeological investigations would be required within the APE to determine the presence of archaeological sites and/or National Register eligibility of sites, as discussed in *Volume 4* of the *Cultural Resources Technical Report* (**Appendix G**). In a letter dated March 12, 2020, MHT concurred with the eligibility and effects determination as well as the need for further Phase I and II archaeological investigation in the specified areas to which access was denied.

In a letter dated March 12, 2020, MHT concurred with the eligibility and effects determination in Maryland as well as the need for further Phase I and II archaeological investigation in the specified areas to which access was denied.

Table 4-14: Archaeological Resources with a Known Adverse Effect

State	MIHP#/ VDHR#	Jurisdiction	Name	Period of Significance	NRHP Criteria	Nature of Adverse Effect
MD	18MO749	NPS/ CHOH	C&O Canal Site 1	Early Woodland	D	The site will be partially or completely destroyed or significantly diminished in all aspects of integrity
MD	18MO751	NPS/ CHOH	C&O Canal Site 3	1828-1924	D	The site will be partially or completely destroyed or significantly diminished in all aspects of integrity
VA	(N/A)	NPS/ GWMP	Dead Run Ridges Archaeological District[2]	Late Archaic-Woodland	D	Portions of individual sites within the district would likely be destroyed, and the district would likely be diminished in all aspects of integrity

a. C&O Canal Site 1 (18MO749)

Located in the Chesapeake and Ohio Canal National Historical Park, Site 18MO749 is an Early Woodland period precontact archaeological site eligible under criterion D. Because the site is within the LODs for the Build Alternatives, the site would likely be partially or completely destroyed or significantly diminished in all aspects of integrity by construction of the project.

b. C&O Canal Site 3 (18MO751)

Situated in the Chesapeake and Ohio Canal National Historical Park Site 18MO751 is a historic period (circa 1828-1924) archaeological site eligible under criteria A, C and D. Because the site is within the LODs for the Build Alternatives, the site would likely be partially or completely destroyed or significantly diminished in all aspects of integrity by construction of the project.

c. Dead Run Ridges Archaeological District

MDOT SHA evaluated a number of recorded precontact archaeological sites within the George Washington Memorial Parkway property in Virginia. MDOT SHA has determined that the majority of the investigated sites together constitute a NRHP-eligible archaeological district of related resources. Contributing sites or possible contributing sites within the proposed district boundary and inside the project LOD include 44FX0373, 44FX0374, 44FX0379, 44FX0381, and 44FX0389. Sites 44FX3160 and 44FX3900 were investigated and found neither individually eligible nor, in the case of 44FX3160,

contributing to the district (44FX3900 is not part of the defined District). Because the district is partially within the LODs for the Build Alternatives, portions of individual sites within the district would likely be destroyed, and the district would likely be diminished in all aspects of integrity by construction of the project.

In their letter dated February 14, 2020, VDHR did not concur with characterizing the resources as an archaeological district and recommends four of the five sites individually eligible for listing on the NRHP (Sites 44FX0374, 44FX0379, 44FX0381 and 44FX0389). MDOT SHA, NPS and VDHR are continuing consultation on eligibility, treatment, and effects determinations regarding these resources.

C. Historic Cemeteries

The parcels containing the likely location of the Montgomery County Poor Farm Cemetery and the Moses Hall Cemetery would be impacted by the LODs for the Build Alternatives. The boundaries of historic cemeteries have not been fully delineated and there is potential that an unknown number of interments are located within the LODs. Additional investigations through both engineering design and historic research (archival and oral history), including potential non-intrusive and intrusive archaeological fieldwork to avoid and minimize the 0.3 acres of impact as currently designed. In their letter dated March 12, 2020, MHT agreed that further consultation and coordination are needed to address the identification and treatment of cemeteries that may be impacted by the undertaking. MDOT SHA is continuing to evaluate both resources to the extent practicable through documentary and non-invasive research to obtain additional information that will inform treatment under the PA.

4.7.4 Mitigation

A. Section 106 Programmatic Agreement

Due to the complexity and wide scope of the Study, and because the full extent of effects to historic properties is uncertain due to the preliminary state of design, MDOT SHA expects the Section 106 process would conclude through the execution of a PA, as described at 36 CFR Part 800.14[b]. Therefore, FHWA notified the ACHP of this anticipated PA in March 2018, and ACHP stated in May 2018 their participation in consultation for this undertaking (36 CFR Part 800.6[a][1][iii]). The PA Annotated Outline, in **Appendix H**, will provide for the continued assessment of effects and resolution of adverse effects to known historic properties. It is also expected to provide protocols for additional consultation, historic properties identification, effects assessment, and adverse effects resolution as design advances. MDOT SHA will oversee implementation of the PA as the project continues following the anticipated Record of Decision. Additionally, the Study will have mitigation development needs for stream, wetland, and other environmental impacts should a Build Alternative be selected. Consideration of the impacts to any historic properties at the selected mitigation sites is also required and MDOT SHA will include procedures to evaluate and assess effects to cultural resources for these sites and other expansions or revisions to the APE in the PA.

In January of 2020, the consulting parties were provided the *Cultural Resources Technical Report* (**Appendix G**) for their review and comment. Since March of 2020, in response to consulting party comments, including the State Historic Preservation Offices (SHPOs) of Maryland (MHT and VDHR), MDOT SHA and FHWA have identified several technical next steps that require resolution prior to the FEIS that are necessary for advancing the Programmatic Agreement. These steps include:

- **Revision of the Area of Potential Effects (APE):** to include stream and wetland mitigation sites being submitted as part of the Joint Permit Application. Because these proposed locations have now been identified, as part of the undertaking they require additional inventory and evaluation effort for historic properties including archaeological evaluation.

- **Revise Effect Determinations for "Historic Properties Where Effects Cannot Be Fully Determined"**: As discussed in **Section 4.7.3.A**, sufficient information is now available to revise effect determinations for the properties listed as "properties where effects cannot be fully determined" in the January 2020 *Cultural Resources Technical Report* (**Appendix G**) and **Table 4-13.** MDOT SHA will provide revised effect determinations for these properties.

- **Eligibility Determination and further coordination regarding Moses Hall and Cemetery**: Multiple consulting parties provided additional information regarding the Moses Hall and Cemetery, also known as the Morningstar Tabernacle No. 88, in Cabin John. In response, MDOT SHA has conducted additional field work and documentary research and believes sufficient information is available to make an eligibility determination on this property and evaluate effects as a historic property. MDOT SHA will complete a determination of eligibility and effect for this property in consultation with MHT and consulting parties, and continue consultation regarding avoidance, minimization, and treatment of the resource, including potential burials within the LOD.

- **Additional historic property evaluations:** MDOT SHA has identified an additional resource in Maryland requiring an eligibility determination (Forest Glen Tower) and new information regarding the segment of the Metropolitan Branch of the B&O Railroad historic property within the APE. MDOT SHA will submit new and revised documentation on these resources to MHT and consulting parties.

- **Continued consultation:** with NPS and VDHR regarding archaeological resources within the George Washington Memorial Parkway. VDHR did not concur with MDOT SHA's finding of an eligible archaeological district within the George Washington Memorial Parkway; instead recommending treating individual sites as eligible or ineligible for the National Register of Historic Places. On April 28, 2020, the National Park Service (NPS) requested additional information from VDHR via letter and noted that NPS found that the archaeological district was valid. MDOT SHA will continue consultation with NPS and VDHR to finalize how these resources are characterized to finalize eligibility and effect findings, and document the resolution of the consultation.

MDOT SHA intends to provide the above information to SHPOs and consulting parties in the spring of 2020, and advance PA development with consulting parties including a draft document and consulting party meeting in the summer of 2020. MDOT SHA anticipates at least two drafts of the PA may be necessary prior to finalizing the agreement for signature. It is anticipated that the first draft will be developed with the consulting parties in the late summer of 2020 with the second draft to follow in the fall or early winter of 2020 with a goal of having a signature ready Programmatic Agreement in Winter 2020 or early 2021, prior to the completion of the FEIS.

B. Historic Architectural Resources

MDOT SHA will conduct consultation to identify mitigation to include in the PA for properties that would experience an adverse effect under any of the Build Alternatives, and where design cannot be adjusted to avoid adverse effects. Typical Section 106 mitigation for architectural resources could include, but is not limited to, elements such as: context-sensitive design, creation of interpretive materials, documentation, or property-specific initiatives. However, specific mitigation for the Study would be determined through the consultation process. Identified mitigation must be reasonable, feasible, and commensurate with the impact to the resource(s).

For historic properties for which the effects are unknown, MDOT SHA will treat these resources under the PA for the Study to evaluate effects, and continue to avoid, minimize, or mitigate such effects as design advances.

C. Archaeological Resources

For the NRHP-eligible archaeological resources located within the LODs of the Build Alternatives, the Section 106 consultation process will continue to assess anticipated effects and efforts to avoid, minimize, or mitigate such effects. MDOT SHA will record the terms and conditions in the PA agreed upon to resolve adverse effects to these archaeological resources. Typical Section 106 mitigation for unavoidable adverse effects to archaeological resources can include, but not be limited to efforts including recovery of archaeological data through excavation, reporting, and public interpretation of archaeological results. However, specific mitigation for the Study would be determined through the consultation process. Identified mitigation must be reasonable, feasible, and commensurate with the impact to the resource(s).

For previously identified archaeological sites within the LODs of the Build Alternatives that require additional evaluation to determine eligibility for the NRHP, MDOT SHA would include commitments in the PA for phased evaluation of these sites, in addition to additional evaluation of areas inaccessible in the initial Phase I survey, or where additional investigations such as deep testing has been recommended. The PA would also include provisions for avoidance, minimization, or mitigation of adverse effects should any of these resources, or newly identified resources be determined NRHP-eligible.

D. Historic Cemeteries

The two cemeteries within the LODs of the Build Alternatives, the Moses Hall Cemetery and the Montgomery County Poor Farm Cemetery, will be subject to additional investigation prior to the PA, with more delineation, evaluation and treatment expected under the PA, including consulting parties and any identified descendants. MDOT SHA will work to avoid or minimize impacts and coordinate with affected communities on treatment of human remains may exist regardless of NRHP eligibility. The PA will document how adverse effects will be addressed, mitigation commitments, and procedures for both marked and unmarked Human Remains in compliance with state and federal regulations. Upon further investigations, if these cemeteries are found to have integrity and also meet the criteria for the NRHP, MDOT SHA will make eligibility determinations and conduct additional Section 106 review, evaluation, and treatment as part of the PA.

4.8 Air Quality

4.8.1 Introduction and Methodology

The Clean Air Act and Amendments (CAA) is the overarching statute regulating air quality in the US. The CAA requires the EPA to set standards for air pollutants, approve state plans, and enforce deadlines for reducing air pollution, among many other responsibilities. EPA's transportation conformity rule (40 CFR Part 93) provides the criteria and procedures for implementing the transportation conformity provisions of the CAA. Because the area in which the Study is located is designated as nonattainment for ozone, Federal conformity requirements, including 40 CFR 93.114 and 40 CFR 93.115 are applicable. Accordingly, there must be a currently conforming transportation plan and program at the time of project approval, and the project must come from a conforming plan and program (or otherwise meet criteria specified in 40 CFR 93.109(b)). The Study is currently included in the National Capital Region Transportation Planning Board (NCRTPB) FY 2019 – 2024 Transportation Improvement Program (TIP) [TIP ID 6432 and Agency ID AW0731 (planning activities)] and the NCRTPB Visualize 2045 Long-Range Plan and accompanying Air Quality Conformity Analysis (CEID 1182, CEID 3281, and Appendix B page 56).

As required by the CAA, EPA sets the National Ambient Air Quality Standards (NAAQS) for airborne pollutants that have adverse impacts on human health and the environment, referred to as criteria pollutants. The criteria pollutants are carbon monoxide (CO), sulfur dioxide (SO_2), ozone (O_3), particulate matter ($PM_{2.5}$ and PM_{10}), nitrogen dioxide (NO_2), and lead (Pb). In addition to the criteria pollutants for which there are NAAQS, EPA also regulates Mobile Source Air Toxics (MSATs). The nine priority MSATs are: benzene, 1,3-butadiene, formaldehyde, acrolein, acetaldehyde, diesel particulate matter, ethylbenzene, naphthalene, and polycyclic organic matter. Greenhouse gases (GHGs) are another pollutant monitored by EPA. The primary GHGs in the Earth's atmosphere are Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), and Fluorinated Gases. A summary of the methodologies for assessing the pollutants within the *Air Quality Technical Report* (**Appendix I**) is provided below.

What is Transportation Conformity?

Transportation conformity is required by the Clean Air Act (42 U.S.C. 7506(c)) to ensure that Federal funding and approval are given to highway and transit projects that are consistent with air quality goals established by a state air quality implementation plan.

Conformity means that transportation activities will not cause or contribute to new violations of air quality standards or delay the attainment of national ambient air quality standards.

NEPA guidelines issued by the USDOT outline federal requirements for air quality analyses for transportation projects. Where applicable, other requirements derive from the Federal transportation conformity rule (40 CFR Parts 50 and 93). NEPA guidance for air quality analyses for transportation projects is found on the FHWA Office of Planning, Environment, & Reality website.[10]

FHWA's 1987 Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* provides general guidance for project-level air quality analyses.[11] That guidance focuses on carbon monoxide. FHWA provides separate guidance on MSATs.[12]

[10] http://www.fhwa.dot.gov/environment/index.cfm

[11] https://www.environment.fhwa.dot.gov/projdev/impTA6640.asp

[12] FHWA, "INFORMATION: Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents", October 18, 2016. See: http://www.fhwa.dot.gov/environment/air_quality/air_toxics/

The Air Quality Analysis Study Area (i.e., Montgomery County, Prince George's County, and Fairfax County) is in an attainment area for fine particulate matter ($PM_{2.5}$), therefore, transportation conformity requirements pertaining to $PM_{2.5}$ do not apply for this Project[13] and no further analysis of $PM_{2.5}$ emissions were evaluated per FHWA guidance.[14]

The Study is located in a region where the maintenance period for CO has expired and the CO NAAQS no longer apply, (**Section 4.8.2**) and the EPA project-level ("hot-spot") transportation conformity requirements do not apply. However, CO is highlighted in the FHWA 1987 guidance as a transportation pollutant to be summarized in an EIS. Therefore, potential impacts for CO were analyzed for the nearby intersections and interchanges that might be impacted by the Study. The methodologies and assumptions applied for the analysis are consistent with FHWA[15] and EPA guidance.[16,17] Air quality modeling was performed using MOVES emission factors, VISSIM traffic data, and the CAL3QHC Version 2.0 dispersion model. CO concentrations were estimated for the No Build Alternative and the Build Alternatives at worst-case intersections throughout the study corridors. The intersections were summarized by worst-case peak AM or PM volumes and level of service (LOS)[18] for all Build Alternatives for opening and design year conditions. The signalized intersections were ranked by LOS and the higher of the AM or PM peak hourly-ranked volumes were summarized for each of the Build Alternatives. Refer to the Air Quality Technical Report (**Appendix I**, **Chapter 3, Section 3.2.1**) for additional information on the traffic analysis supporting the air quality analysis.

The top three ranked intersections for high volume and low LOS for each Build Alternative for Opening Year (2025) and Design Year (2040) were chosen for dispersion modeling consistent with the November 1992 EPA Guidance. The worst-case modeling was conducted using EPA models (MOVES2014b and CAL3QHC) and worst-case assumptions including peak hour AM and PM traffic volumes, meteorology, and receptor locations on the right-of-way edge, which together result in worst-case estimates for near-road concentrations.

The Study is best characterized as one with "higher potential MSATs effects" since the projected 2040 Design Year traffic is expected to reach or exceed the 140,000 to 150,000 annual average daily traffic (AADT) criteria. A quantitative MSATs analysis was conducted consistent with the latest guidance including the 2016 FHWA Interim Guidance and the Frequently Asked Questions (FAQ) Conducting Quantitative MSATs Analysis for FHWA NEPA Documents.[19] The affected network for the MSATs analysis was identified using the Regional Travel Demand Forecast Metropolitan Washington Council of Governments (MWCOG) Regional Travel Demand Model for each Build Alternative and 2025 and 2040

[13] For background, the EPA issued a final rule (81 FR 58010), effective October 24, 2016, on "Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements" that stated, in part: "Additionally, in this document the EPA is revoking the 1997 primary annual standard for areas designated as attainment for that standard because the EPA revised the primary annual standard in 2012." (See: https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf). Accordingly, Fairfax County is no longer designated as maintenance for $PM_{2.5}$, and the associated USEPA regulatory requirements for conformity for $PM_{2.5}$ are eliminated for northern Virginia

[14] Guidance for Preparing and Processing Environmental and Section 4(f) Documents October 30, 1987. https://www.environment.fhwa.dot.gov/projdev/impTA6640.asp

[15] https://www.environment.fhwa.dot.gov/projdev/impTA6640.asp

[16] https://www3.epa.gov/scram001/guidance/guide/coguide.pdf

[17] https://nepis.epa.gov/Exe/ZyPdf.cgi?Dockey=P100M2FB.pdf

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

[19] https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/moves_msat_faq.cfm

analysis years. The Affected Network was determined using the Regional Travel Demand Forecast MWCOG Regional Travel Demand Model as a base for each alternative and analysis year within the study area along with FHWA suggested criteria for evaluating segment links outside of the study area where general meaningful changes in emissions could occur as a result of the Build Alternatives.

Greenhouse Gases (GHGs) are generated through burning fossil fuels and other human activities. Carbon dioxide (CO_2) is the largest component of GHG emissions; other prominent emissions include methane (CH_4), nitrous oxide (N_2O), and hydrofluorocarbons (HFCs). These emissions are different from criteria air pollutants since their effects in the atmosphere are global rather than localized, and also since they remain in the atmosphere for decades to centuries. Greenhouse gas emissions from vehicles using roadways are a function of distance traveled (expressed as vehicle miles traveled (VMT)), vehicle speed, and road grade. VMT derived from the MSATs affected network for each alternative was used to characterize the VMT changes for the GHG discussions as the links identified in the affected network include only roadway links that could significantly impact the study corridors and excludes roadway links not affected by the Build Alternatives. GHG emissions are also generated during roadway construction and maintenance activities.

4.8.2 Affected Environment

Maryland Department of the Environment's (MDE) Air and Radiation Management Administration is responsible for implementing and enforcing regulations to ensure that the air Maryland citizens breathe is clean and healthful. One of their functions is to operate a statewide network of air quality monitors that continuously measure air quality. This data is made available through the EPA's AirData website[20]. A review of data provided for the most recent three years (2016-2018) at the monitoring stations nearest the study corridors are used to describe the existing ambient air quality in the study area and are presented for CO, $PM_{2.5}$, and ozone, respectively, in the *Air Quality Technical Report* (**Appendix I, Chapter 2, Section 2.2**). Review of this data shows that the measured ambient air concentrations on CO and $PM_{2.5}$ closest to the study corridors were well below the corresponding NAAQS. Several of the monitor locations had ozone concentrations that exceeded the 2015 8-hour ozone standard.

The Study is located in Montgomery County and Prince George's County, Maryland as well as a small area in Fairfax County, Virginia. The EPA Green Book[21] lists these counties as attainment for all NAAQS with the exception of the 2015 8-hour ozone standard,[22] for which the counties are nonattainment. The EPA recently redesignated the area to maintenance/attainment for the 2008 8-hour ozone standard.[23] The 2015 Ozone NAAQS (0.070ppm) are more stringent than the 2008 NAAQS (0.075ppm). Maryland, Virginia and the District of Columbia submitted maintenance plans to EPA that demonstrated maintenance of the 2008 ozone NAAQS through 2030 and therefore their request to be redesignated to maintenance/attainment of those NAAQS was granted by EPA in April 2019. The measured ambient air concentrations closest to the study area were all well below the corresponding NAAQS, except for the exceedance of the 2015 8-hour ozone standard recorded at all the monitor locations.

[20] https://www.epa.gov/outdoor-air-quality-data/monitor-values-report
[21] https://www.epa.gov/green-book
[22] These counties were redesignated to attainment of the 2008 ozone NAAQS, effective May 15, 2019 (See: https://www.federalregister.gov/documents/2019/04/15/2019-06128/air-plan-approval-district-of-columbia-maryland-and-virginia-maryland-and-virginia-redesignation).
[23] https://www.federalregister.gov/documents/2019/04/15/2019-06128/air-plan-approval-district-of-columbia-maryland-and-virginia-maryland-and-virginia-redesignation

The Maryland counties were redesignated from a nonattainment area to attainment and entered a 20-year maintenance period for CO in March 1996. The area was considered a maintenance area for the 20 years following until March 2016 when the counties completed the maintenance period. Since the Maryland counties have completed the maintenance period, transportation conformity no longer applies for CO. The study corridor is an attainment area for fine $PM_{2.5}$.[24] Similarly, Fairfax County is designated attainment for CO, and is also considered attainment for the 1997 fine particulate matter per the EPA 2016 ruling.

4.8.3 Environmental Consequences

The No Build Alternative would not result in a reduction in VMT compared to existing conditions nor would it result in the congestion-relief that would result from the implementation of the Build Alternatives; therefore, improvements in air quality are not anticipated. The results of the 1-hour and 8-hour CO hot-spot analysis for the worst-case interchange and intersection locations conservatively assumed worst-case conditions, overestimating the emissions results for each alternative. Results indicate that the modeled worst-case CO concentrations for all alternatives remain well below the CO NAAQS at all receptor locations for each interchange and intersection location. These results demonstrate that the worst-case interchanges and intersections for each Build Alternative and the No Build Alternative, using very conservative assumptions, would not cause or contribute to a violation of the CO NAAQS within the study corridor. Typically, the worst case ranked intersection and interchanges would be modeled individually for comparison to the NAAQS in order to evaluate CO impacts for each Alternative. As shown in *Tables 3-29 and 3-30* of the *Air Quality Technical Report* (**Appendix I**), CO emission factors are expected to decline over time due to improved fuel quality and continued fleet turnover to vehicles built with more stringent exhaust emission standards for CO. Therefore, future CO impacts from the Build Alternatives are not expected to exceed the NAAQS and existing CO concentrations at worst case intersection and interchanges are expected to be higher than those for 2025 and 2040. Because of these factors and in an effort to streamline the CO analysis, a screening analysis was conducted assuming a worst case modeling approach for interchanges and intersections to address CO impacts to cover all the alternatives in lieu of separate alternative results since CO concentrations are expected to be below the NAAQS.

In general, all of the MSATs emissions are expected to increase slightly for the Build Alternative conditions when compared to the No Build condition for 2025 (Opening Year). MSATs emissions are expected to remain the same or slightly decrease for all Build Alternatives when compared to the No Build condition for 2040. In addition, all MSATs pollutant emissions are expected to significantly decline in the Opening Year (2025) and Design Year (2040) when compared to existing conditions. These reductions occur despite projected increase in VMT from 2016 to the 2025 and 2040 build scenarios. Information is currently incomplete or unavailable to credibly predict the study-specific health impacts due to changes in MSAT emissions associated with each of the alternatives. Under each of the Build Alternatives, there may be slightly higher or lower MSATs emissions in the design year relative to the No Build Alternative due to increased VMT or increased vehicle speeds. There could also be increases in MSATs levels in a few

[24] The EPA issued a final rule (81 FR 58010), effective October 24, 2016, on "Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements" that stated, in part: "Additionally, in this document the EPA is revoking the 1997 primary annual standard for areas designated as attainment for that standard because the EPA revised the primary annual standard in 2012." (See: https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf). Accordingly, Washington, DC-MD-VA is no longer designated as maintenance for $PM_{2.5}$, and the associated EPA regulatory requirements for conformity for $PM_{2.5}$ are eliminated for Washington (DC-MD-VA).

localized areas where VMT increases. However, lower MSATs levels are expected in the future due to cleaner engine standards coupled with fleet turnover. The magnitude of the EPA-projected reductions is so great that, even after accounting for VMT growth, MSATs emissions would be significantly lower in the future than they are today, regardless of the alternative selected[25].

The analysis shows GHG emissions are expected to increase slightly for the Build Alternative conditions when compared to the No Build condition for 2025 (Opening Year). In general, GHG emissions are expected to increase for all Build Alternatives when compared to the No Build condition for 2040. Under the No Build and Build Alternative conditions, VMT in the region is expected to increase between 2015 and 2040. Nationally, the Energy Information Administration (EIA) estimates that VMT will increase by approximately 22 percent between 2019 and 2050. It should be noted that the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule, finalized on March 30, 2020 may affect the EIA estimates. This new rule would require less stringent CAFE and CO_2 emissions standards through 2026 compared to the standards implemented in 2012 which it replaces. While VMT is expected to increase under the Build Alternatives, the increase is below the projected national rate. A major factor in mitigating the GHG emissions associated with this increase in VMT is more stringent fuel economy standards. EIA projects that vehicle energy efficiency, thus GHG emissions, on a per-mile basis, will improve by 28 percent between 2012 and 2040. By reducing congestion and increasing speeds, vehicle travel duration and the associated amount of fuel combustion and associated emissions will decrease, minimizing the impacts of GHGs. Regional accessibility will be increased through providing additional lanes so that motorists can more easily pass slow-moving vehicles. Thus, the study area would see a net reduction in GHG emissions under any of the Build Alternatives, even though VMT increases relative to the No Build Alternative and 2015 levels.

The Build Alternatives are not predicted to increase emission burdens compared to the No Build Alternative in 2040, aside from a slight increase in GHG emissions, nor cause or contribute to a violation of the NAAQS. With the mitigating factors in place for the slight increase in GHG emissions as noted above, no long-term or regional air quality impacts are anticipated. (Refer to **Appendix I**, **Chapter 3** for additional information.)

4.8.4 Mitigation

While no mitigation measures are required since the Build Alternatives are not predicted to increase emission burdens for MSATs, nor cause or contribute to a violation of the NAAQS, recent research has been conducted on the benefits of roadside barriers to improve air quality. The EPA report, *Recommendations for Constructing Roadside Vegetation Barriers to Improve Near-Road Air Quality*[26], provides recommendations on the use of walls and vegetation barriers to reduce downwind pollutant concentrations near roadways. MDOT SHA is evaluating the feasibility and reasonableness of noise mitigation in the form of noise barriers along the corridors as discussed in **Section 4.9.4**. Areas of vegetation will be developed in consultation with the design team, local jurisdictions, private interest groups (private developers or companies), local community or business associations, as well as local, state, and Federal agencies.

[25] Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. October 18, 2016. https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/

[26] https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NRMRL&dirEntryId=321772&simpleSearch=1&searchAll=Recommendations+for+constructing+roadside+vegetation+barriers+to+improve+near+road+air+quality

As the project's construction is not anticipated to last more than five years in any single location, construction impacts are considered to be temporary. All required construction-related permits would be obtained from MDE prior to construction. During construction the contractor may use the following dust control measures, to minimize and mitigate, to the greatest extent practicable, impacts to air quality:

- Minimize land disturbance;
- Minimize traffic disruption to the extent possible, especially during peak travel hours;
- Cover trucks when hauling soil, stone, and debris (MDE Law);
- Use water trucks to minimize dust;
- Use dust suppressants if environmentally acceptable;
- Stabilize or cover stockpiles;
- Construct stabilized construction entrances per construction standard specifications;
- Regularly sweep all paved areas including public roads;
- Stabilize onsite haul roads using stone; and
- Temporarily stabilize disturbed areas per MDE erosion and sediment standards.

Refer to **Section 4.23.3** for additional information on short-term construction related impacts.

4.9 Noise

4.9.1 Introduction and Methodology

What is the difference between sound and noise?

The assessment of highway noise impacts distinguishes between "sound" and "noise." When an object moves, sound is created. The movements cause vibrations of the molecules in air to move in waves like ripples on water. Sound is heard when the vibrations reach a person's ears. By contrast, noise is defined by the FHWA as unwanted sound. It represents the unpleasant, unwanted sounds generated on streets and highways.

As defined in Title 23 of the CFR Part 772 (23 CFR 772), this project is classified as a Type I project[27] for the noise analysis. The objective of this noise analysis is to present the predicted loudest-hour build traffic noise levels, to determine if these noise levels cause a traffic noise impact, and, if so, to determine where noise barriers are likely to be feasible and reasonable along the study corridors. All prediction modeling was performed using FHWA's Traffic Noise Model (TNM) v2.5. The TNM seeks to simulate the noise environment by considering variable inputs for traffic (including autos, medium trucks, heavy trucks, buses, and motorcycles), variable inputs of traffic speed for each vehicle type, variable inputs for roadway design, (including roadway width, horizontal and vertical alignment), variable inputs for terrain lines and propagation features (such as building rows, ground zones, and tree zones), and inclusion of traffic control measures including stop lights and stop signs. The preliminary direct access locations were included in this noise analysis (refer to **Chapter 2, Section 2.7.1**). Modifications to the managed lane direct access points will be considered in the updated noise analysis in support of the FEIS.

The TNM validation process reconfirms the model's ability to reproduce the Measured Noise Levels. Measured Noise Levels correspond to ambient measurements taken in conjunction with highway traffic

[27] 23 CFR Part 772.5 (1 through 8) define the types of projects that are classified as a Type I Project. The I-495 and I-270 Managed Lanes Study proposes the addition of through-traffic lanes, including the addition of HOV and HOT lanes. This qualifies this study as a Type I Project according to 772.5 (3).

counts. MDOT SHA considers a Traffic Noise Model to be properly validated when the Modeled Noise Levels are within ±3 decibel (dB(A)) of the Measured Noise Levels for most of the receptors.

Impact criteria is defined based upon the Noise Abatement Criteria (NAC) for the identified type of activities or land uses present within each noise-sensitive area (NSA). The majority of NSAs that MDOT SHA evaluates fall within Activity Categories B and C, which are considered impacted at a noise level of 66 dB(A) or greater. Activity Category B noise-sensitive receptors are defined exclusively as residences. Category C noise-sensitive receptors consist of non-residential land uses where frequent outdoor activity exists such as, sporting areas, campgrounds, parks, picnic areas, playgrounds, schools, places of worship, and other recreational areas.

Federal regulation (23 CFR 772) and the MDOT SHA *Highway Noise Abatement Planning and Engineering Guidelines* (April 2020) require that noise abatement be investigated at all NSAs where the build traffic noise levels approach or exceed the FHWA NAC for the defined land use category, or where there are substantial increases (10 dB(A) per the 2020 MDOT SHA Guidelines) from existing to build condition noise levels. For the NSAs that do not approach or exceed the NAC (and therefore are not considered impacted under that criterion), the lowest existing noise level was compared to the worst-case future build condition noise level in order to determine whether a substantial increase impact would occur. No NSAs will experience a substantial increase as a result of any Build Alternative evaluated for this project. Where noise abatement was warranted for consideration, additional criteria were examined to determine if the abatement would be feasible and reasonable. The assessment of noise abatement feasibility, in general, focuses on whether it is physically possible to build an abatement measure (i.e., noise barrier) that achieves a minimally acceptable level of noise reduction. Barrier feasibility considers three primary factors: acoustics (achieve a 5 dB(A) noise reduction at 70 percent of the impacted receptors), safety and access, and site constraints (construction would require significant grading, ROW, utilities, drainage, or structure costs). Barrier reasonableness considers three primary factors: viewpoints, design goal (achieve a 7 dB(A) noise reduction at a minimum of three (3)[28] or 50 percent of the impacted receptors), and cost effectiveness (700-2,700 square-foot per benefited receptor threshold depending on the scope of the project).

What is a decibel (dB(A))?

A decibel is the basic unit of sound measurement. Decibels represent relative acoustic energy intensities. Because the range of energy found throughout the spectrum of normal hearing is so wide, a base 10 logarithmic scale is used to make the numbers more understandable.

4.9.2 Affected Environment

The study corridors were divided into 133 NSAs in accordance with the MDOT SHA and FHWA noise policies and guidance. The NSAs are comprised of areas that have different land use activity categories which share a common noise environment and have been grouped into a single NSA. Geographically, 92 of the NSAs are located along I-495, 37 are located along I-270, two are located along I-95, and two are located along MD 295 adjacent to the respective interchanges with I-495 (**Table 4-15**).

There are several existing Type I barriers within the study corridors. Any existing noise barrier or portion of barrier falling within the LOD for the Build Alternatives is assumed to be demolished and relocated to accommodate roadway widening and/or storm water management ponds. Since the existing barriers are

[28] NSAs must have a minimum of three (3) impacted receptors in order to be considered for noise abatement.

presently in place, need for barriers and the cost effectiveness for the replacement barriers has been previously determined. Replacement barriers have been analyzed to verify there is no decrease in performance, and if necessary, recommendations to increase the height or length of the barriers have been included to ensure this. Modifications to existing barriers will be re-evaluated during the final design process.

4.9.3 Environmental Consequences

Because many of the Build Alternatives share similar cross sections and traffic parameters, the noise impact analysis results have been presented by grouping the similar Build Alternatives within each segment of the study corridors (refer to **Table 4-15** for details on proposed impacts by NSA).

Of the 92 NSAs along I-495, 89 NSAs contain noise impacts resulting from Alternatives 8, 9, 10, 13B and 13C, with 64 NSAs having levels equal to or exceeding 75 dB(A) [29]; and 89 NSAs contain noise impacts resulting from Alternative 9M, with 52 having levels equal to or exceeding 75 dB(A). Along I-495, 18 NSA locations currently do not have an existing noise barrier and warrant further consideration of noise abatement due to the construction of the proposed highway improvements. (Refer to the *Environmental Resource Mapping* (**Appendix D**) and *Maps 1 through 52, 79 and 80* of the *Noise Analysis Technical Report* (**Appendix J**).

For the 37 NSAs along I-270 and the East and West Spurs the Build Alternatives vary within the corridor and each distinct segment contains a unique combination of proposed alternatives. From I-370 to Montrose Road (NSAs 5-01 through 5-28), 16 NSAs contain noise impacts resulting from Alternative 13B, with four NSAs having levels equal to or exceeding 75 dBA. There were 16 NSAs with noise impacts resulting from Alternatives 8, 9, 9M, and 13C, with four NSAs having levels equal to or exceeding 75 dBA. Under Alternative 10, 18 NSAs were identified with noise impacts, with four NSAs having levels equal to or exceeding 75 dBA.

From Montrose Road to the spurs (NSA 5-29) one NSA contains impacts resulting from all of the Build Alternatives, with the levels equal to or exceeding 75 dBA for each alternative option as well. Along the spurs (NSA 5-30 through 5-37), eight NSAs contain noise impacts resulting from Alternatives 8, 9, 9M, 10, 13B, and 13C, with four NSAs having levels equal to or exceeding 75 dBA. (Refer to the *Environmental Resource Mapping* (**Appendix D**) and *Maps 53 through 76* of the *Noise Analysis Technical Report* (**Appendix J**)).

At the interchanges with I-95 and MD 295, all of the Build Alternatives tie into the highways with the same ramp configuration; therefore, only one Build Alternative was analyzed at each location. Two (2) NSAs were evaluated for impacts along I-95. Both NSAs contain noise impacts resulting from the Build Alternative, with one NSA having levels equal to or exceeding 75 dBA. Two (2) NSAs were evaluated for impacts along MD 295. Both NSAs contain noise impacts resulting from the Build Alternatives, but neither NSA has noise levels equal to or exceeding 75 dBA. (Refer to the *Environmental Resource Mapping* (**Appendix D**) and *Maps 77 through 78* of the *Noise Analysis Technical Report* (**Appendix J**))

[29] Higher absolute noise levels, defined by MDOT SHA as at or above 75 dB(A), are factored into the reasonableness determination for the barrier system. Noise levels at or above 75 dB(A) may warrant a higher noise reduction design goal than the minimum of 7 dB(A) identified in the MDOT SHA Highway Noise Policy, and this condition is used in determining the square footage evaluation threshold.

4.9.4 Mitigation

Federal regulation (23 CFR 772) and MDOT SHA *Highway Noise Abatement Planning and Engineering Guidelines* (April 2020) require that noise abatement be investigated at all NSAs where the build traffic noise levels approach or exceed the FHWA NAC for the defined land use category. Where noise abatement was warranted for consideration, additional criteria were examined to determine if the abatement is feasible and reasonable. Elements of the feasibility and reasonableness criteria are defined in the MDOT SHA *Highway Noise Abatement Planning and Engineering Guidelines* (April 2020). The assessment of noise abatement *feasibility*, in general, focuses on whether it is physically possible to build an abatement measure (i.e., noise barrier) that achieves a minimally acceptable level of noise reduction. Barrier feasibility considers three primary factors: acoustics, safety and access, and site constraints. The assessment of noise abatement *reasonableness*, in general, focuses on whether it is practical to build an abatement measure. Barrier reasonableness considers three primary factors: viewpoints, design goal, and cost effectiveness. Refer to **Appendix J, Section 4.2** for additional details on the elements of the feasibility and reasonableness criteria.

Several noise barrier scenarios have been analyzed for this Study: existing noise barriers that would remain in place; existing noise barriers that will be displaced by construction and would be replaced by a reconstructed barrier on a new alignment; existing noise barriers that would be reconstructed and extended; and new barrier construction. The assumed LODs for the Build Alternatives include the area anticipated for reconstructed or new noise barriers (refer to **Section 4.5.2** for additional information on assumed property impacts). **Table 4-15** is a summary of the noise barrier system mitigation based on the current design of the Build Alternatives. The proposed and assumed locations of the noise barriers are shown on the *Environmental Resource Mapping* (**Appendix D**).

Abatement for the portion of the study area within Virginia is being evaluated in coordination with VDOT and in compliance with the VDOT Highway Traffic Noise Impact Analysis Guidance Manual. The results of this evaluation will be included in the FEIS.

4.9.5 Statement of Likelihood

Based on the studies performed thus far, MDOT SHA recommends installation of highway traffic noise abatement in the form of a barrier for the NSAs as reflected in **Table 4-15**. These preliminary indications of likely abatement measures are based upon preliminary design for barrier square footage equal to or less than the maximum amount allowed per benefited residence by the MDOT SHA Highway Noise Abatement Planning and Engineering Guidelines. Concrete is the typical material used for construction of noise barriers and is assumed as part of the barrier analysis; however, a final determination of material will be made in final design, based upon FHWA requirements to achieve a minimum 20 dB(A) Transmission Loss in accordance with ASTM Recommended Practice E413-87. The findings in this analysis are based upon preliminary design information. A preliminary determination of horizontal and vertical alignment for the noise barriers was made (**Table 4-15**); however, final determination of barrier dimensions will be made in final design. Engineering changes reflected in final design could alter the conclusions reached in this analysis, leading to recommendations to add or omit noise barrier locations. A Final Design Noise Analysis will be performed for this Study based on detailed engineering information during the design phase. The views and opinions of all benefited property owners and residents will be solicited through public involvement and outreach activities during final design.

Table 4-15: Summary of Noise Sensitive Area (NSA) Impacts and Preliminary Sound Barrier System Mitigation[30] by Alternative

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
Area 1: I-495 west side, south of George Washington Parkway												
VA-01	79,80	Y		Abatement for the portion of the study area within Virginia is being evaluated in coordination with VDOT and in compliance with the VDOT Highway Traffic Noise Impact Analysis Guidance Manual. The results of this evaluation will be included in the FEIS.								
VA-02	79,80	Y										
Area 2: I-495 west side, between George Washington Parkway and Clara Barton Parkway												
VA-02	79,80	Y		Abatement for the portion of the study area within Virginia is being evaluated in coordination with VDOT and in compliance with the VDOT Highway Traffic Noise Impact Analysis Guidance Manual. The results of this evaluation will be included in the FEIS.								
VA-04	79,80		N									
Area 3: I-495 west side, between Clara Barton Parkway and MD 190												
1-01	1,2,27,28	Y		✓	✓	✓	✓	✓	✓	✓	1,734	28
1-02	1,2,27,28	Y		✓	✓	✓	✓	✓	✓	✓	9,182	27
1-04	1,2,3,27, 28,29	Y		✓	✓	✓	✓	✓	✓	✓		
1-05	2,3,28,29	Y		✓	✓	✓	✓	✓	✓	✓		
1-03	1,2,27,28	Y		✓	✓	✓	✓	✓	✓	✓	3,751	30
2-01	2,3,28,29	Y		✓	✓	✓	✓	✓	✓	✓		
Area 4: I-495 west side, between MD 190 and I-270 west spur												
1-06	4,30	Y		✓	✓	✓	✓	✓	✓	✓	3,548	35
3-01	4,30	Y		✓	✓	✓	✓	✓	✓	✓		
4-01[31]	4,30	Y		×	×	×	×	×	×	×	N/A	N/A
2-02	4,30	Y		✓	✓	✓	✓	✓	✓	✓	4,182	22
Area 5: I-495 top side, between I-270 west spur and MD 187												
3-02	4,5,30,31	Y		✓	✓	✓	✓	✓	✓	✓	2,513	24
3-04	5,31	Y		✓	✓	✓	✓	✓	✓	✓	3,401	20
1-08	5,6,31,32	Y		✓	✓	✓	✓	✓	✓	✓		
2-03	5,6,31,32	Y		✓	✓	✓	✓	✓	✓	✓	1,621	24
2-04	6,32	Y		✓	✓	✓	✓	✓	✓	✓	4,042	20
2-05	6,32	Y		✓	✓	✓	✓	✓	✓	✓	4,614	20
Area 6: I-495 top side, between MD 187 and I-270 east spur												
2-06	6,7,32,33	Y		✓	✓	✓	✓	✓	✓	✓	2,650	17
1-09	7,33	Y		✓	✓	✓	✓	✓	✓	✓		
1-10	6,7,32,33	Y		✓	✓	✓	✓	✓	✓	✓	3,866	24
Area 7: I-495 top side, between I-270 east spur and MD 185												
1-11	7,8,33,34	Y		✓	✓	✓	✓	✓	✓	✓	5,972	19
1-13	8,9,34,35	Y		✓	✓	✓	✓	✓	✓	✓		
2-07	8,34	Y		✓	✓	✓	✓	✓	✓	✓	3,279	22
1-12	8,34	Y		✓	✓	✓	✓	✓	✓	✓		
2-08	8,9,34,35	Y		✓	✓	✓	✓	✓	✓	✓	2,007	18
3-05	9,35		N	Existing Barrier to Remain							N/A	N/A

[30] This table presents abatement that meets feasibility and reasonableness criteria based on preliminary studies. The feasibility and reasonableness of abatement is subject to change in final design. Concrete is the typical material used for construction of noise barriers and is assumed as part of the barrier analysis; however, a final determination of material will be made in final design, based upon FHWA requirements to achieve a minimum 20 dB(A) Transmission Loss in accordance with ASTM Recommended Practice E413-87.

[31] NSA 4-01 consists of the Burning Tree Country Club. This NSA is not considered to have sufficient frequency and duration of use to warrant consideration of noise abatement.

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
Area 8: I-495 top side, between MD 185 and MD 97												
1-14	9,10,11, 35,36,37	Y		✓	✓	✓	✓	✓	✓	✓	6,731	21
1-36	9,35	Y		✓	✓	✓	✓	✓	✓	✓	6,568	20
2-09	9,10,35,36	Y		✓	✓	✓	✓	✓	✓	✓		
3-06	10,11,36, 37	Y		✓	✓	✓	✓	✓	✓	✓		
2-10	11,37	Y		✓	✓	✓	✓	✓	✓	✓	3,514	77
3-07	11,37	Y		✓	✓	✓	✓	✓	✓	✓	3,393	22
2-11	11,37	Y		✓	✓	✓	✓	✓	✓	✓		
Area 9: I-495 top side, between MD 97 and US 29												
3-08	11,12,37, 38	Y		✓	✓	✓	✓	✓	✓	✓	1,363	20
3-09	11,12,37, 38	Y		✓	✓	✓	✓	✓	✓	✓	2,025	18
4-02[32]	12,38	Y		×	×	×	×	×	×	×	N/A	N/A
4-03[33]	12,38	Y		×	×	×	×	×	×	×	N/A	N/A
2-12	12,13,38, 39	Y		✓	✓	✓	✓	✓	✓	✓	4,142	24
2-13	12,13,38, 39	Y		✓	✓	✓	✓	✓	✓	✓	2,396	22
Area 10: I-495 top side, between US 29 and MD 193												
2-14	13,14,39, 40	Y		✓	✓	✓	✓	✓	✓	✓	2,733	20
4-04	13,14,39, 40	Y		Existing Barrier to Remain/Partial Replacement							N/A	N/A
Area 11: I-495 top side, between MD 193 and MD 650												
2-15	13,14,39, 40	Y		✓	✓	✓	✓	✓	✓	✓	5,399	20
2-17	14,40	Y		✓	✓	✓	✓	✓	✓	✓		
2-16	13,14,39, 40	Y		✓	✓	✓	✓	✓	✓	✓	7,678	20
1-35	14,40	Y		✓	✓	✓	✓	✓	✓	✓		
2-18	14,15,40, 41	Y		✓	✓	✓	✓	✓	✓	✓	1,942	22
Area 12: I-495 top side, between MD 650 and I-95												
2-19	15,41	Y		✓	✓	✓	✓	✓	✓	✓	1,785	20
2-20	14,15,40, 41	Y		✓	✓	✓	✓	✓	✓	✓	3,014	26
1-15[34]	15,15A,41 41A		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[32] NSA 4-02 consists of the Holy Cross Hospital and a portion of the Sligo Creek Trail. There are no outdoor land uses at the Holy Cross Hospital in this area, there would be no interior noise impacts resulting from this project. The Sligo Creek Trail is not considered to have sufficient frequency and duration of use to warrant consideration of noise abatement.

[33] NSA 4-03 consists of Sligo Creek Golf Course and a portion of Sligo Creek Park. These areas are not considered to have sufficient frequency and duration of use to warrant consideration of noise abatement.

[34] NSA 1-15 consists of Eglise Baptiste Du Calvaire and The Hindu Temple of Metropolitan Washington, as well as single family residences in the Adelphi Community, and Knollwood Park. There is no apparent outdoor use at the places of worship; the park does not have apparent areas of recreational activity.

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
1-16	15,15A,41 41A	Y		✓	✓	✓	✓	✓	✓	✓	3180	26
3-17	15,15A,41 41A		N	Existing Barrier to Remain/Partial Replacement							N/A	N/A
I95-N[35]	77	Y		×	×	×	×	×	×	×	N/A	N/A
Area 13: I-495 east side, between I-95 and US 1												
I95-S[36]	77	Y		×	×	×	×	×	×	×	N/A	N/A
1-17	15A,41A	Y		✓	✓	✓	✓	✓	✓	✓	3,692	17
1-18	15A, 16, 41A, 42		N	Active use area is behind building and not impacted.							N/A	N/A
Area 14: I-495 east side, between US 1 and Greenbelt Metro												
2-21	15A, 16, 41A, 42	Y		✓	✓	✓	✓	✓	✓	✓	1,775	20
2-22	16,42	Y		✓	✓	✓	✓	✓	✓	✓	3,559	20
3-18	16,42	Y		✓	✓	✓	✓	✓	✓	✓		
2-23	16,42	Y		✓	✓	✓	✓	✓	✓	✓	3,216	18
Area 15: I-495 east side, between Greenbelt Metro and MD 201												
1-20	17,43	Y		✓	✓	✓	✓	✓	✓	✓	3,289	19
Area 16: I-495 east side, between MD 201 and Baltimore-Washington Parkway												
1-21	17A,43A	Y		✓	✓	✓	✓	✓	✓	✓	3,556	20
1-22	17A,43A	Y		×	×	×	×	×	×	×	N/A	N/A
BW-N	78	Y		✓	✓	✓	✓	✓	✓	✓	1,156	15
Area 17: I-495 east side, between Baltimore-Washington Parkway and MD 450												
BW-S	78	Y		✓	✓	✓	✓	✓	✓	✓	3,489	16
1-23	17A,18,19 ,43A,44, 45	Y		✓	✓	✓	✓	✓	✓	✓	4,720	21
1-24[37]	17A,18, 43A,44	Y		×	×	×	×	×	×	×	N/A	N/A
2-24	18,19,44, 45	Y		✓	✓	✓	✓	✓	✓	✓	4,361	20
2-25	19,45	Y		✓	✓	✓	✓	✓	✓	✓	2,451	21
1-25	19,45	Y		✓	✓	✓	✓	✓	✓	✓		
2-26	19,45	Y		✓	✓	✓	✓	✓	✓	✓	6,182	21
2-27	19,45	Y		✓	✓	✓	✓	✓	✓	✓	3,274	18
Area 18: I-495 east side, between MD 450 and US 50												
3-10	19,20,45, 46	Y		✓	✓	✓	✓	✓	✓	✓	2,060	24
1-33	20,46	Y		✓	✓	✓	✓	✓	✓	✓		
2-28	20,46	Y		✓	✓	✓	✓	✓	✓	✓	1,553	20

[35] NSA I95-N consist of single family residences, two schools, athletic fields and places of worship. The barrier evaluated for this area is not reasonable (<50% of impacts achieve 7 dBA noise reduction).
[36] NSA I95-S consist of single family residences, a community center and athletic fields. The barrier evaluated for this area is not feasible (<70% of impacts are benefited)
[37] NSA 1-24 consists of a portion of Greenbelt Park. There are no apparent areas of recreational activity in this area, and therefore consideration of noise abatement is not warranted.

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
Area 19: I-495 east side, between US 50 and MD 202												
2-29	20,46	Y		✓	✓	✓	✓	✓	✓	✓	1,558	20
3-11	20,46	Y		✓	✓	✓	✓	✓	✓	✓	1,714	18
2-30	20,21,46, 47	Y		✓	✓	✓	✓	✓	✓	✓	3,155	19
2-31	21,47	Y		✓	✓	✓	✓	✓	✓	✓	2,916	21
Area 20: I-495 east side, between MD 202 and Arena Drive												
N/A	N/A			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Area 21: I-495 east side, between Arena Drive and MD 214												
3-12	22,48	Y		✓	✓	✓	✓	✓	✓	✓	208	25
Area 22: I-495 east side, between MD 214 and Ritchie Marlboro Road												
1-26	23,23A,49 49A	Y		✓	✓	✓	✓	✓	✓	✓	4,701	19
Area 23: I-495 east side, between Ritchie Marlboro Road and MD 4												
1-37	23A,49A	Y		✓	✓	✓	✓	✓	✓	✓	2,645	25
Area 24: I-495 east side, between MD 4 and Forestville Road / MD 337												
1-27	24A,50A		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Area 25: I-495 east side, between Forestville Road / MD 337 and Suitland Road / MD 337												
1-28	24,50	Y		✓	✓	✓	✓	✓	✓	✓	5,342	22
Area 26: I-495 east side, between Suitland Road / MD 337 and MD 5												
1-29	24,50	Y		✓	✓	✓	✓	✓	✓	✓	878	35
3-14	24,25,50, 51	Y		✓	✓	✓	✓	✓	✓	✓		
3-13	24,25,50, 51	Y		✓	✓	✓	✓	✓	✓	✓	1,836	20
1-34[38]	25,51	Y		×	×	×	×	×	×	×	N/A	N/A
2-32	25,25A,51 51A	Y		✓	✓	✓	✓	✓	✓	✓	930	22
Area 27: I-495 east side, west of MD 5												
3-15	25A,51A		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3-16	25A,26, 51A,52		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Area 28: I-270 west spur, between I-495 and Democracy Boulevard												
5-35	60,63,72, 75		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3-03/5-36	64,76	Y		✓	✓	✓	✓	✓	✓	✓	3,344	21
5-37/1-07	64,76	Y		✓	✓	✓	✓	✓	✓	✓	528	20
Area 29: I-270 west spur, between Democracy Boulevard and Westlake Terrace												
5-32[39]	63,75	Y		×	×	×	×	×	×	×	N/A	N/A
Area 30: I-270 east spur, between I-495 and MD 187												
5-33	61,62,73, 74	Y		✓	✓	✓	✓	✓	✓	✓	6,164	21

[38] NSA 1-34 consists of the Manchester Estates community. A barrier is not feasible due to the topography and flanking noise coming from MD-5 and the distance between the receptors and the roadway.

[39] NSA 5-32 consists of a pedestrian path. The barrier is not feasible (<70% of impacts are benefited) and is not reasonable (>1700 sf-p-r).

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
5-34	61,62,73, 74	Y		✓	✓	✓	✓	✓	✓	✓	1,984	28
Area 31: I-270 west and east spurs, between Y-split and Westlake Terrace and MD 187												
5-31	60,61,72, 73		N	Existing Barrier to Remain/Partial Replacement							N/A	N/A
5-32	60,61,63, 72,73,75		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Area 32: I-270 mainline, between Y-split and Montrose Road												
5-28	58,70		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-29	58,59,70, 71	Y		Existing Barrier to Remain							N/A	N/A
5-30	60,72		N	Existing Barrier to Remain							N/A	N/A
Area 33: I-270 mainline, between Montrose Road and MD 189												
5-23	57,69		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-24	57,69		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-25	57,69		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-26	57,58,69, 70		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-27	58,70		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Area 34: I-270 mainline, between MD 189 and MD 28												
5-18[40]	56,68	Y		×	×	×	×	×	×	×	N/A	N/A
5-19	56,68	Y		×	×	×	×	×	×	×	N/A	N/A
5-16	55,56,67, 68	Y		✓	✓	✓	✓	✓	✓	✓	4,920	20
5-17	56,68	Y		✓	✓	✓	✓	✓	✓	✓		
5-20	56,68	Y		✓	✓	✓	✓	✓	✓	✓		
5-21	56,57,68, 69	Y		✓	✓	✓	✓	✓	✓	✓		
5-22	56,57,68, 69	Y		×	×	×	×	×	×	×	N/A	N/A
Area 35: I-270 mainline, between MD 28 and Shady Grove Road												
5-08[41]	54,66	Y		×	×	×	×	×	×	×	N/A	N/A
5-09[42]	54,66	Y		×	×	×	×	×	×	×	N/A	N/A
5-10[42]	54,66	Y		×	×	×	×	×	×	×	N/A	N/A
5-11	54,66		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-12	55,67		N	Existing Barrier to Remain							N/A	N/A
5-14[43]	55,67	Y		×	×	×	×	×	×	×	N/A	N/A
5-13	55,67	Y		✓	✓	✓	✓	✓	✓	✓	2,628	22
5-15	55,56,67, 68	Y		✓	✓	✓	✓	✓	✓	✓		
Area 36: I-270 mainline, between Shady Grove Road and I-370												
5-03	54,66		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5-05	53,65		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[40] NSAs 5-18 and 5-19 will be re-evaluated to account for the existing berm along I-270. The results of this evaluation will be included in the FEIS.

[41] NSAs 5-08 and 5-09 consist of an apartment complex and various commercial land uses. The barrier evaluated for this area is not feasible (<70% of impacts are benefited) and is not reasonable (>1700 sf-p-r).

[42] NSA 5-10 consists of various commercial land uses. The barrier for this area is not feasible (<70% of impacts are benefited) and is not reasonable (>2700 sf-p-r).

[43] NSA 5-14 consists of various commercial land uses. The barrier for this area is not feasible (<70% of impacts are benefited) and is not reasonable (>2700 sf-p-r).

NSA	Map Number	Impacted		Preliminary Sound Barrier Mitigation by Build Alternatives							Preliminary Barrier Dimensions (ft)	
		Yes	No	Alt 5[1]	Alt 8	Alt 9	Alt 10	Alt 13B	Alt 13C	Alt 9M	Length	Height
5-06[44]	53,54,65, 66	Y		×	×	×	×	×	×	×	N/A	N/A
5-07	54,66	Y		×	×	×	×	×	×	×	N/A	N/A
Area 37: I-270 mainline, north of I-370												
5-01	53,65		N	Existing Barrier to Remain							N/A	N/A
5-02	53,65		N	Existing Barrier to Remain							N/A	N/A
5-04	53,65		N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Summary of Noise Barrier System Mitigation	
Existing Noise Barriers that would remain in place as currently constructed	7
Existing Noise Barriers that would be displaced and replaced with a reconstructed barrier	42
Existing Noise Barriers that would be reconstructed and extended	19
New Noise Barriers constructed	23
Noise Barrier System is not reasonable or feasible	17

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

4.10 Hazardous Materials

4.10.1 Introduction and Methodology

In accordance with FHWA and MDOT SHA guidance, an evaluation of the potential for hazardous materials or contaminant mobilization during the construction of the Build Alternatives was considered. The results of this evaluation are detailed in the *Hazardous Materials Technical Report* (**Appendix K**). The evaluation referenced data from multiple public sources, including: a regulatory database review from Environmental Data Resources, Inc. (EDR); MDE fact sheets; EPA records; historical site documents and mapping; aerial photographs; and a non-intrusive field reconnaissance of current site conditions.

For the purposes of this analysis, the one-quarter mile buffer area surrounding the widest LODs (for I-495 (Alternative 8, 9, 10, 13B, and 13C) and I-270 (Alternative 13C)) was used as the hazardous materials investigation area. Sites of concern, where hazardous waste and contaminated listings were identified, were documented within the hazardous materials investigation area. In addition, Potential Environmental Concerns (PECs), such as observable fuel storage tanks, dry cleaning operations or chemical drum storage, were identified within the LODs.

4.10.2 Affected Environment

The environmental investigation and field reconnaissance of the hazardous materials investigation area resulted in the identification of 501 sites of concern. The term 'site of concern', as used in this evaluation, includes hazardous substances or petroleum products, even under conditions in compliance with applicable laws. A site of concern does not include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and are not generally the subject of an enforcement action if brought to the attention of appropriate governmental agencies (ASTM, 2013).

[44] NSA 5-06 consists of the Rio Washingtonian Center. NSA 5-07 consists of various commercial land uses. The barrier for this area is not feasible (<70% of impacts are benefited) and is not reasonable (>2700 sf-p-r).

Of the 501 identified sites of concern, site reconnaissance was conducted at 209 sites in order to better understand existing conditions. The site reconnaissance focused on sites that were observable from public rights-of-way and had a higher risk of contaminant or hazard mobilization during construction efforts within the widest LODs. Site reconnaissance was also performed at previously unidentified locations where environmental concerns were visible from public rights-of-way.

4.10.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact any hazardous materials.

The 501 sites of concern were ranked based on a weight of evidence approach using the regulatory database information, historical documentation and site reconnaissance feedback (**Table 4-16**). These rankings are based on the characteristics of the subject site of concern and its proximity within or adjacent to each Build Alternative LOD. Prior to acquisition of right-of-way and construction, detailed analysis would be conducted to further investigate properties within and in the vicinity of the final LOD that have a high potential for mobilization of contaminated materials from construction activities. Refer to the *Environmental Resource Mapping* (**Appendix D**) and the *Hazardous Materials Technical Report* (**Appendix K**) for mapping of these sites of concern.

Table 4-16: Sites of Potential Concern Priority Summary

Priority Ranking	Definition	# of Sites Alt 5[1]	# of Sites Alts 8, 9, 9M, 10, 13B, 13C
1	High Priority	65	65
2	Listed Site/Unknowns	22	22
3	Moderate/High Priority	83	83
4	Moderate Priority	34	34
5	Low Priority (Outside LOD)	147[2]	145
6	Low Priority (Inside LOD)	64[2]	66
7	Not Included	86	86
	Total Sites	501	501

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2] Due to the fact that the Alternative 5 LOD is narrower than the Build Alternative LODs, two low priority sites are outside the LOD of Alternative 5, but inside the LOD for the Build Alternatives.

Of the 501 sites of concern, 65 sites were classified as High Priority for all the of the Build Alternatives due to the potential for contaminant mobilization within or adjacent to the LODs of the Build Alternatives. These properties include: gasoline stations, businesses operating at former gasoline stations, auto repair facilities, dry cleaning facilities, former dry-cleaning facilities, government facilities, landfills, and the Joint Base Andrews (JBA) Air Force Base National Priorities List (NPL) site. Identified high priority sites of concern may require additional investigation to determine the extent and location of existing contaminants and whether or not these contaminants would impact construction activities. These sites have a high potential for contaminant mobilization from leaking underground storage tank (LUST) facilities, or other facilities with PECs relating to petroleum contamination. Several of the LUST facilities, as well as other properties not listed as LUST facilities, have evidence of environmental monitoring and/or remediation activity likely related to past petroleum releases.

Twenty-two sites were classified as Listed Site/Unknowns for all Build Alternatives, meaning the sites have insufficient information to evaluate the potential impact to the LODs of the Build Alternatives due to a lack of site access or insufficient regulatory records to define the location and extent of potential contaminant issues associated with these sites. A review of detailed site documentation for properties within and in vicinity of the final LODs would occur in future design phases of the Study, when property access is obtained to characterize contaminant distributions, and/or their potential for mobilization during construction activities.

The 83 sites identified as Moderate/High Priority and 34 sites identified as Moderate Priority for all Build Alternatives, meaning the sites have hazardous materials or contaminant documentation related to their current or historical use and are inside of the LODs of the Build Alternatives. These sites could include: USTs containing materials other than gasoline, jet fuel, kerosene fuel, waste oil or solvents, surface dumps with empty drums, unidentifiable mounds, Aboveground Storage Tanks (ASTs) with surface stains, suspected Polychlorinated Biphenyl (PCB) containing transformers, stressed vegetation, and hazardous materials storage sites. These sites may or may not require additional evaluation and characterization based on the needs of the final design and construction in the area.

There are 145 low priority sites outside the LOD and 66 sites within the LODs for Alternatives 8, 9, 9M, 10, 13B, and 13C. These low priority sites represent a low concern for additional mobilization or impact to the project construction. The sites are mapped and listed to document their location relative to the study corridors in the event significant changes to the proposed design require a reevaluation of the potential sites of concern. In addition, if hazardous materials or contamination is mobilized during construction, identification of these potential sites of concern may help to identify the contaminant source.

The 86 'Not Included' sites were eliminated from ranking due to inaccurate documentation, field observations, or *de minimis* conditions within the hazardous materials investigation area.

4.10.4 Mitigation

Prior to acquisition of right-of-way and construction, Preliminary Site Investigations (PSIs) would be conducted to further investigate properties within and in the vicinity of the final LODs that have a high potential for mitigation contaminated materials exposed during construction activities. Because the study corridors have been used for vehicular traffic since its construction in the 1950s, it's reasonable to assume that the highway has been the scene of several vehicle accidents, break-downs, and other automotive issues – due to both its daily use and its required maintenance activities. These would have resulted in numerous releases of fuel and other petroleum oils – including leaded gasoline before its gradual phase-out in the late 1970s. Since the locations of these releases and their subsequent subsurface transport are poorly documented, this hazardous material concern would need to be considered a non-point source pollution concern affecting the entire corridor. Pollutants of concern would be diesel-range and gasoline-range petroleum products, and hazardous metals. This concern would be most pronounced within the urbanized areas and other sections of high vehicle use along the corridor. Since this contaminant risk cannot be quantified or used in addressing areas of greater or lesser priority, this concern was not evaluated as part of this assessment. However, it is recommended that this non-point source pollution concern should be addressed in any PSI conducted within the investigation area, with the possibility that contingency plans for contaminated soils would need to be initiated.

Site owners of many of the identified properties may have undertaken additional site characterization studies and/or remediation pursuant to various state and Federal regulatory programs. Prior to designing the PSI, coordination would occur with MDE, Virginia Department of Environmental Quality (VDEQ), and EPA to obtain additional information on the identified properties, in order to further assess potential impacts anticipated during construction and develop the scope for additional investigation.

Following the evaluation of additional information, subsurface sampling would be conducted for those properties needing additional soil and/or groundwater analysis beyond the information documented in detailed regulatory records. The PSIs would implement a tiered approach to any additional investigation based on the risk of contaminant mobilization, distance from the alignment, and likelihood of impact due to environmental factors such as depth to groundwater and construction requirements (refer to **Section 4.23.2** and **Appendix K** (*Hazardous Materials Technical Report*) for additional details).

4.11 Topography, Geology, and Soils

4.11.1 Introduction and Methodology

The evaluation for topography, geology, and soils referenced data from multiple public sources including US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) website, Web Soil Survey, US Geological Survey (USGS) geospatial data, the physiographic map of Maryland, and Maryland's Environmental Resources and Land Information Network (MERLIN).

The Farmland Protection Policy Act (FPPA) (7 U.S.C. 4201; 7 CFR 658) aims to minimize the conversion of important food and fiber producing farmland into non-agricultural land by Federal programs. Prime Farmland Soils, Soils of Statewide Importance, and unique farmland soils within the corridor study boundary were identified using desktop review. The corridor study boundary is located almost entirely within the boundary of the Census Bureau Map designated urbanized area; as such, the corridor study boundary is not subject to protection under the FPPA. Additional detail on the FPPA is provided in **Appendix E** and **Appendix L**.

4.11.2 Affected Environment

The corridor study boundary includes the Piedmont Plateau and Atlantic Coastal Plain Physiographic Provinces. The provinces are separated by the Atlantic Seaboard Fall Line, which roughly matches the boundary between Montgomery and Prince George's Counties. The Atlantic Seaboard Fall Line is both a geologic and topographic boundary, marking the boundary between two distinct areas of geologic origin and of relative elevation: the low-lying Coastal Plain and the hilly and mountainous Piedmont. The elevation within the corridor study boundary ranges from 38 to 516 feet above mean sea level. The Piedmont Plateau Physiographic Province has broadly undulating to rolling topography underlain by metamorphic rock, with low knobs, ridges, and valleys. The Atlantic Coastal Plain Physiographic Province is characterized by flat to moderately rolling upland and an even flatter lowland, composed of unconsolidated sediments including gravel, sand, and silt.

The USDA-NRCS Web Soil Survey (2018) identified 151 mapped soil units within the corridor study boundary, which are depicted on the *Natural Resources Inventory Maps* (**Appendix L**). The majority of soils in the corridor study boundary exhibit slow to moderate infiltration rates. Within the corridor study boundary, three soil units are classified as hydric (approximately one percent of the area within the corridor study boundary), five soil units are classified as predominantly hydric (covering approximately

three percent of the area within the corridor study boundary), five soil units are classified as partially hydric (covering approximately two percent of the area within the corridor study boundary), 33 soil units are classified as predominantly non-hydric, and 105 soil units are classified as non-hydric (predominantly non-hydric and non-hydric soil units covering the remaining 95 percent of the area within the corridor study boundary). Additionally, 54 soil units within the corridor study boundary are highly erodible. Highly erodible soils are located throughout the corridor study boundary, with higher concentrations along I-270, and I-495 west of New Hampshire Avenue.

Twenty-eight soils within the corridor study boundary were identified by USDA NRCS as Prime Farmland Soils, 21 soils were identified as Soils of Statewide Importance, and no soils were identified as Unique Farmland Soils. Two soils were identified as having the potential to be Prime Farmland, one if drained (FaaA) and one if irrigated (HgB).

4.11.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and therefore would not directly impact topography, geology, or soils within the corridor study boundary.

Topography within Build Alternative construction areas would be altered by surficial excavation and grading, thereby changing the relative ground elevation, but this work is not anticipated to have a substantial effect on underlying sediments. Possible impacts to geologic formations and rock structures include impacts from construction activities, such as cutting and filling. The primary impact to soils from the Build Alternatives would be soil removal or alterations to the soil profile and structure due to construction activities. Additional impacts include leaching of chemicals into the soil from general construction or accidental spills, soil erosion, and soil compaction associated with the use of heavy equipment.

Impacts to soils from the Build Alternatives are presented in **Table 4-17** and **Table 4-18**. The impacts to "hydric soils" listed in the tables are based upon the NRCS Web Soil Survey and do not reflect hydric soils identified as jurisdictional wetlands in accordance with the Clean Water Act.

Table 4-17: Impact to Soils by Type in Acres

	Alt 5[1]	Alt 8&9[2]	Alt 9M	Alt10	Alt 13B	Alt 13C
Farmland of Statewide Importance	1.9	1.9	1.9	1.9	1.9	1.9
Prime Farmland	2.1	2.1	2.1	2.1	2.1	2.1
Hydric	20.0	20.4	20.3	20.8	20.3	20.6
Predominantly Hydric	80.4	82.2	81.8	82.8	82.0	82.4
Partially Hydric	24.2	25.3	25.3	25.3	25.3	25.3
Predominantly Non-Hydric	711.0	733.1	724.2	742.4	728.2	735.6
Non-Hydric	2,508.3	2,556.9	2,544.2	2,566.7	2,552.8	2,561.7

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

Impacts to hydric soils would be similar across all Build Alternatives. Alternative 9M would result in the lowest hydric soil impact of 20.3 acres and Alternative 10 would result in the highest hydric soil impact of 20.8 acres. The impacts to Prime Farmland and Farmland of Statewide importance are the same for all Build Alternatives, 2.1 and 1.9 acres respectively. As detailed in **Table 4-18**, Alternative 10 would result

in the highest high-erodible soil impact of 1,206.9 acres. Refer to the *Natural Resources Technical Report* (**Appendix L, Section 2.1**) for detailed impacts on the different classifications of soils.

Table 4-18: Impacts to Steep Slopes and Highly Erodible Soils in Acres

	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Steep Slopes > 5, K Factor > 0.35	350.5	362.1	357.4	369.0	359.1	364.5
Steep Slopes 15	808.2	831.4	824.1	837.9	827.9	796.4
Total Impacts to Highly Erodible Soils	**1,158.7**	**1,193.5**	**1,181.5**	**1,206.9**	**1,187.0**	**1,160.9**

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

4.11.4 Mitigation

Construction in the corridor study boundary requires consideration of hydric and highly erodible soils, as well as steep slopes. Measures to protect soils from erosion would be implemented based on approved Erosion and Sediment Control Plans (E&S Plans) prepared in accordance with Maryland and Virginia regulations. Detailed geotechnical studies would be performed before construction to identify subsurface issues that may impact project construction or the surrounding environment. MDOT SHA would minimize any negative effects, such as unstable soils or high-water table, through engineering design. Negative impacts to the surrounding environment, such as sedimentation, would be minimized through implementation and strict adherence to erosion and sediment control plans.

Additional water quality protection measures are required for highway construction projects in Maryland to prevent soil erosion and subsequent sediment influx into nearby waterways. Construction contractors are designated as co-permittees on the National Pollutant Discharge Elimination System (NPDES) permit to ensure compliance. This permit is issued under Maryland's General Permit for construction activities and is implemented with a regular inspection program for construction site sediment control devices that includes penalties for inadequate maintenance. To ensure compliance, onsite evaluations by a certified erosion and sediment control inspector would occur throughout the duration of construction.

Fairfax County, Virginia requires any projects with land-disturbing activities exceeding 2,500 square feet (SF) to prepare an erosion and sediment control plan (Fairfax County, 2018g). The County must approve each plan before any land-disturbing activities begin, and each project is subject to inspections throughout the duration of land-disturbing activities to prevent erosion and sediment control violations.

4.12 Waters of the US and Waters of the State, Including Wetlands

4.12.1 Introduction and Methodology

Wetlands and waterways are protected by several federal and state regulations. Jurisdictional Waters of the US, including wetlands, are jointly defined by the Environmental Protection Agency (EPA) and the US Army Corps of Engineers (USACE) in 40 CFR 230.3(s) and 33 CFR 328.3. Effective June 22, 2020, the regulatory definitions for Jurisdictional Waters of the US will be set forth in 33 CFR 328.3 and 40 CFR 120.2. Unavoidable impacts caused by the discharge of dredge or fill material into Waters of the US, including wetlands, within the corridor study boundary are federally regulated under Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Act (33 U.S.C. 403). Section 10 will only apply to the Potomac River for the Study.

Wetlands and their buffers are also protected by the State of Maryland Environment Article Title 5, Subtitles 5 and 9 of the Maryland Annotated Code. Pursuant to the Maryland Code, the MDE has promulgated stringent regulations to protect wetlands (COMAR, Title 26). Buffers are defined in COMAR 26.23.01.01 as a regulated area, 25 feet in width, surrounding a nontidal wetland, measured from the outer edge of the nontidal wetland. According to COMAR 26.23.01.04, nontidal wetland buffers shall be expanded to 100 feet for nontidal Wetlands of Special State concern, nontidal wetlands with adjacent areas containing steep slopes or highly erodible soils (soils with an erodibility factor greater than 0.35), and outstanding national resource waters. Wetlands of Special State concern are examples of Maryland's most valuable wetlands resources and are designated for special protection under COMAR 26.23.06. These wetlands have high ecological or educational value and may provide specialized habitat for rare plant or animal species. Waterways regulated by the State are defined in COMAR 26.17.04.02 as Waters of the State and include the 100-year floodplain. Impacts to waterways, 100-year floodplains, nontidal wetlands, 25-foot nontidal wetland buffers, or 100-foot expanded buffers require a Maryland Nontidal Wetlands and Waterways Permit. Additionally, a Section 401 Water Quality Certificate from MDE is required for any impacts to waterways or wetlands requiring a USACE Section 404 permit.

In Virginia, the Virginia Department of Environmental Quality (VDEQ) is the authority that provides the Section 401 certification through its Virginia Water Protection Permit (VWPP) Program (9 VAC 25-210), which gets its statutory authority from the Code of Virginia (VAC 62.1-44.15). Work in non-tidal streams with drainage areas greater than five square miles also require a permit from the Virginia Marine Resources Commission (VMRC) under the authority of the Code of Virginia (VAC 28.2-1204). Virginia state law requires that a VWPP be obtained before disturbing a stream by clearing, filling, excavating, draining, or ditching (VDEQ, 2018). Work in non-tidal streams with drainage areas greater than five square miles also require a permit from the VMRC under the authority of the Code of Virginia (VAC 28.2-1204).

Wetlands and waterways within the corridor study boundary were delineated by environmental scientists on behalf of MDOT SHA and VDOT from March 2018 through January 2019, with delineations ongoing for properties that have not yet permitted access. Much of the MDOT SHA right-of-way within the corridor study boundary was previously delineated as part of the Prince George's County and Montgomery County Integrated Roadside Vegetation Management (IRVM) and the I-270 Innovative Congestion Management projects. All previously delineated features were field reviewed and delineations were revised as needed for the purposes of the Study. No previous delineations were referenced for the Virginia portion of the corridor study boundary.

Wetlands features were delineated in accordance with the following:

- USACE Wetlands Delineation Manual, Y-87-I (Environmental Laboratory, 1987)
- USACE 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0 (USACE, 2012)
- USACE 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Coastal Plain Region (USACE, 2010)

A functions and values assessment was conducted for all delineated wetlands using the USACE New England Method as presented in *The Highway Methodology Workbook Supplement – Wetland Functions and Values; A Descriptive Approach* (USACE 1999).

Waterways features were delineated using the limits defined in 33 CFR 328. The boundaries of nontidal waterways features were set at the ordinary high water (OHW) mark and include but are not limited to: in-line stormwater management (SWM) ponds, palustrine open water (POW or ponds), stream systems (waterways), and some disturbed areas. The OHW mark was determined in the field using physical characteristics established by the fluctuations of water (e.g., change in plant community, changes in the soil character, shelving) in accordance with USACE Regulatory Guidance Letter No. 05-05 (USACE 2005).

Unavoidable impacts to regulated wetlands and waterways within the corridor study boundary in Maryland are subject to a Section 404 permit from the USACE, as well as a Maryland Nontidal Wetlands and Waterways Permit from MDE, and Section 401 Water Quality Certification. USACE Baltimore District will be the lead district for permitting impacts to Waters of the US within both the Virginia and Maryland portions of the corridor study boundary. The Potomac River is considered a navigable waters of the US under Section 10 of the Rivers and Harbors Act. Typically, the designation of a waterway under Section 10 would require a bridge permit to be issued by the US Coast Guard (USCG), but in a letter dated September 19, 2019, included in *Appendix N of the Natural Resources Technical Report* (**Appendix L**), the USCG stated that a bridge permit would not be required under Section 10 for the American Legion Bridge. USACE will regulate the Potomac River under Section 10 regarding the piers and abutments for the American Legion Bridge reconstruction.

Under the OFD Federal Agency Memorandum of Understanding (MOU) for Major Infrastructure Projects, signed in 2018, the wetlands and waterways permit application and authorization process must be completed concurrently with the NEPA process, requiring permitting decisions to be made based on preliminary design within 90 days from the Record of Decision. Refer to **Chapter 6** of the DEIS for additional information on the OFD. The study team, including roadway engineers, stormwater engineers, structural engineers, construction engineers, environmental planners, and environmental scientists, worked in close coordination with the regulatory agencies, USACE, and MDE, for nearly two years to review delineated features and coordinate avoidance and minimization of impacts to wetlands and waterways throughout the study corridor to the greatest extent practicable. This effort included close coordination via calls, emails, and office meetings as well as extensive multi-agency field reviews of resources over the two-year time period.

A desktop investigation of the National Wetlands Inventory (NWI), Maryland Department of Natural Resources (MDNR) Wetlands and Waters GIS data was conducted prior to beginning the field investigation to identify existing mapped waterways and nontidal wetlands in the corridor study boundary. No statewide wetland and stream GIS layer exists for Virginia. The results of the desktop investigation are included in the *Natural Resources Technical Report* (**Appendix L, Section 2.3**).

4.12.2 Affected Environment

A total of 407 nontidal wetland features and 1,075 waterway segment features were delineated within the corridor study boundary (**Table 4-19**). One Traditional Navigable Water, the Potomac River, was identified within the corridor study boundary. All other perennial waterways are classified as tributaries of the Potomac or Patuxent Rivers.

Table 4-19: Total Number of Delineated Features

Features	Total (# features)
Wetlands	**407**
Palustrine Emergent (PEM)	117
Palustrine Forested (PFO)	269
Palustrine Scrub-Shrub (PSS)	21
Waterways	**1,075**
Ephemeral	140
Intermittent	464
Perennial	458
Palustrine Open Water (POW)	13

The wetlands and waterways features are shown on the *Environmental Resource Mapping* (**Appendix D**). Additional detailed information is available in the *Natural Resources Technical Report* (**Appendix L**), including a summary of delineated waterways features, maps of each feature's location within the corridor study boundary, Routine Wetland Determination Data Forms, Waterways Datasheets, Wetland Functions and Values Evaluation Forms, and photographs of each feature.

4.12.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact wetlands and other Waters of the US or Waters of the State.

Direct impacts to wetlands and waterways associated with construction of the Build Alternatives include fill from roadway and interchange construction, drainage improvements, and temporary construction-related activities. An assessment of temporary construction-related impacts will occur in later phases of design. **Table 4-20** provides a summary of all impacts to wetlands in acres (AC) and square feet (SF), and all impacts to waterways in linear feet (LF) and SF within the corridor study boundary by classification. In comparing the Build Alternatives, Alternative 9M would have the least amount of impacts to wetland features with 16.1 acres, which is slightly less than the wetland impacts for Alternatives 8, 9, and 13B with 16.3 acres each. Alternatives 10 and 13C would have the highest wetland impacts with 16.5 acres each. No Maryland Wetlands of Special State Concern would be impacted within the Build Alternative LODs.

Table 4-20: Summary of Impacts to USACE/MDE Wetlands and Waterways Corridor-wide

Type	Classification	ALT 5[1]		ALT 8 & Alt 9[2]		ALT 9M		ALT 10		ALT 13B		ALT 13C	
		AC	SF	AC	SF	AC	SF	AC	SF	AC	SF	AC	SF
Wetlands	PEM	3.7	162,549	3.9	167,750	3.9	167,750	4.0	173,615	3.8	167,589	4.0	172,983
	PFO	10.7	464,917	11.4	497,307	11.2	486,114	11.5	499,176	11.4	496,280	11.4	498,158
	PSS	1.0	45,524	1.1	46,802	1.1	46,802	1.1	46,802	1.1	46,802	1.1	46,802
	Total	**15.4**	**672,990**	**16.3**	**711,859**	**16.1**	**700,412**	**16.5**	**719,593**	**16.3**	**710,671**	**16.5**	**717,943**
Waterways		**LF**	**SF**	**LF**	**SF**	**LF**	**SF**	**LF**	**SF**	**LF**	**SF**	**LF**	**SF**
	Ephemeral	10,829	46,016	11,167	47,293	11,135	47,168	11,199	47,556	11,167	47,293	11,196	47,539
	Intermittent	64,252	368,373	65,354	373,447	64,980	371,577	65,580	375,839	65,287	372,841	65,445	374,323
	Perennial	78,621	1,401,275	79,401	1,424,712	79,114	1,418,147	80,205	1,432,736	79,368	1,424,335	79,991	1,429,246
	POW[3]	N/A	64,134	N/A	64,134	N/A	64,134	N/A	64,134	N/A	64,134	NA	64,134
	Total	**153,702**	**1,879,798**	**155,922**	**1,909,586**	**155,229**	**1,901,026**	**156,984**	**1,920,265**	**155,822**	**1,908,603**	**156,632**	**1,915,242**

Notes: [1] MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only.
[2] Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.
[3] POW= Palustrine Open Water (a nontidal system that is permanently flooded and largely lacks rooted vegetation above the water's surface)
[4] The summary totals shown in **Table 4-20** include the features on NPS properties. Refer to **Table 4-21** for the specific impacts by NPS property using the Cowardin classification system.

NPS has adopted a goal of no net loss of wetlands and uses the *Classification of Wetlands and Deepwater Habitats of the US* as the standard for defining, classifying, and inventorying wetlands, as outlined in Director's Order (DO) #77-1. The Cowardin Classification of wetlands used by NPS not only includes the areas defined as wetlands by USACE and MDE, as well as shallow water habitats such as intermittent and perennial stream channels under 2.5 meters deep. Therefore, the acreage of wetlands calculated on NPS property includes some of the features that are considered waterways by USACE and MDE. NPS requires avoidance, minimization, and compensation for unavoidable adverse impacts to NPS wetlands via restoration of degraded wetlands on NPS property at a minimum of a 1:1 restoration/replacement ratio that can be adjusted upward to ensure functional replacement. NPS requires that a Wetland Statement of Findings (WSOF) be prepared in accordance with the procedural manual during NEPA documenting compliance with DO #77-1 for proposed actions that would result in adverse impacts to wetlands. The WSOF is required to include a detailed and site-specific mitigation plan for mitigation sites to be located on NPS property following the mitigation site location hierarchy in the procedural manual. MDOT SHA will work with NPS to identify mitigation opportunities on NPS property for unavoidable impact to wetlands.

The draft WSOF will be developed once a Preferred Alternative has been identified and temporary and permanent impacts have been determined. The FEIS and the draft WSOF will be advertised for public comment and will have a concurrent 30-day comment period. The final, signed WSOF will be attached to the ROD. The following NPS wetlands subject to DO #77-1 and will be included in the WSOF: three palustrine emergent (PEM), nine palustrine forested (PFO), one palustrine scrub-shrub (PSS), four riverine lower perennial, two riverine upper perennial, and 22 riverine intermittent wetlands. Impacts to and full Cowardin classification of these features are summarized for each NPS property in **Table 4-21**; this table is also included in *Appendix I* of the *Natural Resources Technical Report* (**Appendix L**). Work within floodplains on NPS lands must adhere to NPS Floodplain Management DO #77-2 unless exempted. The Floodplain Statement of Findings will be prepared and may be combined with the WSOF in the FEIS.

Table 4-21: Summary of Delineated NPS Wetland Features and Impacts on NPS Properties within the Corridor Study Boundary

Park Property	Feature ID	Cowardin Classification	Total Size Delineated (SF)	Total Size Delineated (AC)	Impact (SF)	Impact (AC)
George Washington Memorial Parkway	22WW	R4SB4	27,447	0.63	2,703	0.06
	22WW_C	R4SB4	1,360	0.03	1,360	0.03
George Washington Memorial Parkway Total			**28,807**	**0.66**	**4,063**	**0.09**
C&O Canal	22LL	PFO1C	1,987	0.05	1,988	0.05
	22M_1	R3UB1H	1,316	0.03	1,121	0.03
	22M_C	R3UBr	15,356	0.35	1,848	0.04
	22MM	R2UB2	338,853	7.78	19,651	0.45
	22MM_B	R2UB2	78,622	1.80	1,752	0.04
	22NN	R4SB4	3,474	0.08	3,474	0.08
	22NN_B	R4SB4	1,599	0.04	1,599	0.04
	22OO	PFO1B	36,794	0.84	12,137	0.28
	22PP	PFO1A	642	0.01	643	0.01
	22QQ	R4SB5	469	0.01	469	0.01
	22W	PEM1Fx	72,306	1.66	15,186	0.35
C&O Canal Total			**551,417**	**12.66**	**59,868**	**1.37**

Park Property	Feature ID	Cowardin Classification	Total Size Delineated (SF)	Total Size Delineated (AC)	Impact (SF)	Impact (AC)
Clara Barton Parkway	22V	R4SB3d	576	0.01	190	0.00
	22V_1	R4SB3d	92	0.00	92	0.00
	22V_2	R4SB3d	66	0.00	66	0.00
	22V_B	R4SB3	331	0.01	331	0.01
	22V_B1	R4SB3	69	0.00	69	0.00
Clara Barton Parkway Total			**1,134**	**0.03**	**748**	**0.02**
Baltimore Washington Parkway	10F	R4SB3	237	0.01	237	0.01
	10F_C	R4SBr	670	0.02	670	0.02
	10FF	R4SB5	1,569	0.04	1,569	0.04
	10GG	PFO1A	3,075	0.07	3,076	0.07
	10JJ	R4SB4r	2,840	0.07	67	0.00
	10KK	R4SB4r	1,488	0.03	1,488	0.03
	10MM	R4SB3	2,678	0.06	203	0.00
	10MM_1	R4SB3	4,741	0.11	3,411	0.08
	10MM_C	R4SBr	2,419	0.06	2,419	0.06
	10P	PFO1B	378	0.01	378	0.01
	10PP	R4SB3r	412	0.01	235	0.01
	10PP_1	R4SB3r	830	0.02	830	0.02
	10PP_C	R4SBr	2,477	0.06	2,477	0.06
Baltimore Washington Parkway Total			**23,814**	**0.55**	**17,060**	**0.39**
Greenbelt Park	10AAA	R4SB3	267	0.01	18	0.00
	10EE	PFO1B	4,188	0.10	4,189	0.10
	10TT_C1	R5UBr	4,993	0.11	1,473	0.03
Greenbelt Park Total			**9,448**	**0.22**	**5,680**	**0.13**
Suitland Parkway	3KKK	PSS1B	3,313	0.08	1,193	0.03
	3L	R2UB2	2,397	0.06	493	0.01
	3L_1	R2UB2	1,067	0.02	820	0.02
	3M	PEM1B	1,043	0.02	68	0.00
	3O	PFO1E	60,660	1.39	328	0.01
	3S	R2UB1	12,463	0.29	2,824	0.06
	3T	PFO1A	6,077	0.14	6,078	0.14
	3V	PFO1C	745	0.02	746	0.02
Suitland Parkway Total			**87,765**	**2.01**	**12,550**	**0.29**
TOTAL NPS WETLANDS IMPACTED AND DELINEATED			**702,386 SF**	**16.12 AC**	**99,969 SF**	**2.29 AC**

Note: The wetlands in this table are only those wetlands occurring on NPS property as defined in the NPS Director's Order #77-1: Wetland Protection and Procedural Manual #77-1: Wetland Protection.

4.12.4 Mitigation

A. Avoidance and Minimization

The corridor study boundary is characterized by an extensive network of streams and wetlands that are located adjacent to and flow beneath the existing roadway, resulting in unavoidable impacts to these resources with roadway modification and/or widening under any Build Alternative. Continual efforts to

avoid and minimize impacts have occurred throughout the planning process and will continue during final design.

The process for avoidance and minimization of impacts to wetlands, their buffers, waterways, and the FEMA 100-year floodplain to the greatest extent practicable is detailed in the *Avoidance, Minimization, and Impacts Report* (AMR) (**Appendix M**). In summary, this process entailed identification of avoidance and minimization opportunities throughout the limits of the study corridor, and extensive coordination of potential options with the regulatory agencies over a 16-month period. The AMR summarizes the study corridors and the Build Alternatives; explains how the Build Alternative LODs were established based on a corridor-wide stepwise process of avoidance and minimization of impacts; and describes the targeted avoidance and minimization of impacts to resources in specific areas of the study corridor. The AMR then presents impact reductions resulting from the avoidance and minimization process and provides justifications for unavoidable impacts.

MDOT SHA worked with regulatory and resource agencies during field and office meetings to review impacted natural resources and explore further avoidance and minimization possibilities. The study team evaluated agency recommendations and implemented them wherever practicable. Design revisions to avoid and minimize direct impacts to natural resources to date include the following:

- Elimination of the collector-distributor system on I-270;
- Preliminary alignment shift designs;
- Alterations to preliminary roadside ditch and grading designs;
- Additions to preliminary retaining wall designs to minimize the roadway footprint;
- Revisions to preliminary ramp designs, construction access areas, and preliminary stormwater management (SWM) facility locations; and
- Relocations of preliminary managed lane access locations.

1.

Examples of Avoidance and Minimization Efforts

- **Rock Creek:** reduction in waterway impacts by 3,287 linear feet to Rock Creek and reduction in parkland impacts of approximately 10 acres
- **Thomas Branch:** reduction in waterway impacts by 592 linear feet
- **Paint Branch Mainstem:** reduction in waterway impacts by 2,393 linear feet

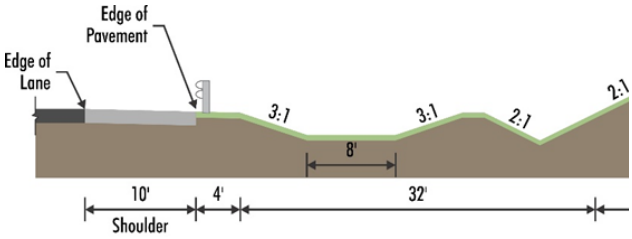
To ensure that avoidance and minimization was applied to limit impacts to wetlands and waterways, a step-wise process was applied corridor-wide to avoid or limit impacts to wetlands and waterways which included the application of five progressively narrower roadside typical sections from widest to narrowest until impacts were avoided or Step 5 was reached. The five steps applied to the avoid or minimize resources are shown in **Figure 4-14**.

The five roadside typical sections are described further in the *Alternatives Technical Report* (**Appendix B**) and the *Natural Resources Technical Report* (**Appendix L, Section 2.3.4**), and the *Avoidance, Minimization and Impacts Report* (**Appendix M**).

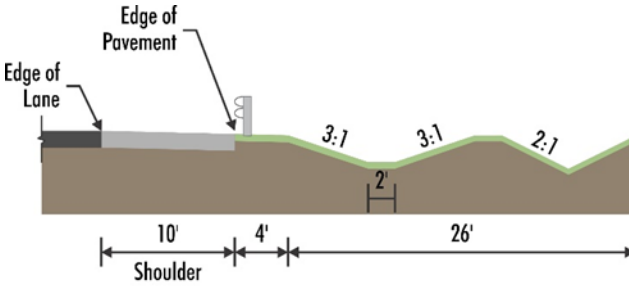
Wetlands and waterways were avoided and minimized to the maximum extent practicable along the outer edge of interchanges using the same five-step process as along the roadway. Additionally, the design was refined and portions of the LOD within interchanges were excluded to limit impacts to wetlands and waterways.

Figure 4-14: Five-Step Avoidance and Minimization Process

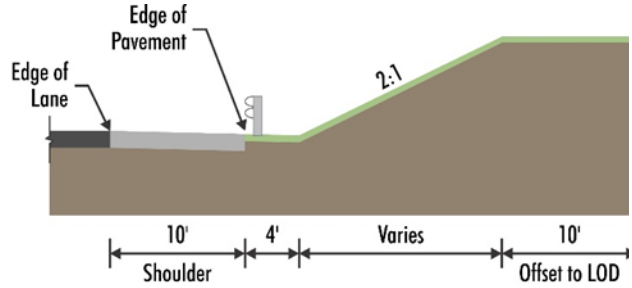
1.Step 1 - an open section with a full-width (8ft) bioswale for stormwater management



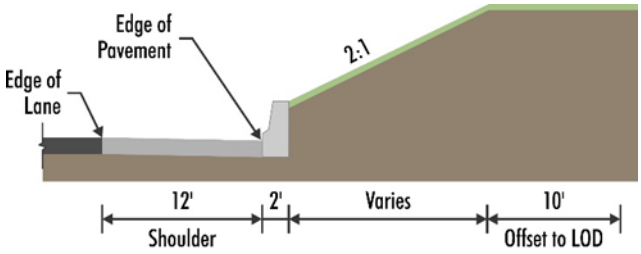
2.Step 2 - an open section with a reduced-width (2-4ft) bioswale for stormwater management



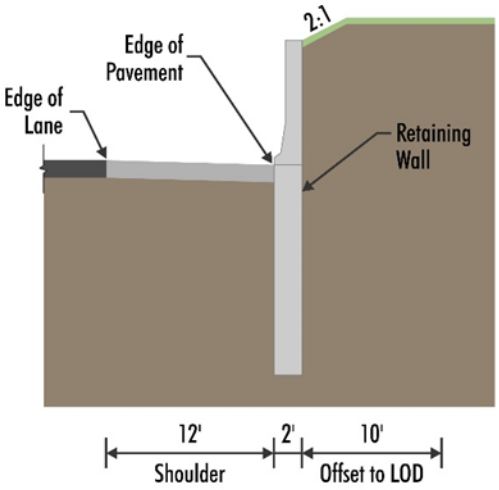
3.Step 3 - an open section with no surface stormwater management (drainage ditch only)



4. **Step 4 - a closed section with concrete barrier**



5. **Step 5 - a closed section with retaining wall**



Balance between avoidance and minimization of impacts to features and providing adequate space to construct the roadway improvements was necessary. MDOT SHA reviewed the entire corridor with respect to constructability to avoid and minimize impacts to wetlands and waterways while maintaining a constructible work area. The LOD was expanded in areas where construction activities would likely require additional space, especially for elements such as culvert or drainage outfalls and bridge construction/expansion and was reduced in areas adjacent to wetlands and waterways where practicable. Construction needs were also determined for staging, stockpiling, access, outfall stabilization, and construction equipment areas with consideration to avoid wetlands, their buffers, waterways, and the FEMA 100-year floodplain to the maximum extent practicable.

All wetlands, their buffers, waterways, and FEMA 100-year floodplains were avoided and minimized to the greatest extent practicable at this stage of the Study, resulting in a significant reduction of impacts. In mid-late 2018, preliminary impact quantities for a two-lane Build Alternative were computed, and these quantities represent the impacts before avoidance and minimization techniques were applied. The total impacts of all Build Alternatives were calculated in May 2020, and these quantities represent the impacts after the application of avoidance and minimization techniques, including corridor-wide and targeted avoidance and minimization. Note that impacts reported in **Table 4-22** are summation totals of all feature impacts regardless of jurisdiction (i.e., USACE and MDE jurisdictional wetlands and waterways are reported as a composite quantity). For totals of impacts by agency jurisdiction, refer to the *Impact Tables* in the *Joint Permit Application* (**Appendix R**).

Table 4-22: Comparison of a Two Managed Lane Alternative Pre-Avoidance and Minimization (A&M) to All Build Alternatives Post-A&M Impacts

Resources	Pre-A&M Impacts	Post-A&M Impacts					
	2018 Two Managed Lanes Alternative	Alts 8 & 9[1]	Alt 9M	Alt 10	Alt 13B	Alt 13C	Estimated Difference in Impact
Waterways (LF)	168,534	155,922	155,229	156,984	155,822	156,632	-14,000 LF
Wetlands (AC)	38.10	16.34	16.08	16.52	16.31	16.48	-21.5 AC
Wetland Buffer (AC)	69.05	53.14	52.66	53.62	53.08	53.49	-15.0 AC
FEMA Floodplain (AC)	143.44	119.53	116.51	120.00	119.51	119.93	-23.0 AC

Note: [1]Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.
Alternative 5 was not considered a reasonable alternative and therefore avoidance and minimization was not advanced on this alternative.

B. Mitigation

Wetland mitigation requirements in Maryland and Virginia were developed using standard practices of USACE, MDE and VDEQ. The proposed permittee-responsible, off-site mitigation in Maryland consists of 13 mitigation sites, including a total of 61.94 acres of potential wetland mitigation credits and 74,085 linear feet of potential stream mitigation credits. Permittee-responsible mitigation sites included in the *Draft Compensatory Mitigation Plan* (CMP) (**Appendix N**) were chosen based on their potential for functional uplift, construction feasibility, proximity to the study area, mitigation credits, and replacement of lost functions and values resulting from roadway improvements.

Privately-owned mitigation banks would be used to fulfill all mitigation requirements in Virginia. The mitigation requirement of 0.1 wetland mitigation credits and 729 riverine mitigation credits in the Fairfax

County Middle Potomac-Catoctin watershed would be met by purchasing bank credits. MDOT SHA will negotiate with the banker to identify credits, confirm credit use with the USACE, and purchase credits to be included in the Final CMP.

No mitigation bank credits or in-lieu fee programs were identified in Maryland. Due to the lack of in-lieu fee programs and mitigation bank credits in Maryland, MDOT SHA decided to pursue permittee-responsible mitigation for the remaining mitigation requirements. A two-tiered approach was used to identify potential permittee-responsible mitigation sites for the remaining off-site mitigation requirements in Maryland that included a traditional mitigation site search on public lands and a Request for Proposals (RFP) on private lands. Refer to the *Draft Compensatory Mitigation Plan* (**Appendix N**) for additional details.

NPS requires avoidance, minimization, and compensation for unavoidable adverse impacts to NPS wetlands via restoration of degraded wetlands on NPS property at a minimum of a 1:1 restoration/replacement ratio that can be adjusted upward to ensure functional replacement. NPS requires that a Wetland Statement of Findings (WSOF) be prepared in accordance with the procedural manual during NEPA documenting compliance with DO #77-1 for proposed actions that would result in adverse impacts to wetlands. The WSOF is required to include a detailed and site-specific mitigation plan for mitigation sites to be located on NPS property following the mitigation site location hierarchy in the procedural manual. MDOT SHA will work with NPS to identify mitigation opportunities on NPS property for unavoidable impact to wetlands.

4.13 Watersheds and Surface Water Quality

4.13.1 Introduction and Methodology

Surface waters include rivers, streams, and open water features such as ponds and lakes. Streams are generally defined as water flowing in a channel with defined bed and bank and an ordinary high water mark. Section 401 and Section 402 of the Federal CWA (33 U.S.C. 1341 and 1342) regulate water quality and the introduction of contaminants to waterbodies. The MDE and VDEQ are the regulatory agencies responsible for ensuring adherence to water quality standards in Maryland and Virginia, respectively. In general, the National Pollutant Discharge Elimination System (NPDES) stormwater program requires permits for discharge from construction activities that disturb one or more acres, and discharges from smaller sites that are part of a larger common plan of development. Individual permits for erosion and sediment control approval will be submitted and approved as contract packages are developed.

Under the COMAR: Title 26 Department of the Environment, Subtitle 08 Water Pollution, Chapter 02 Water Quality (26.08.02), the State of Maryland has adopted water quality standards to enhance and protect water resources and serve the purposes of the Federal CWA. Similarly, all of Virginia's surface waters are classified by VDEQ according to designated uses promulgated in Virginia's water quality standards (9 VAC 25-260). The water quality standards serve this purpose by designating uses to the waters of the state and setting criteria by which these uses are protected. Water quality in Maryland and Virginia shall be protected and maintained for these "Designated Uses." Coordination with the MDNR Environmental Review Program (ERP) and online research through the MDE and VDEQ websites was conducted to determine designated uses and regulations for the waters crossed by the corridor study boundary.

The Maryland Scenic and Wild Rivers Act of 1968 established the Maryland Scenic and Wild Rivers System to preserve and protect the natural values and enhance the water quality of rivers, or segments of rivers, which possess outstanding scenic, geologic, ecologic, historic, recreational, agricultural, fish, wildlife, cultural, and other similar resource values. Each unit of state and local government, in recognizing the intent of the Act and the Scenic and Wild Rivers Program, is required to take whatever action is necessary to protect and enhance the qualities of a designated river. Potential effects to scenic and wild rivers are reviewed and coordinated by the MDNR in collaboration with the relevant Scenic and Wild River Advisory Board.

The Virginia Scenic Rivers Act of 1970 established the Virginia Scenic Rivers Program with the intent to identify, designate, and help protect rivers and streams that "possess superior natural and scenic beauty, fish and wildlife, and historic, recreational, geologic, cultural, and other assets." River segments are evaluated based on 13 criteria, including water quality, corridor development, recreational access, historic features, natural features, visual appeal, quality of fisheries, and the presence of unique habitats or species. If a waterway qualifies for designation, the Virginia Department of Conservation and Recreation (VDCR) prepares a report including supporting comments by local governments and state agencies.

Existing information on surface water resources (to include scenic and wild rivers) and water quality within the corridor study boundary was obtained from MDOT SHA, MDE, MDNR Maryland Biological Stream Survey (MBSS), Montgomery County Department of Environmental Protection (MCDEP), Prince George's County Department of the Environment (PGDoE), VDEQ, and Fairfax County Department of Public Works and Environmental Services (FCDPWES); all of which utilize a variety of data sources in order to assess the overall health and condition of the applicable watersheds. This includes data on chemical water quality, fish and benthic macroinvertebrate communities, aquatic habitat, land use characteristics, riparian buffer conditions, and impervious surface coverage.

Data collected on aquatic habitat conditions and fish and benthic macroinvertebrate communities are often used to summarize existing water quality conditions based on an overall narrative rating (e.g., Very Poor, Poor, Fair, Good, etc.), using established methodologies. These methodologies and rating criteria are summarized in **Section 4.18** of this chapter and are detailed within *the Natural Resources Technical Report* (**Appendix L, Section 2.9**).

Discussions of water chemistry within the *Natural Resources Technical Report* (**Appendix L, Section 2.4**) are based upon data collection from both in-situ multi-probe sampling and chemical grab sampling. In-situ data are defined as data collected with field measurement techniques such as water quality meters, while chemical grab sampling is defined as sampling where water samples were collected in the field and transported to a laboratory for detailed analysis.

4.13.2 Affected Environment

Within Virginia, the entirety of the corridor study boundary crosses the Potomac River drainage basin in Fairfax County. More specifically, the corridor study boundary crosses the Middle Potomac watersheds, comprised of the Bull Neck Run, Scotts Run, Dead Run, Turkey Run, and Pimmit Run subwatersheds (FCDPWES, 2008). For the purposes of this document, only streams within the Fairfax County Middle Potomac watersheds that cross the corridor study boundary are discussed. These subwatersheds include the Scotts Run and Dead Run watersheds.

Within Maryland, the majority of the corridor study boundary crosses the Potomac River drainage basin, with the eastern-most portion of the corridor study boundary, between approximately US 50 and MD 4, falling within the Patuxent River drainage basin. Within the Potomac River drainage basin, the corridor study boundary crosses state-designated Washington Metropolitan watershed (MDE 6-digit watershed), encompassing the Potomac River-Montgomery County, Cabin John Creek, Rock Creek, Anacostia River, Potomac River Upper Tidal, and Oxon Creek subbasins (MDE 8-digit watersheds). Within the state-designated Patuxent River watershed (MDE 6-digit watershed), the corridor study boundary crosses the Western Branch subbasin (MDE 8-digit watershed).

MDNR 12-digit watersheds are third order stream drainage watersheds determined by USGS contours in a joint state and Federal effort. For the purposes of this document, only streams with watersheds that cross the corridor study boundary are discussed. The MDNR 12-digit watersheds that cross the corridor study boundary include Potomac River/Rock Run, Cabin John Creek, Rock Creek, Sligo Creek, Northwest Branch of the Anacostia River (Northwest Branch), Paint Branch, Little Paint Branch, Northeast Branch, Bald Hill Branch, Upper Beaverdam Creek, Upper Southwest Branch, Lower Southwest Branch of the Western Branch of the Patuxent River (Lower Southwest Branch), Upper Henson Creek, Watts Branch, and Muddy Branch. A watershed characteristics summary and water quality data based upon chemical sampling for each watershed is provided in *the Natural Resources Technical Report* (**Appendix L, Section 2.4**).

Based on review of available information on the National Wild and Scenic River System website, there are no Federally-designated Wild and Scenic Rivers in Maryland. However, the Potomac River in Montgomery County, the Anacostia River, the Patuxent River, and their tributaries are state-designated as Scenic under the Maryland Scenic and Wild Rivers Program. Most streams within the corridor study boundary are regulated under the Maryland Scenic and Wild Rivers Act, as they drain to one of the rivers or river segments mentioned above. Streams in the Rock Creek and Henson Creek watersheds are not regulated under the Maryland Scenic and Wild Rivers Act, as these watersheds enter the Potomac River downstream of the designated river segments.

No waterways within the Virginia portion of the corridor study boundary are state-designated as Scenic Rivers.

4.13.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact surface waters, surface water quality, and watershed characteristics.

All Build Alternatives would affect surface waters, surface water quality, and watershed characteristics in the corridor study boundary due to direct and indirect impacts to ephemeral, intermittent, and perennial stream channels and increases in impervious surface in their watersheds. The impacts to jurisdictional surface waters by classification are summarized in **Table 4-20** of this chapter. The impacts to jurisdictional surface waters by MDNR 12-digit and USGS HUC8 watersheds are provided in *the Natural Resources Technical Report* (**Appendix L, Section 2.3**).

MDE has designated certain surface waters of the state as Tier II (High Quality) waters, based on monitoring data that documented water quality conditions that exceeded the minimum standard necessary to meet designated uses. The only delineated tributaries within the corridor study boundary

that also drain to Tier II waters were identified in the Bald Hill Branch and Beaverdam Creek–Northeast Branch watersheds. Although the corridor study boundary also intersects a small portion of the Piscataway Creek Tier II watershed, no features were identified within and no runoff would drain to this watershed. No impacts would occur within the Piscataway Creek Tier II watershed.

Impacts to surface water quality during construction include physical disturbances or alterations, accidental spills, and sediment releases. These impacts can affect aquatic life through the potential to contaminate waterways in the vicinity of the corridor study boundary. Direct stream channel impacts associated with each Build Alternative are compared and quantified in the *Natural Resources Technical Report* (**Appendix L, Section 2.3**). The potential negative water quality results of these impacts are discussed below.

During construction, large areas of exposed soil can be severely eroded by wind and rain when the vegetation and naturally occurring soil stabilizers are removed. Erosion of these exposed soils can considerably increase the sediment load to receiving waters (Barrett et al., 1993). These increased sediment loads can destroy or damage fish spawning areas and macroinvertebrate habitat. An accidental sediment release in a stream can clog the respiratory organs of fish, macroinvertebrates, and the other members of their food web (Berry et al., 2003). Additional suspended sediment loads have also been shown to cause stream warming by reflecting radiant energy (CWP, 2003).

An additional impact associated with the initial construction phase of roadway improvements is the removal of trees and possibly other riparian buffer vegetation. The removal of riparian vegetation greatly reduces the buffering of nutrients and other materials and allows unfiltered water to directly enter a stream channel (Trombulak and Frissell, 2001). Tree removal during the construction process can reduce the amount of shade provided to a stream and thereby raise the water temperature of that stream. In addition to tree removal, stormwater discharges also have the potential to increase surface water temperatures in nearby waterways. The effect of the temperature change depends on stream size, existing temperature regime, the volume and temperature of stream baseflow, and the degree of shading. Thermal effects from decreased shading and stormwater discharge are of particular concern for Use III and IV stream networks, such as Paint Branch and Northwest Branch, as they support aquatic biota less tolerant of warmwater conditions.

Impacts associated with the use of the road after construction are mainly based on the potential for contamination of surface waters by runoff and from new impervious roadway surfaces. The most common heavy metal contaminants are lead, aluminum, iron, cadmium, copper, manganese, titanium, nickel, zinc, and boron. Most of these contaminants are related to gasoline additives and regular highway maintenance. Other sources of metals include mobilization by excavation, vehicle wear, combustion of petroleum products, historical fuel additives, and catalytic-converter emissions. Generally, heavy metals from highways found in streams are not at concentrations high enough to cause acute toxicity (CWP, 2003).

Deicing compounds that are used during the winter for highway safety maintenance also pose a threat to water quality. Sodium chloride is the most common deicing compound, but it can also be blended with calcium chloride or magnesium chloride. Urea and ethylene glycol are also sometimes used to deice. MDOT SHA most commonly uses rock salt (sodium chloride), a salt brine, and magnesium chloride. Chlorides from these salts can cause acute and chronic toxicity in fish, macroinvertebrates, and plants.

The effect of chlorides in streams is dependent on the amount that is applied and the dilution of the receiving waters. Runoff containing road salts, among other things, can cause elevated conductivity in streams, especially during the spring.

Organic pollutants, including dioxins and PCBs, have been found in higher concentrations along roadways. Sources of these compounds include runoff derived from exhaust, fuel, lubricants, and asphalt (Buckler and Granato, 1999). These organic pollutants are known to accumulate in concentrations that can cause mortality and affect growth and reproduction in aquatic organisms (Lopes and Dionne, 1998).

Sediments are also a primary pollution concern associated with an increase in impervious areas. All Build Alternatives would add the most impervious surface to the Cabin John Creek, Northeast Branch, and Upper Beaverdam MD 12-digit watersheds, with between 49.4 and 108.4 acres added. The least additional impervious surface would be added to Northwest Branch, Little Paint Branch, Muddy Branch, Watts Branch, and Bald Hill Branch watersheds, with between 0 and 13.9 acres added. The only Tier II watershed that would experience an increase in impervious surface is the Beaverdam Creek – Northeast Branch watershed, with an increase of less than 0.1 acres. Refer to the *Natural Resources Technical Report* (**Appendix L, Section 2.3**) for a discussion of jurisdictional surface water impacts and **Table 4-29** for additional impervious surface by Build Alternative. Additional impervious surface includes all new impervious surface outside of the existing roadway footprint. Water quality would be protected by implementing strict erosion and sediment control plans with BMPs appropriate to protect water quality during construction activities. Post-construction stormwater management and compliance with total maximum daily loads (TMDLs) will be accounted for in the stormwater design and water quality monitoring to comply with required permits.

Regulatory agencies and the NPS expressed interest in the impacts to 15 streams/rivers: Rock Creek, Paint Branch, Thomas Branch, a tributary to Southwest Branch, Northwest Branch, the Potomac River, Rock Run, Booze Creek, Cabin John Creek, Sligo Creek, Little Paint Branch, Indian Creek, Henson Creek, Muddy Branch, and Watts Branch. The specific proposed impacts to these streams are included in the *Avoidance, Minimization and Impacts Report* (**Appendix M**). These streams are of particular interest to the agencies due to the proximity of their mainstems to the corridor study boundary, their particular ecological significance, and the potential need to relocate, bridge, and culvert portions of these stream channels. Segments of Thomas Branch and Rock Creek were relocated to accommodate construction of I-495 in the 1960s and currently flow parallel to and very near the roadway. Paint Branch flows through the I-95 interchange with I-495, a very large interchange that would require reconfiguration with any of the Build Alternatives. The tributary to Southwest Branch flows parallel to and near I-495 in the vicinity of MD 214 and MD 202. The other eleven waterways are major crossings within the proposed LODs. One element that contributes to the LOD required for major stream crossings is the potential need for capacity augmentation/auxiliary culverts to accommodate potential increases in surface water elevation and reduce flood risk. Culverts were evaluated throughout the study corridor to determine flood risk potential and auxiliary culverts, additional culvert pipes running alongside the existing culverts, are proposed in those areas where flood risk potential was identified.

The impacts to rivers and tributaries designated as scenic would be the same as other streams. Any aesthetic impacts to scenic streams would be mostly temporary, during construction activities. However, replacement or major modification of the American Legion Bridge and Northwest Branch Bridge could have a longer-term aesthetic effect on the Scenic designated rivers, and would therefore be designed to

protect the scenic value of the resource. As noted in **Section 4.13.1** of this document, MDNR will assist the study team with coordination for Maryland Scenic Rivers.

4.13.4 Mitigation

Impacts to surface waters would be unavoidable if a Build Alternative is selected. However, continual efforts to avoid and minimize impacts have occurred throughout the planning process in consultation with the regulatory agencies and would continue as the Study moves forward to more detailed stages of design. MDOT SHA would work with regulatory agencies and resource managers to identify sensitive aquatic resources and determine further avoidance and minimization possibilities. Agency recommendations would be and have been evaluated and implemented wherever practicable and will continue to be evaluated as the Study progresses. Efforts to avoid and minimize direct impacts to natural resources, including surface water and water quality, to date have included elimination of the collector-distributor system on I-270, alignment shifts to avoid water resources, alteration of roadside ditch design, addition of retaining walls to minimize the roadway footprint, revision of ramp design, revision of construction access areas, relocation of managed lanes access to avoid water resources, and revision of preliminary stormwater management locations to avoid streams. MDOT SHA is committed to continuing efforts to maximize avoidance and minimization where practicable. The results of the planning stage avoidance and minimization efforts are further detailed in the *Avoidance, Minimization, and Impacts Report* (**Appendix M**).

Impacts to all Scenic Rivers have been avoided and minimized to the maximum extent practicable during preliminary design. Coordination with MDNR and the Scenic and Wild River Advisory Board will continue throughout future project design phases. Typically, protection of tributaries to state-designated Scenic Rivers is achieved through minimization and mitigation measures that are already being applied to waterways within the corridor study boundary.

The Study will be required to adhere to E&S requirements during construction. Water quality would be protected by implementing stringent erosion and sediment control plans with BMPs appropriate to protect water quality during construction activities. Post-construction stormwater management and compliance with TMDLs will be accounted for in the stormwater design and water quality monitoring to comply with required permits. Post-construction stormwater management and compliance with TMDLs will be accounted for in the stormwater design and water quality monitoring to comply with required permits. Other measures may also be considered in particularly sensitive watersheds after further coordination with MDE, such as redundant erosion and sediment control measures in especially sensitive watersheds or providing on-site environmental monitors during construction to provide extra assurance that erosion and sediment control measures are fully implemented and functioning as designed.

Any unavoidable impacts would be regulated under state and Federal wetlands and waterways permits that would be issued for the Study. Avoidance and minimization efforts to reduce impacts to natural resources are described in **Section 4.12.4**, and the *Avoidance, Minimization and Impacts Report* (**Appendix M**). The wetlands and waterways mitigation process for the Study is described in the *Draft Compensatory Mitigation Plan* (**Appendix N**). Avoidance and minimization efforts for the 15 targeted streams/rivers is discussed in the *Natural Resources Technical Report* (**Appendix L, Section 2.3.4**) and within the *Avoidance, Minimization, and Impacts Report* (**Appendix M, Section 3.3**).

4.14 Groundwater Hydrology

4.14.1 Introduction and Methodology

In 1974, Congress passed the Safe Drinking Water Act (SDWA) to regulate the public drinking water supply (EPA, 2004). The SDWA Amendments of 1986 require each state to develop Wellhead Protection Programs to assess, delineate, and map source protection areas for their public drinking water sources, and determine potential risks to those sources (42 U.S.C. 300h-7). Wellhead Protection specifically manages the land surface around a well where activities might affect water quality (MDE, 2018). Source water protection is not specifically mandated by the SDWA, though it does mandate source water assessments, as described below. This allows for flexibility in the delineation and development of source water protection areas to fit the needs of the state (42 U.S.C. 300j-13). States, tribes, and communities are encouraged to use SDWA guidance to protect their public water sources from pollution of major concern and to pass local regulations (EPA, 2004).

The EPA approved Maryland's Wellhead Protection Program in June of 1991, and Maryland's Source Water Assessment Program in November of 1999. The EPA approved Virginia's Source Water Assessment Program in October 1999, and their Wellhead Protection Program in 2005 (VDH, 1999; VDEQ, 2005). The EPA, as authorized by Section 1424(e) of the Safe Drinking Water Act of 1974, is responsible for the Sole Source Aquifer (SSA) Program, which allows the EPA to designate an aquifer as a sole source of drinking water and establish a review area for any Federally-funded projects that fall within the area (42 U.S.C. 300h-6). Both Virginia's and Maryland's program provides technical assistance, information, and funding to local governments to aid in water supply protection. The SDWA does not regulate private wells serving fewer than 25 individuals (EPA, 2004). Data on wells and groundwater conditions within the corridor study boundary were gathered from online sources from the USGS, Maryland Geological Survey (MGS), Virginia Department of Health (VDH), and the EPA. Groundwater well data were gathered from the USGS National Water Information System (USGS, 2017).

4.14.2 Affected Environment

The hydrogeology of the corridor study boundary is largely defined by the geology of the area. According to USGS and Maryland Geological Survey (MGS), two main aquifers split the corridor study boundary almost evenly in half. The western half of the corridor study boundary is underlain by the crystalline-rock and undifferentiated sedimentary-rock aquifer, one of the three primary aquifers of the Piedmont and Blue Ridge Physiographic Province. The eastern half of the corridor study boundary is underlain by the North Atlantic Coastal Plain aquifer, which is comprised of 16 local aquifers and 14 confining units that vary in their extent depending on the location within the North Atlantic Coastal Plain aquifer. The Atlantic Seaboard Fall Line is an area of the Coastal Plain Physiographic Province that is underlain by a wedge of unconsolidated sediments including gravel, sand, silt, and clay, which overlaps the consolidated rocks of the eastern Piedmont along an irregular line of contact (MGS, 2018). The Atlantic Seaboard Fall Line, or Fall Zone, transects the corridor study boundary near and generally parallel to the I-95 corridor, but the exact outcrop locations of the coastal aquifers along the Atlantic Seaboard Fall Line vary in width and depth depending on where coastal sediments and consolidated rocks come together. These outcroppings along the Atlantic Seaboard Fall Line serve as groundwater recharge areas for these coastal aquifers, making this area important to groundwater discussions as they can be more prone to pollutant contamination (Water Management Administration, 2013).

Each aquifer is comprised of a variety of bedrock, rocks, and regolith which results in the recharge in the aquifers to be highly variable. Aquifers and aquifer systems are distinguished by their geology, with aquifers being more homogenous and aquifer systems being more heterogeneous in terms of composition and continuity of the formation(s). The Sole Source Aquifer (SSA) Program allows the EPA to designate an aquifer as a sole source of drinking water and establish a review area for any Federally-funded projects that fall within the area. SSAs are defined as providing at least 50 percent of the drinking water for its service area, and where that service area has no reasonably available alternative drinking water sources. No SSAs are present within the project study corridor.

The aquifers beneath the corridor study boundary are used for groundwater withdrawals. MDE has documented numerous groundwater wells within Montgomery and Prince George's Counties, although the majority of these fall in locations far from the corridor study boundary where homes still use well water (MDE, 2015). MDE does not release the exact locations of groundwater wells for landowner privacy and security, therefore the exact location of most wells within the corridor study boundary cannot be determined.

In Maryland, the entire corridor study boundary falls within the service area of the Washington Suburban Sanitary Commission (WSSC), which receives its water from the Potomac River and the Patuxent River. WSSC provides all drinking water within the corridor study boundary. Similarly, in Virginia, the Fairfax County Water Authority serves the areas immediately surrounding the corridor study boundary and receives its water from the Potomac River via the Washington Aqueduct (Fairfax Water, 2018). Less than 20 percent of the population in Fairfax County is served by private wells (VDH, 2019). Groundwater wells within the corridor study boundary that are still in use are generally for commercial and industrial usage, and not used as drinking water. Additional information on Groundwater and Hydrology can be found in the *Natural Resources Technical Report* (**Appendix L, Section 2.5**).

4.14.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact groundwater quality.

All Build Alternatives have the potential to affect groundwater and hydrology in the corridor study boundary, mainly due to highway runoff impacts from stormwater infiltration. Groundwater can be contaminated by roadway runoff which could include substances such as gasoline, oil, and road salts that can seep into the soil and enter the groundwater flow. Soil composition affects how readily contaminants may reach groundwater sources. For example, contaminants are more likely to reach groundwater in sandy soils, which allow more infiltration, than clay soils, which have low infiltration rates. Groundwater wells within the corridor study boundary that are still in use are generally for commercial and industrial usage, and not for drinking water. Consequently, drinking water impacts are not anticipated. Groundwater impacts are highly geographically variable, based on local soil types, slope variability, impervious area, and widespread construction throughout the region. Therefore, groundwater impacts are difficult to quantify and attribute to one source.

4.14.4 Mitigation

During construction activities of any of the Build Alternatives, erosion and sediment (E&S) plans with the most appropriate best management practices (BMPs) would be in place to mitigate potential impacts to groundwater and hydrology by capturing sediment and pollutants before they are released to the

surrounding environment, while also maintaining local groundwater quantities through recharge. The use of the latest stormwater management BMP in design, including wet ponds and bioswales that filter pollutants through vegetation and soil mediums, would help to reduce the potential for contamination of shallow groundwater resources, while promoting infiltration.

4.15 Floodplains

4.15.1 Introduction and Methodology

Floodplains provide numerous natural and beneficial functions including: flood moderation; water impurity and sediment filtration; groundwater recharge; habitat for fish, terrestrial wildlife, and plants; outdoor recreation space; and open space for agriculture, aquaculture, and forestry (USDOT, 1979). Floodplains naturally and economically help to maintain water quality and reduce flood property damage by providing floodwater storage and decreasing water flow velocity and sedimentation. Floodplains also provide protected environments for plants to grow and for fish and other wildlife to breed and forage. In addition to the advantage of flood damage reduction, humans also benefit from floodplains through the agricultural and recreational space they provide (FEMA, 2018).

Executive Order 11988, USDOT Order 5650.2, and the National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 et. seq. govern the construction and fill within floodplains. Floodplains are governed by local Flood Insurance Programs and supervised by the Federal Emergency Management Agency (FEMA). MDE houses Maryland's Coordinating Office for the National Flood Insurance Program (NFIP) and is responsible for coordination of all state floodplain programs in Maryland under the Maryland Model Floodplain Management Ordinance (MDE, 2014). Impacts to the 100-year floodplain must be included in the Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland and coordinated through MDE's Water Management Administration – Regulatory Services Coordination Office. Regulatory authority for floodplain impacts includes Section 404 of the CWA; §5-501 through 514, Environment Article, Md. Code Ann.; and COMAR 26.17.04 (Construction on Nontidal Waters and Fllodplains) (MDOT, 2015). Work within floodplains on NPS lands must adhere to NPS Floodplain Management DO #77-2 unless exempted. In Maryland, Waters of the State include the 100-year floodplain. The VDCR floodplain management program and Virginia Department of Transportation (VDOT) construction specifications for roadways also address roadway construction within floodplains. Fairfax County Floodplain Regulations are more stringent than the Federal minimum requirements of the NFIP. Activities within their floodplains may require written approval from the Fairfax County Department of Public Works and Environmental Services, or a Special Exception approval issued by the Board of Supervisors (Fairfax County, 2018c). Floodplain approvals will be obtained by the appropriate jurisdiction. The Study will meet floodplain requirements.

Floodplains within the corridor study boundary were identified using Maryland iMap and the FEMA Effective Floodplain GIS layer. Acreage of the 100-year floodplains within the Build Alternative LODs were calculated using GIS. Floodplain analysis will be conducted at a later stage of design.

4.15.2 Affected Environment

The corridor study boundary overlaps the FEMA 100-year floodplains of 21 stream systems to varying degrees. **Table 4-23** lists each stream and the location where its associated floodplain crosses or enters the corridor study boundary. All FEMA 100-year floodplains within the corridor study boundary are

depicted on the *Environmental Resource Mapping* (**Appendix D**) of this document and the *Appendix B of the Natural Resources Technical Report* (**Appendix L**).

Table 4-23: Waterways and Associated Floodplains within the Corridor Study Boundary

Name of Associated Waterway	Location Where Floodplain Crosses Corridor Study Boundary
Muddy Branch	Crosses under I-270, north of I-370 interchange and enters SE of I-270/ Muddy Branch Road intersection
Watts Branch	Crosses under I-270, NW of West Montgomery Avenue interchange
Unnamed Tributary to Watts Branch	Small area between I-270 and Watts Branch Parkway near Fallswood Court
Cabin John Creek	Enters NE portion of I-270/Montrose Road interchange, enters south of the I-495/Cabin John Parkway, crosses the I-495/Cabin John Parkway interchange, enters southwest of I-495/River Road interchange
Booze Creek	SW of the I-495/Cabin John Parkway
Unnamed Tributary to Old Farm Creek	Small area between I-270 and Windermere Court
Thomas Branch	Follows Thomas Branch from I-270 Spur S at Democracy Blvd (starting at NE corner of interchange), south along I-495 to the River Road interchange where it meets Cabin John Creek
Potomac River	At the Maryland/Virginia border
Rock Run	Northwest of I-495/Clara Barton Parkway interchange
Rock Creek	Along 495 from I-270 to Jones Mill Road
Sligo Creek	Crosses under I-495 at Sligo Creek Parkway
Northwest Branch Anacostia River	Crosses under I-495 at Northwest Branch Stream Valley Park
Paint Branch	Crosses under I-495/I-95 interchange
Little Paint Branch	Crosses under I-495 west of the I-495/Baltimore Avenue interchange
Indian Creek	Crosses under I-495 east of the Greenbelt Metro station
Unnamed Tributary to Paint Branch	Crosses under MD 295 in Greenbelt Park (south of I-95/MD 295 interchange) and I-495 at Kepner Court and Lake Park Drive. Enters southeast portion of I-495/ MD295 interchange.
Beaverdam Creek	Crosses under US 50 west of the US 50/I-495 interchange
Bald Hill Branch	Crosses under US 50 east of the US 50/I-495 interchange
Southwest Branch Western Branch Patuxent River	Crosses under through southern portion of MD 214/I-495 interchange
Ritchie Branch	Crosses under I-495 near Kaverton Road
Henson Creek	Crosses under I-495 at Suitland Parkway and again at west of Branch Avenue

4.15.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact the 100-year floodplain within the corridor study boundary.

The 100-year floodplain impacts presented in **Table 4-24** represent the estimated footprint of fill areas associated with construction of the Build Alternatives. Actual analysis of potential study related changes to hydraulic function and elevation of floodplains would be determined using hydraulic and hydrologic floodplain modeling as part of the engineering process for each structure in later phases of design. In

general, construction of roadway improvements across drainageways and in floodplains may lead to increases in floodplain elevation and size, which would be addressed by adjusting stormwater structures to ensure that no property damage or impacts to other natural resources result. Portions of the I-495 roadway are already significant encroachments according to 23 CFR §650.105(q). The proposed expansion of the roadway would increase the size of existing significant encroachment areas, but would not propose significant encroachment in new areas.

Table 4-24: Impacts to FEMA 100-Year Floodplain in Acres

Resource	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
FEMA 100-Year Floodplain (acres)	114.3	119.5	116.5	120.0	119.5	119.9

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

Section 14 of the Rivers and Harbors Act of 1899, as amended and codified in 33 U.S.C 408 (Section 408) regulates alteration of USACE civil work's projects, such as dams, levees, or flood channels. One Section 408 resource was identified by USACE near the corridor study boundary, the Washington Aqueduct, adjacent to the Clara Barton Parkway near the Potomac River. This feature would not be impacted by any of the Build Alternatives.

4.15.4 Mitigation

FEMA 100-year floodplain impacts were avoided and minimized to the greatest extent practicable based on the preliminary design while also minimizing increases to flooding levels. Impacts to large vegetated floodplains such as Rock Creek were avoided and minimized to maintain hydrologic function as well as wildlife habitat. A detailed hydrologic and hydraulic (H&H) study would be prepared during final design to identify the existing storm discharge and floodplain impacts. All construction occurring within the FEMA designated floodplains must comply with FEMA-approved local floodplain construction requirements. These requirements consider structural evaluations, fill levels, and grading elevations. Stormwater Management would be provided and all hydraulic structures would be designed to accommodate flood volumes without causing substantial impact. Culverts and bridges would be designed to limit the increase of the regulatory flood elevation to protect structures from flooding risks, and the use of standard hydraulic design techniques for all waterway openings would be utilized where feasible to maintain current flow regimes, limit upstream flooding, and preserve existing downstream flow rates (COMAR 26.17.04). The use of state-of-the-art erosion and sediment control techniques and stormwater management controls would also minimize the risks or impacts to beneficial floodplain values due to encroachments.

If H&H studies find that the flood elevation would change, floodplain storage mitigation will be implemented, if required. SHA will submit project plans to MDE for approval of structural evaluations, fill volumes, proposed grading evaluations, structural flood-proofing, and flood protection measures in compliance with FEMA requirements, USDOT Order 5650.2, *Floodplain Management and Protection*, and Executive Order 11988. Improvements at existing culverts are required to maintain existing 100-year high water elevations. At new culverts, 100-year high water elevation is required to be contained within either right-of-way or permanent easement. Culvert improvements and new culvert design would ensure that flood risk to adjacent properties is not increased, a requirement of COMAR 26.17.04.11. 23

CFR § 650.115(a) will be consulted when determining design standards for flood control measures. The requirement set forth in 23 CFR § 650.111 will be complied with at later stages of design to complete location hydraulic studies for floodplain encroachment areas. Any significant encroachments associated with the Preferred Alternative will include a finding by FHWA in the FEIS that the proposed significant encroachment is the only practicable alternative. This finding will be supported by the three elements of 23 CFR § 650.113(a).

4.16 Vegetation and Terrestrial Habitat

4.16.1 Introduction and Methodology

Terrestrial habitats identified within the corridor study boundary include: forests, urban and maintained areas, agricultural lands, open fields, and barren lands. While some wetlands have adjacent terrestrial zones, they are considered a separate and distinct habitat type for the purposes of this document and are discussed in **Section 4.12** of this chapter.

Forest is the most common terrestrial habitat within the corridor study boundary. COMAR (2016) defines a forest as, "a biological community dominated by trees and other woody plants covering a land area of 10,000 SF or larger. It includes areas that have at least 100 trees per acre with at least 50 percent of those having a two-inch or greater diameter at breast height (DBH), and forest areas that have been cut but not cleared (08.19.03.01, Article 2.17)." State-funded highway construction projects that involve cutting and clearing of forests are regulated under Maryland Reforestation Law, a regulation created to protect Maryland forests and mitigate for the loss of forest cover. Virginia Department of Forestry (VDOF) regulates the use of Virginia state forests.

Individual forest stand data was not able to be collected in the field for the Study due to the large extent of the study area. However, GIS forest cover data from the Chesapeake Conservancy Conservation Innovation Center's High Resolution Land Cover Data for tree canopy cover and the most recent data from the Virginia Department of Forestry (VDOF) 2005 Virginia Forest Cover dataset (VDOF, 2014), were used to identify forest coverage within the corridor study boundary. Data from the 2006 MDOT SHA Draft Capital Beltway Study Natural Environmental Technical Report (NETR) and the 2017 MDOT SHA I-270 ICM Project provide vegetation cover type information that remains applicable within the Maryland portions of the corridor study boundary. Land cover types were identified according to the Anderson Land Use Classification System (Anderson et al., 1976). Forests were classified by cover types in the 2006 and 2017 studies in accordance with "Forest Cover Types of the United States and Canada" (Eyre, 1980) and associations in accordance with the "Vegetation Map of Maryland" (Brush et al., 1976). The aerial extent of vegetation cover within the corridor study boundary was identified using GIS data obtained from the Chesapeake Conservancy Conservation Innovation Center's High Resolution Land Cover Data for tree canopy cover and the VDOF 2005 Virginia Forest Cover dataset (VDOF, 2014). This information was collectively used to determine forest cover within the corridor study boundary.

As noted above, VDOF regulates the use of state forests. No state forests exist within the Virginia portion of the corridor study boundary. The only forest resources within the corridor study boundary in Virginia are on NPS property and Scott's Run Nature Preserve, owned by Fairfax County Park Authority. Park Use Permits would require coordination and application with the Fairfax County Park Authority for construction within parkland, including removal of trees and vegetation. Any impact to forests on NPS lands must be coordinated directly with the NPS.

Existing county and state forest conservation easement locations within the corridor study boundary were determined using MD iMap data and through coordination with the counties and MDNR. Land cover types were identified according to the Anderson Land Use Classification System.

4.16.2 Affected Environment

The following terrestrial land cover types were identified within the corridor study boundary in the 2006 and 2017 studies: residential; commercial and services; industrial; transportation, communication, and utilities; industrial and commercial complexes; mixed urban or built-up land; cropland and pasture; orchards, groves, vineyards, nurseries, and ornamental horticultural areas; strip mines, quarries, and gravel pits; open fields/meadows/grasslands, scrub/shrub lands; and deciduous, evergreen, and mixed forests. Forest is the most common terrestrial habitat.

Larger forested areas within the corridor study boundary are found on parkland and within stream valleys, with smaller areas of mostly disturbed vegetation occurring in residential and commercial areas. MDOT SHA planted thousands of trees within the corridor study boundary under the Chesapeake Bay TMDL Tree Program and the MD 200 Intercounty Connector (ICC) Project Mitigation Program, with the goal of establishing new forested areas to mitigate for stormwater runoff and MDOT SHA project construction impacts. TMDL tree planting sites are located in interchanges throughout the corridor study boundary, with the majority of sites located in Prince George's County.

In accordance with Maryland Reforestation Law, reforestation areas were established within the MDOT rights-of-way along I-495 and I-270 to mitigate for forest impacts associated with ICC construction. Two reforestation sites are located in the Montgomery County portion of the corridor study boundary in the eastern clover leaf of the I-270/Shady Grove Road interchange and the northern clover leaf of the I-495/Connecticut Avenue interchange. No reforestation areas were identified by VDOT within the Virginia portion of the corridor study boundary.

Other terrestrial vegetation and habitat areas of note are summarized within the *Natural Resources Technical Report* (**Appendix L, Section 2.7**) include MDOT SHA reforestation areas, Maryland county forest conservation easements, VDOF open space easements, and forests found on national/state/county parkland. The only forest resources with the corridor study boundary in Virginia are on NPS property and Scott's Run Nature Preserve.

4.16.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact terrestrial habitats, including forests, conservation easements, or reforestation sites.

Construction of any of the Build Alternatives would involve the physical removal and disturbance of vegetated areas, including forests, within the LOD due to clearing and grading of land needed for construction of highway travel lanes; highway interchanges and ramps; noise barriers; and construction of required stormwater management, among other construction related activities. Forest canopy impacts under the Build Alternatives would range from 1,477 to 1,515 acres, depending on the alternative. Impacts to Forest Conservation Act easements, including state and county-owned easements, would range from 18.6 to 20.8 acres under the Build Alternatives. **Table 4-25** summarizes impacts to forested areas based on forest cover by Build Alternative and **Table 4-26** summarizes the tree canopy cover impacts on NPS properties.

Table 4-25: Impacts to Forests in Acres

Resource	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alt 13C
Forest Canopy	1,434	1,497	1,477	1,515	1,489	1,503
Forest Conservation Act Easements[3]	17.2	19.3	18.6	20.8	18.8	19.7
TMDL Reforestation Sites[4]	60.7	60.7	60.7	60.7	60.7	60.7
ICC Reforestation Sites	4.6	4.6	4.6	4.6	4.6	4.6

Notes: [1]MDOT SHA and FHWA determined Alternative 5 is not a reasonable alternative, but it is included in the DEIS for comparison purposes only. [2]Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts. [3] Forest Conservation Easement impacts include both county and state forest conservation easements. [4]MDOT SHA planted thousands of trees within the corridor study boundary under the Chesapeake Bay TMDL Tree Program and the Intercounty Connector (ICC) Project Mitigation Program, with the goal of establishing new forested areas to mitigate for stormwater runoff and project construction impacts.

Table 4-26: Tree Canopy Cover Impacts on NPS Properties in Acres

NPS Property	Potential Impacts from the Alternatives 8, 9, 9M, 10, 13B, 13C (Acres)
George Washington Memorial Parkway	9.3
Chesapeake and Ohio Canal National Historical Park	16.6
Clara Barton Parkway	1.2
Baltimore-Washington Parkway	47.0
Greenbelt Park	0.8
Suitland Parkway	1.3
TREE CANOPY COVER TOTAL[1] IMPACTS ALL NPS PROPERTIES (ACRES)	**76.2**

Note: [1] The total reflects no overlapping areas and is not a sum of the individual property totals.

Direct forest and tree impacts would include tree removal, critical root zone (CRZ) disturbance, tree canopy/limb damage, soil compaction, changes in soil moisture regimes due to grading operations and other construction-related activities, and sunscald and windthrow of individual trees growing along the newly exposed edges of retained forested areas. Indirect impacts to vegetated areas could result from increased roadway runoff, sedimentation, and the introduction of non-native plant species within disturbed areas. These indirect impacts could lead to terrestrial habitat degradation within the corridor study boundary, and ultimately a decrease in plant and animal species that inhabit these areas.

Impacts to contiguous forest areas, such as Forest Interior Dwelling Bird Species (FIDS) habitat areas, increase habitat fragmentation and edge to interior ratio, which has the potential to negatively impact wildlife species that rely on these forested corridors as habitat. Many wildlife species in the Washington DC metropolitan region rely on forested corridors to move safely within an otherwise urbanized environment. Impacts to potential FIDS habitat would be due to widening of the existing highway, resulting in slightly contracted forest interiors required by FIDS species, but most of these impacts would not result in new edge habitat that would occur from bisecting the FIDS habitat. A few contiguous forested areas within the study corridor would be bisected, such as those along the George Washington Memorial Parkway, which would result in increased edge habitat. Increased edge habitat supports species common to developed areas such as deer and red-tailed hawks, but impacts populations that rely on mature forests such as barred owls and scarlet tanagers, thereby reducing biodiversity. Increased deer habitat within an

urbanized setting promotes unhealthy population growth and can pose a roadway hazard by increasing deer-related automobile accidents. Increased edge-to-interior ratio in forests also results in increased introduction of invasive plant species, resulting in lower plant biodiversity and fewer native plant species that support native wildlife.

4.16.4 Mitigation

Avoidance and minimization efforts to reduce forest impacts will involve a two-tiered approach. The first level will occur during the planning stage where every reasonable effort will be made to minimize disturbance to or removal of forest and trees by minimizing the LODs of the Build Alternatives. The second level of additional avoidance and minimization will occur during final design. Cost reduction related to tree removal and replacement provide incentive for the Developers to reduce impacts to resources, but due to the fixed nature of the highway corridor, opportunities for avoidance and minimization of impacts to roadside forest and tree resources are limited.

Unavoidable impacts to forest from the Study will be regulated by MDNR under Maryland Reforestation Law. Forest impacts must be replaced on an acre-for-acre or one-to-one basis on public lands, within two years or three growing seasons of project completion (MDNR, 1997). The Maryland Reforestation Law hierarchy for mitigation options is on-site planting, then off-site planting on public lands within the same county and/or watershed. If planting is not feasible, there is the option to purchase credits from forest mitigation banks, or to pay into the state Reforestation Fund at a rate of ten cents per square foot or $4,356 per acre. As such, MDOT SHA would first be required to find available public land to be reforested within the same county and/or watershed. If this is not possible, MDOT SHA could purchase credits in a forest mitigation bank or pay into the MDNR Reforestation Fund. The Maryland Reforestation Fund is used by DNR to plant replacement trees.

The only forest resources within the corridor study boundary in Virginia are NPS property and Scott's Run Nature Preserve. Mitigation for any impacts to these forests would require specific coordination with NPS and VDCR. No Virginia Department of Forestry open space easements or Agricultural/Forested Districts are located within the corridor study boundary.

Specific mitigation requirements for impacts to Forest Conservation Easement areas, Reforestation Areas, State Parks, county parks, or NPS lands are discussed in further detail within the *Natural Resources Technical Report* (**Appendix L, Section 2.7**) and will be developed in coordination with the appropriate regulatory agency (e.g., MDNR, NPS, Virginia Department of Conservation and Recreation (VDCR)).

4.17 Terrestrial Wildlife

4.17.1 Introduction and Methodology

The protection of all migratory birds is governed by the Migratory Bird Treaty Act (16 U.S.C. 703-712), under which it is illegal to "take, kill, possess, transport, or import migratory birds or any part, nest, or egg of any such bird" unless authorized by a valid permit (16 U.S.C. 703). A list of migratory birds protected by the Migratory Bird Treaty Act (MBTA) is included in 50 CFR 10.13, and includes most species within Maryland and Virginia including the peregrine falcon.

The conservation of terrestrial wildlife is managed in both Maryland and Virginia through the implementation of state wildlife action plans (SWAP). The SWAP was initiated by the USFWS in 2005 to have states track wildlife species to determine those species of greatest conservation need (SGCN).

In Maryland, Colonial Water Bird Nesting Areas and FIDS are regulated as protected resources within the Chesapeake Bay Critical Area (Critical Area) (COMAR 27.01.09.04). Additionally, the MDNR and USFWS track these species to ensure their populations remain viable and do not become threatened or endangered. Examples of colonial water birds include black-crown night-heron (*Nycticorax nycticorax*), snowy egret (*Egretta thula*), and black skimmer (*Rynchops niger*). Examples of FIDS include red-shouldered hawk (*Buteo lineatus*), barred owl (*Strix varia*), pileated woodpecker (*Dryocopus pileatus*), and scarlet tanager (*Piranga olivacea*).

FIDS habitat was identified by estimating the size of forest patches within the corridor study boundary from aerial photography. (Refer to the *Environmental Resource Mapping* in **Appendix D** of this document.) FIDS habitat typically includes contiguous forest of at least 50 acres with at least 10 acres of forest interior habitat or riparian forests at least 50 acres in size with a width of at least 300 feet. Forest interior habitat is defined as forest at least 300 feet from the nearest forest edge. Regulated FIDS habitat includes documented FIDS breeding areas within existing riparian forests that are at least 300 feet in width and that occur adjacent to streams, wetlands, or the Chesapeake Bay shoreline, and other forest areas used for breeding by FIDS (Jones et al., 2000). Those patches that met the definition of FIDS habitat as defined above, were considered FIDS habitat for the purposes of this Study. There are no designated Critical Areas within the corridor study boundary, and FIDS are not specifically regulated outside of the Critical Area; however, MDNR encourages avoidance of impacts to FIDS habitat throughout the state, including those associated with transportation improvements.

Several types of amphibians are obligate vernal pool species, meaning that they must use temporary pools during a portion of their life stage. In Maryland, vernal pools may or may not be regulated by the USACE under Section 404, depending upon their position within the landscape, duration of inundation, and connection or lack thereof to Waters of the US. Because vernal pools are necessarily ephemeral in nature, they may not hold water long enough to create hydric soil conditions. The presence of vernal pool amphibian species discussed in **Section 4.17.2** is based upon the availability of vernal pool habitat within the corridor study boundary, as observed and mapped during fieldwork for the I-495 & I-270 Managed Lanes Study, and information gathered from Cunningham and Nazdrowicz (2018).

Data on wildlife habitat and documented wildlife species within the corridor study boundary were collected through aerial imagery of vegetative cover and incidental observations of wildlife species and related habitat made during various natural resource field investigations (e.g., wetland delineations) for the Study.

4.17.2 Affected Environment

Terrestrial wildlife expected within the corridor study boundary reflect the availability of various natural and man-modified habitats across a wide swath of the western Coastal Plain and eastern Piedmont physiographic provinces. Because most of the area adjacent to the existing highway corridors is urbanized, natural habitats along the corridors are comprised of a mix of scattered, small, remnant patches of forest and disturbed old fields. Man-modified open agricultural lands were observed within the corridor study boundary. A complete list of wildlife species identified within the corridor study boundary during wetlands and waterways delineation is included in the *Natural Resources Technical Report* (**Appendix L, Section 2.8**).

MDNR indicated in an email on February 28, 2020, included in *Appendix N of the Natural Resources Technical Report* (**Appendix L**), that MDNR no-longer tracks bald eagle nests and that although this species is no-longer listed by the state, it is protected under the Federal Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c).

USFWS responded to MDOT SHA's request for information regarding potential bald eagle nest locations within the proximity of the corridor study boundary and potential protection measures for the peregrine falcons nesting on the American Legion Bridge during bridge replacement on May 13, 2020 and this correspondence is included in *Appendix N of the Natural Resources Technical Report* (**Appendix L**). USFWS reports that there have been no bald eagle nests identified within the corridor study boundary and that the nearest nest is more than eight miles away.

Peregrine falcons began nesting at the American Legion Bridge (ALB), the bridge that spans the Potomac River, in 2007 (USFWS. C. Koppie, 2007 MD Peregrine Falcon Annual Nest Survey). When MDOT SHA initiated a contract for bridge painting and maintenance, it became apparent that peregrine falcon nesting attempts would be unsuccessful. Soon after, MDOT SHA formed a partnership with USFWS and MDNR to protect and promote more favorable conditions for nesting falcons on the ALB over the Potomac River. Through this partnership MDOT SHA constructed and installed a nest box platform to ensure long term protection for nesting peregrine falcons on the ALB. The falcon pair has been successfully using the nest box for 12 consecutive years (USFWS. Koppie, C.A, 2019 MD Peregrine Falcon Nest Survey). A peregrine falcon nest box is installed on the underside of the American Legion Bridge, spanning the Potomac River, which is proposed to be replaced as part of the Study. MDOT SHA has coordinated with USFWS to determine appropriate conservation measures for the peregrine falcons during potential bridge replacement.

Six Species of Greatest Conservation Need (SGCN) were observed within the corridor study boundary, including eastern box turtle (*Terrapene carolina*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), American kestrel (*Falco sparverius*), chimney swift (*Chaetura pelagica*), and magnolia warbler (*Setophaga magnolia*).

Vernal pool amphibians are another specialized group of wildlife potentially occurring within the corridor study boundary. Vernal pools are temporary pools that typically retain water only during winter and spring and are dry by mid-summer. Vernal pools do not support fish, allowing specialized frog and salamander species to exploit a predator-free breeding and early life stage environment. Species that rely completely on vernal pools for reproduction that could occur within the corridor study boundary include marbled salamanders (*Ambystoma opacum*), spotted salamanders, (*Ambystoma maculatum*) and wood frogs (*Lythobates sylvaticus*). Vernal pool habitat exists within the corridor study boundary as natural or man-modified shallow depressions that appear to hold water only for a temporary period of time. The Rock Creek floodplain had the most mapped potential vernal pools within the corridor study boundary. No obligate vernal pool species were incidentally observed during the study.

4.17.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact wildlife.

There would be wildlife impacts from construction of any of the Build Alternatives, as each alternative would involve widening along the existing highways. Therefore, clearing of small forest fragments and encroachments on larger forest resources would result in displacements of some edge-adapted species, but would not result in substantial loss of terrestrial wildlife habitat. Typically, forests along the corridor study boundary are early- to mid-successional (MDOT SHA, 2006) and many areas would regain functionality due to replanting requirements. The Build Alternatives could potentially contribute contaminants to remaining wildlife habitat through pollutant runoff.

Bald eagles are not expected to be impacted by the Study, because USFWS has indicated that no bald eagle nests have been identified within the corridor study boundary. One peregrine falcon pair has been documented to have successfully nested on the American Legion Bridge for 12 consecutive years (USFWS. Koppie, C.A, 2019 MD Peregrine Falcon Nest Survey). The replacement of the ALB would be expected to disturb nesting of the resident peregrine falcons.

The Study is not located within the Critical Area; therefore, no Colonial Water Bird Nesting Areas are anticipated to appear or be affected within the corridor. There would be impacts to potential FIDS habitat within the corridor study boundary from the Build Alternatives. Alternative 9M has fewer impacts than Alternatives 8, 9, 10, 13B, and 13C, as summarized in **Table 4-27**. Impacts to potential FIDS habitat would be due to widening of the existing highway, resulting in slightly contracted forest interiors required by FIDS species, but would not result in new edge habitat in most cases, as would occur from bisecting the FIDS habitat.

Table 4-27: Impacts to Forest Interior Dwelling Species Habitat in Acres

Resource	Alt 5[1]	Alts 8 and 9[2]	Alt 9M	Alternative 10	Alternative 13B	Alternative 13C
Potential FIDS Habitat	25.2	27.7	26.6	27.7	27.7	27.7

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

Most of these impacts would be to smaller, upland forest stands resulting in reductions in available edge habitat, rather than complete elimination of habitat. Therefore, some less mobile wildlife could be killed during construction and other more mobile species would be shifted away from the new construction, potentially into already occupied territories requiring further movement into unoccupied suitable habitat, if available. It is also possible that these wildlife movements would be onto existing roadways resulting in potential mortality from vehicle strikes, posing threats to both wildlife and drivers. This effect would likely be most pronounced within the smallest forest stands where remaining habitat may be too small to support populations. The vast majority of wildlife-vehicle collisions reported in the US involve deer, as they are most likely to cause human injury and vehicle damage due to their size, use of edge habitats adjacent to roadways, and prevalence (FHWA,[45] 2008).

4.17.4 Mitigation

Impacts to terrestrial wildlife would be unavoidable if a Build Alternative is selected, primarily due to the associated reduction in the availability of vegetated habitat. Impacts to wildlife are anticipated to be

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

minimal since the Study would improve an existing roadway corridor primarily populated by edge and disturbance acclimated species. In addition, impacts to potential FIDS habitat would be minimal, resulting from slightly impacted forest interiors. Efforts to avoid and minimize forest impacts are discussed in Section 4.16.4 in this chapter. To minimize vehicle collisions with large animals, MDOT SHA would also investigate options such as fencing and landscaping. In addition, the use of erosion and sediment control BMPs would help to minimize pollutant runoff into surrounding wildlife habitat.

To minimize potential impacts to the currently nesting peregrine falcons, USFWS recommends that MDOT SHA remove the existing peregrine falcon nest box on the American Legion Bridge just prior to the nesting season when construction is scheduled to begin. Disruption for one or more nesting season due to long-term construction activities is anticipated. Once construction activities are mostly complete near the former nest site, MDOT SHA will reinstall the nest box on the bridge in coordination with USFWS. MDOT SHA will follow the USFWS recommendation to contact USFWS just prior to construction to confirm the absence/presence of bald eagle nests located within the corridor study boundary.

4.18 Aquatic Biota

4.18.1 Introduction and Methodology

Fish and shellfish species are protected through Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and MDNR Fishery Management Plans. Existing data on aquatic biota within the corridor study boundary were gathered from Montgomery County Department of Environmental Protection (MCDEP), Prince George's County Department of the Environment (PGDoE), Maryland Biological Stream Survey (MBSS), MDOT SHA, Fairfax County Department of Public Works and Environmental Services (FCDPWES), Virginia Department of Game and Inland Fisheries (VDGIF), and VDEQ, all of which conduct periodic monitoring of stream habitat, benthic macroinvertebrates, and/or fish within the vicinity of the corridor study boundary. Additionally, MDOT SHA requested information from MDNR Environmental Review Program (ERP) and MDNR Wildlife and Heritage Service (WHS) regarding the presence of sensitive species and other natural resources within the corridor study boundary.

A variety of indices and data measurement techniques were used to analyze metrics for aquatic habitat, fish assemblages and benthic macroinvertebrate communities. These methods, together with the qualitative meanings of the resulting index values, are described in detail within the *Natural Resources Technical Report* (**Appendix L, Section 2.9**).

4.18.2 Affected Environment

No Essential Fish Habitat (EFH) was identified within the study corridors, therefore the MSFCMA does not apply to this Study. MDOT SHA requested information from the MDNR Environmental Review Program (ERP) regarding the presence of protected aquatic species within the corridor study boundary. MDNR ERP provided feedback in a response letter dated January 10, 2019 that included a list of fish species likely to occur within the waterbodies crossed by I-495 and I-270 and time of year restrictions for instream work to minimize impact to these species. A copy of this letter is included in *Appendix N of the Natural Resources Technical Report* (**Appendix L**) and the Study will comply with all time of year restrictions for construction activities within stream channels to protect fish species that are included in this correspondence.

Three parameters were evaluated for each of 15 MDNR 12-digit watersheds and areas in the USGS HUC8 Fairfax County Middle Potomac watershed within the corridor study boundary: aquatic habitat, benthic

macroinvertebrates, and fish. Aquatic habitat quality was quantified using the EPA Rapid Bioassessment Protocol (RBP), which uses a numerical index ranking scale from 0 (Poor) to 200 (Excellent). Benthic macroinvertebrates and fish were assessed using various Indices of Biological Integrity (IBI), with scores ranging from Very Poor to Excellent. The *Natural Resources Technical Report* (**Appendix L**) expands upon the different IBIs used and the significance of the scores. A summary of the quality index score results (numerical range) for each of the parameters within the assessed watersheds is provided in **Table 4-28**. The total number of waterways within each watershed that were evaluated varied depending on data availability. Detailed information, broken down by waterway, is provided within the *Natural Resources Technical Report* (**Appendix L, Section 2.9**).

Table 4-28: Summary of Watershed Quality Index Narrative Score Results

Watershed	Aquatic Habitat (RBP Score Range)	Benthic Invertebrates (IBI Score Range)	Fish (IBI Score Range)
Fairfax County Middle Potomac	Fair – Good	Very Poor - Poor	Very Poor
Potomac River/Rock Run	Good	Poor - Fair	Fair - Good
Cabin John Creek	Fair – Good	Very Poor – Poor/Fair	Poor – Fair/Good
Rock Creek	Fair – Good/Fair	Very Poor – Poor/Fair	Very Poor - Good
Sligo Creek	Fair – Good/Fair	Poor	Poor - Fair
Northwest Branch	Good/Fair – Excellent/Good	Poor - Fair	Fair - Good
Paint Branch	Severely Degraded – Partially Degraded	Very Poor – Fair	Good
Little Paint Branch	Degraded – Minimally Degraded	Poor - Fair	Good
Northeast Branch	Severely Degraded – Partially Degraded	Poor - Fair	Poor
Bald Hill Branch	Severely Degraded	Very Poor - Fair	No Data
Upper Beaverdam Creek	Severely Degraded – Partially Degraded	Very Poor - Fair	Very Poor - Fair
Upper Southwest Branch	Severely Degraded – Partially Degraded	Very Poor - Poor	Fair
Lower Southwest Branch	Degraded	Poor - Fair	No Data
Upper Henson Creek	Severely Degraded – Partially Degraded	Very Poor - Fair	Very Poor - Good
Watts Branch	Fair – Good	Fair	Fair - Good
Muddy Branch	Fair – Good	Poor - Fair	Fair - Good

A list of fish species found within the assessed watersheds within the corridor study boundary is found in the *Natural Resources Technical Report* (**Appendix L, Section 2.9**). The highest number of fish species (33) were found within the Cabin John Creek Watershed.

4.18.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact aquatic biota.

All Build Alternatives have the potential to affect aquatic biota in the corridor study boundary due to direct and indirect impacts to perennial and intermittent stream channels. Stream channel impacts associated with the Build Alternatives range from 155,229 to 156,984 linear feet, and wetland impacts range from 16.1 to 16.5 acres are provided in more detail in **Section 4.12** of this chapter. Impacts to aquatic biota could range from mortality of aquatic organisms during construction of culvert extensions and loss of natural habitat from the placement of culvert pipes and other in-stream structures, to more gradual changes in stream conditions. Impacts to aquatic biota, including species of freshwater mussels, are possible from the replacement of bridges and their in-water piers. Replacement of the American Legion Bridge crossing the Potomac River will require extensive in-stream work and all required precautions will be taken to avoid and minimize impacts to the stream and its aquatic biota.

During construction of culvert extensions, the associated stream channel is excavated and any organisms living within the stream channel would be displaced or crushed by construction equipment. The primary impact from this activity would be to benthic organisms, such as macroinvertebrates, that are relatively stationary. However, fish mortality is also a possibility as they can be trapped in pools during dewatering of the channel. Even if a natural stream bottom is reestablished within the culvert, the habitat is unlikely to support the same fish or macroinvertebrate community present before construction as culverts are relatively straight and typically do not allow for the development of the varied habitat of an unrestrained channel. In the majority of the impacted streams, the area of channel disturbance for the culvert extension is relatively small in comparison to the remaining habitat available. In addition to displacement and habitat alteration, decreased aquatic organism passage could result from the extension of culverts. Other temporary impacts to aquatic biota related to construction include the potential for unintentional sediment discharges that degrade aquatic habitat and impair aquatic communities. Additionally, the conversion of open-space and forested areas to impervious surfaces has the potential to have a wide range of impacts on corridor study boundary streams and their inhabitants. **Table 4-29** identifies the additional impervious surface impacts by watershed. Additional impervious surface includes all new impervious surface outside of the existing roadway footprint.

Impervious surface creation is unavoidable when widening a roadway. Converting open space and forested areas to impervious surfaces increases hydrologic flashiness, or the change in flow rate of surface waters from the input of surface water runoff. Flashy systems contribute to bank erosion and channel incision, resulting in disconnection of stream channels from their floodplains; increased sediment loading; degraded physical habitat; and changes in channel morphology. Disconnection from the floodplain effects water quality by eliminating water filtration by floodplain wetlands from the system. Poor water quality has detrimental effects on aquatic biota by negatively impacting their health and limiting which species can survive in a given system. Bank erosion contributes to sedimentation and can also uproot riparian trees, effecting the width of the riparian forest, which effects water temperature and quality, and creating log jams, which can effect stream morphology. Increased sediment loading contributes to turbidity and poor water clarity, which degrades in-water habitat for fish and other aquatic biota such as bottom invertebrates.

Table 4-29: Additional Impervious Surfaces by Watershed

Watershed Name	MDNR 12-Digit Watershed	Alt 5[1]		Alts 8 & 9[2]		ALT 10		ALT 13B		ALT 13C	
		AC	SF	AC	SF	AC	SF	AC	SF	AC	SF
Potomac River/Rock Run	021402020845	9.1	396,479	13.8	599,986	13.8	599,986	13.8	599,986	13.8	599,986
Cabin John Creek	021402070841	64.1	2,791,915	90.4	3,937,384	111.7	4,865,280	80.6	3,510,516	96.4	4,199,977
Rock Creek	021402060836	43.7	1,904,069	56.5	2,460,759	62.9	2,739,693	54.5	2,375,644	58.4	2,542,005
Sligo Creek	021402050821	17.7	770,111	24.5	1,066,885	24.5	1,066,885	24.5	1,066,885	24.5	1,066,885
Northwest Branch	021402050818	16.6	722,856	23.7	1,030,664	23.7	1,030,664	23.7	1,030,664	23.7	1,030,664
Paint Branch	021402050826	24.7	1,077,300	29.2	1,270,058	29.2	1,270,058	29.2	1,270,058	29.2	1,270,058
Little Paint Branch	021402050825	8.4	364,474	10.1	439,088	10.1	439,088	10.1	439,088	10.1	439,088
Northeast Branch	021402050822	64.8	2,823,465	86.3	3,758,473	86.3	3,758,473	86.3	3,758,473	86.3	3,758,473
Upper Beaverdam Creek	021402050816	45.7	1,992,463	51.0	2,219,977	51.0	2,219,977	51.0	2,219,977	51.0	2,219,977
Upper Southwest Branch	021311030924	22.2	967,846	33.1	1,443,606	33.1	1,443,606	33.1	1,443,606	33.1	1,443,606
Lower Southwest Branch	021311030922	15.0	653,087	18.4	800,512	18.4	800,512	18.4	800,512	18.4	800,512
Upper Henson Creek	021402010797	35.3	1,539,708	47.0	2,045,481	47.0	2,045,481	47.0	2,045,481	47.0	2,045,481
Muddy Branch	021402020848	13.4	582,659	14.5	632,307	19.1	830,422	14.9	650,486	18.3	796,919
Watts Branch	021402020846	1.1	47,398	2.9	127,328	7.6	331,873	2.4	102,407	5.4	233,242
Bald Hill Branch	021311030928	0.9	38,634	1.0	42,208	1.0	42,208	1.0	42,208	1.0	42,208
Beaverdam Creek	021402050823	0.0	2,007	0.0	2,007	0.0	2,007	0.0	2,007	0.0	2,007
Nichols Run - Potomac River (Virginia)[3]	N/A	12.9	562,791	14.5	631,590	14.5	631,590	14.5	631,590	14.5	631,590

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

[2] Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts.

[3] Part of the additional impervious surface area is in the Potomac River HUC8 Watershed in Virginia and is not associated with an MDNR 12-digit Watershed.

4.18.4 Mitigation

MDOT SHA will continue to coordinate with regulatory agencies and resource managers to identify sensitive aquatic resources and determine further potential avoidance and minimization as design is refined. Agency recommendations would be evaluated based on engineering and cost effectiveness and would be implemented wherever possible. Avoidance and minimization efforts to date have included alignment shifts, reductions to roadside ditch widths to minimize the overall width of improvements, bridging waterways when feasible, and addition of retaining walls where practicable.

Bridges and depressed culverts would be used wherever possible to maintain natural stream substrate in areas where new or replaced culverts are necessary. However, opportunities for using depressed culverts may be limited because most existing culverts would be extended or augmented rather than replaced. Channel morphology would be evaluated, and culvert extensions designed to maintain aquatic life passage by avoiding downstream scour and channel degradation. Preliminary designs do not include culvert replacements, but do include augmentations resulting from installing new pipes adjacent to existing culverts to provide additional area for flow.

All in-stream work would comply with the stream closure period for the designated use class of the stream, including that for culvert extensions, and any potential waiver requests would require agency approval(s). In-stream work is prohibited in Use I streams from March 1 through June 15, Use III streams from October 1 through April 30, and Use IV streams from March 1 through May 31, to protect aquatic species. In addition, in areas where yellow perch have been documented (Bald Hill Branch and Western Branch of the Patuxent River), no in-stream work is permitted in Use I waters from February 15 through June 15.

In particularly sensitive areas, other impact minimization activities may be considered and could include: more specialized stormwater management options; redundant erosion and sediment control measures; monitoring of aquatic biota above and below sensitive stream crossings before and after construction to quantify any inadvertent impacts that occur at the crossing; fish relocation from dewatered work areas during construction to reduce fish mortality; and use of a qualified environmental monitor on-site to enhance erosion and sediment control compliance. Through the use of erosion and sediment control measures, stormwater management, and other BMPs, MDOT SHA will minimize impacts from any additional impervious area from the proposed project to the greatest extent practicable to avoid further declines in the quality of aquatic habitat and communities.

4.19 Rare, Threatened, and Endangered Species

4.19.1 Introduction and Methodology

A. Regulatory Context

Section 7 of the Endangered Species Act (ESA) of 1973 (16 U.S.C. § 1531-1544) requires all Federal agencies to use their authorities to conserve endangered and threatened species in consultation with the USFWS and/or National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). Section 7(a)(2) (16 U.S.C. § 1536) establishes substantive requirements for Federal agencies to ensure, in consultation with the USFWS, any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any endangered or threatened species or destroy or adversely modify designated critical habitat.

The Section 7 implementing regulations (50 CFR Part 402) specify how Federal agencies must fulfill their Section 7(a)(2) consultation requirements. Section 9 of the ESA (16 U.S.C. § 1538) prohibits any action that causes a "take" of species listed as endangered or threatened. "Take" is further defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt any of these. The USFWS administers the ESA for all terrestrial and nontidal freshwater species, while the NMFS administers the ESA for marine and anadromous species or critical habitat. While there are no tidal areas within the corridor study boundary, NMFS also regulates effects to other trust resources, such as anadrous fish species, estuaries, and EFH. The Fish and Wildlife Coordination Act (FWCA) requires consultation with the NMFS to address impacts to fish and aquatic resources under their jurisdiction. The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires consultation with NMFS to address effects to fish and EFH identified under the MSFCMA. These resources are discussed in **Section 4.18**.

Although the bald eagle (*Haliaeetus leucocephalus*) is no longer a listed species under the ESA, it is still protected under the Bald and Golden Eagle Protection Act (16 U.S.C. § 668-668c). The Bald and Golden Eagle Protection Act prohibits the take, possession, sale, purchase, barter, transport, export, or import of any bald or golden eagle (alive or dead), including any part (such as feathers), nest, or egg without a valid permit issued by the Secretary of the Interior (50 CFR 22.3). MDOT SHA's position is that the MLS is not an activity that deliberately intends to kill or take migratory birds. MDOT SHA coordinated with USFWS to determine whether any bald eagle nests occur within the corridor study boundary.

The Maryland Nongame Endangered Species Conservation Act (Md. Code Ann., Nat. Res., § 10¬2A¬01 through 09) regulates activities that impact plants and wildlife, including their habitats, listed on the Maryland Threatened and Endangered Species list. Protections under the Act are for species listed as Endangered, Threatened, or In Need of Conservation (animals only). Endangered species are those whose continued existence in Maryland is in jeopardy. Threatened species are those that are likely, in the foreseeable future, to become endangered in Maryland. Species with a status of In Need of Conservation are animals whose populations are limited or declining in Maryland such that the species may become threatened in the foreseeable future if current trends or conditions persist. Any Federal, state, local, or private constructing agency is required to cooperate and consult with MDNR regarding: the presence of listed species within a project area, field verification of habitat and/or populations of listed species, and avoidance and minimization efforts, as appropriate.

The Virginia Department of Agriculture and Consumer Services (VDACS), Virginia Department of Game and Inland Fisheries (VDGIF), and VDCR cooperate in the protection of Virginia's state and Federally listed threatened and endangered species. Threatened and endangered wildlife species are protected under the Virginia Endangered Species Act of 1972 (Chapter 5 Wildlife and Fish Laws; Va. Code Ann., § 29.1¬563 through 570). Virginia's threatened and endangered plant and insect species are protected under the Endangered Plant and Insect Species Act of 1979 (Chapter 10 Endangered Plant and Insect Species of the Virginia Code; Va. Code Ann., § 3.2¬1000 through 1011). In addition, a cooperative agreement with the USFWS, signed in 1976, recognizes VDGIF as the designated state agency with regulatory and management authority over Federally-listed animal species and provides for Federal/state cooperation regarding the protection and management of those species. VDACS holds authority to enforce regulations pertaining to plants and insects. However, as per a memorandum of agreement between VDCR and VDACS, VDCR represents VDACS in comments regarding potential impacts to state-listed threatened and endangered plant and insect species.

B. Methodology

The Information for Planning and Consultation (IPaC) tool was used to assess the potential presence of Federally-listed species under the jurisdiction of the USFWS. This online resource allows an assessment of potential listed species within an estimated action area. The IPaC official species list for both the Virginia and Chesapeake Bay Ecological Services field offices of the USFWS were originally accessed on July 11, 2018. Follow-up IPaC coordination occurred on October 24, 2019. The NMFS was contacted by email on July 16, 2018 regarding the potential presence of EFH or Federally-listed tidal aquatic threatened or endangered species. NOAA Fisheries indicated via email dated July 27, 2018 that no EFH resources exist within the study area. Response letters, online reviews, and other correspondence from the state and Federal agencies responsible for rare, threatened, and endangered (RTE) species are included in *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**).

The results of the USFWS Virginia field office official species list in 2018 indicated the potential presence of the northern long-eared bat (*Myotis septentrionalis*) and the yellow lance (*Elliptio lanceolata*), both federally-listed threatened species. However, the yellow lance is presumed extirpated within the study area, as explained by USFWS in the 2018 Final Rule[46] and the *Species Status Assessment Report for the Yellow Lance (Elliptio lanceolata)* (USFWS, 2018[47]). No federally-listed species were noted in the 2018 USFWS Chesapeake Bay field office official species list. However, in early 2019 during coordination meetings with MDOT SHA, USFWS voiced concerns about potential impacts from the Study in Maryland and Virginia to the northern long-eared bat (NLEB) and Indiana bat (*Myotis sodalis*) (IB), a federally-listed endangered species due to positive detections of these species through field research conducted by researchers from Virginia Polytechnic Institute and State University (Virginia Tech) in areas surrounding the study corridor boundary in their 2017, 2018, and 2019 spring/summer surveys. As a result of new information, the USFWS met with MDOT SHA and FHWA on March 25, 2019 to further discuss Study coordination efforts regarding the NLEB and IB. The IPaC reviews for the Virginia and Chesapeake Bay field offices were rerun on October 24, 2019. Both field offices listed only the NLEB as potentially occurring within the corridor study boundary.

On July 18, 2019, the USFWS submitted a letter to the MDOT SHA providing comments on the IPaC Section 7 coordination for the two Federally listed bat species. Two potential ESA consultation pathways can be used when transportation projects may affect the NLEB or IB. These include 1) the Programmatic Biological Opinion (BO) for Transportation Projects in the Range of the Indiana Bat and Northern Long-eared Bat, currently dated February 2018 due to revisions, and 2) the Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-eared Bat and Activities Excepted from Take Prohibitions, dated January 5, 2016. Either of these two Biological Opinions could be used to help facilitate ESA Section 7(a)(2) compliance for transportation projects.

According to the July 18, 2019 USFWS letter to MDOT SHA, the Study would not qualify under the Programmatic BO for Transportation Projects referenced above because the Study proposes to clear more than 20 acres of suitable habitat within any given five-mile section of roadway. The Study would qualify under the Programmatic BO on the Final 4(d) Rule for the NLEB even though forest clearing may affect NLEB. However, the following conservation measures in the Final 4(d) Rule must be followed: Incidental

[46] USFWS, 2018a. Threatened Species Status for the Yellow Lance; Final Rule. 83. Fed. Reg. 14189. (May 3, 2018).

[47] US Fish and Wildlife Service (USFWS). 2018b. Species Status Assessment Report for the Yellow Lance (*Elliptio lanceolata*). Species Status Assessment Reports. Version 1.3. January, 2018. Raleigh Ecological Services Field Office.

take resulting from tree removal is prohibited if it: (1) occurs within a 0.25 mile (0.4 kilometer) radius of known NLEB hibernacula; or (2) cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot (45-meter) radius from the known maternity tree during the pup season (June 1 through July 31). Based on the data collected by researchers at Virginia Tech over the previous three summers, the USFWS recommended that MDOT SHA conduct surveys to determine if IB are utilizing summer habitat within the corridor study boundary. These studies, which include visual bridge surveys and emergence bridge surveys, would qualify as "conservation measures" under Section 7(a)(I) of the ESA for the NLEB and are recommended for the IB to let the USFWS know if conservation measures need to be implemented to avoid adverse effects to the IB.

A follow-up meeting between the MDOT SHA, FHWA, and USFWS was held on July 26, 2019 to further discuss potential bat survey activities and to finalize an acceptable survey approach. To apply "conservation measures" under Section 7(a)(I) of the ESA for the NLEB, MDOT SHA proposed acoustic presence/absence surveys within the corridor study boundary and informational mist netting and radio tracking in areas with positive acoustic identification of rare, threatened and endangered bat species during the survey window from May 15 through August 15, 2020. The USFWS concurred with the survey approach on March 11, 2020. USFWS subsequently asked that mist netting and radio telemetry surveys be removed from the study plan due to concerns of transmission of COVID-19 to bats (refer to *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**) for copies of the agency correspondence). The results of the acoustic and 2020 bridge surveys will be presented in the FEIS. Results of the 2020 bridge survey are discussed in **Section 4.19.2A**. Refer to the *Natural Resources Technical Report* (**Appendix L, Section 2.10**) for the complete summary of USFWS coordination related to these species.

The Maryland Trilogy Application was completed to determine the potential for the presence of Maryland state-listed terrestrial or aquatic RTE species within the corridor study boundary. This online application solicits state-listed RTE species review from the MDNR Wildlife and Heritage Service (WHS) and MDNR Environmental Review Program (ERP). In addition, mapped MDNR Sensitive Species Project Review Areas (SSPRA) were reviewed in Maryland to determine areas supporting or providing habitat buffers for RTE species within the corridor study boundary. SSPRAs are mapped to include both sensitive species habitat and a buffer to allow potential activities anywhere within or near the SSPRA to be flagged for more detailed review by MDNR to determine if a sensitive species could potentially be affected.

MDOT SHA requested information from USFWS about potential bald eagle nest locations in proximity to the corridor study boundary as well as potential protection measures for the peregrine falcons nesting on the American Legion Bridge during the proposed replacement of the bridge. USFWS replied to this request via email on May 13, 2020 (included in *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**)), and a summary of this response is included in **Section 4.19.2**.

For Virginia state-listed RTE species, the VDCR was contacted for information on the potential presence of RTE plant and insect species within the corridor study boundary. Response letters, online reviews, and other correspondence from the state and Federal agencies responsible for rare, threatened, and endangered (RTE) species are included in *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**).

4.19.2 Affected Environment

A. Northern Long-eared Bat and Indiana Bat

The NLEB and IB, both Federally-listed bat species, are found throughout the eastern and north-central US, hibernating in mines and caves during winter and spending the summer in wooded areas (USFWS, 2016; USFWS, 2018c). NLEB is typically a short-distance migrant, with the distance from winter hibernacula in caves and mines to summer roosts being typically less than 50 miles (USFWS, 2016), while IB are known to migrate hundreds of miles from their hibernacula (USFWS 2007). No winter hibernacula exist within the corridor study boundary for either species, but summer roosting and maternity habitat can include any patch of typically upland forest or loose clusters of trees that have individual live or dead trees with loose bark, crevices, cavities, or hollows. The NLEB will also use barns and sheds in areas where suitable roost trees do not occur (USFWS, 2016). Upland forest habitat that could serve as summer roost habitat for NLEB or IB occurs throughout the corridor study boundary in Virginia and Maryland.

Due to timing of the Study and the short survey period, MDOT SHA was not able to conduct acoustic or mist netting surveys in 2019. However, based on agreement between USFWS and MDOT SHA, bat surveys of bridges, both visual and emergence, adjacent to suitable forest habitat were able to be conducted prior to the August 15, 2019 survey deadline. Between August 5 and 12, 2019, 14 bridge structures and associated ramp bridges within the corridor study boundary were assessed for the presence of roosting bats or their suitability to support roosting bats. While suitable bat roosting habitat features were present on most bridges, most did not combine all necessary habitat variables. Bat guano was found beneath the American Legion Bridge on the Maryland side of the Potomac River, the McArthur Boulevard/Clara Barton Parkway Westbound bridge, and the bridge over Seven Locks Road. Based on the results of the visual assessment, there was no evidence of use of the bridges by the NLEB or IB. However, five big brown bats, not state or Federally- listed, were found day-roosting singly within gaps between pier caps of the bridge over the McArthur Boulevard/Clara Barton Parkway Westbound bridge. All five roosting bats were in locations with a vertical clearance of at least 10 feet with forested habitat adjacent to the bridge. All had small amounts of guano on the ground beneath them suggesting that these were not extensively used roosts. Bat emergence surveys were conducted at the American Legion Bridge on August 12, 2019 and at the Northwest Branch Bridge on August 13, 2019. Small and larger bats were observed flying beneath or near each bridge, but no bats were definitively confirmed exiting the bridge structures.

Based on suitable conditions for bridge roosting reported in the literature and evidence of roosting bats from MDOT SHA's visual survey, corridor study boundary bridges that support or could support roosting bats include the American Legion Bridge, Clara Barton Parkway Eastbound bridge (not surveyed due to construction, but with conditions similar to the McArthur Boulevard/Clara Barton Parkway Westbound bridge), McArthur Boulevard/Clara Barton Parkway Westbound bridge, Seven Locks Road bridge, and Northwest Branch bridge. Details of the bridge visual and bridge emergence surveys can be found within the *Bridge Survey Report for the Northern Long-eared Bat (Myotis septentrionalis) and Indiana Bat (Myotis sodalis)* in *Appendix P* of the *Natural Resources Technical Report* (**Appendix L**). MDOT SHA will perform acoustic surveys during the survey window from May 15 through August 15, 2020 to determine whether listed bat species are present within the Build Alternative LODs as well as some additional bridge surveys

for those bridges not able to be surveyed in the 2019 season. The results of the bat acoustic surveys will be presented in the FEIS.

B. Fisheries

A response was received on August 9, 2018 from NMFS, included in *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**), stating the corridor study boundary lies outside the limits of potential direct or indirect effects to Federally-listed or proposed threatened or endangered species under the jurisdiction of NMFS. Therefore, further consultation with NMFS under Section 7 of the ESA is not needed unless the study changes substantially or new information becomes available.

C. Sensitive Species Project Review Areas

MDNR has mapped five SSPRAs that intersect with the corridor study boundary. As mentioned previously, these mapped areas include both sensitive species habitat and a buffer to allow potential activities within the SSPRA to be flagged for more detailed review by MDNR to determine if a sensitive species could potentially be affected. Presence of an SSPRA within the corridor study boundary or LOD does not necessarily mean an impact would occur. **Table 4-30** displays the total acreage of SSPRA impacted by Build Alternative.

Table 4-30: SSPRA Acreage Impacted by Build Alternative

	Alt 5[1]	Alts 8&9	Alt 9M	Alt 10	Alt 13B	Alt 13C
Total SSPRA in Acres	151.7	155.0	153.7	155.0	155.0	155.0

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

D. Maryland Species of Concern

MDNR indicated that the state-listed RTE species shown in **Table 4-31**, located within riparian areas of the Potomac River in the western portion of the corridor study boundary, were those of greatest concern. Known occurrences of RTE species identified by MDNR (two species of dragonflies, six species of plants, three species of fish, and one crustacean) are described in the *Natural Resources Technical Report* (**Appendix L, Section 2.10**).

Table 4-31: RTE Plant Species in Riparian Areas of the Potomac River Within the Corridor Study Boundary, as indicated by MDNR

Scientific Name	Common Name	Status
Rumex latissimus	Tall dock	Endangered
Paspalum fluitans	Horse-tail paspalum	Endangered
Matelea obliqua	Climbing milkweed	Endangered
Baptisia australis	Blue wild indigo	Threatened
Coreopsis tripteris	Tall tickseed	Endangered
Phacelia covellei	Buttercup scorpionweed	Endangered

All of the Maryland-listed species are known to occur on scour bars of the Potomac River or within the adjacent floodplain, and MDNR recommended habitat surveys of the area where the Potomac River

crosses the corridor study boundary to determine whether suitable habitat exists for the listed species. MDOT SHA conducted state-listed RTE plant habitat assessments within the corridor study boundary within forested habitat on terraces and slopes immediately above the Potomac River floodplain, the forested Potomac River floodplain itself, and the rocky shoreline of the Potomac River on June 25 and July 10, 2019 to determine the presence of suitable habitat for six state-listed plant species. A targeted species survey was also completed for four of the six species. Marginally-suitable habitat for the climbing milkweed and the buttercup scorpionweed was found within upland terrace forest in two locations within the corridor study boundary, one just south of the C&O Canal Towpath and the other just west of the American Legion Bridge. Neither of these species were observed during the field survey. Marginally-suitable habitat was also found for tall dock, tall coreopsis, wild blue indigo, and horse-tail paspalum within bedrock scour bar/riverside outcrop barrens habitat, though the scour areas appear to be too frequently disturbed and the outcrop barrens devoid of sufficient soil to support these plants. None of these four species were found during the survey. Field survey methodologies are described within the *Natural Resources Technical Report* (**Appendix L, Section 2.10**).

Much of the forested upland terrace areas within the proposed LODs had dense invasive species cover within the understory, vine, and groundcover layers. Dominant species included bush honeysuckle (*Lonicera* spp.), Asian bittersweet (*Celastrus orbiculatus*), Japanese stilt grass (*Microstegium vimineum*), and ground ivy (*Glechoma hederacea*). The scour bar areas occurred beneath the American Legion Bridge and intermittently downstream to the extent of the corridor study boundary. Areas beneath the bridge appeared to be frequently flooded and may not have been able to support herbaceous vegetation growth, as much of the area was bare mud. Riverside outcrop barrens occurred on boulders at the edge of the river, but these areas had very little soil. Vegetation present in this area included sapling American sycamore (*Platanus occidentalis*) and sticky goldenrod (*Solidago racemosa*). None of the targeted RTE plant species were found during the surveys. One of the targeted species, buttercup scorpionweed (*Phacelia covellei*), is an early spring blooming herbaceous plant that would not have been present at the time of the surveys. Follow up surveys for this and the other targeted species identified by the state and Federal resource agencies are being conducted between spring and late summer 2020.

E. Virginia Species of Concern

Correspondence with VDCR indicated that the corridor study boundary overlaps the Potomac Gorge Conservation Site. According to VDCR, conservation sites are tools for representing key areas of the landscape that warrant further review for possible conservation action because of the natural heritage resources and habitat they support. Conservation sites are like SSPRAs tracked by the MDNR in Maryland and discussed above. The Potomac Gorge Conservation Site has been given a biodiversity significance rank of B1, which represents a site of outstanding significance. The list of the natural heritage resources known to occur within the Potomac Gorge Conservation site includes several state-listed rare plant and invertebrate fauna. While not protected under state or Federal laws, these species are tracked by the state because they are vulnerable to becoming state threatened or endangered. Additionally, the NPS has identified state and globally rare plants and invertebrates from national park property within the Potomac Gorge on both sides of the Potomac River through numerous distributional surveys over the past ten to twenty years. Some of these areas lie adjacent to the corridor study boundary. **Table 4-32** includes a list provided by the NPS of these state-listed rare plant and invertebrate species documented by VDCR or the NPS.

The above referenced NPS Potomac Gorge park surveys also noted numerous Virginia state first records for various species of beetles, moths, caddisflies, and land snails and slugs. VDCR also indicated the potential presence of other Stygobromus amphipod species within the corridor study boundary. VDCR and NPS have recommended conducting plant surveys to document whether any of the listed species are presently located within the corridor study boundary. Coordination with VDCR and NPS will continue and targeted plant species surveys within the corridor study boundary are planned for 2020 and the results will be presented in the FEIS.

Table 4-32: Virginia and Maryland State Listed Species From the Potomac Gorge Known or Potentially Occurring[3] (VDCR/NPS/MDNR) Within the Corridor Study Boundary

Scientific Name	Common Name	Organism	Global Rank[2]	State Rank/Status[3]
Stygobromus phreaticu	Northern Virginia Well Amphipod	Amphipod	G1	S1
Stygobromus pizzinii[1]	Pizzini's Amphipod	Amphipod	G3G4	S1S2
Fontigens bottimer	Appalachian Springsnail	Snail	G2	S1S2
Hydropsyche brunneipenni	Caddisfly	Caddisfly	G3G4	S1S3
Cordulegaster erronea	Tiger Spiketail	Dragonfly	G4	S3
Gomphus fraternus	Midland Clubtail	Dragonfly	G5	S2
Acronicta radcliffei	Radcliffe's Dagger Moth	Moth	G5	S2S4
Acronicta spinigera	Nondescript Dagger Moth	Moth	G4	S1S3
Sphinx frankii	Frank's Sphinx	Moth	G4G5	S2S3
Arabis patens	Spreading Rock Cress	Vascular Plant	G3	S1
Baptisia australis	Blue Wild Indigo	Vascular Plant	G5T5	S2
Boechera dentata	Short's Rock Cress	Vascular Plant	G5	S1
Cirsium altissimum[1]	Tall Thistle	Vascular Plant	G5	S1
Clematis viorna	Vase-vine Leatherflower	Vascular Plant	G3	S3
Coreopsis tripteris	Tall Tickseed	Vascular Plant	G5T5	S1
Cuscuta polygonorum[1]	Smartweed Dodder	Vascular Plant	G5	S1
Echinocystis lobata[1]	Wild Cucumber	Vascular Plant	G5	SH
Erigenia bulbosa	Harbinger-of-Spring	Vascular Plant	G5	S1
Eryngium yuccifolium var. *yuccifolium*[1]	Northern Rattlesnake-Master	Vascular Plant	G5T5	S2
Galactia volubilis	Downy Milkpea	Vascular Plant	G5	S3
Helianthus occidentalis	McDowell's Sunflower	Vascular Plant	G5	S1/T
Hibiscus laevis	Halberd-leaf Rosemallow	Vascular Plant	G5	S3
Hybanthus concolor	Green Violet	Vascular Plant	G5	S3
Lipocarpha micrantha	Small-flower Halfchaff Sedge	Vascular Plant	G5	S2
Maianthemum stellatum	Starry Solomon's-Plume	Vascular Plant	G5	S2
Monarda clinopodia	Basil Beebalm	Vascular Plant	G5	S3S4
Orthilia secunda[1]	One-sided Shinleaf	Vascular Plant	G5	SH
Phacelia covillei	Covilli's Phacelia	Vascular Plant	G3	S1
Phaseolus polystachios	Wild Kidney Bean	Vascular Plant	G5	S3
Polygala polygama	Racemed Milkwort	Vascular Plant	G5	S1/T
Sida hermaphrodita	Virginia Sida	Vascular Plant	G3	S1
Silene nivea	Snowy Campion	Vascular Plant	G4*	S1

[1] Historically occurred within the Potomac Gorge Conservation Site crossed by the project. [2] G1 = Highly Globally Rare, G2 = Globally Rare, G3 = Very Rare and Local or Range Restricted, G4 = Apparently Secure Globally, G5 = Demonstrably Secure Globally, GNR = Not Yet Ranked, * = Species has not yet been Ranked or additional information is needed [3] Rank: S1 = Highly State Rare, S2 = State Rare, S3 = Watch List, S4 = Apparently Secure; Status: E = Endangered, T = Threatened; *Sources: VDCR July 31, 2019 letter, Steury et al. 2007, NPS Coordination*

4.19.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact RTE species.

The USFWS IPaC indicates that the NLEB may occur within the corridor study boundary. Additionally, the NPS and VDCR have identified rare, state-listed plant and invertebrate species that occur on NPS lands within the Potomac River Gorge. Potential impacts to RTE habitat would be the same for all Build Alternatives along I-495, except for Alternative 9M. Surveys were initiated in spring 2020 for NLEB, IB and identified rare state-listed plant and invertebrate species and will continue to the end of the surveying season in late summer 2020. Coordination also continues with the USFWS, VDGIF, VDCR, and NPS to determine whether any potential effects could occur to any of these species from any of the Build Alternatives. The survey results and effects will be documented in the FEIS.

Within the Maryland portion of the corridor study boundary, the NLEB and IB may occur within suitable forested habitat. Neither species was confirmed within the corridor study boundary during visual bridge and emergence surveys in 2019. However, temporary day roosting by big brown bats on the bridge over McArthur Boulevard/Clara Barton Parkway Westbound and evidence of guano beneath the American Legion Bridge and bridge over Seven Locks Road, suggest that bats do occasionally roost on suitable I-495 bridges. None of the I-495 bridges appeared to serve as maternity roosting habitat, but were likely used as temporary day or night roosting sites. Therefore, potential impacts to bridge roosting bats would be minimal and would likely cause a shift to other suitable roosting sites near the bridges rather than resulting in an impact to the bats. The ALB and many other bridges within the study corridors will need to be replaced in all Build Alternatives, so any impacts to potential roosting bats on these bridges would occur regardless of which Build Alternative is selected. To determine potential impacts to suitable forested habitat for the NLEB and IB, further studies will be undertaken within the corridor study boundary during the 2020 active season (May 15 through August 15). Acoustic surveys are proposed to be conducted to better determine the potential presence of these Federally-listed bat species within the corridor study boundary. Mist net and radio telemetry surveys were proposed within the corridor study boundary for the 2020 survey season, however the USFWS has asked that mist netting not be conducted due to concerns of transmission of COVID-19 to bats, included in *Appendix N* of the *Natural Resources Technical Report* (**Appendix L**).

The MDNR identified several state-listed threatened or endangered plant species that may occur within scour bars or the adjacent floodplain of the Potomac River. A habitat assessment and targeted species survey was completed on Federal lands within the C&O Canal National Historical Park in late June and early July 2019 to determine whether suitable habitat for the state listed plant species exists. Marginally suitable habitat was found for climbing milkweed (*Matelea obliqua*) and buttercup scorpionweed within less disturbed understory of upland terrace forest habitat and on scour bar/riverside outcrop barren habitat along the Potomac River for the remaining species. The targeted species survey did not identify any of the listed species, though follow-up surveys for the buttercup scorpionweed were conducted during the suitable flowering period for this species in the spring of 2020. Based on the results of the targeted RTE species survey conducted in 2019, the Build Alternatives for the Study would not be anticipated to impact five of the six DNR WHS-listed plant species of concern within the Potomac River corridor. However, further surveys will be conducted in this area and within the Potomac Gorge in Virginia in the spring and summer of 2020 to determine whether buttercup scorpionweed and other state listed

or rare plants occur within the corridor study boundary. These surveys are currently ongoing and, if found, an evaluation will be made of the potential impacts of the Study on these species and will be documented in the FEIS.

4.19.4 Mitigation

Acoustic surveys for federally-listed bats are proposed during spring and summer 2020 to determine the presence/probable absence of these species within the LODs of the Build Alternatives. MDOT SHA will continue to coordinate with USFWS regarding federally listed bat species before, during, and after the bat surveys are completed. USFWS confirmed in a meeting with MDOT SHA on April 30, 2020, that if high frequency calls from NLEB and/or IB are identified within the LODs of the Build Alternatives, each positive acoustic detection location will receive a 3-mile buffer for NLEB and a 5-mile buffer for IB, within which there will be a tree clearing time-of-year restriction from May 1 to July 31. Additional bridge surveys for bats will also be conducted in the 2020 survey season. If either the NLEB or IB are found roosting on bridges within the corridor study boundary, minimization efforts could include a time of year restriction on the start of construction on these bridges. This would ensure that bats would not be present when the construction work begins. Most species of bats, and particularly NLEB and IB, would be expected to be absent from the corridor study boundary from mid to late October through March. Bats returning to the area the following season would likely seek other suitable roosting sites to avoid an active work zone on the bridge. In the unlikely event of a construction delay or stoppage lasting longer than two months, bridges under construction would be re-surveyed for bat utilization prior to resuming construction. All bridges where guano was found occur in areas with large stands of suitable forest habitat for bats that could be and are likely used for roosting. USFWS indicated in the April 30, 2020 meeting that full compliance with the time-of-year restrictions would conclude informal Section 7 consultation.

For state-listed plant species, additional surveys have been initiated and will continue through summer of 2020 for the buttercup scorpionweed and other rare and listed species to determine whether project-related impacts could occur to these species if present. Coordination with the regulatory agencies is ongoing and will continue regarding Federally- or state-listed RTE species. If more detailed surveys or later coordination indicate that effects could occur, those effects will be minimized and mitigated to the extent practicable and in accordance with state and Federal regulations.

4.20 Unique and Sensitive Areas

4.20.1 Introduction and Methodology

Unique and Sensitive Areas are ecological resources designated by state and local municipalities that do not fall within the regulations of other environmental resources such as waterways or forests. Maryland's 2001 GreenPrint Program was established to protect Maryland's most-ecologically-valuable natural lands and watersheds, which were designated as Targeted Ecological Areas (TEAs). TEAs were created based on rankings of Green Infrastructure (GI); RTE species; aquatic habitat and biota; water quality; coastal ecosystem; and climate change adaptation. GI areas were identified by the Maryland Greenways Commission and MDNR's Green Infrastructure Assessment (GIA), which considered land cover, wetlands, sensitive species, roads, streams, terrestrial and aquatic conditions, floodplains, soils, and developmental pressure to identify a network of "hubs" and "corridors" containing the most-ecologically-critical undeveloped lands remaining in Maryland. Montgomery County has designated certain watersheds as Special Protection Areas (SPAs) due to the presence of high-quality water resources and related natural features that could be jeopardized by development activities without additional water quality protection

measures. Environmental Overlay Zones were established within the limits of SPAs to impose additional land use regulations and impervious surface limits on the underlying areas (Montgomery Planning, 2012[48]; Blackwell, 1989[49]).

A review of MDNR, Maryland iMap, and the Montgomery County Atlas (MCAtlas) was conducted to identify the locations of TEAs, GI hubs and corridors, SPAs, and Environmental Overlay Zones within the corridor study boundary.

The VDCR Natural Heritage (DNH) Program conserves Virginia's natural resources through programs such as biological inventories, natural community inventory and classification, and the creation of Natural Area Preserves throughout the state. VDCR-DNH also identifies Conservation Sites, which represent key areas of the landscape worthy of protection and stewardship action, because of the natural heritage resources and habitat they support.

Additional information including the locations of identified unique and sensitive areas, can be found in the *Natural Resources Technical Report* (**Appendix L, Section 2.11**).

4.20.2 Affected Environment

A. Targeted Ecological Areas and Green Infrastructure

Ten GI corridors and eight GI hubs overlap with the corridor study boundary, as shown in *Appendix Q of the Natural Resources Technical Report* (**Appendix L**). In addition, TEAs overlap with the corridor study boundary between Cabin John Creek and the Potomac River in Montgomery County, a small area along Little Paint Branch, and along Bald Hill Branch east of the I-495/US 50 interchange in Prince George's County.

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

There are no SPAs or Environmental Overlay Zones within the corridor study boundary, but the Piney Branch SPA is located approximately 4,000 feet southwest of the I-270/Shady Grove Road interchange.

C. Natural Area Preserves and Conservation Sites

There are no VDCR-DNH Natural Area Preserves within the corridor study boundary or within Fairfax County, Virginia. There are two VDCR Conservation Sites within a five-mile radius of the corridor study boundary.

4.20.3 Environmental Consequences

The No Build Alternative would not result in any study-related construction and would therefore not directly impact GI hubs and corridors, TEAs, or SPAs.

Impacts associated with the Build Alternatives are summarized in **Table 4-33**. All of the Build Alternatives would impact 77.1 acres of TEAs. The GI hubs would be impacted from between to 43.8 acres under Alternative 13B and 46.2 acres with Alternative 10. GI corridors would be impacted by all Build Alternatives as well, with the lowest impact of 280.4 acres for Alternative 9M and the highest impact of

[48] Montgomery Planning. 2012. Special Protection Areas (SPA). Available at: http://www.montgomeryplanning.org/environment/spa/index.shtm [Accessed 7 September 2018].
[49] Blackwell, Robert J. 1989. *Overlay Zoning, Performance Standards, and Environmental Protection After Nollan*. 16 B.C. Envtl. Aff. L. Rev. 615. Available at: http://lawdigitalcommons.bc.edu/ealr/vol16/iss3/6 [Accessed 7 September 2018].

287.5 acres for Alternative 10. There would be no impacts to SPAs or VDCR Natural Area Preserves and Conservation Sites resulting from the Build Alternatives.

Table 4-33: Impacts to Unique and Sensitive Areas (acres)

Resource	Alt 5[1]	Alts 8 & 9[2]	Alt 9M	Alt 10	Alt 13B	Alte 13C
Targeted Ecological Areas	74.7	77.1	77.1	77.1	77.1	77.1
Green Infrastructure Hubs	41.8	45.0	44.3	46.2	43.8	44.4
Green Infrastructure Corridors	278.8	286.1	280.4	287.5	285.8	287.1
Special Protection Areas	0	0	0	0	0	0
TOTAL Unique and Sensitive Area Types	**395.3**	**408.2**	**401.8**	**410.8**	**406.7**	**408.6**

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

Each of the Build Alternatives would increase the man-made footprint within the TEAs and GI areas, but the GI hubs and corridors would remain intact. However, road widening would create larger gaps in GI corridors, further fragmenting the GI network. New manmade structures and roadways impact contiguous forest blocks and wetland complexes in TEAs and GI areas, which are often habitats for FIDS, and contain biologically important rivers, streams, and other natural resources.

4.20.4 Mitigation

Avoidance and minimization efforts to reduce impacts to GI and TEAs will involve a two-tiered approach. The first tier is occurring during the planning stage where effort is being made to avoid wetlands and waterways, floodplains, and large forested areas to the greatest extent practicable. Many GI, TEA, and wildlife corridors overlap with wetlands, waterways, and park land. The second tier of avoidance and minimization will occur during final design, with advancement of the design and further refinements to the LOD to further reduce impacts.

4.21 Environmental Justice and Title VI Compliance

4.21.1 Introduction and Regulatory Context

All federal agencies must comply with Title VI of the 1964 Civil Rights Act and Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EJ Order). Under Title VI and related statutes, each federal agency is required to ensure that no person is excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving federal financial assistance on the basis of race, color, national origin,[50] age, sex, disability, or religion. Executive Order 12898 states that "…each Federal agency shall make achieving Environmental Justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

Executive Order 12898 directs Federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. A disproportionately high and adverse effect on

[50] Including individuals with Limited English Proficiency.

minority and low-income populations is defined by the FHWA Order 6640.23A: *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (2012), as an impact that:

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

The Executive Order is intended to promote nondiscrimination in Federal programs that affect human health and the environment, as well as provide minority and low-income communities access to public information and public participation.

The strategies developed under Executive Order 12898 and subsequent Environmental Justice (EJ) FHWA guidance set forth the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal transportation projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law. The guidance also addresses an important aspect of EJ: providing meaningful opportunities for public involvement by members of minority populations and low-income populations during the planning and development of programs, policies, and activities (including the identification of potential effects, alternatives, and mitigation measures). The following policies and guidance documents provide assistance for addressing minority and low-income communities.

- US Department of Transportation (USDOT) Order 5610.2(a) Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (2012 revision);
- FHWA Order 6640.23A, FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (2012); and
- FHWA memorandum Guidance on Environmental Justice and NEPA (2011).

Executive Order 12898 does not define the terms *minority* or *low-income*, but the terms have been defined in the USDOT and FHWA Orders on EJ. FHWA Order 6640.23A provides the following definitions, which have been used in this analysis:

- *Minority Individual* – A person who identifies as:
    1) Black: a person having origins in any of the black racial groups of Africa;
    2) Hispanic or Latino: a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race;
    3) Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia or the Indian subcontinent;
    4) American Indian and Alaskan Native: a person having origins in any of the original people of North America, South America (including Central America), and who maintains cultural identification through tribal affiliation or community recognition; or
    5) Native Hawaiian and Other Pacific Islander: a person having origins in any of the original peoples of Hawaii, Guam, Samoa or other Pacific Islands.
- *Low-Income Individual* – A person whose household income is at or below the US Department of Health and Human Services (HHS) poverty guidelines.

4.21.2 Environmental Justice Analysis Methodology

As stated previously, the strategies developed under Executive Order 12898, USDOT Order 5610.2(a), FHWA Order 6640.23A, and FHWA memorandum *Guidance on Environmental Justice and NEPA* (2011) set forth the appropriate and necessary steps to identify and address disproportionately high and adverse effects of Federal transportation projects on minority and low-income populations. Based on these strategies, the following steps are documented in this Environmental Justice Analysis in support of the DEIS:

1) The identification of minority race and ethnicity populations and low-income populations (EJ populations) along the study corridors (**Section 4.21.2A and 4.21.2B**);

2) The review of demographic data to determine the existing environmental and community conditions of the EJ populations (**Section 4.21.3**);

3) The documentation of public outreach as planned, conducted and refined throughout the study duration in consideration of the demographic and community data to ensure meaningful involvement in EJ populations (**Section 4.21.4**); and

4) The identification of beneficial and adverse effects to EJ populations under the No Build and Build Alternatives (**Section 4.21.5**).

The following steps will be documented in the FEIS:

5) The consideration of mitigation and enhancement measures if unavoidable adverse effects are expected to occur under the Preferred Alternative.

6) A comparison of adverse effects from the Preferred Alternative within EJ populations to adverse effects within a non-EJ population reference community;

7) A determination of whether disproportionately high and adverse effects would occur under the Preferred Alternative to EJ populations; and

8) A final conclusion of whether disproportionately high and adverse effects would occur, based on unmitigated adverse effects and whether public feedback has been addressed.

A. Identification of Minority Race and Ethnicity Populations

MDOT SHA, in coordination with FHWA, identified the methodology for the EJ Analysis for the Study. Using this methodology, the following definition applies to this Study:

- *Minority Populations* - Any readily identifiable groups of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed FHWA program, policy or activity (refer to USDOT Order 5610.2(a) and FHWA Order 6640.23A).

Per the Council on Environmental Quality (CEQ) Environmental Guidance Under NEPA (1997), a minority population is present when: (A) the minority race/ethnicity population of the affected area exceeds 50 percent or (B) the minority population percentage of the affected area is meaningfully greater than the

minority population percentage in the general population or other appropriate unit of geographic analysis.

For the purposes of this EJ Analysis, the appropriate unit of geographic analysis utilized was the block group, with boundaries defined by the US Census Bureau in 2010.[51] Collectively, 199 block groups are within the EJ Analysis Area surrounding the I-495 and I-270 study corridors[52] (**Figure 4-15**). Based on data collected from the American Community Survey (ACS) Five-Year Estimates (2012-2016), the minority population percentage within the EJ Analysis Area was 63 percent. Of the 199 block groups within the EJ Analysis Area, 107 had minority populations equal to or above 50 percent while 108 had minority populations equal to or above 48 percent. For the EJ Analysis, a block group was considered an EJ population where the percent of minority race and/or ethnicity persons was equal to or greater than 50 percent of the total block group population, consistent with the CEQ guidance.

B. Identification of Low-Income Populations

As stated previously, MDOT SHA, in coordination with FHWA, identified the methodology for the EJ Analysis for the Study. Using the methodology, the following definition applies to this Study:

- *Low-Income Population* – Any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed USDOT program, policy, or activity (refer to USDOT Order 5610.2 and FHWA Order 6640.23A).

The ACS Five-Year Estimates (2012-2016) were also used to collect the median household income and average household size data for each of the 199 EJ Analysis Area block groups. The average household size within the block groups was three persons. The HHS Poverty Guidelines provide a threshold median household income for low-income household identification by size of household. Using the HHS 2016 Poverty Guidelines income threshold for a three-person household, an EJ Analysis Area block group would have a median income of $20,160 or less to be considered a low-income population. However, no EJ Analysis Area block groups had a median household income at or below $20,160. Under the HHS 2016 Poverty Guidelines methodology, no low-income populations would be in the EJ Analysis Area.

Additional guidance provided in the EJ Federal Interagency Working Group (IWG) report, *Promising Practices for EJ Methodologies in NEPA Reviews* (2016) was used to evaluate low-income populations for the EJ Analysis Area. Guidelines for identifying low-income populations explain that it may be appropriate for agencies to select a threshold for identifying low-income populations that exceed the poverty level as defined by the HHS Poverty Guidelines (IWG EJ 2016). While HHS Poverty Guidelines are calculated based on a national average, the EJ Analysis Area is in a high-income area compared to the rest of the 48 contiguous states. Because the cost of living in the EJ Analysis Area was determined to be greater than the national average and comparison with the HHS 2016 Poverty Guidelines did not yield any low-income populations, a more conservative methodology for determining low-income populations was adopted

[51] Block groups were selected as the appropriate unit of geographic analysis for this EJ Analysis because they provide demographic detail for small selections of the study corridor population and because they were also determined to be the appropriate unit of geographic analysis for the demographic data collection in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (Appendix E, Section 2.1).

[52] Block group delineation for the EJ Analysis Area is the same as the delineation for the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (Appendix E, Section 2.1).

using the Department of Housing and Urban Development (HUD) 2016 Income Limits Survey. The HUD Income Limits Survey calculates the threshold for a low-income family/household designation at the Metropolitan Fair Market Rent (FMR)/Income Limits Area-level. The calculations are based on the number of persons in a family.

The HUD 2016 FMR/Income Limits, shown in **Table 4-34**, provided a more appropriate comparison for determining local low-income populations in the EJ Analysis Area. HUD defines *low-income* as a family earning 80 percent or less of an area's median family income. The EJ Analysis Area is in the Washington-Arlington-Alexandria, DC-VA-MD FMR Area. As previously stated, the average household size within the EJ Analysis Area block groups was three persons. Therefore, for this EJ Analysis, a block group was considered an EJ population if its median household income was at or below $63,150, the HUD 2016 Low-Income Limit for a family of three in the Washington-Arlington-Alexandria, DC-VA-MD FMR Area.

Table 4-34: HUD 2016 Low-Income Limit for the Washington-Arlington-Alexandria, DC-VA-MD FMR Area

Persons in Family/Household	Guideline
1	$49,150
2	$56,150
3	$63,150
4	$70,150
5	$75,800
6	$81,400
7	$87,000
8	$92,600

Source: Department of Housing and Urban Development, FY 2016 Income Limits Survey (www.huduser.gov/portal/datasets/il/il2016/2016summary.odn)

4.21.3 Existing Conditions of Environmental Justice Populations

The existing conditions of minority race and ethnicity populations and low-income populations are identified for each EJ Analysis Area block group. Of the total 199 EJ Analysis Area block groups along the study corridors, 111 are considered EJ populations. Note that EJ Analysis Area block groups are sometimes described as belonging to an *EJ Analysis Area Community* for the purpose of local context[53]. The 199 EJ Analysis Area block groups have been sorted into 36 EJ Analysis Area Communities using the same methodology as done for *CEA Analysis Area Communities* in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Chapters 2 and 3**).

A. Existing Minority Race and Ethnicity Populations

As described in **Section 4.21.2A**, a block group was identified as minority population if 50 percent or more of the block group population identified as a minority.

[53] The terms "CEA Analysis Area Community and "EJ Analysis Area Community" are interchangeable. For instance, the Silver Spring EJ Analysis Area Community has the same block groups and boundaries as the Silver Spring CEA Analysis Area Community. As such, the profile for the Silver Spring CEA Area Community serves as the profile for the Silver Spring EJ Analysis Area Community. Refer to the Community Effects Assessment and Environmental Justice Analysis Technical Report (Appendix E, Section 2.1) for delineation details.

The percent minority population within the EJ Analysis Area (63 percent) exceeds that of the state of Maryland (48 percent) by 15 percent. In the Montgomery County portion of the EJ Analysis Area, 45 percent of the population identifies as of minority race and/or ethnicity, which is less than that of Montgomery County as a whole (54 percent). In the Prince George's County portion of the EJ Analysis Area, 86 percent of the population identifies as of minority race and/or ethnicity, which is equal to that of Prince George's County. In the Fairfax County portion of the EJ Analysis Area, 28 percent of the population identifies as of minority race and/or ethnicity, which is nearly half that of Fairfax County as a whole.

Within the EJ Analysis Area as a whole, the population composition is highly diverse (refer to *Race and Ethnicity Characteristics* in **Section 4.2.2**). Of the 199 EJ Analysis Area block groups, 107 had minority populations equal to or above 50 percent. Minority populations were present to varying degrees in all EJ Analysis Area Communities except for the McLean; Cabin John; North Bethesda; Bethesda; South Kensington; Chevy Chase; and Joint Base Andrews EJ Analysis Area Communities. Within Montgomery County, 31 of the 112 EJ Analysis Area block groups (nearly 28 percent) were identified as minority populations; 76 of the 82 EJ Analysis Area block groups (nearly 93 percent) in Prince George's County were identified as minority populations.

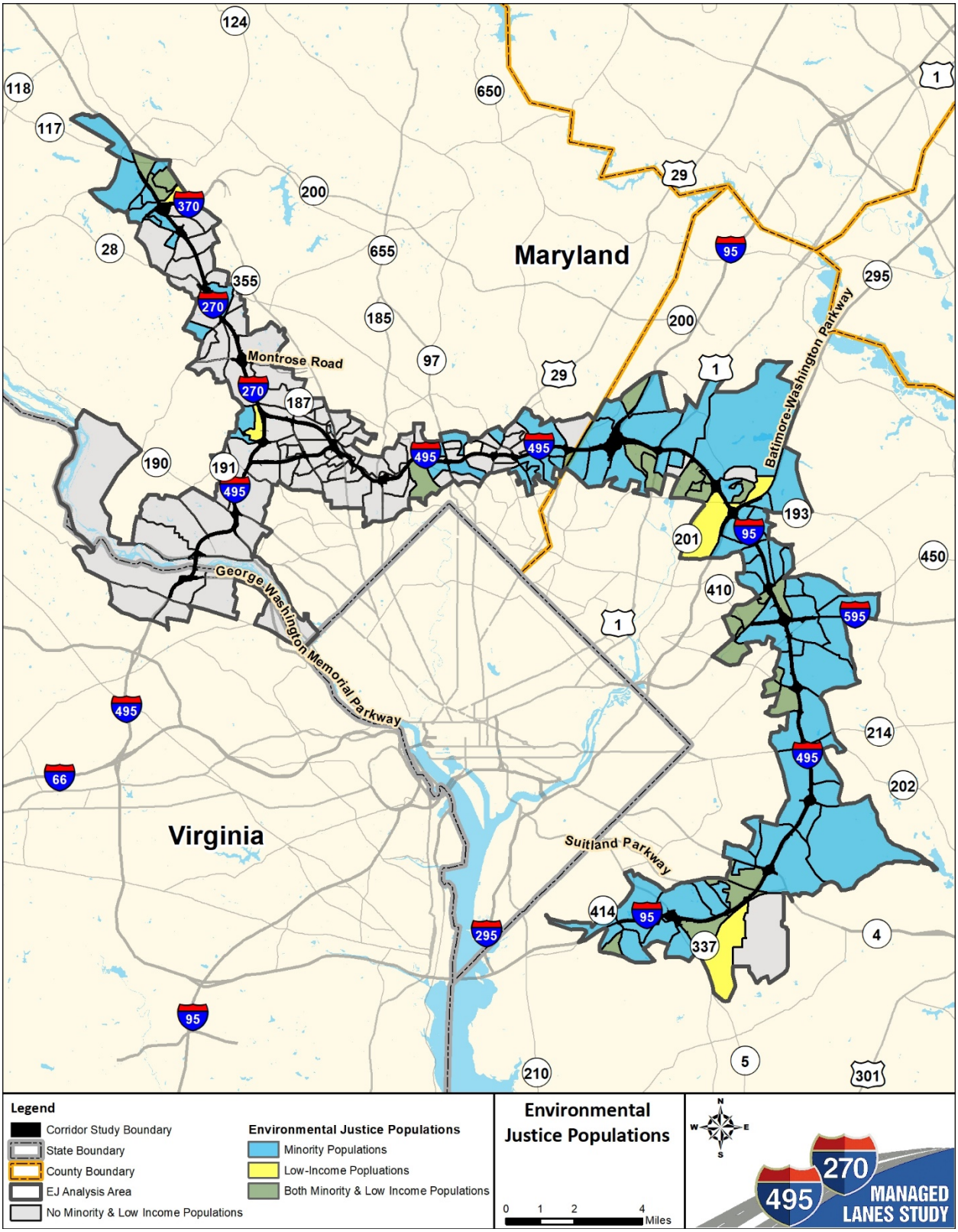
Minority populations were present to varying degrees in all EJ Analysis Area Communities except for the McLean; Cabin John; North Bethesda; Bethesda; South Kensington; Chevy Chase; and Joint Base Andrews EJ Analysis Area Communities. Within Montgomery County, 31 of the 112 EJ Analysis Area block groups (nearly 28 percent) were identified as minority populations; 76 of the 82 EJ Analysis Area block groups (nearly 93 percent) in Prince George's County were identified as minority populations. The minority populations are shown in blue in **Figure 4-15**.

Race and ethnicity data for each EJ Analysis Area block group is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 4.3.1** and **Table 4-2**).

B. Existing Low-Income Populations

As described in **Section 4.21.2B**, a block group was identified as low-income population if its median household income was at or below $63,150. EJ Analysis Area block groups that qualified as low-income populations are highlighted in yellow in **Figure 4-15**. (Refer to **Appendix E, Table 4-3** for details on the EJ Analysis Area household/low-income characteristics and EJ populations.) Of the 199 EJ Analysis Area block groups, 30 had a median household income below $63,150. The highest density of low-income populations was in the Landover and Landover Hills EJ Analysis Area Communities, where all the block groups had median household income below $63,150. Slightly less than half of the Greenbelt EJ Analysis Area Community block groups (seven of the 16) had a median household income below $63,150. The remaining low-income populations were individual block groups located in the Potomac, Silver Spring, Beltsville, College Park, New Carrollton, Lanham, Summerfield, Forestville, Joint Base Andrews, Camp Springs, Gaithersburg, and Temple Hills EJ Analysis Area Communities. Household income data for each EJ Analysis Area block group is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 4.3.2**).

Figure 4-15: EJ Populations in the EJ Analysis Area



C. Supplemental Community Data

Supplemental data reviewed to further identify EJ populations is summarized below, including: households' English-speaking status, the locations of low-income subsidized housing, the distribution of Food Stamps/Supplemental Nutrition Assistance Program (SNAP) benefits, the proportion of students receiving free and reduced-price lunch programs, and Equity Emphasis Areas[54].

a. Limited English-Speaking Households

Executive Order 13166 *Improving Access to Services for Persons with Limited English Proficiency* (2000) requires Federal agencies to examine the services they provide, identify any need for services to those with limited English proficiency (LEP), and develop and implement a system to provide those services so LEP persons can have meaningful access to them. A person who does not speak English as their primary language and who has a limited ability to read, speak, write or understand English may be LEP. In accordance with MDOT SHA's *Title VI Program Implementation Plan* (2015), "MDOT SHA will provide translation services to individuals that have limited ability to read, write, speak or understand English. SHA will seek to communicate with LEP populations and provide LEP individuals meaningful access to SHA programs and activities." Interpretation services were available by request at each Public Workshop and outreach event and will be available for the Public Hearings and any subsequent public outreach effort. Spanish and American Sign Language (ASL) interpreters have been requested and utilized at several Public Workshops and will be available for the Public Hearings.

ACS Five-Year Estimates (2012-2016) data on limited English-Speaking households was evaluated to identify potential LEP populations within the EJ Analysis Area where specific LEP supporting outreach would be targeted. The ACS allows respondents to identify one's household as English-speaking only, Spanish-speaking, other Indo-European language-speaking, Asian and Pacific Island language-speaking, or other language-speaking. Respondents who identify as part of a non- English-speaking only household further classify as either a "limited English-speaking household" or, "not a limited English-speaking household."

Using ACS Five-Year Estimates (2012-2016) data, LEP populations were identified in nearly every block group within the EJ Analysis Area. Half of the EJ Analysis Area block groups had a population of limited English-speaking households that is three percent (rounded down from 3.03 percent) or less, and half of EJ Analysis Area block groups have a population of limited English-speaking households greater than three percent (rounded down from 3.03 percent).

b. Free and Reduced-Price Lunch Programs

The Virginia Department of Education (VDOE 2016) and Maryland State Department of Education (MSDE 2017) provide annual data on public school student enrollment in the free and reduced-price lunch program. Among the public schools in the EJ Analysis Area, an average of 45 percent of students use free and reduced-price lunch programs per school. Within the EJ Analysis Area, 36 schools (all located in the Maryland portion of the EJ Analysis Area) have a student population that receives free or reduced-price

[54] The National Capital Region Transportation Planning Board (TPB) *Methodology for Equity Emphasis Areas,* referenced tract-level Census data to identify communities that have significant concentrations of low-income and/ or minority populations. Data from the American Community Survey for each of the following four population groups is used: Low-Income, African American, Asian, and Hispanic or Latino.

lunches, which is greater than the 45 percent, the EJ Analysis Area average. All of the schools with an above-average population of students receiving a free and reduced-price lunch are in block groups already identified as minority or low-income populations. A list of the 36 public schools with an average of 45 percent or more students using free and reduced-price lunch programs is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Chapter 4, Section 3.3**).

c. Places of Worship[55]

Additionally, to support and facilitate outreach efforts places of worship located within EJ Analysis Area Communities that contain minority or low-income populations were identified. A list of the 108 places of worship is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 4.3.3**).

d. Low-Income Subsidized Housing Complexes

The HUD Multifamily Assistance & Section 8 Database, Montgomery County Housing Opportunities Commission, Prince George's County Housing Authority, and Fairfax County Redevelopment and Housing Authority were consulted to locate housing complexes with subsidized units within the EJ Analysis Area. Housing complexes are identified in their respective Community Profile[56] in *Appendix C of* the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E**). In the EJ Analysis Area, a total of 32 housing complexes rent units at affordable, below-market rates for qualifying households. A list of the housing complexes is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Section 4.3.3**).

Four of the 32 subsidized housing complexes (Timberlawn Crescent, Victory Forest Senior Apartments, St. Luke's Homes, Inc., and Pooks Hill Tower and Court Apartments) are located outside of minority or low-income populations; in the North Bethesda, Bethesda, and Forest Glen EJ Analysis Area Communities. The remaining 28 housing complexes with subsidized units are in minority or low-income populations within the EJ Analysis Area.

e. Food Stamps/SNAP Benefits

American Community Survey Five-Year Estimates (2012-2016) were used to collect data on households utilizing Food Stamps/SNAP benefits. The average percent of households receiving Food Stamps/SNAP benefits for the Maryland EJ Analysis Area block groups is seven percent. Of the 199 EJ Analysis Area block groups, 74 block groups have a proportion of households that receive Food Stamps/SNAP benefits above the seven percent EJ Analysis Area average. Seventy-one (71) of these block groups were identified as minority or low-income populations. The three block groups that were not identified as minority or low-income populations are located within EJ Analysis Area Communities that contain multiple minority or low-income populations.

[55] Geographic Information Systems (GIS) data sourced from Maryland iMap (data.imap.maryland.gov/datasets/maryland-land-use-land-cover-land-use-land-cover-2010); Prince George's County Open Data Portal (gisdata.pgplanning.org/metadata/); Montgomery County Planning Department Open Data Portal (Montgomery County Planning Department. Open Data Portal). Corresponding mailing addresses gathered using Google Search.

[56] The Community Profiles provide information for each CEA Analysis Area Community in *Appendix C* of the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (Appendix E).

f. Equity Emphasis Areas

The National Capital Region Transportation Planning Board (TPB) identified Equity Emphasis Areas as census tracts with higher than average concentrations of minority, low-income populations, or both. The TPB methodology used census tract data, which encompassed a larger geographic area than the census block groups referenced to identify minority or low-income populations. As a result, there are a few areas where TPB identified an entire census tract as an Equity Emphasis Area; however, individual census block groups within the EJ Analysis Area did not contain higher than average concentrations of minority populations or low-income populations. Similarly, there were census tracts that TPB did not identified as Equity Emphasis Areas; however, block groups within the EJ Analysis Area were identified as minority or low-income populations for this analysis.

g. MDOT SHA Voluntary Demographic Survey

It is MDOT SHA policy to offer a demographic survey to voluntarily complete for attendees of MDOT SHA public meetings. Attendees at the April 11, 23, 24, 2019 and November 13 and 21, 2019 Public Workshops completed the survey and provided the demographic information shown in **Table 4-35**. Note that, due to the voluntary nature of the survey and the small sample size, the results of the survey may not accurately represent the demographics of all the Public Workshop attendees.

Table 4-35: Voluntary Demographic Survey Results

Demographic Information*	Number of Attendees
Race	
Asian	1
Black or African American	3
Hispanic or Latino	3
White	48
Sex	
Female	21
Male	23
Not Answered	12
Age Bracket	
65+	24
41-65	27
18-40	4
Not Answered	
Disability with Reasonable Accommodation	
N/A	37
Not Answered	10
Yes	3
Conditional Yes	1
No	7
Other Language Spoken	
ASL	2
Not Answered	24

Demographic Information*	Number of Attendees
No	14
Spanish	1
French	1
Lithuanian	1
N/A	2

Note: Categories listed here reflect categories checked by the attendees and do not necessarily include all survey question options. Associated comments, where provided on the surveys, are not included here.

The review of the above additional data confirmed that minority and low-income populations previously identified correspond with the locations of limited English-Speaking households, low-income subsidized housing, households receiving Food Stamps/SNAP benefits, and students receiving free and reduced-price lunches. Further, block groups identified as minority and low-income populations are located within census tracts that were identified as Equity Emphasis Areas.

D. Summary of the Existing Conditions of Environmental Justice Populations

Based on the methodology described in **Section 4.21.2**, there are a total of 111 block groups identified as EJ populations within the EJ Analysis Area. The 111 EJ Analysis Area block groups ("EJ populations") are shown above in **Figure 4-15** and listed in the *Community Effects Assessment and Environmental Justice Analysis Technical Report* (**Appendix E, Sections 4.3.1 and 4.3.2**).

4.21.4 Public Outreach with Environmental Justice Populations

Providing full and fair access to meaningful involvement by low-income and minority populations in project planning and development is an important aspect of EJ. Meaningful involvement means the Lead Agencies invite participation from populations typically underrepresented, throughout all the project stages. It is important to engage and advise EJ populations of the project development steps and consider their feedback. Residents are an important source for local history, special sites, and unusual traffic, pedestrian or employment patterns relevant to the project. This information is used in the design and evaluation of alternatives, to avoid negative impacts to valued sites, and to support the development of safe, practical, and attractive transportation options that are responsive to the EJ population's needs. Due to the highly diverse demographics composing the population adjacent to and using the study corridors, much of the corridor-wide public involvement efforts conducted for the Study were aimed at reaching this socioeconomically diverse audience. This section summarizes the public involvement efforts conducted in EJ populations, as well as additional efforts to notify traditionally underserved populations. Additional detail on the public involvement efforts presented here is provided in the *Public Involvement and Agency Coordination Technical Report* (**Appendix P**).

A. Study Corridor-Wide Public Involvement Efforts

Beginning with the initiation of the Study in March 2018, public involvement efforts have included comprehensive outreach through Public Open Houses/Workshops, Community Association meetings, stakeholder meetings, community pop-up events, updates via website and email, and solicitation of public comments. Outreach events were held or attended in EJ Analysis Area Communities that contain one or more EJ populations, in locations adjacent to EJ populations, or at events generally serving EJ populations in the EJ Analysis Area. These public involvement efforts are shown in **Table 4-36**.

Table 4-36: Public Involvement Efforts in or near EJ Populations

EJ Analysis Area Community[1]/ General EJ Population	Date	Outreach Type	Event/ Organization/ Location	Number of Attendees
Summerfield, Lake Arbor, Glenarden, and Landover EJ Analysis Area Communities	April 23, 2018	Community Association Meeting during Scoping	Greater 202 Coalition St. Margaret's Catholic Church 410 Addison Road South, Capitol Heights, MD 20743	Approx. 50
General EJ Population throughout EJ Analysis Area	August 5, 2018	Pop-Up Informational Booth	9th Annual Salvadoran American Festival/7th Annual Latino Health Fair Montgomery College Rockville Campus, Rockville, MD 20850	120
General EJ Population throughout EJ Analysis Area	August 7, 2018	Pop-Up Informational Booth	National Night Out Against Crime Heurich Park 2800 Nicholson Street Hyattsville, MD 20782	105
Greenbelt EJ Analysis Area Community	April 24, 2018	Public Scoping Open House	Eleanor Roosevelt High School 7601 Hanover Parkway, Greenbelt, MD 20770	56
	July 17, 2018	Preliminary Alternatives Public Workshop		130
	April 23, 2019	ARDS Public Workshop		99
College Park EJ Analysis Area Community	January 30, 2019	Stakeholder Meeting	Four Cities Meeting (College Park, Berwyn Heights, Greenbelt, New Carrollton)	-
Gaithersburg EJ Analysis Area Community	April 8, 2019	Legislative/Elected Officials Briefing	Gaithersburg Mayor and Council City Hall, 31 S Summit Ave Gaithersburg, MD 20877	6
Landover and Summerfield EJ Analysis Area Communities	April 11, 2019	ARDS Public Workshop	Prince George's Sports & Learning Complex 8001 Sheriff Rd Landover, MD 20785	48
Silver Spring EJ Analysis Area Community	April 24, 2019	ARDS Public Workshop	Eastern Middle School 300 University Blvd E Silver Spring, MD 20901	377
Marlow Heights, Camp Springs, and Forestville EJ Analysis Area Communities	April 27, 2019	ARDS Public Workshop	Suitland Community Center 5600 Regency Ln, Forestville, MD 20747	23
Marlow Heights and Temple Hills EJ Analysis Area Communities	May 14, 2019	ARDS Public Workshop	Oxon Hill High School 6701 Leyte Drive Oxon Hill, MD 20745	26

EJ Analysis Area Community[1]/ General EJ Population	Date	Outreach Type	Event/ Organization/ Location	Number of Attendees
Glenarden EJ Analysis Area Community	May 23, 2019	Legislative/Elected Officials Briefing	City of Glenarden Councilmembers	18
College Park EJ Analysis Area Community	June 4, 2019	Stakeholder Meeting	Four Cities Meeting (College Park, Berwyn Heights, Greenbelt, New Carrollton)	-
College Park EJ Analysis Area Community	June 13, 2019	Community Association Meeting	North College Park Citizens' Association	53
General EJ Population throughout EJ Analysis Area	June 13, 2019	Stakeholder Meeting	Montgomery County Hispanic Chamber 12276 Rockville Pike, Rockville, MD 20852	2
Glenarden EJ Analysis Area Community	June 17, 2019	Residents' Meeting	City of Glenarden Residents	80
Gaithersburg EJ Analysis Area Community	June 30, 2019	Pop-Up Informational Booth	SummerFest 506 South Frederick Ave., Gaithersburg, MD 20877	200
Lake Arbor EJ Analysis Area Community	July 13, 2019	Pop-Up Informational Booth	Lake Arbor Community Center 10100 Lark Arbor Way, Mitchellville, MD 20721	300
Gaithersburg and Rockville EJ Analysis Area Communities	July 26, 2019	Legislative/Elected Officials Briefing	Del. Kumar Barve, District 17 Montgomery County 150 Gibbs St, Rockville, MD 20850	1
Forestville EJ Analysis Area Community	July 31, 2019	Large Landowner Meeting	Calvary Lutheran Evangelical Church 9545 Georgia Ave Silver Spring, MD 20910	9
General EJ Population throughout EJ Analysis Area	August 15, 2019	Stakeholder Meeting	Hispanic Chamber of Commerce Montgomery County 11001 Veirs Mill Rd, Silver Spring, MD 20902	25
Gaithersburg EJ Analysis Area Community/ General EJ Population throughout EJ Analysis Area	August 9-17, 2019	Pop-Up Informational Booth	Montgomery County Agricultural Fair 501 Perry Pkwy., Gaithersburg, MD 20877	286
Forestville EJ Analysis Area Community	September 6, 2019	Large Landowner Meeting	Jabbok Ministries 7819 Parston Dr Forestville, MD 20747	6
General EJ Population throughout EJ Analysis Area	September 5-8, 2019	Pop-Up Informational Booth	Prince George's County Fair 14900 Pennsylvania Avenue, Upper Marlboro, MD 20772	134
Rockville EJ Analysis Area Community	October 3, 2019	Large Landowner Meeting	First Baptist Church 55 Adclare Rd Rockville, MD 20850	10
Gaithersburg and Rockville EJ Analysis Area Communities	October 10, 2019	Legislative/Elected Officials Briefing	Del. Julie Palakovich-Carr, District 17 Montgomery County	1

EJ Analysis Area Community[1]/ General EJ Population	Date	Outreach Type	Event/ Organization/ Location	Number of Attendees
			225 N Washington St, Rockville, MD 20850	
General EJ Population throughout EJ Analysis Area	October 17, 2019	Stakeholder Meeting	Maryland Hispanic Chamber of Commerce 11 W Mt Vernon Pl, Baltimore, MD 21201	35
New Carrollton EJ Analysis Area Community	November 9, 2019	Community Association Meeting	295 Coalition Meeting New Carrollton Library, 7414 Riverdale Rd., New Carrollton, MD 20784	30
General EJ Population throughout EJ Analysis Area	November 14, 2019	Stakeholder Meeting	Maryland Black Chamber of Commerce 8630 Fenton Street, Plaza 5, Silver Spring, MD 20910	2
General EJ Population throughout EJ Analysis Area	December 4, 2019	Legislative/Elected Officials Briefing	Montgomery County Minority Legislative Breakfast Event 5151 Pooks Hill Rd, Bethesda, MD 20814	300
Gaithersburg and Rockville EJ Analysis Area Communities	December 10, 2019	Legislative/Elected Officials Briefing	Sen. Cheryl Kagan, District 17 Montgomery County 225 N Washington St, Rockville, MD 20850	1
General EJ Population throughout EJ Analysis Area	February 26, 2020	Stakeholder Meeting	Asian American Chamber of Commerce 1801 Rockville Pike, Rockville, MD 20852	25
General EJ Population throughout EJ Analysis Area	March 4, 2020	Stakeholder Meeting	Maryland Black Chamber of Commerce 8630 Fenton Street, Plaza 5, Silver Spring, MD 20910	2
Gaithersburg and Rockville EJ Analysis Area Communities	April 6, 2020	Legislative/Elected Officials Briefing	Montgomery County District 17 Legislative Town Hall (Conference Call)	75

Note: [1] Identifies the community containing EJ populations in which the event either occurs directly, is adjacent to, or is outside of but in whose community EJ populations are served.

Public outreach events were accessible by public transit, such as the Suitland Metro Station near the Suitland Community Center and the Greenbelt Road/Frankfort Drive bus station near Eleanor Roosevelt High School. All Public Open House/Workshop venues were accessible by Americans with Disabilities Act (ADA) standards; each Public Open House/Workshop and several pop-up events featured an American Sign Language interpreter. As shown in **Table 4-36**, pop-up informational booths were staffed at the Annual Salvadoran American Festival/7th Annual Latino Health Fair at Montgomery College (August 5, 2018), and the National Night Out Against Crime at Hyattsville's Heurich Park (August 7, 2018 and August 6, 2019). A Spanish interpreter was available at the Annual Salvadoran American Festival/7th Annual Latino Health Fair, and Spanish and English outreach materials were provided at both events.

Advertisement campaigns for Public Open Houses/Workshops included a variety of outreach methods. Digital outreach included P3 Program website announcements, e-mail blasts, social media posts, downloadable newsletters, and digital newspapers. Print outreach included local/regional newspaper advertisements, newspaper inserts, postcards, and mailed newsletters. Advertisements were featured in print and online newspapers whose local/regional readership includes EJ populations in the EJ Analysis Area as well as those whose primary audiences are of minority races/ethnicities and are considered traditionally underserved (Tiempo Latino, Washington Hispanic, Prince George's Sentinel, Afro.com, and DCBlack.com). Additionally, a newspaper insert was distributed in the Washington Post's Local Living Section to over 690,000 regional subscribers and non-subscribers, also including EJ populations. Radio outreach for the Alternatives Retained for Detailed Study (ARDS) Public Workshops included "traffic sponsorships" on 14 regional radio stations whose local/regional audiences also broadly encompass EJ populations in the EJ Analysis Area.

Multi-lingual meeting materials for the Public Open Houses/Workshops were provided by request; requests were made for Amharic, Spanish, and Chinese language materials. Each Public Open House/Workshop and several pop-up events featured a Spanish-language interpreter. Newspaper inserts and postcards stated that Amharic, Vietnamese, Spanish, and Chinese language materials could be requested in each respective language. Spanish-language "Stay Connected" cards were distributed at engagement events, and Spanish-language meeting materials, including display boards and Public Workshop handouts were made available on the P3 Program website. The website also features Google Translate capabilities.

Additional detail on the public involvement efforts presented here is provided in the *Public Involvement and Agency Coordination Technical Report* **(Appendix P)**.

B. Coordinated Local Outreach and Demonstrated Engagement of Traditionally Underrepresented Populations

Based on initial low attendance at Prince George's County events and receipt of fewer public comments compared to Montgomery County, MDOT SHA reached out to the M-NCPPC Prince George's County Planning Department to enhance local engagement during the ARDS Public Workshop outreach campaign. Coordinated local outreach efforts included, but were not limited to:

- M-NCPPC Prince George's County Planning Department distribution of the Public Workshops' announcement flyer via Office of Municipalities' community outreach database for display at 45 County community centers (March 14, 2019);
- M-NCPPC Prince George's County Planning Department distribution of the Public Workshops' announcement flyer via WMATA Office of Communications for their community update posting (March 29, 2019);
- M-NCPPC Prince George's County Planning Department forwarding of study e-mail blasts to their Community Association database and Office of Planning database (e-mail blasts distributed on March 7, April 10, May 8, June 10, 2019);
- Prince George's County Department of Public Works and Transportation distribution of Public Workshops' announcement flyer through email blast; and
- Distribution of Public Workshops' announcement flyer to several large places of worship along the study corridor (on and after March 14, 2019), including First Baptist Church of Glenarden, the

Collective Empowerment Group (an umbrella group for more than 300 churches in the County), Prince George's County Liaison for Faith Connections/Relationship Building, People's Community Baptist Church, Sanctuary at Kingdom Square, and the Transforming Neighborhoods Initiative.[57]

While study awareness, meeting attendance, and the volume of comments received was consistently strong in Montgomery County; additional outreach was conducted that included distribution of the Public Workshops' announcement flyer through the Montgomery County Department of Transportation email blasts.

To enhance engagement of the Study's identified EJ populations and other underserved populations, and consistent with recommendations in NCHRP Report 710, *Practical Approaches for Involving Traditionally Underserved Populations in Transportation Decisionmaking*, demographic data was used to identify locations for targeted mailing outreach. These locations included EJ Analysis Area schools with above-average participation in the Free and Reduced-price Meals Program;[58] places of worship[59] in EJ Analysis Area Communities containing EJ populations; and all affordable-housing complexes[60] in the EJ Analysis Area.

In early April 2019, an introductory cover letter asking recipients to display an enclosed Public Workshops' announcement flyer wherever community information is displayed was mailed to the 174 affordable-housing complexes, schools, and places of worship listed in the *Community Effects Assessment and Environmental Justice Analysis Technical Report*, **Appendix E, Section 4.2**. English and Spanish versions of the flyer were included with the cover letter.

C. Public Comments with Socioeconomic Themes

Public input on the I-495 and I-270 Managed Lanes Study has been solicited continually since the initiation of the Study in March 2018. Over 3,900 comments have been received via postal mail, e-mail, the website comment form, hard copy comment forms at Public Workshops, and oral testimony. Comments specifically from EJ populations cannot be identified as commenters do not submit race/ethnicity or income status with their submissions. However, the following socioeconomic-related statements, questions, or suggestions raised by some commenters may be broadly considered as relevant to Environmental Justice principles: concerns that toll pricing could have a negative impact on low-income users; concerns about the potential financial impact of tolls on households, particularly lower/middle-income; general commentary on toll affordability and wealth; the socioeconomic status of I-495 and I-270

[57] The Transforming Neighborhoods Initiative was an effort by Prince George's County to provide additional services and resources to six underserved communities within the County.

[58] The MDOT SHA Office of Equal Opportunity collects public feedback surveys to ensure compliance with Title VI of the Civil Rights Act of 1964. Maryland State Department of Education (*Free and Reduced-Price Meal Statistics for School Year 2017-2018.* http://marylandpublicschools.org/programs/pages/school-community-nutrition/freereducedpricemealstatistics.aspx).

[59] Geographic Information Systems (GIS) data sourced from Maryland iMap (data.imap.maryland.gov/datasets/maryland-land-use-land-cover-land-use-land-cover-2010); Prince George's County Open Data Portal (gisdata.pgplanning.org/metadata/); Montgomery County Planning Department Open Data Portal (Montgomery County Planning Department. Open Data Portal). Corresponding mailing addresses gathered using Google Search.

[60] Sourced from Housing and Urban Development Multifamily Assistance & Section 8 Database, Montgomery County Housing Opportunities Commission, Prince George's County Housing Authority, and Fairfax County Redevelopment and Housing Authority websites. Corresponding mailing addresses gathered using Google Search.

highway corridor users; and support for mass transit transportation improvements either in combination with the proposed Build Alternatives or instead of the proposed Build Alternatives.

Additional detail on the comment themes discussed here is provided in the *Scoping Report, Summary of July 2018 Alternatives Public Workshops, and Summary of Public and Stakeholder Engagement for the Recommended ARDS*, available for download on the Study website (https://495-270-p3.com/your-participation/past-public-outreach/). An overview of other comment themes received during the Study is provided in the *Public Involvement and Agency Coordination Technical Report* **(Appendix P)**.

4.21.5 Identification of Beneficial and Adverse Effects to Environmental Justice Populations

Both beneficial and adverse effects to the existing conditions of EJ populations are considered in this EJ Analysis. Effects described in this section include physical impacts to and relocations of existing private property, including community facility property, as well as physical impacts to transportation right-of-way. Per FHWA EJ Order 6640.23A, consideration is also given to effects on the following environmental characteristics: human health and safety; air quality; noise/vibration; water quality; hazardous materials; natural resources; visual landscape and aesthetic values; economy and employment; access and mobility; community cohesion/isolation and quality of life; and tolling considerations.

A. No Build Alternative

The No Build Alternative would not result in any study-related construction and therefore no right-of-way or property acquisitions are required; no direct impacts would occur in EJ populations. Increased traffic congestion under the No Build Alternative would contribute to increased overflow congestion on the local road network. As a result, the No Build Alternative would result in increased response times for emergency services and increased travel times to community facilities, especially during peak travel periods.

Existing congestion on I-495 and I-270 occur for periods of ten to seven hours per day, respectively. Re-occurring congestion results in vehicles idling for extended periods which can increase emissions and impact air quality. The No Build Alternative would not address the existing congestion experienced along the study corridors.

B. The Build Alternatives

The Build Alternatives would, to varying degrees, provide improvements as outlined by the Study Purpose and Need. The impacts of the Build Alternatives to EJ populations are presented in this section. As shown in **Table 4-37**, the Build Alternatives would convert between 163.3 and 313.3 acres of right-of-way from properties in EJ populations adjacent to the existing I-495 and I-270 roadway alignments. The conversion of land would be mostly sliver takes along existing interstate systems.

Table 4-37: Right-of-Way Requirements in EJ Populations

Build Alternative	Right-of-Way Required (acres)
Alternative 5[1]	163.3
Alternatives 8 and 9[2]	182.9
Alternative 9M	313.3
Alternative 10	185.0
Alternative 13B	182.0
Alternative 13C	184.0

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

Each of the Build Alternatives would result in the relocation of four businesses, one of which is located in the Glenarden EJ Analysis Area Community, an EJ population. Alternative 9M would result in 25 residential relocations, seven of which are located in the Silver Spring EJ Analysis Area Community, an EJ population. Alternatives 8, 9, 10, 13B and 13C would result in 34 residential relocations, eight of which are also located in the Silver Spring EJ Analysis Area Community. Impacted properties under the Build Alternatives are shown on the *Environmental Resource Mapping* (**Appendix D**). None of the 32 housing complexes in the EJ Analysis Area with subsidized units would experience relocation.

Community facility properties within EJ populations would be impacted by partial property acquisition (generally, sliver impacts along property lines), including (depending on the Build Alternative): 11 to 12 places of worship, three schools, one higher education facility, one to two postal facilities, one police station, two recreation centers, and 15 to 16 parks. No community facilities would be relocated. However, impacts at one recreational facility located adjacent to I-495 in the Silver Spring EJ Analysis Area Community would include the outdoor and indoor pools; further information on impacts to this facility is provided in the *Community Effects Assessment and Environmental Justice Analysis Technical Report*, **Appendix E**, **Section 3.5.2**.

Additionally, preliminary archeological research has identified two potentially historic cemeteries whose sites are located within the Build Alternatives' LOD and may be cultural significant: the Moses Hall Cemetery (Cabin John EJ Analysis Area Community) and the Montgomery County Poor Farm Cemetery (Rockville EJ Analysis Area Community). Further archaeological investigations will be included in development of the Programmatic Agreement; additional information is provided in the *Volume 4* of the *Cultural Resources Technical Report*, (**Appendix G**). MDOT SHA will work to avoid and minimize impacts. MDOT SHA will continue to coordinate with affected communities and the Friends of Moses Hall, which includes some descendant families of those buried in the cemetery, on treatment of human remains should avoidance not be possible.

Other environmental characteristics within EJ populations would experience effects from the Build Alternatives. The nature of most of these characteristics makes it difficult to precisely quantify effects at the block group-level. The effects within EJ populations are described qualitatively for each environmental characteristic below.

a. Human Health and Safety

When traffic speeds and flow are optimized, less idling occurs; thereby reducing excessive emissions. As the No Build Alternative would not address traffic speed and flow, excessive emissions would not be expected to be reduced under the No Build Alternative. The Build Alternatives would address congestion on two of the most heavily traveled highways in the region. Implementation of any of these would, to varying degrees, reduce emissions through the corridor, as documented in the *Air Quality Technical Report* (**Appendix I**). The Build Alternatives would maintain the existing separation between highway operations and local traffic, bicyclists, and pedestrians through access limits and physical barriers in accordance with state and Federal regulation. Where direct access ramps would be constructed, alterations to traffic patterns and roadway/sidewalk networks would be mitigated by the inclusion of signage, high-visibility crosswalk markings, pedestrian countdown signals, and the implementation of a temporary detour

network. Existing pedestrian and bicycle facilities impacted by the Build Alternatives would be replaced in-kind, at a minimum, regardless of the alternative and would be coordinated with the counties and local jurisdictions. Additional capacity on I-495 and I-270 would assist in accommodating a population evacuation and improving emergency response access should an event related to homeland security occur. Further, by providing additional travel choices, the Build Alternatives are expected to reduce congestion on the mainline and local roadways networks, allowing for more reliable travel times for all users, including emergency responders, as documented in the *Alternatives Technical Report* (**Appendix B**). In summary, the Build Alternatives would result in a reduction in emissions and congestion while improving emergency response access, increasing travel choice, and providing reliable travel times; resulting in a benefit to human health and safety throughout the study corridors. Human health and safety impacts and benefits would be borne throughout the study corridors in both EJ populations and non-EJ populations.

b. Air Quality

As stated above, when traffic speeds and flow are optimized, less idling occurs; thereby reducing excessive emissions. As the No Build Alternative would not address traffic speed and flow, excessive emissions would not expect to be reduced under the No Build Alternative.

As documented in the *Air Quality Technical Report* (**Appendix I**), the Build Alternatives are not predicted to cause or exacerbate a violation of the NAAQS or measurably increase regional emission burdens or MSATs levels. The Build Alternatives would address congestion on two of the most heavily traveled highways in the region. As a result, the Build Alternatives are not predicted to increase emission burdens compared to the No Build Alternative in 2040, aside from a slight increase in GHG emissions; nor cause or contribute to a violation of the NAAQS, no long-term or regional air quality impacts are anticipated, and no mitigation measures are warranted.

As the project's construction is not anticipated to last more than five years in any single location, construction-related effects of the project would be limited to short-term increased fugitive dust and mobile-source emissions during construction. State and local regulations regarding dust control and other air quality emission reduction controls would be followed.

c. Noise

The *Noise Analysis Technical Report* (**Appendix J**) found that Build Alternatives would increase traffic noise in communities adjacent to the proposed limits of disturbance throughout the corridor. Where noise barriers already exist, they would be replaced, as needed. In accordance with Federal regulation (23 CFR 772) and the MDOT SHA *Highway Noise Policy*, approved by FHWA, noise abatement is being investigated at all noise sensitive areas (NSAs) where the traffic noise levels would approach or exceed the FHWA noise abatement criteria (NAC) for the defined land use category. The study area was divided into 133 noise sensitive areas in accordance with the MDOT SHA and FHWA noise policies and guidance. Geographically, 92 of the noise sensitive areas (NSAs) are located along I-495, 37 are located along I-270, and four are located along I-95 and MD 295 adjacent to the respective interchanges with I-495. The NSAs are comprised of areas that have different land use activity categories which have been combined into a single NSA. Federal regulation (23 CFR 772) and the MDOT SHA *Highway Noise Policy* require that noise abatement be investigated at all NSAs where the Build traffic noise levels approach or exceed the FHWA

Noise Abatement Criteria (NAC) for the defined land use category. Where noise abatement was warranted for consideration, it was examined to determine if the abatement is feasible and reasonable.

The following is a summary of the proposed feasible and reasonable noise barrier systems under the Build Alternatives and their NSA locations relative to EJ populations:

- Of the seven NSAs where the existing noise barrier would remain in place as currently constructed, five are located in EJ populations;
- Of the 42 NSAs where the existing noise barrier would be displaced by construction and replaced by a reconstructed barrier, 24 are located in EJ populations;
- Of the 19 NSAs where the existing noise barrier would be reconstructed and extended, eight are located in EJ populations;
- Of the 23 NSAs where there is currently not an existing noise barrier and a new barrier would be constructed, 10 are located in EJ populations;

Noise barrier systems are considered not feasible and reasonable[61] based on the MDOT SHA Highway Noise Policy in 17 NSAs, 9 of which are located in EJ populations.

Refer to the *Noise Analysis Technical Report* (**Appendix J**) for the locations of the proposed noise barriers.

d. Water Quality

As documented in the *Natural Resources Technical Report* (**Appendix L**), the Build Alternatives would result in additional impervious surface to accommodate additional lanes throughout the study corridors. Public drinking water within the EJ Analysis Area is supplied through the Occoquan Reservoir, Potomac River, and Patuxent River. Potential impacts to water quality, including public drinking water sources, would be mitigated via stormwater management measures in accordance with appropriate Federal and state stormwater management regulations. The impacts and benefits from stormwater management would be borne throughout the study corridors in both EJ populations and non-EJ populations.

e. Hazardous Materials

Construction of any of the Build Alternatives would require disturbance of existing soil conditions, including identified hazardous materials sites of concern as documented in the *Hazardous Materials Technical Report* (**Appendix K**). Prior to acquisition of right-of-way and construction, Preliminary Site Investigations (PSIs) would be conducted to further investigate properties within the final limits of disturbance and vicinity that have a high potential for mobilization of hazardous materials as a result of construction activities.

f. Natural Resources

As documented in the *Natural Resources Technical Report* (**Appendix L**), the Build Alternatives would impact: soils, wetlands and waters, floodplains, vegetation and terrestrial habitats, and wildlife. Efforts to mitigate for these impacts would include development and implementation of an Erosion and Sediment

[61] Feasible and reasonable criteria are determined in accordance with MDOT SHA policy. The assessment of noise abatement feasibility, in general, focuses on whether it is physically possible to build an abatement measure (i.e., noise barrier) that achieves a minimally acceptable level of noise abatement reasonableness, in general, focuses on whether it is practical to build an abatement measure. Barrier reasonable ness considers three primary factors: viewpoints, design goal, and cost effectiveness.

Control Plan, water resource mitigation, and the replacement of impacted trees and habitat to the extent possible with priority replacement on-site near the impacted area.

g. Visual Landscape and Aesthetic Values

The Build Alternatives would result in changes to viewsheds or visual impacts within the EJ Analysis Area. The construction of managed lanes, shoulders, traffic barrier, cut and fill slopes, stormwater management facilities, retaining walls, and noise walls along the existing highway corridor would not introduce new elements incompatible with the existing visual character or qualities along the study corridors. However, where managed lanes access ramps would be constructed, new interchange ramps and structures may be introduced that could impact the viewsheds of adjacent properties and communities. The locations or design of these elements have not been finalized. The design of all highway elements would follow aesthetic and landscaping guidelines that will be developed in consultation with the design team, local jurisdictions, private interest groups (private developers or companies), local community or business associations, as well as local, state and Federal agencies.

h. Economy and Employment

Except where right-of-way acquisitions would result in business property relocation, the Build Alternatives would not impact access to area businesses or employers. Within EJ populations, one business, a warehouse/office property in the Glenarden EJ Analysis Area Community, is anticipated to require relocation. Similar services exist and facilities and properties are available for the relocation of these services if business owners choose to relocate. There would be no overall impact to the distribution of worker occupation, or major employers within EJ populations or non-EJ populations within the EJ Analysis Area.

Proposed improvements would help address increasing congestion, thereby maintaining mobility throughout the region, including areas with EJ populations.

Additionally, through Opportunity MDOT Program the agency will provide resources for job seekers as well as small, minority-, women- and veteran-owned businesses and disadvantaged businesses to access training, advisory services and advanced industry resources to prepare for potential opportunities to work with MDOT and the I-495 & I-270 P3 Program.

i. Access and Mobility

The No Build Alternative would not provide reduced congestion, enhanced trip reliability, or travel choices to destination points within the region, thereby reducing access and mobility conditions along the study corridors.

For each of the Build Alternatives, traffic, access, and mobility would be maintained during construction in compliance with MDOT SHA Work Zone Safety and Mobility requirements. Where direct access ramps would be constructed, alterations to traffic patterns and roadway/sidewalk networks would be mitigated by the inclusion of signage, high-visibility crosswalk markings, pedestrian countdown signals, and the implementation of a temporary detour network. Existing pedestrian and bicycle facilities impacted by the Build Alternatives would be replaced in-kind, at a minimum, regardless of the alternative and would be coordinate with the counties and local jurisdictions. The Build Alternatives would not eliminate access, nor would they impede access between residences and community facilities and business. However, an

incremental enhancement to access may occur due to reduced congestion on local routes. Additionally, bus transit systems could utilize I-495 and I-270 managed lanes implemented under the Build Alternatives.

j. Community Cohesion/Isolation and Quality of Life

Under the Build Alternatives, changes to community cohesion would occur from the loss of 25 or 34 residences and four businesses. This would include the loss of seven or eight residences in two EJ populations in the Silver Spring EJ Analysis Area Community and the loss of one business in an EJ population within the Glenarden EJ Analysis Area Community. Additionally, partial property acquisition for right-of-way would occur throughout the study corridors. Generally, these would include acquiring strips of land from undeveloped areas or areas of trees from properties adjacent to I-495 or I-270, resulting in a reduction of the overall property size. However, impacts by relocation or partial property acquisition would be limited to the individuals immediately affected by the property acquisition and would occur in areas bordering the existing highway rights-of-way due to the generally parallel nature of the limits of disturbance of the Build Alternatives along the study corridors.

Changes to land use and development would be limited to those properties affected by property acquisition. Residents and employees who live, work, and utilize services immediately adjacent to the study corridors may experience changes in current quality of life due to property acquisition and temporarily during construction activities. However, community residents would experience a benefit to quality of life due to reduced congestion along the study corridors and enhanced trip reliability and travel choices to destination points within the region.

k. Tolling Considerations

The FHWA's, *Impacts of Congestion Pricing on Low-Income Populations* (FHWA 2017), explains that the impacts of congestion pricing on low-income populations vary widely by context and type of project (i.e., full facility tolling or partial facility tolling). In the tolled managed-lanes scenario, new travel choice becomes available for all users and additional network capacity is provided. According to FHWA, well planned congestion pricing schemes:

- "Increase transportation options for all commuters, including low-income commuters, to achieve relatively congestion-free travel on specific occasions.
- Demonstrate wide acceptance and usage of priced-managed facilities by low-income commuters.
- Demonstrate that low-income commuters, many of whom are transit riders, particularly benefit from reduced congestion and transit investments made from pricing revenues (FHWA 2017)."

Consistent with FHWA guidance, while the travel speed and trip reliability benefits offered by the tolled lanes could be a less feasible choice for EJ populations due to cost burden, under any of the managed lane alternatives, all existing GP lanes would remain toll-free and would undergo some travel time improvements. Traffic analysis conducted in support of the Study indicates that travel times would improve and congestion would decrease along GP lanes under each of the Build Alternatives. MDOT currently provides the following in managed lanes throughout the state:

- Free transponders for all customers
- Prepaid cash/check payment options at MDTA walk-in centers, including four MVA's and six MDTA facilities

- Allowing multiple payment methods, including credit card, cash, check or money order
- Funding alternative modes of transportation through commuter programs such as Commuter Choice Maryland, Guaranteed Ride Home, and Maryland Rideshare
- Providing more than 100 park-n-ride locations throughout the state
- Minimum prepaid balances sized to reduce the chance of users violating account minimums

All electronic tolling (AET) methods would be enlisted to collect tolls for the managed lanes under each of the Build Alternatives. Tolls would be set using dynamic pricing, based on a tolling algorithm that would correlate the traffic volumes and demands with the toll rate. The toll rate caps, or upper and lower thresholds for tolls, would be set through a public process by the Maryland Transportation Authority in accordance with COMAR 11.07.05. Additionally, COMAR 11.07.05. requires public notice of toll schedule revisions. The advantage of using dynamic pricing is that it enables the managed lanes to maintain a 45-MPH speed at all times and would reduce congestion in the GP lanes, which results in benefits for all users of the roadway facilities. GP lanes would remain free for users under all Build Alternatives. In addition, under Build Alternatives 9, 9M, and 13B all HOV +3 users would be able to travel toll-free.

C. The Potential for Adverse Effects to Environmental Justice Populations

As described above, both beneficial and adverse effects to EJ populations would occur from the Build Alternatives. The potential for adverse effects to EJ populations is summarized in **Table 4-38**.

Table 4-38: Potential for Adverse Effects to Environmental Resources within EJ Populations

No Build	Alt. 5[1]	Alts. 8 & 9[2]	Alt. 9M	Alt. 10	Alt. 13B	Alt. 13C
Right-of-Way Requirements and Property Relocations within EJ Populations						
No	Yes (163.3 acres) (8 relocations)	Yes (182.9 acres) (9 relocations)	Yes (313.3 acres) (29 relocations)	Yes (185.0 acres) (9 relocations)	Yes (182.0 acres) (9 relocations)	Yes (184.0 acres) (9 relocations)
Impacted Community Facility Properties[3] within EJ Populations						
No	Yes (19 properties)	Yes (20 properties)	Yes (20 properties)	Yes (21 properties)	Yes (20 properties)	Yes (20 properties)
Human Health and Safety						
Yes	Yes	Yes	Yes	Yes	Yes	Yes
Air Quality						
Yes	Yes	Yes	Yes	Yes	Yes	Yes
Noise						
No	Yes	Yes	Yes	Yes	Yes	Yes
Water Quality						
No	Yes	Yes	Yes	Yes	Yes	Yes
Hazardous Materials						
No	Yes	Yes	Yes	Yes	Yes	Yes
Natural Resources						
No	Yes	Yes	Yes	Yes	Yes	Yes
Visual and Aesthetic Resources						
No	Yes	Yes	Yes	Yes	Yes	Yes
Economy and Employment						
TBD	No	No	No	No	No	No

Access and Mobility						
Yes	No	No	No	No	No	No
Community Cohesion/ Isolation and Quality of Life						
No	No	No	No	No	No	No
Tolling Considerations						
No	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The potential for adverse effects to environmental resources in EJ populations, as documented in the DEIS and in other Technical Reports are described in the *Community Effects Assessment and Environmental Justice Analysis Technical Report*; Appendix E, Chapter 5 identifies the direct impacts as well as effects to environmental characteristics for the CEA Analysis Area Communities, including those containing EJ populations.

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

[2]Alternatives 8 and 9 have the same limits of disturbance footprint and therefore have the same impacts. [3]Community facility properties within EJ populations would be impacted by partial property acquisition (generally, sliver impacts along property lines). No community facilities would be relocated.

The determination of disproportionately high and adverse impacts to EJ populations will be made on the Preferred Alternative and will be disclosed in the FEIS. Measures to mitigate any disproportionately high and adverse impacts will be determined in consideration of the specific impacts to EJ populations and will be done with input from the potentially affected minority of low-income populations. Strategies for mitigating potential adverse effects to EJ populations may consist of, but are not limited to:

- Free bus transit usage of managed lanes for faster and more reliable trip
- Direct access to existing and proposed transit stations and transit-oriented development areas within the EJ Analysis Area
- Direct access supporting transit connections in Equity Emphasis Areas
- No toll for eligible High Occupancy Vehicles (Alts 9 and 13B)
- Making cross highway pedestrian and bicycle enhancements and connections

As enumerated in **Section 4.21.2**, the next steps for the EJ Analysis, to be documented in the FEIS, include the following:

- The consideration of mitigation and enhancement measures if unavoidable adverse effects are expected to occur under the Preferred Alternative
- A comparison of adverse effects from the Preferred Alternative within EJ populations to adverse effects within a non-EJ population reference community
- A determination of whether disproportionately high and adverse effects would occur under the Preferred Alternative to EJ populations
- A final conclusion of whether disproportionately high and adverse effects would occur, based on unmitigated adverse effects and whether public feedback has been addressed.

4.22 Indirect and Cumulative Effects

4.22.1 Introduction and Methodology

> **Indirect effects** are caused by the action and are later in time or farther removed in distance but are still reasonably-foreseeable(40 CFR § 1508.8(b)).
>
> **Cumulative effects** are defined as impacts on the environment that result from the incremental impact of the action when added to past, present, and reasonably-foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR § 1508.7).

This indirect and cumulative effects (ICE) assessment was conducted in accordance with MDOT SHA's current ICE guidelines (MDOT SHA, 2012) and in accordance with NEPA and its implementing regulations. The ICE analysis considers the effects discussed in this chapter on general population trends, employment trends, and general growth trends based on master plans, reports, census and geographic data, historic maps, and aerial imagery. It considers planning and forecasting documents concerning past, present, and future economic development; the history and origins of the proposed action and previous studies; and data reflected in previously completed NEPA documents for understanding of the potential for indirect and cumulative effects in the region.

The ICE Analysis methodology includes the following four general steps:

- Step 1: Collect data and identify resources
- Step 2: Define the ICE Analysis Boundary
- Step 3: Define the ICE time frame
- Step 4: Define the analysis approach and methodology

Step 1: This ICE analysis considers the resources, listed below, that could potentially experience direct or indirect impacts by the Build Alternatives:

- Socioeconomic Resources (communities, residences, businesses, parks and recreation);
- Cultural Resources (historic structures/districts and archeological sites);
- Natural Resources (surface water, wetlands, floodplains, forest, wildlife /wildlife habitat, and sensitive species); and
- Air Quality

Step 2: Representative sub-boundaries were identified and reviewed, for example Area of Traffic Influence, Planning Areas, and watersheds. The geographic boundary used for the ICE analysis was developed by synthesizing sub-boundaries to create a single ICE Analysis Area boundary (**Figure 4-16**) to capture the full geographic area where potential indirect and/or cumulative effects would be reasonably-foreseeable. The representative sub-boundary components can be found in the *Indirect and Cumulative Effects Technical Report* **(Appendix O, Section 2.2.2)**.

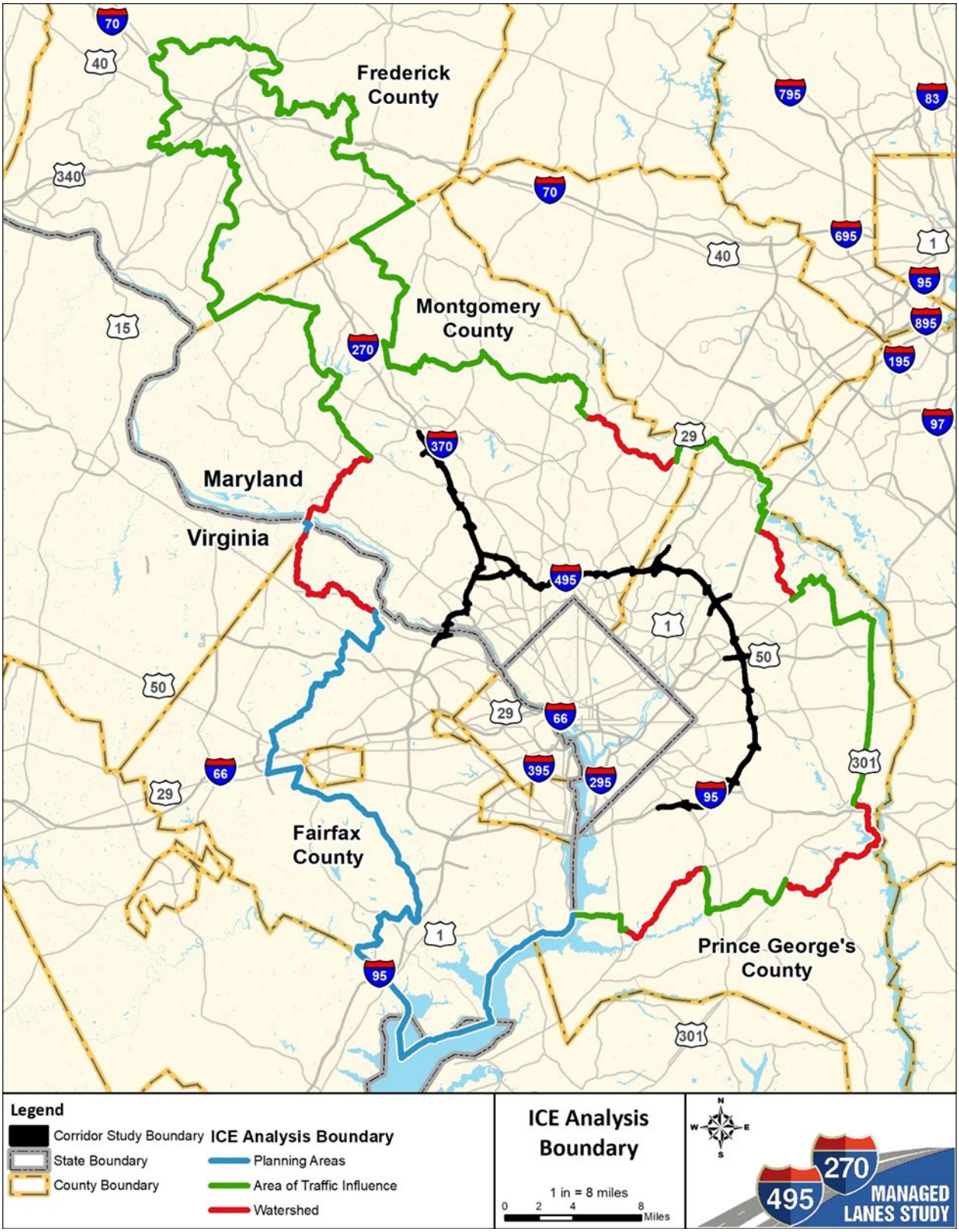
Step 3: The temporal boundaries, or time frame, of the ICE analysis includes setting a past and future time frame. In general, the temporal boundary is identified based on factors including data availability, relevant historical events or trends, data availability and the design year for improvements being evaluated in the EIS.

A period of 70 years, from 1970 to 2040, is the ICE time frame (or temporal boundary). The first section of I-495 was opened in 1961, and the highway was completed in 1964. The first year for which decennial census data was available after the completion of I-495 was 1970. In addition, 1970 generally coincides with the opening of I-95 between Baltimore and Washington, DC. Washington National Pike was built from 1953 to 1960 and became known as I-270 in 1975.

The future time frame of 2040 was determined based on the Study's design year, as well as the availability of data. Population and employment projections are available through 2040 from MWCOG, allowing a more accurate depiction of future conditions within the ICE Analysis Area.

Step 4: The ICE analysis requires an understanding of past, current and potential future conditions in the ICE analysis area in order to assess the potential for impacts associated with the range of study alternatives. Consideration of past effects included research and review of published literature, census information, and historic aerial imagery. Geographic information systems (GIS) mapping was obtained or created for the ICE Analysis Area and used to assess trends from the past to the present time frame. Resources identified within the ICE boundary are considered in light of past and present socioeconomic, cultural, and natural environmental conditions and trends. Future conditions are analyzed to compare build and no build scenarios and the resulting potential indirect and cumulative effects.

Figure 4-16: Overall ICE Analysis Area Boundary



The methodologies identified in the MDOT SHA ICE guidance were applied, including trends analysis and overlays.

- Trends analysis involves qualitative discussion of impacts to a resource over time. Past and current effects can allow for an informed projection of likely future effects.
- Overlays of present and future land use maps over the existing environmental resources allow for quantitative or qualitative description of the impacts to those resources.

Based on these methods, the ICE Analysis is designed to identify impacts to resources from other actions (past, present, and future) including indirect impacts—if any—due to each Build Alternative. Then, the potential incremental effects of the Build Alternatives are evaluated in light of the past, present, and future impacts identified. **Table 4-39** provides a brief summary of the resources, data, data sources, and analysis methodology used for identifying potential indirect and cumulative effects.

Table 4-39: ICE Analysis Data Sources and Methodology

Resource	Data	Data Sources	Analysis Methodology
Socioeconomic Resources			
Communities (facilities, services, cohesion), residences, businesses, parks and recreation	Aerial photos, land use maps, census data, county comprehensive plans	M-NCPPC, MDP, Maryland iMap GIS, MWCOG, US Census Bureau, Montgomery County, Prince George's County, Fairfax County, Alexandria, City of Fairfax	Overlay mapping and aerial photos, analyze trends in population and housing and availability of services, examine county comprehensive plans
Cultural Resources			
Historic structures/districts and archeological sites	Historic maps and photos, land use maps, historical site records	M-NCPPC, MHT, VDHR, National Register	Overlays of land use surrounding historical sites; trend analysis
Natural Resources			
Surface Water / Floodplains	Stream mapping, aerial imagery, land use data, watershed boundaries, floodplain mapping	M-NCPPC, MDNR, MDE, VDEQ, FEMA	Overlays of land use and historical imagery, trends analysis
Wetlands and Aquatic Habitat	Wetlands mapping, land use and historical imagery	M-NCPPC, MDNR, VDNR, NWI	Overlays of land use and historical imagery, trends analysis
Forests	Land use mapping and historical imagery	M-NCPPC, MDP, VDNR	Overlays of land use and historical imagery, trends analysis
Other			
Air Quality	CLRP	NCRTPB	Regional conformity discussion

4.22.2 Affected Environment

A. Past and Present Land Use

Substantial population growth and land development has occurred in the ICE Analysis Area during the analysis time frame. Most ICE Analysis Area jurisdictions have seen substantial population growth since 1970 and are projected to have an increase in population by 2040. Most populations in the ICE Analysis Area are estimated to rise at a somewhat more modest pace compared to the prior decades, as the land uses become older and available land becomes scarcer.

MWCOG member jurisdictions include the ICE Analysis Area jurisdictions of Montgomery, Prince George's and Fairfax Counties, as well as Frederick, Charles, Arlington, Loudoun and Prince William Counties, the District of Columbia, and the many independent cities and municipalities within the region. According to the MWCOG 2016 Amended CLRP (NCRTPB, 2016), approximately 57 major roadway construction projects and 15 major transit projects are proposed in the ICE Analysis Area. According to MWCOG's Round 9.1 Cooperative Forecast, the Metropolitan Washington Region will add more than 633,000 households between 2015 and 2040, for a total of 2.6 million households. More than half of the expected household growth in the ICE Analysis Area will occur in Fairfax County, the District of Columbia, and Montgomery County. Commercial development in the MWCOG region declined by seven percent in 2017 compared to 2016 (MWCOG, 2018d). Seven of the ten largest development projects in the MWCOG region, by square footage, are located within the ICE Analysis Area.

The majority of the study corridor is located within the Potomac River drainage basin, with the eastern-most portion of the study corridor, between approximately US 50 and MD 4, falling within the Patuxent River drainage basin. The full ICE Analysis Area contains approximately 40,900 acres of wetlands according to NWI mapping and approximately 6,700 acres of FEMA's 100-year floodplains. A total of 407 nontidal wetlands and 1,061 stream segments were delineated within the corridor study boundary. More detailed descriptions of wetland resources and impacts are included in the *Natural Resources Technical Report* (**Appendix L**).

The Chesapeake Bay Land Cover GIS dataset was used to identify land cover in the full ICE Analysis Area (670,000 acres total). Forest and shrub land cover accounts for approximately 51 percent (341,700 acres) of the ICE Analysis Area, with herbaceous and impervious land cover at 25 percent (168,300 acres) and 20 percent (137,600 acres), respectively. The remaining categories account for three percent (19,400 acres) water cover and less than one percent (3,200 acres) of barren land.

Existing land use in the ICE Analysis Area includes a mix of developed residential, commercial, and institutional land uses, along with open spaces, forested areas, and relatively small areas of farmland. For the Maryland portion of the ICE Analysis Area, Land Use/Land Cover (LULC) is available for 1973, 2002, and 2010 data years from the MDP. The data suggests an overall pattern of agricultural and forest land converted into residential use between 1973 and 2010. Institutional and industrial uses rose modestly in this time frame, and other land use categories were generally stable. Land use in the Maryland portion of the ICE Analysis Area is predominantly suburban, mid to low-density residential use, with more dense areas closer to Washington, DC and becoming less intense further from the city core. Commercial, industrial, and institutional uses are generally clustered around major transportation corridors, especially interstate highways. Green spaces are generally stream valley corridors and larger parks dispersed throughout the area.

The land use data for the District of Columbia from 2005, as presented in the District of Columbia Comprehensive Plan notes the expansive city core of about four-square miles centered around the open spaces of the Federal city. The core is surrounded by an inner ring of moderate- to high-density residential and mixed-use neighborhoods. Beyond the inner ring is an outer ring of less dense development, characterized largely by single-family housing and garden apartments. However, as noted in the Comprehensive Plan, the District was almost fully developed by 1960.

The Virginia portion of the ICE Analysis Area is generally characterized by mature suburban residential land uses, with commercial and other uses focused in hubs along major transportation corridors. The land uses are denser in the areas closer to Washington, DC, becoming more suburban further away from the urban core. The Virginia portion of the ICE Analysis Area has seen a major growth in office buildings since 1970, particularly in areas close to highways, Metrorail stations, and near Washington, DC. Residential land use accounts for 50 percent of the land use in the Fairfax County portion of the ICE Analysis Area.

A. Future Land Use

The availability and level of detail for future land use varies depending on the planning jurisdiction. Background information on future land use is summarized below based on available plans and data by jurisdiction. County and local master plans focus on protecting existing open space and residential communities by directing future development to designated areas. There are no planned developments in the ICE Analysis Area that are dependent upon the completion of the Build Alternatives. For additional information refer to the *Indirect and Cumulative Effects Technical Report* (**Appendix O, Chapter 3, Section 3.1**).

- Montgomery County, Maryland: A review of the various land use plans in Montgomery County, indicates that the comprehensive planning documents aim to protect existing suburban residential areas along I-495, and maintain them in their current form. New growth is to be primarily focused into hubs around existing mass transit, and in more-densely-urbanized areas closer to Washington, DC.

- Prince George's County, Maryland: Future land use changes are outlined in the Growth Policy Map, included in the Prince George's Approved General Plan (M-NCPPC, 2014). The Regional Transit Districts, Employment Areas, and Local Centers are primarily focused along and inside I-495, particularly near highways and Metro lines. Most of the area between I-495 and US 301 is designated as Established Communities with pockets of Future Water and Sewer Service Areas scattered throughout. The Rural and Agricultural Areas are primarily east of US 301, along with several large areas near the northern and southern boundaries of the County. This overall distribution indicates that new growth will be focused primarily around major transit hubs and highways, along with infill development in existing residential communities.

- Frederick County, Maryland: The 2010 comprehensive plan policy is to direct future land use growth in the vicinity of existing population centers and highway infrastructure, particularly near Frederick and along I-270 in the ICE Analysis Area.

- Fairfax County, Virginia: The 2017 county plan also calls for the creation of community-focused, mixed-use centers with a compatible mix of housing, commercial, institutional/public services, and recreation uses. These are encouraged within the established urban centers such as Tysons

Corner, primarily located along major highways in the County, and focused mostly closer to Arlington and Washington, DC.

- Arlington County, Virginia: The 2016 comprehensive plan calls for retention of the predominant residential character of the County, and limitation of intense development to defined areas (Arlington County, 2016). In particular, it calls for concentrating high-density development within the Rosslyn-Ballston and Jefferson Davis Metrorail Transit Corridors.

- District of Columbia: The District of Columbia comprehensive plan notes that the City has been largely built-out since the 1960s, but demand for land for housing and jobs has continued to fuel land use change (DC Office of Planning, 2010). The plan notes that two areas are emerging as major hubs of central city growth in DC. The first includes land in the triangle bounded by New York Avenue, Massachusetts Avenue NW, and the CSX railroad, along with adjacent lands around the New York Avenue Metro station. The second includes the South Capitol corridor and Near Southeast.

B. Population, Housing and Employment Growth

Most ICE Analysis Area jurisdictions have seen substantial population growth since 1970. Montgomery County's population nearly doubled between 1970 and 2016; and Prince George's County grew by over 35 percent. Frederick County, the least populous of the three Maryland counties, nearly tripled with a growth of 187 percent. Fairfax County, the most populous of the ICE Analysis Area counties in Virginia, grew nearly 150 percent during that time. Arlington County grew by approximately 30 percent.

All of the ICE Analysis Area jurisdictions are projected to increase in population by 2040. Most are estimated to rise at a somewhat more modest pace compared to the prior decades, as the land uses become more mature and available land becomes scarcer. Washington, DC is estimated to continue rising in population, regaining the population lost since 1970 and exceeding it by 2030. **Figure 4-17** shows the estimated growth by Traffic Analysis Zone (TAZ) between 2015 and 2040. Areas with the greatest population growth (shown in darker shades) are generally clustered around I-270 and I-495, in Washington, DC, and along other major roadway corridors such as I-95 and I-66.

Much of the housing growth occurred as farmland in the jurisdictions surrounding Washington, DC were converted to suburban residential uses. The growth in housing has gradually tapered off as developable land has been depleted in these areas; new housing growth primarily comes from infill, densification, and redevelopment of existing land uses.

Employment growth projections were obtained from MWCOG Round 9.1 Cooperative Forecasts and shows that employment is projected to grow between 2015 and 2040 for all jurisdictions in the ICE Analysis Area. Washington, DC is the greatest concentration of employment in the ICE Analysis Area, followed by Fairfax County and Montgomery County.

Figure 4-18 shows the total estimated change in employment by TAZ for the ICE Analysis Area between 2015 and 2040, with greater employment growth forecast for darker shaded areas. The forecasts predict growth clustered in central Washington, DC as well as other urban centers primarily located along major transportation infrastructure corridors such as I-495, I-270, I-95 and I-66. Similar to population growth, several growth areas are located along I-495 and I-270.

Figure 4-17: Projected Population Growth 2015 – 2040 by TAZ

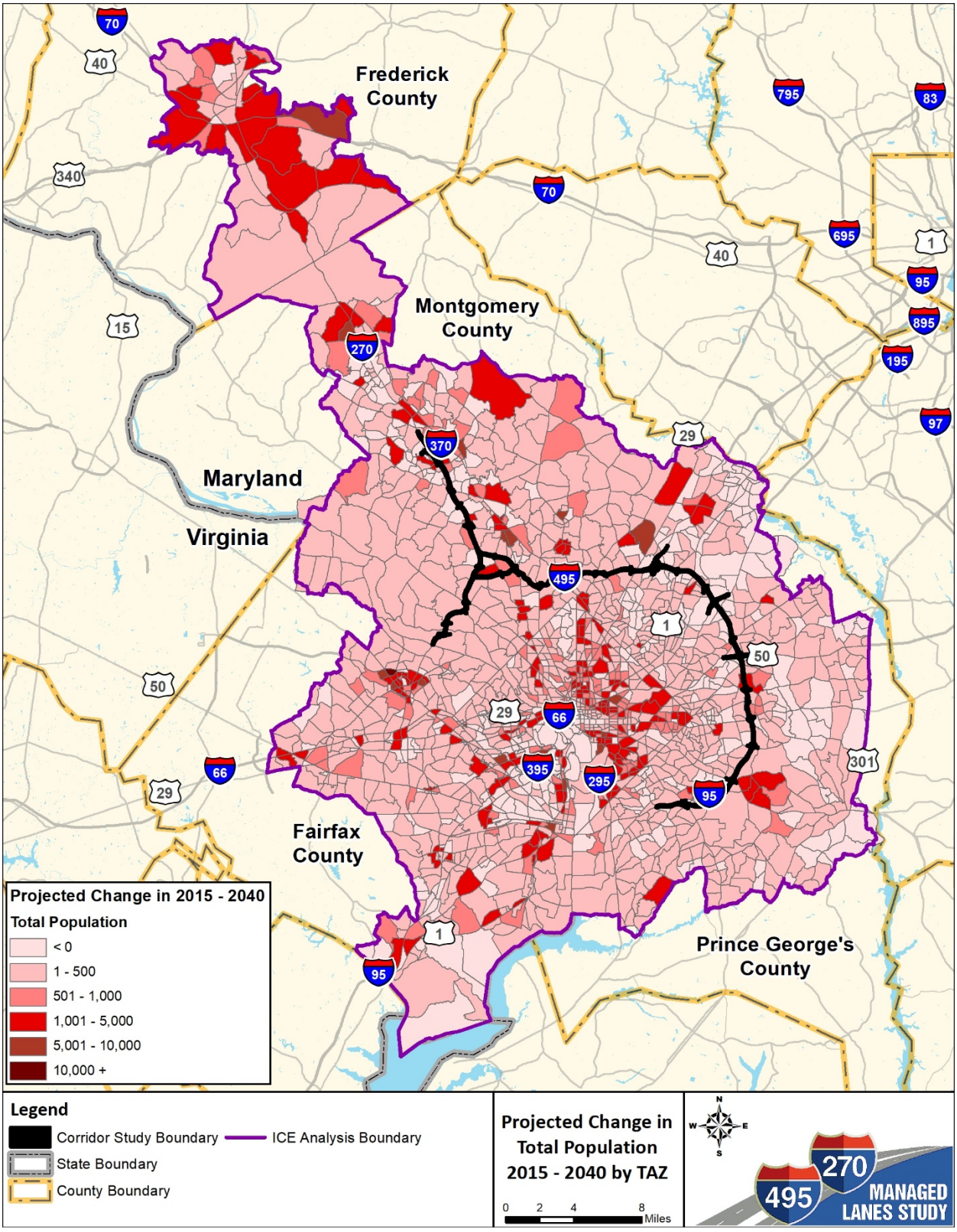
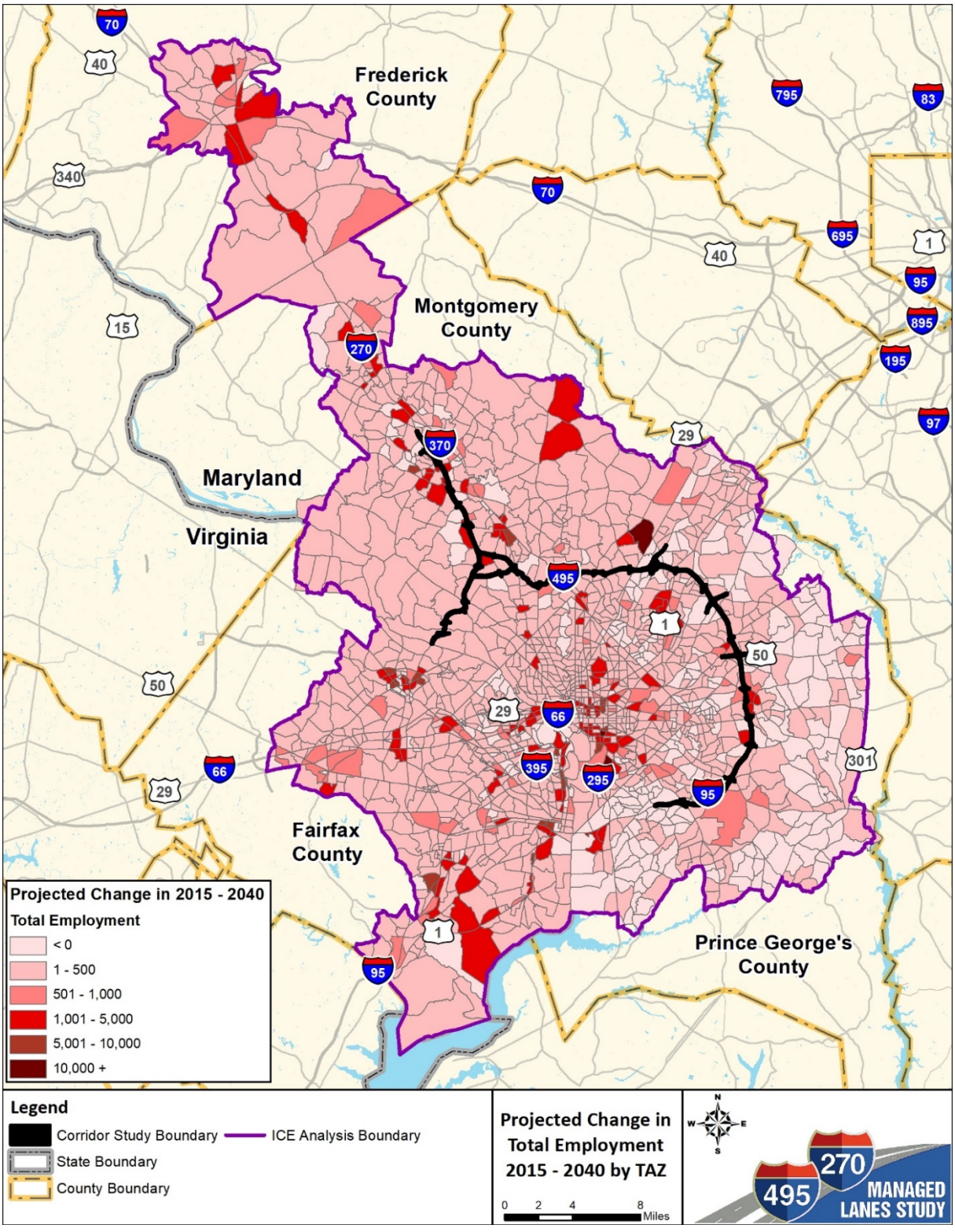


Figure 4-18: Projected Employment Growth 2015 -2040 by TAZ



Source: MWCOG Round 9.1 Cooperative Forecasting

MWCOG member jurisdictions include all the ICE Analysis Area jurisdictions and more. According to MWCOG's Round 9.1 Cooperative Forecast, the Metropolitan Washington Region will add more than 633,000 households between 2015 and 2040, for a total of 2.6 million households. Fairfax County, the District of Columbia, and Montgomery County would have more than half of the expected household growth in the ICE Analysis Area. Commercial development in the MWCOG region declined by seven percent in 2017 compared to 2016 (MWCOG, 2018d). Seven of the ten largest development projects in the MWCOG region, by square footage, are located within the ICE Analysis Area. None of the future projects identified are known to be dependent upon the I-495 & I-270 Managed Lanes Study. Refer to the *Indirect and Cumulative Effects Technical Report* (**Appendix O**) for additional details.

4.22.3 Environmental Consequences

A. Indirect Effects

Indirect effects are caused by the action and are later in time or farther removed in distance but are still reasonably-foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the patterns of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR § 1508.8).

The indirect effects of worsening traffic congestion under the No Build Alternative could include loss of economic productivity, changes in community cohesion resulting from reduced access and delays, effects on the desirability of communities, and potential changes to individual decisions about where to live and work. While no resources are anticipated to be directly impacted by a No Build Alternative, the No Build Alternative does include currently planned and programmed infrastructure projects that may affect the ICE Analysis Area. Moreover, under the No Build Alternative, motor vehicle volumes are forecasted to increase over time and with them are anticipated increases in travel times and delays related to growing traffic congestion. Worsening traffic congestion could have potential negative effects on motor vehicle-reliant activities, such as; emergency response services, supply chain/commercial trucking and deliveries, school bus schedules, and workforce commuters.

The indirect effects of the Build Alternatives in the ICE Analysis Area are summarized in **Table 4-40.**

Table 4-40: Indirect Effects in the ICE Analysis Area

Resource	Indirect Effects of the Build Alternatives
Socioeconomic Resources (communities, residences, businesses, parks and recreation)	Roadway improvements, such as those proposed under the Build Alternatives, can be an attraction to commercial or real estate development. The possibility of induced growth in this ICE analysis area would be lessened by the long-term presence of the existing highway, as well as the mature land uses and developments that have occurred in the ICE Analysis Area. As a result, the likelihood of induced commercial or residential development is reduced substantially by the built-out environment that has been in existence for many years. Moreover, much of the undeveloped land within the ICE Analysis Area is designated by comprehensive plans for preservation. The Build Alternatives could change travel patterns by providing increased capacity along existing facilities. More rural, less-developed portions of the ICE Analysis Area and other locations where undeveloped land exists would be most likely to experience pressure for new development from improved access along the I-270 and I-495 corridors. Noise impacts could occur to communities from greater traffic volumes on connecting roadways. Indirect impacts would be minimized by adherence to existing master plans and zoning regulations pertaining to new development.

Resource		Indirect Effects of the Build Alternatives
Cultural Resources (historic structures /districts and archeological sites)		Potential indirect effects could occur to historic properties resulting from increased population growth and development in the APE. However, these areas are subject to many greater economic and demographic pressures producing increased population and development that are not caused by the Study. Development of new land uses or more intensive land uses could lead to destruction or altering the integrity of historically important characteristics of archeological and architectural historic properties.
Natural Resources	Surface Water	Indirect impacts of the Build Alternatives would result from effects related to changes in facility-related run-off quality and quantity associated with the conversion of land from rural to urban and suburban uses as well as changes in drainage patterns and imperviousness. Indirect downstream impacts to surface water would be minimized through the development and application of approved erosion and sediment control plans and stormwater-related best management practices (BMPs). In addition, coordination with state and local agencies overseeing water resources in the ICE Analysis Area will continue throughout the study to determine appropriate mitigation for impacts
	Wetlands	Indirect impacts to wetlands and waterways from the Build Alternatives could result from roadway runoff, sedimentation, and changes to hydrology. All indirect impacts would lead to a decrease in available wetland and waterway habitat within the ICE Analysis Area and ultimately a decrease in plant and animal species inhabiting these areas. Any wetlands impacts associated with proposed public or private development would require permitting by the USACE and state regulatory agencies, as well as review and approval by county governments to ensure consistency with environmental protection guidelines.
	Floodplains	Floodplain encroachment could alter the hydrology of the floodplain, which could indirectly result in more severe flooding in terms of flood height, duration, and erosion. Indirect impacts from the Build Alternatives would be limited as they are confined to widening in existing corridors and impacts to floodplains would be minimized through adherence to existing regulatory requirements.
	Forest	Indirect impacts to forests from any of the Build Alternatives could result from roadway runoff, sedimentation, and the introduction of non-native plant species within disturbed areas. Increased demand for land development resulting from greater access provided by the Build Alternatives could result in pressure for conversion of forest land to residential or commercial use.
	Wildlife and Wildlife Habitat	The potential negative indirect effects to terrestrial and aquatic wildlife and wildlife habitat would be limited as the Build Alternatives would improve existing roadways in highly urbanized areas which are already highly fragmented and affected by the existing transportation facilities
	Sensitive Species	Loss of protected species' habitat and fragmentation of such habitat related to an increased demand for land use changes could indirectly affect protected and other wildlife species.
Air Quality		No substantial indirect effects to air quality are anticipated from the Build Alternatives and would not cause or contribute to any violation of NAAQS. The quantitative assessments conducted for the project-specific CO and MSATs impacts were considered analyses of indirect effects because they address air quality impacts attributable to the project that occur at a later time in the future. Those assessments demonstrate that in the future: (1) air quality impacts from CO would not cause or contribute to violations of the CO NAAQS; (2) MSATs emissions from the affected network would be significantly lower than they are today; and (3) the mobile source emissions budgets established for the region for purposes of meeting the ozone NAAQS would not be exceeded.

B. Cumulative Effects

Cumulative effects are defined as impacts on the environment that result from the incremental impact of the action when added to past, present, and reasonably-foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR § 1508.7).

Past actions that have impacted resources include the numerous infrastructure and land development activities that occurred in the ICE Analysis Area throughout the ICE time frame. As described in the *Indirect*

and Cumulative Effects Technical Report (**Appendix O**, **Section 3.1.2)** jurisdictions in the ICE Analysis Area have experienced substantial growth of population, housing, and employment since 1970. For example, Montgomery County's population nearly doubled between 1970 and 2016; and Prince George's County grew by over 35 percent according to US Census 2016 five-year estimates. This growth and development in the ICE Analysis Area has entailed continuous expansion and intensification of urban and suburban land uses into previously rural landscapes. Similarly, the network of transportation infrastructure has been continually expanded to accommodate the transportation needs of the growing regional economy and population.

Present and future actions impacting resources include noise, land development, and infrastructure improvements required to accommodate existing and future populations and economic activity. MWCOG estimates show ICE Analysis Area jurisdictions growing in population and employment through 2040. Demand from existing populations and economic activity has created substantial traffic congestion in the region, and many currently planned projects are intended to accommodate this existing demand. Future projects, as described in the *Indirect and Cumulative Effects Technical Report* (**Appendix O, Section 3.1.3**) will continue to expand infrastructure capacity to meet the needs of the growing population.

The past, present and future actions have had both beneficial and adverse impacts. Past and present growth and development have improved local economies and led to provision of community facilities, transportation infrastructure, and recreational resources benefiting residences and businesses. Construction and expansion of transportation facilities has facilitated economic growth by providing access to employment and community facilities and allowing for more efficient movement of goods and services.

Increased population and employment in the ICE Analysis Area is expected to increase traffic volumes and create eventual need for more transportation improvement projects. The proposed action is one of many reasonably-foreseeable future transportation projects designed to address both existing volumes, as well as anticipated growth. The Build Alternatives alone would provide improved access, mobility, and traffic conditions. Combined with the other projects identified in the *Indirect and Cumulative Effects Technical Report* (**Appendix O**, **Section 3.1.3B**) it is anticipated that there would be a greater overall benefit to local communities. The proposed action, along with other future transportation projects would cause noise impacts, with potential cumulative effects on communities in the vicinity of improved and new roadways.

The No Build Alternative, considered in the context of growth and development occurring throughout the ICE Analysis Area, would result in potentially negative socioeconomic impacts from increasing traffic congestion. The effects of worsening traffic congestion could include loss of economic productivity, changes in community cohesion resulting from reduced access and delays, effects on the desirability of communities, and potential changes to individual decisions about where to live and work.

The cumulative effects of the Build Alternatives in the ICE Analysis Area are summarized in **Table 4-41.**

Table 4-41: Cumulative Effects in the ICE Analysis Area

Resource		Cumulative Effects of the Build Alternatives
Socioeconomic Resources (communities, residences, businesses, parks and recreation)		• The continual expansion of transportation facilities in the region, while providing benefits of increased access and mobility, also has detrimental effects on communities adjacent to these facilities, including potential loss of community cohesion. • The Build Alternatives would add to the impacts from other past, present and future projects to parklands in communities adjacent to the I-495 and I-270 corridors, often in well-developed areas where replacement parkland could not be easily located.
Cultural Resources (historic structures /districts and archeological sites)		• Past actions in the ICE Analysis Area have already resulted in destruction or degradation of resources, including demolition for new construction or changes in land use context surrounding cultural resource areas, where proximal replacement of resources may not be possible. • Present and future actions, including transportation projects and land development activity, would likely continue to impact cultural resources in similar ways.
Natural Resources	Surface Water	• Cumulative impacts to water quality could occur from stream loss and the incremental increase of impervious surfaces that may increase runoff from past, present, and future development projects. • These would be minimized through the use of BMPs during construction and use of SWM facilities. • The incremental effect would be minimized by the required permitting process, which would identify avoidance, minimization, and mitigation as needed to offset wetland losses.
	Wetlands	• Past land use development and transportation projects have had impacts on wetlands, particularly those that occurred prior to the passage of state and Federal laws that regulate wetland impacts. • The incremental effect would be minimized by the required permitting process, which would identify avoidance, minimization, and mitigation as needed to offset wetland losses.
	Floodplains	• The incremental impact of the Build Alternatives to floodplains, considered in light of past, present and future impacts, is expected to be relatively minimal due to existing regulatory controls and regulations.
	Forest	• While future development and transportation projects would be regulated in a manner that minimizes forest impacts, the past losses of forest in the ICE Analysis Area have been extensive. The incremental effect of the Build Alternatives on forested land in the ICE analysis area would be potentially substantial. • The required 1:1 mitigation would help offset the incremental effect of this impact; however, it may not be possible to find suitable replacement land within close proximity of the build corridors. Additionally, this may result in replacement of mature forest areas with new, smaller trees.
	Wildlife and Wildlife Habitat	• Overall, the cumulative effects of past transportation and development projects have been adverse to wildlife and wildlife habitat, but present and future impacts would be reduced by applicable Federal, state, and local laws and regulations requiring potential adverse effects to be avoided, minimized, or mitigated. • The Build Alternatives would contribute to the incremental effect on wildlife habitat in the ICE Analysis Area in light of other past, present and future projects.
	Sensitive Species	• The overall impacts of past actions in the ICE Analysis Area have had adverse effects on sensitive species due to the conversion of wildlife habitat to urbanized land. • Present and future development could potentially impact protected species, though such effects would likely be minimized by adherence to Federal and state laws and regulations for protected species.

Resource	Cumulative Effects of the Build Alternatives
Air Quality	• The Study is currently included in the NCRTPB FY 2019 – 2024 TIP [TIP ID 6432 and Agency ID AW0731 (planning activities)] and the NCRTPB Visualize 2045 Long-Range Plan (CEID 1182; CEID 3281; and Appendix B, page 56). This project (adding two managed lanes in each direction) is included in the Air Quality Conformity Analysis that accompanies the Visualize 2045 Plan. This analysis demonstrates that the incremental impact of the proposed project on mobile source emissions, when added to the emissions from other past, present, and reasonably-foreseeable future actions, is in conformance with the TIP and will not cause or contribute to a new violation, increase the frequency or severity of any violation, or delay timely attainment of the NAAQS established by EPA. Therefore, the cumulative impacts of the project to air quality are not expected to be significant. Prior to the ROD being signed, the selected alternative will be included in the TIP and Long-Range Plan along with a transportation conformity determination. (See Appendix I– Air Quality Technical Report for more information.)

4.23 Consequences of Construction

The LODs of the Build Alternatives account for areas needed for construction. The assumed areas for construction staging and materials storage are identified on the *Environmental Resource Mapping* (**Appendix D**). The quantified impacts presented in this DEIS are assumed to be permanent or long-term effects. As design is advanced on the Preferred Alternative, the long-term effects will be refined and short-term, construction-related effects of the Preferred Alternative will be quantified and documented in the FEIS. Impacts associated with construction that will be further evaluated for the Preferred Alternative include, traffic congestion associated with construction maintenance of traffic, impacts to business and residential access, utility disruptions, vibrations, sediment erosion and stormwater management, and construction related noise and visual impacts, among others.

Due to the magnitude of the Study, MDOT SHA would need to construct any Build Alternative in phases. Phase 1 of the P3 Program would include that portion of the MLS along I-495 from the vicinity of the George Washington Memorial Parkway in Virginia, across and including the ALB, to its interchange with I-270 at the West Spur, and I-270 from its interchange with I-495 to its interchange with I-370. A Phase 1 P3 Agreement would also include I-270 up to I-70 which would be advanced through a separate, independent NEPA study.

It is anticipated that construction of any phase will last approximately four to five years. Details related to when construction related activities will occur will be determined in final design; however, the project will likely require night work to occur when activities could not be completed safely during the day. Advanced notice of construction related activities would be provided and all reasonable efforts to minimize impacts to residential communities would be undertaken. MDOT SHA will continue to coordinate with the neighboring communities through design and construction, should a Build Alternative be selected.

4.23.1 Visual and Aesthetic Resources

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

impacts from both dynamic and static views will occur from the addition of construction equipment including cranes, heavy vehicles, trucks, borrow material and equipment stockpiling, safety signage, temporary barriers, etc.

4.23.2 Hazardous Materials

Prior to construction, the Preliminary Site Investigations (PSIs) would be conducted based on the proposed construction schedule and phases of design in order to identified sites with contamination that may require mitigation prior to construction. The PSIs will include subsurface sampling for those properties where additional soil and/or groundwater analysis (beyond the information documented in detailed regulatory records) is needed. The Developer would be required to use best management practices to minimize the release of any hazardous materials during construction.

4.23.3 Air Quality

The construction duration of the project is not anticipated to exceed five years in any single location; thus, most emissions associated with construction are considered short-term or temporary in nature. The primary air quality concerns during construction would be a potential short-term localized increase in the concentration of fugitive dust (including airborne $PM_{2.5}$ and PM_{10}), as well as mobile source emissions, including pollutants such as CO. To minimize the amount of emissions generated, efforts would be made during construction to limit traffic disruptions, especially during peak travel hours. A quantitative analysis of the construction-related GHG emissions for the Preferred Alternative will be conducted using FHWA's Infrastructure Carbon Estimator tool. The results of that analysis will be included in the FEIS.

Mobile source emissions include pollutants such as CO. Since CO emissions from motor vehicles generally increase with decreasing vehicle speed, disruption of traffic during construction (such as temporary reduction of roadway capacity and increased queue lengths) could result in short-term elevated concentrations of CO. To minimize the amount of emissions generated, efforts would be made during construction to limit traffic disruptions, especially during peak travel hours.

Construction and subsequent maintenance of the project would also generate GHG emissions. Preparation of the roadway corridor (e.g., earth-moving activities) involves a considerable amount of energy consumption and resulting GHG emissions; manufacture of the materials used in construction and fuel used by construction equipment also contribute to GHG emissions; and on-road vehicle delay during construction would also increase fuel use, resulting in GHG emissions. A quantitative analysis of the construction related GHG emissions for the Preferred Alternative will be conducted using FHWA's Infrastructure Carbon Estimator tool. The results of that analysis will be included in the FEIS.

During construction the contractor may use the following dust control measures, to minimize and mitigate, to the greatest extent practicable, impacts to air quality:

- Minimize land disturbance;
- Cover trucks when hauling soil, stone, and debris (MDE Law);
- Use water trucks to minimize dust;
- Use dust suppressants if environmentally acceptable;
- Stabilize or cover stockpiles;
- Construct stabilized construction entrances per construction standard specifications;
- Regularly sweep all paved areas including public roads;

- Stabilize onsite haul roads using stone; and
- Temporarily stabilize disturbed areas per MDE erosion and sediment standards.

4.23.4 Noise

Noise would be generated from the construction of the highway improvements and the noise barriers. The Developer would be responsible for developing a construction work sequence that minimizes the duration of time without a noise barrier in place.

4.24 Commitment of Resources

4.24.1 Irreversible and Irretrievable Commitment of Resources

Implementation of any of the Build Alternatives in this DEIS would require the commitment of a range of natural, physical, human, and fiscal resources. Under the implementing regulations for NEPA, any expenditure of these resources that would be considered irreversible or irretrievable is required to be included in the discussion of potential environmental impacts of the alternatives (40 CFR §1502.16). The term irreversible refers to the loss of future options; it applies primarily to the impacts or use of nonrenewable resources, such as cultural resources, or to those factors, such as soil productivity, that are renewable only over long periods of time. The term irretrievable applies to the loss of production (via land use) or use of natural resources. The production lost is irretrievable, but the action is not irreversible. Therefore, an irreversible or irretrievable commitment of resources results in a permanent loss of a resources for future uses (or alternative purposes) as they cannot be replaced or recovered.

Under the No Build Alternative there would be no study-related construction. The No Build Alternative would result in the irreversible loss of financial resources for maintaining the existing infrastructure in the study corridors.

The construction of any of the Build Alternatives would result in the commitment of natural, physical, and financial resources that would be irreversible and irretrievable. The irreversible dedication of land to transportation use for the construction of any of the Build Alternatives would render the land unusable for any other use. The range in impacts of land converted to transportation use under the Build Alternatives varies by the specific alternative and would range from 362.4 to 388.5 acres (refer to **Section 4.1.3, Table 4-2**). Land used in the construction and operation of the proposed facility (right-of-way) is considered an irreversible commitment during the time period that the land is used for a transportation facility. However, if a greater need arises for use of the land or if the transportation facility is no longer needed, the land can be converted to another use. At present, it is not anticipated such a conversion would be necessary or desirable.

As part of this permanent land alteration, approximately 1,477 to 1,515 acres of forest canopy (refer to **Section 4.16.3, Table 4-25**), 16.1 to 16.5 acres of wetlands, and 155,229 to 156,984 linear feet of streams (refer to **Section 4.12.3, Table 4-20**) have the potential to be affected, depending on the Build Alternative. While forest, stream and wetland mitigation could account for some of these losses, these individual distinct ecosystems could be irreversibly impacted.

Significant amounts of fossil fuels, electricity, labor, and highway construction materials would be irretrievably expended for the construction of any of the Build Alternatives. Anticipated construction materials would include aggregates, asphalt, cement, gravel, and sand. Concrete and steel would be required for bridges and other structures such as retaining walls and noise walls. Fuel, electricity, and

labor required to manufacture, transport, and install these materials would be irretrievably lost. As of the time of this document these construction materials are not in short supply and their use would not have an adverse effect upon the continued availability of these resources. The resources used to construct any of the Build Alternatives would be similar; however, Alternative 9M may require slightly less resources due to the narrower LODs of these Build Alternatives. No long-term construction-related resources are anticipated with any of the Build Alternatives.

Since the managed lanes would generate toll revenue, the costs would be recouped over time. Projects that include a future revenue source such as tolls may be constructed with no direct state and Federal funding upfront. The I-495 & I-270 P3 Program has a goal to implement the improvements at no net cost to the State. However, if a state subsidy is required, it would typically be paid to the Developer at the beginning of the contract, whereas if positive excess cashflows are anticipated, they could be paid to the State at the beginning of the contract and/or as revenue sharing payments to the State during the operation of the facility.

The commitment of these resources is based on the concept that residents in the immediate area, state, and region would benefit from the improved quality of the transportation system. These benefits would consist of reduced congestion, enhanced trip reliability, additional roadway choices, and improved movement of goods and services, as described in **Chapters 1 and 2**, which are expected to outweigh the commitment of the irreversible and irretrievable resources.

4.24.2 Short-Term Effects/Long-Term Effects

Short-term impacts to resources in relation to long-term productivity have been evaluated in accordance with (42 U.S.C. 4332(C)(iv)) and guidelines published by CEQ on implementing NEPA (40 CFR 1502.16). This analysis qualitatively discusses the relationship between short-term impacts to and use of resources, and the long-term benefits and productivity of the environment. For this analysis, short-term refers to the estimated three-to-five-year period of construction, the time when the largest number of temporary environmental effects is most likely to occur. Long-term refers to the more than 100-year life span estimated for the proposed improvements. This section discusses whether the short-term uses of environmental resources by the proposed improvements would affect (either positively or negatively) the long-term productivity of the environment.

A. Short-Term Impacts

Construction of any Build Alternative would result in short-term impacts, as described in **Chapter 2**, **Section 2.7.3.**

An increase in employment and job opportunities for future permitting and design, construction workers, suppliers, and inspectors would result during construction of a Build Alternative. In addition, short-term employment, use of materials to construct the improvements, and purchases of goods and services generated by construction could create a short-term improvement in the local economy that would diminish once the construction is completed. Workers who live in the region may fill these new positions or it is possible that people may move to the area as a result of the job opportunities created by the project. The concentration of workers within the area would stimulate the local economy by increasing business at area commercial and retail establishments. Increased sales tax would be derived from the commercial sales and from the sales of materials required for construction.

During construction, detours may be required rerouting travelers to other area roadways. Some travelers may choose to take alternate routes to avoid construction areas and further delays. The use of alternate routes may increase fossil fuel usage and could result in loss of business for commercial establishments thereby lowering sales tax revenues. Rerouting may lead to increased congestion and delays on the detour routes.

Expanding roadway alignments, materials storage areas, and movement of construction vehicles may result in the removal of existing vegetation. A temporary increases in air quality and noise impacts are expected. Water resources would also be needed for construction activities including mixing aggregate materials, road wetting, and landscaping.

Construction activity resulting from the project would impact different sectors of the region's economy. Specifically, the total jobs generated under each Build Alternative scenario would add value to the gross regional product.

B. Long-Term Impacts

The long-term impacts and benefits of the implementation of the Build Alternatives would remain for the duration of the facility's life. The increased capacity and reduced traffic congestion would result in more efficient use of fossil fuels.

Reduced congestion, enhanced trip reliability, and additional roadway choices would result in quicker trips and commutes for drivers. Improved movement of goods and services would benefit the local and regional economy. Generally, logistics costs decrease as trucks and commercial vehicles travel in less congested conditions, spending less time en route, thus improving supply chain fluidity for regional industries dependent on truck traffic.

Improving congestion and reducing the amount and duration of idle traffic would result in decreased air pollution, (refer to **Section 4.8** for more detail). Together, these effects would result in an enhanced overall environment for the many communities in Maryland along I-495, I-270, and the greater National Capital area.

The implementation of any of the Build Alternatives would require permanent conversion of property to transportation uses. Real estate taxes paid of those properties would be eliminated. These long-term loses may be offset by areas adjacent to the improvements that experience induced growth.