5 AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION

Substantive changes that have been made to this Final EIS since the publication of the Draft EIS are indicated with underlined text. Substantive changes that have been made in response to public or agency comments are indicated with double underlined text. Public comments and responses are in **Appendix G,** and agency comments and responses are in **Appendix H**.

This chapter presents the existing conditions of the environmental resources in the study area, referred to as the affected environment, and the reasonably foreseeable effects, which include the potential direct environmental consequences of the Tier 2 Study ARDS. The chapter presents summaries of assessment methodologies, existing conditions, and potential effects. Potential avoidance, minimization, and further mitigation efforts are also considered where applicable. Methodologies, data collection, and effects analyses were assessed in coordination with cooperating and participating agencies, as described in **Chapter 7** of this document.

Additional detail, data, and information on the existing environmental conditions and potential environmental consequences are located in the following technical documents:

- *Socioeconomic and Land Use Technical Report*
- *Cultural Resources Technical Report*
- *Natural Environment Technical Report*
- *Hazardous Materials Technical Report*
- *Air Quality Technical Report*
- *Noise Analysis Technical Report*

The MDTA has performed an analysis of effects for all resources. Physical impacts have been quantified based on LOD, and other effects that may occur as a result of the ARDS are also discussed. As described in **Chapter 3**, the LOD for each alternative is the proposed boundary that includes anticipated construction, ESC, SWM, and right-of-way acquisition. The LODs were developed from the proposed horizontal and vertical geometry, typical sections, roadside design, and proposed interchange modifications. The LOD includes temporary and permanent disturbances on land and in water.

As described in **Section 4.3**, Alternative C was further refined to avoid and minimize impacts after it was identified as the Preferred Alternative. Impacts based on the LOD for the Preferred Alternative (Refined Alternative C) are identified throughout this chapter under each resource. When referring to the build alternatives or southern alignments, the Preferred Alternative is included.

To view the LOD for each alternative and the Preferred Alternative, and how they affect environmental resources, see the mapping in **Appendices A-1** and **A-2**.

The resources evaluated in this Final EIS are as follows:

- Socioeconomic resources and land use (including community resources and land use; economics and employment; and visual resources);
- Cultural resources;
- Section 4(f) and Section 6(f) properties (e.g., parks and recreation areas);

- Natural resources (such as wetlands and waterways, floodplains, water quality, and Chesapeake Bay Critical Areas (CBCAs); aquatic and terrestrial habitat and biota; rare, threatened, and endangered species; unique and sensitive areas; and hydrodynamics);
- Hazardous materials;
- Air quality; and
- Noise.

5.1 Socioeconomics

This section summarizes population and demographics; housing; businesses, economics, and employment, as well as community facilities in the analysis area. This socioeconomic analysis identifies key characteristics to provide a demographic overview of the population residing, working, and traveling through the study limits. More information on the data sources, methodology, and regulatory context used is included in the *Socioeconomic & Land Use Technical Report*.

The socioeconomic analysis includes the review of U.S. Census Tract Block Groups (block groups) (2022) within or intersecting a one-quarter mile buffer of U.S. 50/301 within the study limits as well as block groups encompassing communities on peninsulas that must travel along U.S. 50/301 within the study limits to access workplaces, goods, and services. The socioeconomic analysis area encompasses 42 block groups within six communities (Arnold, Cape St. Claire, Broadneck, Kent Island, Kent Narrows/Grasonville, and Queenstown), as shown in **Figure 5-1**.

Impacts could include potential changes to population, housing, labor force, employment, business centers, and recreational activities.

5.1.1 Population and Demographics

Table 5-1 displays the population and population density of the analysis area and comparison geographies, as well as projected population changes for comparison geographies. Projected population data is not available at the block group level. **Figure 5-2** shows the population density by block group in the analysis area and surrounding counties.

Table 5-1: 2022 Population, Population Density, and Projected Population Change

Geography	2022 Total Population	Population Density per Square Mile	Percent Change 2000-2020	Percent Change 2020-2040
Analysis Area	73,415	659	NA	NA
Anne Arundel County, Maryland	588,109	1,418	20%	7%
Queen Anne's County, Maryland	50,316	135	23%	24%
Maryland	6,161,707	634	17%	9%

Source: American Community Survey Five-Year Estimates (2018-2022) and Historical and Projected Total Population by Maryland's Jurisdictions, MDP, 2020

The U.S. Census Bureau collects information on households, which includes related family members and all unrelated people, if any, who share the housing unit. **Table 5-2** presents total households within the analysis area, Anne Arundel County, Queen Anne's County, and Maryland.

Table 5-2: Total Households and Occupancy Status

Geography	Total Households	Owner Occupied (%)	Renter Occupied (%)
Analysis Area	27,234	83%	17%
Anne Arundel County	221,704	75%	25%
Queen Anne's County	19,351	81%	19%
Maryland	2,318,124	67%	33%

Source: American Community Survey Five-Year Estimates (2018-2022)

Median household income within the analysis area is greater than Anne Arundel and Queen Anne's counties, and Maryland. **Table 5-3** shows median annual household income and the percentage of persons living below the poverty level within the analysis area and comparison geographies.

Table 5-3: Median Annual Household Income and Persons Living Below the Poverty Level

Geography	Median household income in the past 12 months (in 2022 inflation-adjusted dollars)	Percent of persons living with income below poverty level in the past 12 months
Analysis Area	$129,121	5%
Anne Arundel County	$116,009	6%
Queen Anne's County	$108,332	7%
Maryland	$98,461	9%

Source: American Community Survey Five-Year Estimates (2018-2022)

Figure 5-1: Analysis Area Communities and Block Groups

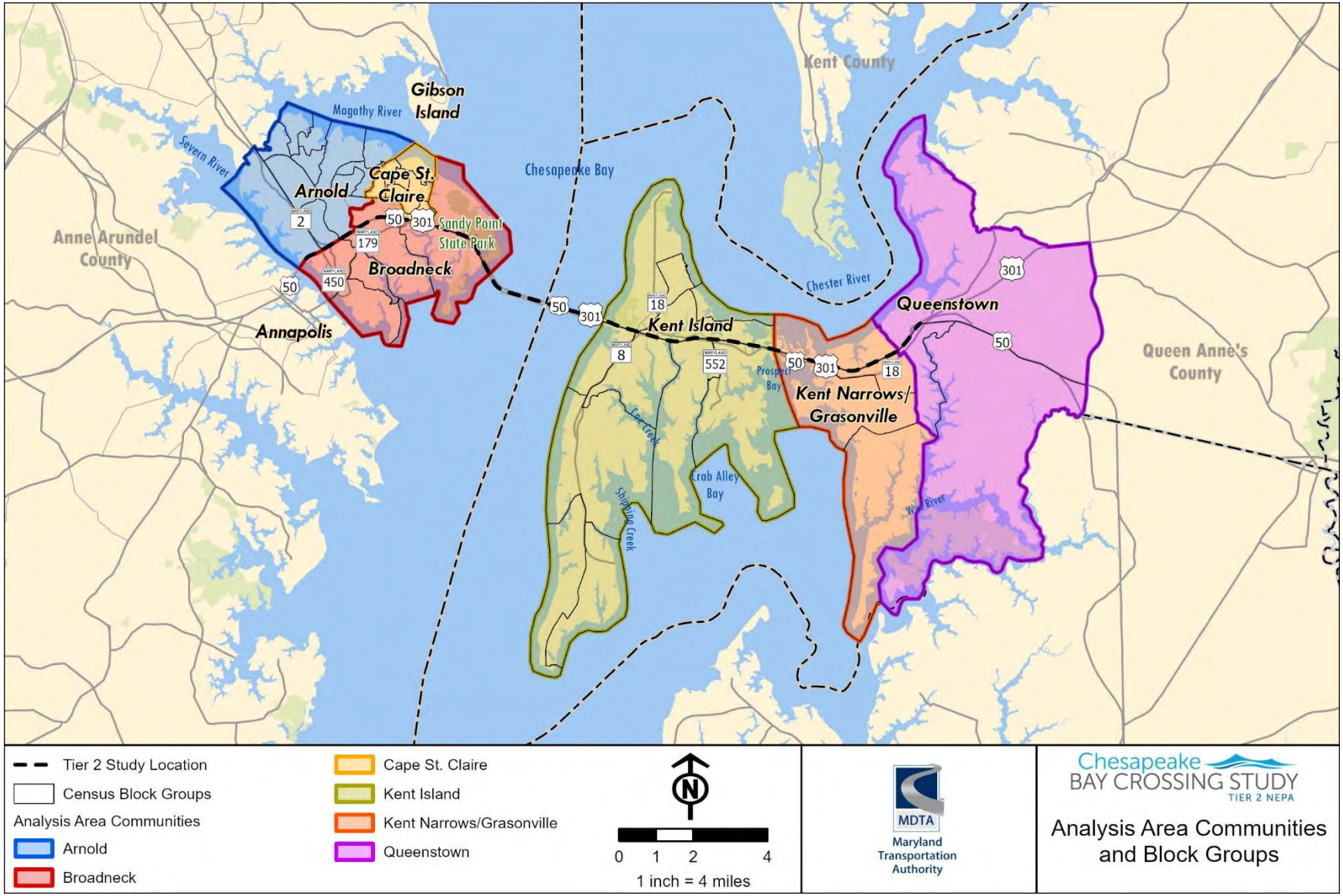
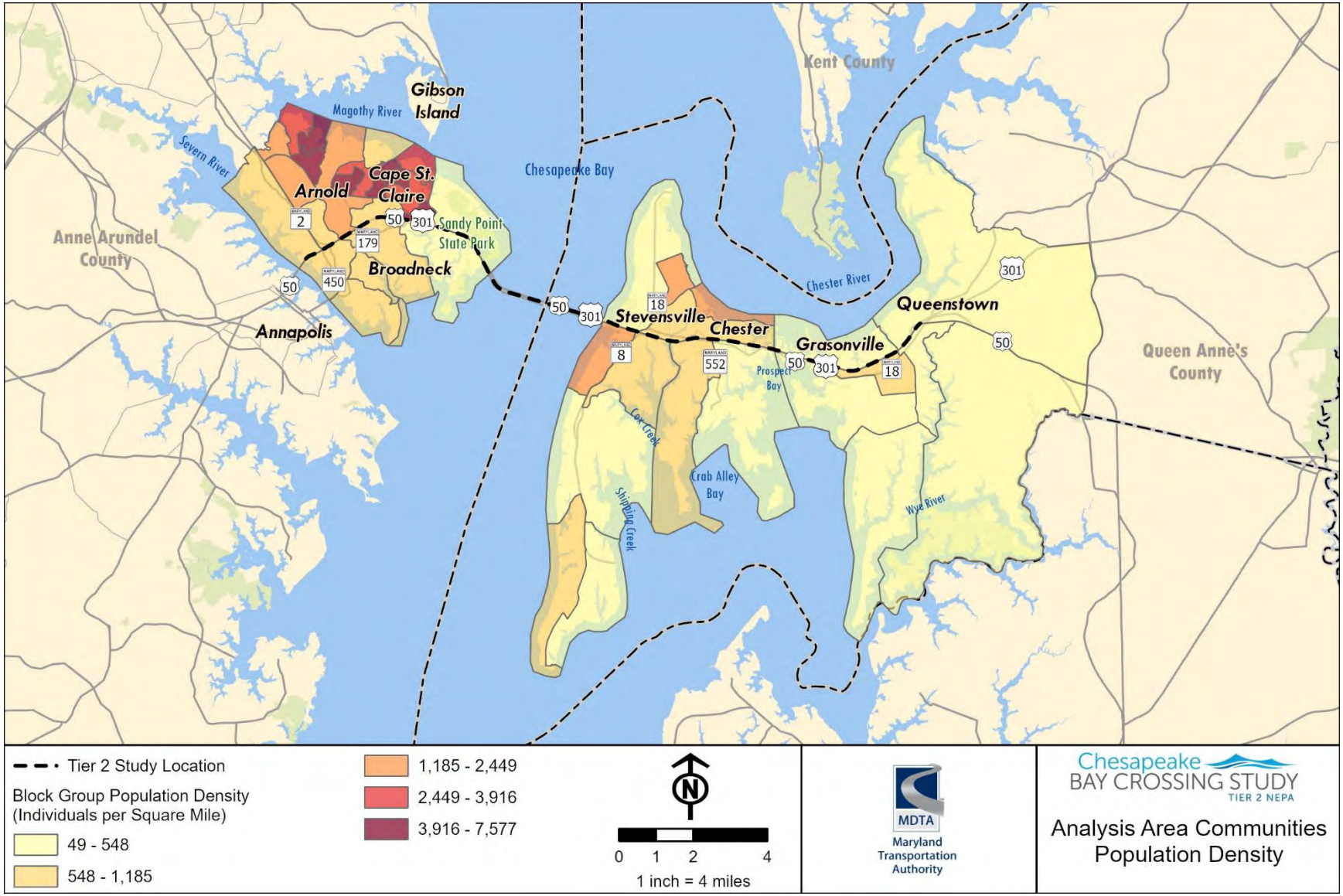


Figure 5-2: Population Density by Block Group (Individuals per Square Mile)



5.1.1.1 Environmental Consequences

Alternative A: No-Build

The No-Build Alternative would have no impact on population or demographics throughout the analysis area. The regional population is projected to continue growing. Through 2040, the population of Queen Anne's County is projected to increase by 24 percent, while population growth in Anne Arundel County is projected to slow to seven percent. The No-Build Alternative would not affect this anticipated population growth.

Build Alternatives

Alternatives B, C, D, E, and the Preferred Alternative would not result in residential displacements. Alternatives F and G would result in one residential displacement in the Broadneck community, see **Appendix A-1**. The effect on total population or demographics would be a small proportion of the overall population throughout the analysis area. All build alternatives, including the Preferred Alternative, would provide additional roadway capacity; therefore, to varying degrees, the build alternatives would accommodate increased traffic attributed to the projected regional population growth through 2040.

5.1.2 Housing

U.S. Census Bureau defines a housing unit as "a house, an apartment, a mobile home or trailer, a group of rooms, or a single room that is occupied, or, if vacant, is intended for occupancy as separate living quarters." Owner-occupied single family detached homes represent 70 percent of occupied housing structures within the analysis area. The total owner-occupied housing structures represent approximately 84 percent of occupied housing within the analysis area, with the remaining approximately 16 percent as rented housing structures, regardless of units. The analysis area contains 27,234 occupied housing units, plus an additional 1,981 vacant housing units (U.S. Census Bureau ACS, 2018-2022).

5.1.2.1 Environmental Consequences

Alternative A: No-Build

The No-Build Alternative would not require residential relocations or right-of-way acquisition and would not affect the quantity, age, type, or tenure of housing stock.

Build Alternatives

All build alternatives, including the Preferred Alternative, would require right-of-way acquisition to accommodate proposed roadway widening. All residential property impacts, including the one residential displacement attributed to Alternatives F and G and partial parcel acquisitions for each build alternative, would occur along the existing roadway right-of-way at the edge of any established communities, as displayed in **Appendices A-1 and A-2**. The proposed property acquisition would not bisect residential areas or create new impediments to travel through residential communities. Based on the review of housing stock within the analysis area, the loss of one residential property from Alternatives F and G would have no effect on the overall distribution of age, type, or tenure of housing stock.

5.1.3 Businesses, Economics, and Employment

The analysis area was used in the economic modeling tools to estimate the effects of the alternatives' investments on regional economies, capturing changes in employment, income, and output across industries. The analysis area contains a variety of industries which contribute to

the economic health of the region. More information on the data sources, methodology, and results are included in the *Socioeconomic & Land Use Technical Report*.

The economic impacts analysis focused on the direct impacts that may result along U.S. 50/301 within the study limits. Within the study limits, the 804 businesses located adjacent to U.S. 50/301 generate an annual revenue of $2.601 billion (AtoZDatabase). The top industries by revenue adjacent to U.S. 50/301 include petroleum and petroleum products wholesale ($277 million), new car dealers ($257 million), restaurants ($183 million), and tank testing and inspection ($166 million).

Water-based businesses, including boat dealers, marinas, marine equipment, and boat repair services, as well as tourism and recreation located along U.S. 50/301 within the study limits generate $35.6 million in annual revenue and employ 178 people. Top industries include boat dealers, recreational vehicle dealers, and marinas.

A variety of shopping centers and clusters of businesses are located along U.S. 50/301 within the study limits which provide employment and economic activity for the surrounding region. There are 15 shopping centers along U.S. 50/301 within the study limits, containing 610 businesses, generating $1,895 million in annual revenue, and employing 5,874 people.

Employment by industry data was not available at the block group level. Total employment numbers by industry were collected and combined for Anne Arundel and Queen Anne's counties. As of 2022, the industries with the largest employment include educational services, health care and social assistance (20%); professional, scientific, and management, and administrative and waste management services (17%); public administration (12%); and retail trade (10%).

The Chesapeake Bay is a nationally significant ecological and economic resource, producing about 500 million pounds of seafood each year and supporting both commercial and recreational fishing industries across the region. Importantly for the Bay Bridge corridor, Anne Arundel County is home to roughly 25 percent of Maryland's marine jobs and generates about 43 percent of the state's marine economy Gross Domestic Product, underscoring the economic sensitivity of marine-related activities in and around the bridge location[20].

5.1.3.1 Environmental Consequences

Alternative A: No-Build

The No-Build Alternative would not impact buildings or properties compared to the existing conditions. Alternative A would result in an increase in employment, earnings, and output for the local economy due to maintenance costs required to maintain existing infrastructure. These economic impacts are detailed in **Table 5-5** and **Table 5-6**.

[20] NOAA. 2024 Marine Economy Report Maryland. https://coast.noaa.gov/data/digitalcoast/pdf/marine-economy-maryland.pdf.

Build Alternatives

Worker characteristics for those individuals who physically work within the analysis area, employment and unemployment characteristics, as well as commuting patterns, are not expected to measurably change under the alternatives, including the Preferred Alternative. Construction and operations and maintenance (O&M) spending of the alternatives would represent substantial capital investment in the local economy. This spending would increase employment, earnings, and output for the duration of construction and operations.

Table 5-4 summarizes the business impacts and displacements that would occur due to the alternatives.

Table 5-4: Impacts to Businesses

Alternative	Business Name	Impact Level	Annual Revenue (millions)	Employees
Alternative A (No-Build)	N/A	N/A	N/A	N/A
Alternatives B and C	Shopping Center*	Partial Acquisition	$1.0M	10
	Automotive Retail Center*	Displacement		
	Tree/Lawn Care	Displacement		
Alternatives D, E, F, and G	Shopping Center*	Partial Acquisition	$30.4M	111
	Tree/Lawn Care	Displacement		
	Contracting Services	Displacement		
	Insurance Office	Displacement		
	Contracting Services	Displacement		
	Automotive Retail Center*	Displacement		
	Restaurant	Displacement		
	Contracting Services*	Displacement		
	Storage Facility	Partial Acquisition		
Preferred Alternative	Shopping Center*	Partial Acquisition	$1.0M	10
	Automotive Retail Center*	Displacement		
	Tree/Lawn Care	Displacement		

**Annual Revenues and employment counts for these businesses were not listed in AtoZ Database and are considered unknown.*

Generally, the build alternatives, including the Preferred Alternative, would require acquisition of undeveloped strips of land from properties along U.S. 50/301, as displayed in **Appendices A-1 and A-2**. While some driveways and parking may be impacted, these impacts are not expected to restrict access to businesses. The build alternatives would not impact the building facilities; therefore, businesses for which partial acquisitions are identified are anticipated to continue unimpeded by the build alternatives.

Table 5-5 and **Table 5-6** detail the potential economic impacts of the alternatives. These economic impacts are due to output generated from construction spending and reoccurring employment and earnings. Costs used for this analysis were developed for the *NOI APID* and based on preliminary engineering, using 2025 dollars. These costs do not include the costs associated with the optional SUP. If the SUP is advanced, the economic benefits including person-year-jobs, earnings, value added, and output would increase proportionally.

Construction and demolition of the Bay Bridge could produce localized but economically meaningful impacts on fishing, crabbing, and oystering activities in the immediate area, which could translate into higher operating costs for commercial fishermen and crabbers.

While these impacts are expected to be localized rather than Bay-wide, their significance may be heightened given the multi-year construction timeline, potentially resulting in temporary revenue losses or increased uncertainty for seafood businesses reliant on fishing, crabbing, and oystering near the Bay Bridge. Notification protocols would be followed throughout the construction duration to inform recreational and commercial fisheries of restriction periods.

Table 5-5: Net Effects of Capital Expenditure of Alternatives Capital Costs

Alternative	Net Capital Expenditure (2025 $)	Net Effect			
		Employment (Person-Year Jobs)	Earnings (2025 $)	Valued Added (2025 $)	Output (2025 $)
Alternative A (No-Build)	$3,800M	14,598	$980M	$3,015M	$5,561M
Alternative B	$15,850M	62,320	$4,310M	$13,076M	$23,461M
Alternative C	$15,600M	61,337	$4,242M	$12,869M	$23,090M
Alternative D	$18,250M	71,756	$4,963M	$15,056M	$27,013M
Alternative E	18,050M	70,970	$4,909M	$14,891M	$26,717M
Alternative F	$20,300M	79,817	$5,520M	$16,747M	$30,047M
Alternative G	$20,000M	78,637	$5,439M	$16,499M	$29,603M
Preferred Alternative	$15,600M	61,337	$4,242M	$12,869M	$23,090M

Table 5-6: Net Effects of Capital Expenditure of Alternatives O&M Costs

Alternative	Net Capital Expenditure (2025 $)	Net Effect			
		Employment (Person-Year Jobs)	Earnings (2025 $)	Value Added (2025 $)	Output (2025 $)
Alternative B	$396M	1,558	$108M	$327M	$587M
Alternative C	$390M	1,533	$106M	$322M	$577M
Alternative D	$419M	1,794	$124M	$376M	$675M
Alternative E	$451M	1,774	$123M	$372M	$668M
Alternative F	$508M	1,995	$138M	$419M	$751M
Alternative G	$459M	1,966	$136M	$412M	$740M
Preferred Alternative	$390M	1,533	$106M	$322M	$577M

5.1.4 Community Facilities

Public and private community facilities within the analysis area include educational facilities, places of worship, religious facilities and cemeteries, health care facilities, parks, trails and recreational areas, public institutions and services, and other facilities. **Table 5-7** shows the number of each type of facility in the analysis area by county.

Table 5-7: Community Facilities in the Analysis Area

Location		Anne Arundel County	Queen Anne's County
Type of Facility	**Education**	22	8
	Place of Worship	18	25
	Cemetery	4	4
	Health Care	16	8
	Parks, Trails, and Recreational Areas	21	37
	Public Institutions	3	7
	EMS and Law Enforcement	8	9
	Other Community and Social Services*	4	6

**Includes daycares, senior services, disability care, veterans' affairs, and subsidized housing along U.S. 50/301 within the analysis area.*

5.1.4.1 Environmental Consequences

Alternative A: No-Build

The No-Build Alternative would not result in any direct impact to community facilities.

Build Alternatives

Community facilities that would be impacted by the build alternatives, including the Preferred Alternative, are summarized in **Table 5-8**.

Table 5-8: Property Impacts to Community Facilities

Type of Community Facility	Alternatives B and C	Alternatives D, E, F, and G	Preferred Alternative
Educational Facilities (# Properties Impacted)	**1**	**1**	**1**
Stevensville Middle School (Impact Type)	Partial acquisition	Partial acquisition	Partial acquisition
Places of Worship, Religious Facilities, and Cemeteries	**1**	**5**	**1**
Kent Island United Methodist Church	Partial acquisition	Partial acquisition	Partial acquisition
New Walk Community Church	--	Partial acquisition	--
St. Andrew by the Bay	--	Partial acquisition	--
Unity by the Bay	--	Partial acquisition	--
Gardner Family Cemetery	--	Partial acquisition	--
Health Care Facilities	**0**	**5**	**0**
Annapolitan Care Center	--	Partial acquisition	--
Anne Arundel Medical Center Pavilion/Annapolis Pediatrics - Kent Island	--	Partial acquisition	--
Mid Atlantic Health Institute	--	Partial acquisition	--
University of Maryland Shore Medical Campus and Emergency Center	--	Partial acquisition	--
University of Maryland Urgent Care - Kent Island	--	Partial acquisition	--

Type of Community Facility	Alternatives B and C	Alternatives D, E, F, and G	Preferred Alternative
Parks, Recreational Areas and Trails[1]	**4**	**9**	**3**
Broadneck Peninsula Trail	Partial acquisition	Partial acquisition	Partial acquisition
Sandy Point State Park	Partial acquisition	Partial acquisition	--
Terrapin Nature Park	Partial acquisition	Partial acquisition	Partial acquisition
Kent Island Water Trails	Temporary impact	Temporary impact	Temporary impact
Cross Island Trail	--	Partial acquisition	--
Kent Narrows Trail South	--	Partial acquisition	--
Kent Narrows Landing[2]	--	Partial impact	--
Piney Creek Nature Area	--	Partial acquisition	--
Queenstown Harbor Golf Links	--	Partial acquisition	--
Public Institutions	**0**	**1**	**0**
Chester Post Office	--	Partial acquisition	--
Emergency Services, Law Enforcement, and Correctional Facilities	**1**	**1**	**0**
DNR Police - Southern Region Broadneck Office	Partial acquisition	Partial acquisition	--
Transportation	**2**	**4**	**2**
Stevensville Park & Ride	Partial acquisition	Partial acquisition	Partial acquisition
Kent Island Castle Marina Road Park & Ride[3]	--	Partial impact	--
Bay Bridge Marina	Partial acquisition	Partial acquisition	Partial acquisition
Kent Narrows Boatel	--	Partial acquisition	--
Public Utility Facilities	**1**	**3**	**1**
Delmarva Power & Light Co	Partial acquisition	Partial acquisition	Partial acquisition
Amberly Water Treatment Plant	--	Partial acquisition	--
Cellular Tower	--	Partial acquisition	--
Other Community and Social Services	**0**	**1**	**0**
St. Andrew by the Bay Preschool	--	Partial acquisition	--
Total Community Facilities Impacted[4]	**10**	**30**	**8**

*1. Where applicable, impacts to recreation areas, recreational trails, and water trails subject to protection under Section 4(f) are fully documented in the Final Section 4(f) Evaluation (**Appendix E**). Queenstown Harbor Golf Links is a recreational commercial property that is not protected by Section 4(f).*
2. Kent Narrows Landing is located in existing right-of-way.
3. Kent Island Castle Marina Park & Ride is located in existing right-of-way.
4. The build alternatives would not result in the displacement of any community facilities.

The build alternatives, including the Preferred Alternative, would not result in the displacement of any community facilities. Generally, the build alternatives would require acquisition of undeveloped strips of land from properties along U.S. 50/301, as displayed in **Appendices A-1**

and A-2. While some driveways and parking may be impacted, these impacts are not expected to restrict access to facilities. The build alternatives would not impact the building facilities; therefore, these community facilities and services they provide are anticipated to continue unimpeded by the build alternatives. As discussed in **Section 4.3**, refinements were made to Alternative C after it was identified as the Preferred Alternative to further avoid and minimize impacts. As a result of these refinements, the Preferred Alternative (Refined Alternative C) avoids impacts to Sandy Point State Park and the DNR Police – Southern Region Broadneck Office.

For the Preferred Alternative, the optional SUP would require additional partial acquisition from Terrapin Nature Park and would impact an additional property containing two community facilities: Sandy Point State Park and MDNR Police - Southern Region Broadneck Office. Under the other build alternatives, the optional SUP would not impact additional community facilities; however, it would require additional partial acquisition from Sandy Point State Park and Terrapin Nature Park. Inclusion of the optional SUP could include or enhance access to existing and proposed trails, such as the Cross Island Trail network, Broadneck Peninsula Trail, and Baydale Road Bike Path.

5.2 Land Use

This section summarizes land use and planning for community needs and resource protection, growth management and proposed developments, and right-of-way and property. The impacts analysis of this document is focused on the direct impacts that may result along U.S. 50/301. More information on the data sources, methodology, and regulatory context used is included in the *Socioeconomic & Land Use Technical Report*.

5.2.1 Land Use and Planning

5.2.1.1 General Land Use

In Anne Arundel County, Commercial and "Other" Land[21] are widely spread, with Commercial land use clustered near interchanges. Low-Density Residential land use is spread along U.S. 50/301, especially within the western portion of the Anne Arundel County study limits, while Medium-Density Residential and High-Density Residential land use occur in small areas north of U.S. 50/301 (**Figure 5-3**). Land use along U.S. 50/301 within the Queen Anne's County study limits is mainly classified as Commercial and Other Land (**Figure 5-4**). Institutional, Industrial, and Open Urban Land use classifications are also located along U.S. 50/301. The western portion of the Queen Anne's County study limits has a higher concentration of Medium-Density Residential land use, with some High-Density Residential land use. East of Kent Narrows, Low-Density Residential land use is more prevalent along U.S. 50/301.

5.2.1.2 Planning

Planning and development goals along U.S. 50/301 within the study limits are guided by a variety of comprehensive, master, and sector plans. Relevant local, county, regional, and State plans are listed in the *Socioeconomic and Land Use Technical Report*. These plans generally set goals to improve transportation system safety and enhance transportation efficiency by promoting the use of major highways and arterial networks to limit traffic impacts on local and neighborhood streets and improve multimodal connectivity.

[21] *"Other Land" refers to the remaining land not covered under another category. Examples include but are not limited to rural or agricultural lands, single-family residential parcels greater than or equal to 20 acres in size, and undeveloped portions of large parcels containing urban uses (See MDP's Statewide Classification Definitions).*

Various residential, mixed-use, commercial, and retail development projects are proposed along U.S. 50/301 within the study limits. Development projects that have been approved by their respective County Planning Board but not yet constructed are summarized in the *Socioeconomic and Land Use Technical Report*.

The most readily available information from the Anne Arundel Office of Planning and Zoning lists nine approved development projects along U.S. 50/301 within the Anne Arundel County study limits as of July 2025. These projects are six site development plans (non-residential or mixed-use development) and three preliminary site development plans (non-residential or mixed-use development) (Anne Arundel County Office of Planning and Zoning, 2025).

Coordination with Queen Anne's County Planning and Zoning Department and the Town of Queenstown identified approved development projects along U.S. 50/301 within the Queen Anne's County study limits as of July 2025. There are 19 total projects, which include three major subdivisions, 15 major site plans, and one concept plan.

5.2.1.3 Protected Lands

Protected lands include environmental trusts, conservation easements, forest conservation, and transfer development rights, as well as local protected lands. Within the study limits along U.S. 50/301 within Anne Arundel County, protected lands are mostly associated with parks. Protected lands also include some small areas of Forest Conservation Act preserved lands. In Queen Anne's County, local protected lands along U.S. 50/301 within the study limits are associated with parks, as well as development related open space reservations. Additionally, Maryland Environmental Trust (MET) Easement properties are located along the north side of U.S. 50/301 in the eastern portion of the study limits.

5.2.1.4 Priority Funding Areas and Smart/Sustainable Growth

Maryland's *Smart Growth Priority Funding Areas Act of 1997* (the PFA law) directs Maryland state infrastructure funds to areas within, or connecting with, local jurisdiction-designated and State-concurred Priority Funding Areas (PFAs), saving the State's farmland, open spaces, and natural resources (Maryland Department of Planning [MDP], 2019). Directing future growth to existing towns, cities, and designated growth areas helps preserve the rural character, forests, and farms while still allowing development to occur. Section 5-7B-01 of the PFA law exempts from the definition of "growth-related project" any existing transportation facilities project, as that term is defined in § 4-101(h) of the Transportation Article, which includes the Bay Bridge. Priority Funding Areas occur throughout the project study limits as shown in **Figure 5-5** and **Figure 5-6**. For details of the land use, zoning, and development patterns reviewed for the Tier 2 Study, refer to the *Socioeconomic & Land Use Technical Report.*

Figure 5-3: Land Use - Anne Arundel County

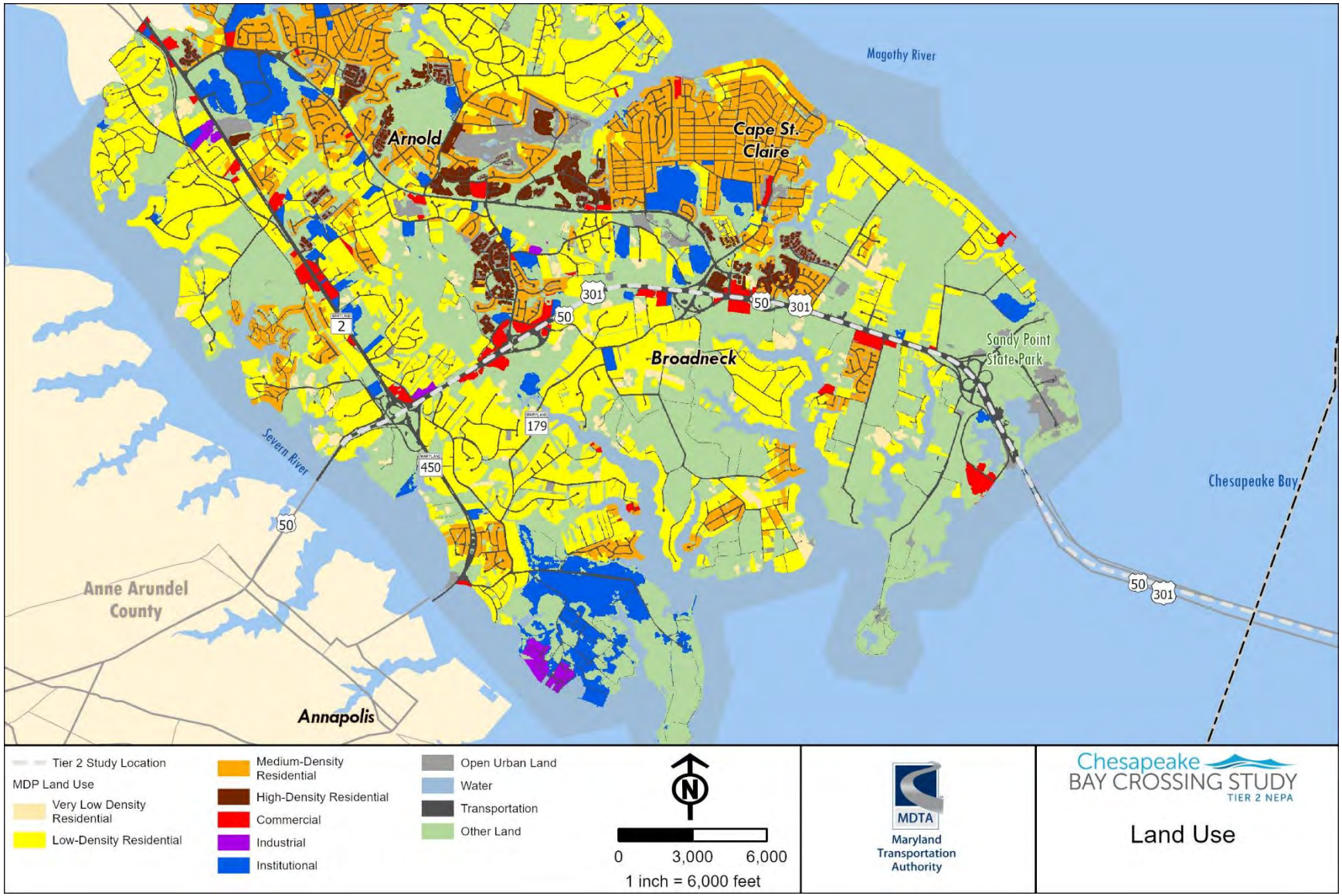


Figure 5-4: Land Use - Queen Anne's County

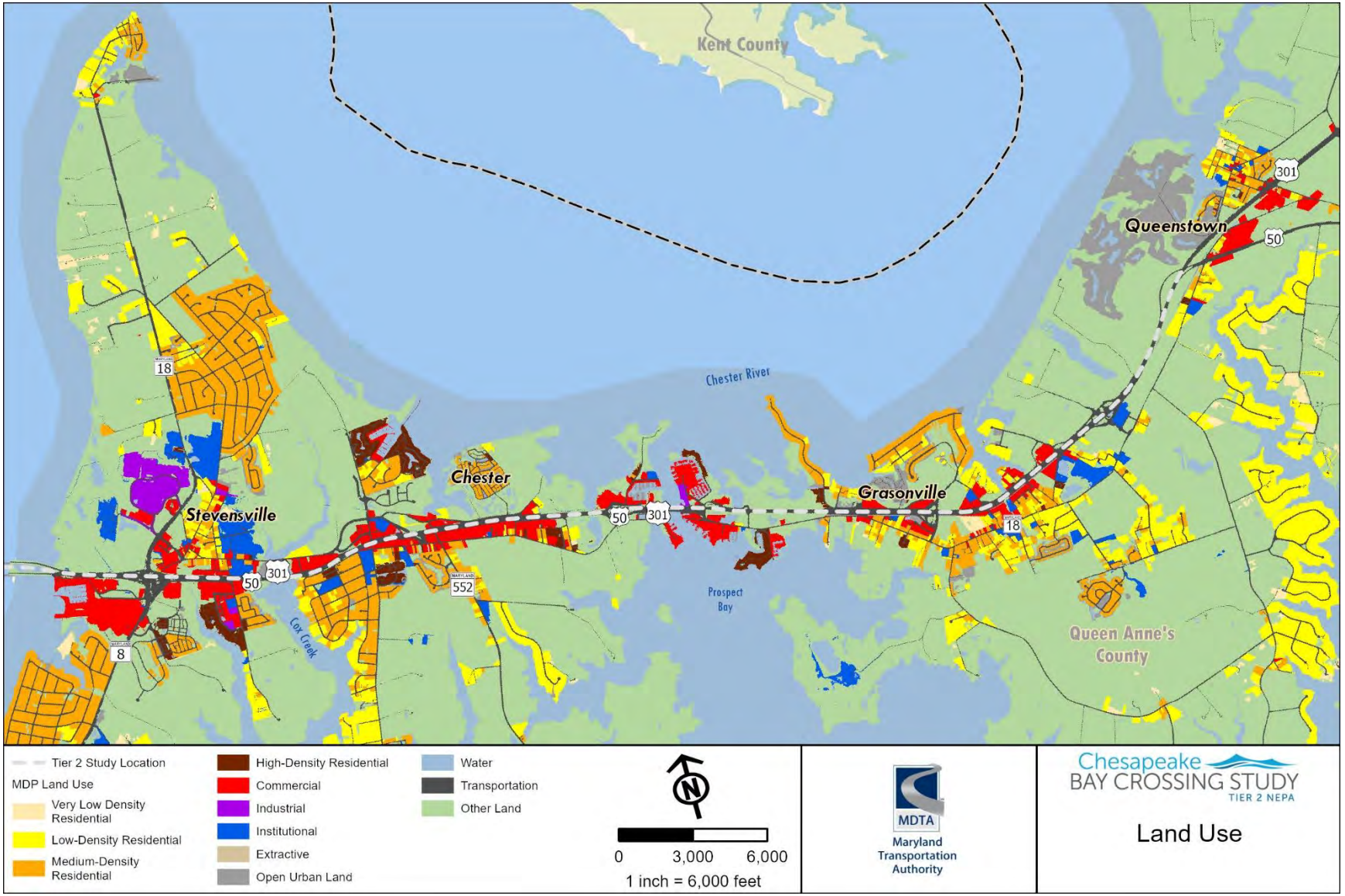
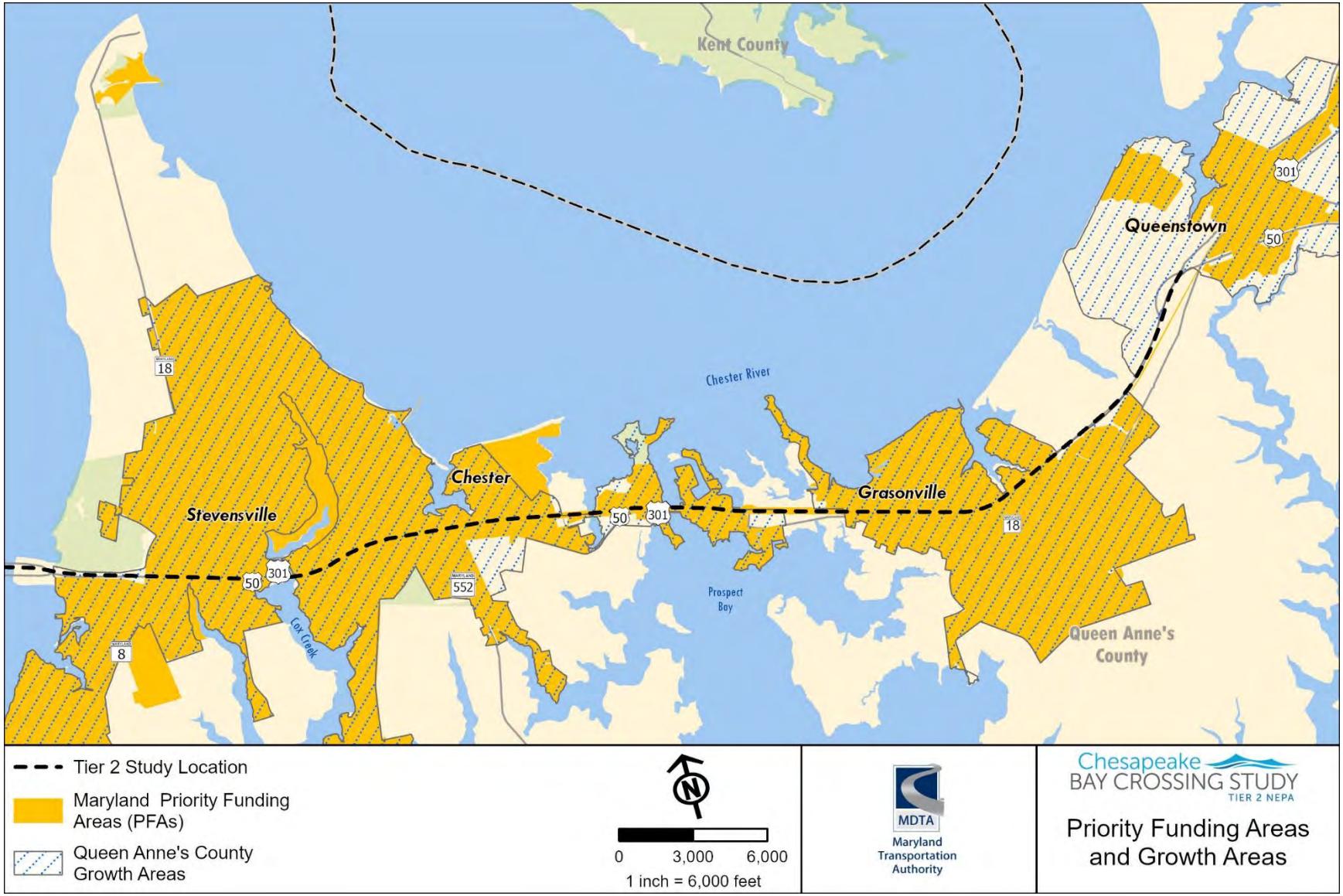


Figure 5-5: Anne Arundel County Priority Funding Areas and Growth Areas



Figure 5-6: Queen Anne's County Priority Funding Areas and Growth Areas



5.2.1.5 Environmental Consequences

Alternative A: No-Build

The No-Build Alternative only includes routine maintenance and safety improvements along U.S. 50/301, therefore, would have no impact on land use and planning.

Build Alternatives

The build alternatives, including the Preferred Alternative, would result in the conversion of existing land use to right-of-way for transportation use, including the alteration of transportation right-of-way from non-highway facilities (e.g., county right-of-way) outside the MDTA and SHA right-of-way. Land use impacts for the build alternatives are summarized in **Table 5-9**.

Table 5-9: Land Use Converted to Transportation Right-of-Way

Land Use	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G	Preferred Alternative
Transportation[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Very Low-Density Residential	0.0 acre	0.0 acre	<0.1 acre	<0.1 acre	<0.1 acre	<0.1 acre	0.0 acre
Low-Density Residential	0.7 acre	0.7 acre	4.3 acres	4.3 acres	4.5 acres	4.5 acres	0.7 acre
Medium-Density Residential	<0.1 acre	<0.1 acre	0.5 acre	0.5 acre	0.5 acre	0.5 acre	<0.1 acre
High-Density Residential	0.0 acre	0.0 acre	1.0 acre	1.0 acre	1.0 acre	1.0 acre	0.0 acre
Commercial	4.0 acres	4.3 acres	16.7 acres	17.1 acres	18.0 acres	18.4 acres	3.7 acres
Industrial	0.0 acre	0.0 acre	0.9 acre	0.9 acre	0.9 acre	0.9 acre	0.0 acre
Institutional	0.8 acre	0.8 acre	1.5 acres	1.5 acres	1.6 acres	1.6 acres	0.8 acre
Extractive	0.0 acre	0.0 acre	0.0 acre	0.0 acre	0.0 acre	0.0 acre	0.0 acre
Open Urban Land	1.2 acres	1.2 acres	5.3 acres	5.3 acres	5.3 acres	5.3 acres	1.2 acres
Water[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other Land[2]	18.9 acres	18.9 acres	54.1 acres	54.2 acres	56.1 acres	55.9 acres	17.4 acres
TOTAL CHANGE IN LAND USE	**25.6 acres**	**25.9 acres**	**84.3 acres**	**84.8 acres**	**87.9 acres**	**88.1 acres**	**23.8 acres**

Note: Numerical values presented are rounded to the nearest 0.1 acre.

[1] Impacts to Transportation and Water Land Use types are not applicable for this analysis. Land designated for Transportation use will remain Transportation under each of the build alternatives. Impacts to water resources are documented in the Natural Environment Technical Report.

[2] "Other Land" refers to the remaining land not covered under another category. Examples include but are not limited to rural or agricultural lands, single-family residential parcels greater than or equal to 20 acres in size, and undeveloped portions of large parcels containing urban uses (See MDP's Statewide Classification Definitions[22]).

With the exception of displacements described in **Section 5.2.2**, the build alternatives, including the Preferred Alternative, would primarily convert strips of land from undeveloped areas or areas

[22] https://planning.maryland.gov/Documents/OurWork/GDA/2024-Statewide-Land-Use-Classifications.pdf

of landscaping and trees, and paved areas associated with commercial and other transportation developments along U.S. 50/301 to Transportation land use. For all build alternatives, Other Land (between 19 and 56 acres, depending on the alternative) and Commercial (between 4 and 18 acres) would be the most common land use types converted to Transportation. Impacts converting Residential land use types (Very Low-Density, Low-Density, Medium-Density, and High-Density Residential) to Transportation land use would be six or fewer acres.

As discussed in **Section 4.3**, Alternative C was refined after it was identified as the Preferred Alternative to further avoid and minimize impacts. As a result, the Preferred Alternative (Refined Alternative C) would convert 23.8 acres of various land uses to Transportation land use, which is 2.1 acres less than Alternative C.

The addition of the optional SUP would increase total land use conversions by less than three acres. For all build alternatives, including the Preferred Alternative, Institutional (less than 0.1 to 0.2 acres), Open Urban Land (0.1 acre), and Other Land (1 to 2 acres) would be the only land use types converted to Transportation from the optional SUP.

The build alternatives, including the Preferred Alternative, would impact protected lands through conversion to Transportation land use as shown in **Table 5-10**. The protected lands data includes MDNR-owned and local parks as well as Forest Conservation Act easement areas. For park lands impacted, the MDTA will coordinate with the official(s) with jurisdiction as detailed in **Section 7**. Forest Conservation Act easements can be moved but require approval from the Maryland Board of Public Works. The MDTA will continue to coordinate with MDNR through final design regarding impacts to Maryland Forest Conservation Act easements. A NEPA re-evaluation will be completed, as necessary, to assess changes to property impacts resulting from the coordination with MDNR.

Table 5-10: Protected Lands Converted to Transportation Right-of-Way

Protected Lands	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G	Preferred Alternative
MD Agricultural Land Preservation Foundation	0.0 acre	0.0 acre	0.0 acre	0.0 acre	0.0 acre	0.0 acre	0.0 acre
MD Environmental Trust Easements	0.0 acre	0.0 acre	4.7 acres	4.7 acres	4.7 acres	4.7 acres	0.0 acre
MD Forest Conservation Act	0.1 acre	0.1 acre	0.1 acre	0.1 acre	0.1 acre	0.1 acre	0.1 acre
MDNR Owned and Conservation Easements	2.1 acres	1.7 acres	2.1 acres	1.7 acres	2.3 acres	1.7 acres	0.0 acre
Coastal and Estuarine Land Conservation Program	0.0 acre	0.0 acre	0.0 acre	0.0 acre	0.0 acre	0.0 acre	0.0 acre

Protected Lands	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G	Preferred Alternative
Transfer Development Rights Program	0.0 acre	0.0 acre	0.1 acre	0.1 acre	0.1 acre	0.1 acre	0.0 acre
Local Protected Land	0.6 acre	0.7 acre	1.4 acres	1.4 acres	1.9 acres	1.9 acres	0.7 acre
TOTAL CHANGE IN PROTECTED LANDS	**2.9 acres**	**2.5 acres**	**8.4 acres**	**8.0 acres**	**9.1 acres**	**8.5 acres**	**0.8 acre**

Note: Numerical values presented are rounded to the nearest 0.1 acre.

As discussed in **Section 4.3**, Alternative C was refined after it was identified as the Preferred Alternative to further avoid and minimize impacts. As a result, the Preferred Alternative (Refined Alternative C) would convert 0.8 acres of protected lands to Transportation land use, which is 1.7 acres less than Alternative C.

The addition of the optional SUP would increase impacts to protected lands by less than 2.0 acres. For all build alternatives, including the Preferred Alternative, MDNR Owned and Conservation Easements (between 0.6 and 0.7 acre) and Local Protected Land (between 0.6 and 1.3 acres) would be the only protected lands impacted by the optional SUP.

Currently, the MDTA and SHA operate and maintain U.S. 50/301. As detailed in § 4-101(h) of the Transportation Article, the Bay Bridge is an existing facility, which the PFA law (codified in Section 5-7B-01 of the State Finance and Procurement Article) exempts from the definition of "growth-related project." Additionally, no Maryland state infrastructure funds will be used to construct the Preferred Alternative, including approaches to the Bay Bridge. Since no Maryland state infrastructure funds will be used to construct the Preferred Alternative, the consistency requirements of the Smart Growth Priority Funding Areas Act of 1997 (the PFA law) would not apply.

The improvements associated with the build alternatives, including the Preferred Alternative, would be compatible with planned and approved future development in Anne Arundel and Queen Anne's counties, including those listed in **Section 5.2.1.2**. Continuing coordination with both counties and appropriate local jurisdictions will occur to identify appropriate elements to maximize community safety, cohesion, and economic vitality, consistent with U.S. DOT Order 2100.7. Where appropriate, design elements may integrate signage and enhanced access improvements consistent with or that do not preclude enhancements outlined in related planning documents. The Anne Arundel County Corridor Growth Management Plan (2012) recommends widening U.S. 50/301 to eight lanes from the Chesapeake Bay Bridge to I-97. Alternatives B, C, and the Preferred Alternative would consist of six lanes along U.S. 50/301 on the Western Shore; however, they would not preclude the eventual widening of U.S. 50/301 to eight lanes. Alternatives D, E, F, and G would be consistent with the Anne Arundel County Corridor Growth Management Plan (2012). Additional roadway capacity would accommodate existing traffic and long-term traffic growth. Additional capacity would provide enhanced trip reliability and improved movement of goods and services, including maritime navigation, consistent with the Tier 2 Study's purpose and need. Improvements proposed with the build alternatives would, to varying degrees, continue to make the area desirable for business and residential development and tourism access

along U.S. 50/301 within the study limits. All build alternatives include the option for the safe inclusion of an SUP along a new bridge. The MDTA has identified connections to existing and proposed trails and recreational facilities on the Eastern Shore and Western Shore. The inclusion of the optional SUP would enhance safe pedestrian and bicycle access while connecting communities to each other and to services along U.S. 50/301, consistent with both Walk & Roll Anne Arundel! (2023) and Queen Anne's County Pedestrian and Bicycle Master Plan (2024), as well as other Queen Anne's County plans. Coordination considering consistency with local master plans, Maryland State Transportation Trails Strategic Plan (2025), and Maryland's Complete Streets Policy will continue in final design.

Should transit-related improvements or TSM/TDM measures be advanced in the future, they would be subject to additional environmental studies, analysis, and collaboration with the public, stakeholders, and local agencies.

The build alternatives would generally support already approved development projects, despite property impacts. Alternatives B, C, and the Preferred Alternative would result in impacts to three properties containing five approved developments. Alternatives D, E, F, and G would impact an additional eight properties with approved developments. Property impacts at these locations would require only partial acquisitions.

5.2.2 Right-of-Way and Property

Within the study limits are well-established communities, parklands and open space, and commercial and industrial areas that are traversed by state and local transportation rights-of-way. The existing U.S. 50/301 right-of-way within the study limits accommodates a six-lane limited access freeway (three lanes in each direction), plus auxiliary lanes in some locations. The U.S. 50/301 right-of-way is under the jurisdiction of the MDTA from Oceanic Drive to MD 8, and SHA along the rest of U.S. 50/301 to the extents of the study limits. The MDTA and SHA's existing right-of-way includes features such as existing roadway travel lanes; shoulders; interchange ramps and structures; traffic barriers; cut and fill slopes; SWM facilities; retaining walls; noise walls; and utilities.

Within Anne Arundel County, Generalized Residential zoning districts are spread along U.S. 50/301 within the study limits. Generalized Commercial zoned properties are also present along U.S. 50/301 within the study limits, with higher concentrations near the interchanges. Properties within zones classified as Generalized Open Space occur mostly in the eastern portion of the Anne Arundel County study limits. Generalized Agriculture zoned properties are located just south of U.S. 50/301 and east of Colbert Road. There is one property located at the easternmost portion of the study limits in Anne Arundel County, immediately south of U.S. 50/301, that is zoned as Generalized Industrial.

Along U.S. 50/301 within the Queen Anne's County portion of the study limits, Generalized Commercial zones are mainly concentrated at the U.S. 50/301 interchange with MD 18 and between Long Point Road and Hissey Road. Generalized Mixed-Use zones mainly occur along U.S. 50/301 in Chester and Kent Narrows. Generalized Residential zoned properties are primarily located between Nesbitt Road and the U.S. 50/301 split at the eastern portion of the study limits. Generalized Agriculture zoned properties are evenly distributed along U.S. 50/301 within the Queen Anne's County study limits. Properties zoned as Generalized Municipal or Industrial are located along U.S. 50/301 at the eastern end of the study limits. The generalized zoning designations for properties along U.S. 50/301 within the study limits are presented in **Table 5-11.**

Table 5-11: Generalized Zoning Along U.S. 50/301 Within the Study Limits

County	Generalized Zoning Classification (# of Properties)						
	Agriculture	Commercial	Industrial	Mixed-Use	Municipal	Open Space	Residential
Anne Arundel County	2	61	1	0	0	7	81
Queen Anne's County	24	123	6	119	8	0	55

5.2.2.1 Environmental Consequences

Alternative A: No-Build

The No-Build Alternative requires no right-of-way acquisition, as it would include only routine maintenance and safety improvements along U.S. 50/301.

Build Alternatives

Property impacts for right-of-way differ under each of the build alternatives, with the Preferred Alternative requiring the least amount of additional right-of-way (18 acres) and Alternative G requiring the most (86 acres). Property impacts for conversion to transportation right-of-way under the build alternatives can include partial acquisitions or displacements (**Table 5-12**). See the *Socioeconomics and Land Use Technical Report, Appendix A, Socioeconomics Detailed Mapping* for the locations of impacted properties. A partial acquisition is considered one that would not cause a residential or business displacement, and where it is not anticipated that the conceptual design would prohibit property access. A displacement has been assumed where property access to a principal building is anticipated to be impacted by construction activities attributed to the build alternatives based on conceptual engineering.

- As discussed in **Section 4.3**, Alternative C was refined after it was identified as the Preferred Alternative to further avoid and minimize impacts. As a result, the Preferred Alternative will not result in residential or business/other displacements and requires the least amount of additional right-of-way.
- Alternatives B and C would result in two business/other displacements, both of which are commercial or retail businesses located in Broadneck.
- Alternatives D and E would result in seven business/other displacements: four business offices, and three commercial or retail businesses.
- Alternatives F and G would result in one residential displacement and seven business/other displacements: five business offices, and two commercial or retail businesses.
- For Alternatives B, D, and F, the optional SUP would increase the acreage required for partial acquisition by 1.8 to 1.9 acres.
- For Alternatives C, E, G, and the Preferred Alternative, the optional SUP would increase the acreage required for partial acquisition by 1.2 acres.

Table 5-12: Property Impacts of the Build Alternatives

Property Impact Type	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G	Preferred Alternative
Partial Acquisitions (# of properties)	46	46	204	204	207	207	45
Residential Displacements[1] (# of properties)	0	0	0	0	1	1	0
Business/Other Displacements[1, 2] (# of properties)	2	2	7	7	7	7	0
Total Property Impact (# of properties)	48	48	211	211	215	215	45
Total Property Impact[3] (acres)	**20.5 acres**	**20.8 acres**	**82.0 acres**	**82.3 acres**	**86.2 acres**	**86.4 acres**	**18.2 acres**

[1]*All property owners, from whom partial or total property right-of-way would be obtained, would be compensated and paid fair market value for the affected property. The compensation value would be proportionate to the amount of property taken. Residential property owners would receive relocation assistance in accordance with Federal and state requirements.*
[2]*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. These properties may include community facilities.*
[3]*Total right-of-way acreage requirements differ 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 the Maryland Department of Planning (MDP) 2018 Statewide land use data (released 2024).*

Generally, the build alternatives, including the Preferred Alternative, would require acquisition of undeveloped strips of land from properties along U.S. 50/301. While some driveways and parking may be impacted, these impacts are not expected to restrict access to facilities.

As discussed above, Alternative C was refined after it was identified as the Preferred Alternative to further avoid and minimize impacts. As a result, the Preferred Alternative (Refined Alternative C) requires acquisition from 45 properties totaling 18.2 acres. This is reduced from Alternative C, which would require acquisition from 48 properties totaling 20.8 acres.

All property owners, from whom partial or total property right-of-way would be obtained, would be compensated and paid fair market value for the affected property. The compensation value would be proportionate to the amount of property taken. Residential property owners would receive relocation assistance in accordance with Federal and state requirements. The Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended, requires that the project not proceed into any phase that will cause the displacement of any persons or proceed with any construction project, until it has furnished assurance that all displaced persons will be satisfactorily relocated in comparable decent, safe, and sanitary housing within their financial means, or that such housing is in place and has been made available to the displaced person.

5.2.3 Communities

This section summarizes the impacts of the build alternatives, including the Preferred Alternative, on each community in **Table 5-13** below. See **Appendices A-1 and A-2** for the locations of impacted properties.

Table 5-13: Summary of Impacts on Analysis Area Communities

Community	Alternative	Residential and Business Property Impacts (#)	Community Facilities Property Impacts (#)	Existing Land Use Conversion to Transportation Right-of-way (acres)
Arnold	Alternatives B and C	None	None	None
	Alternatives D, E, F, and G	**Residential Properties**: 3 Partial Acquisitions 0 Displacements **Business/Other Properties**: 11 Partial Acquisitions 0 Displacements	**Partial Acquisitions:** 1 Health Care Facility **No Displacements**	**Low-Density Residential**: <1 acre **Commercial**: 2 acres **Industrial**: 1 acre **Open Urban Land:** <1 acre **Other Land**: 2 acres
	Preferred Alternative	None	None	None
Cape St. Claire	Alternatives B and C	None	None	None
	Alternatives D, E, F, and G	**Residential Properties**: 7 Partial Acquisitions 0 Displacements **Business/Other Properties**: 3 Partial Acquisitions 4 Displacements	**Partial Impacts to:** 1 Park and Recreational Area **No Displacements**	**Medium-Density Residential**: <1 acre **High-Density Residential**: 1 acre **Commercial**: <1 acre **Open Urban Land**: <1 acre **Other Land**: 1 acre
	Preferred Alternative	None	None	None
Broadneck	Alternatives B and C	**Residential Properties**: 10 Partial Acquisitions 0 Displacements **Business/Other Properties**: 14 Partial Acquisitions 2 Displacements	**Partial Acquisitions:** 1 Law Enforcement 2 Parks and Recreational Areas **No Displacements**	**Low-Density Residential**: 1 acre **Commercial**: 1 acre **Institutional**: 1 acre **Open Urban Land**: 1 acre **Other Land**: 6 - 7 acres
	Alternatives D and E	**Residential Properties**: 36 Partial Acquisitions 0 Displacements **Business/Other Properties**: 36 Partial Acquisitions 3 Displacements	**Partial Acquisitions:** 2 Places of Worship 1 Law Enforcement 2 Parks and Recreational Areas 1 Health Care Facility 2 Public Utilities 1 Other Community & Social Services **No Displacements**	**Very Low-Density Residential**: <1 acre **Low-Density Residential**: 3 acres **High-Density Residential**: <1 acre **Commercial**: 3 acres **Institutional**: 1 acre **Open Urban Land**: 1 acre **Other Land**: 20 acres

Community	Alternative	Residential and Business Property Impacts (#)	Community Facilities Property Impacts (#)	Existing Land Use Conversion to Transportation Right-of-way (acres)
	Alternatives F and G	**Residential Properties**: 36 Partial Acquisitions 1 Displacements **Business/Other Properties**: 37 Partial Acquisitions 3 Displacements	**Partial Acquisitions:** 2 Places of Worship 1 Law Enforcement 2 Parks and Recreational Areas 1 Health Care Facility 2 Public Utilities 1 Other Community & Social Services **No Displacements**	**Very Low-Density Residential**: <1 acre **Low-Density Residential**: 4 acres **High-Density Residential**: <1 acre **Commercial**: 4 acres **Institutional**: 4 acres **Open Urban Land**: 1 acre **Other Land**: 20 - 21 acres
	Preferred Alternative	**Residential Properties**: 10 Partial Acquisitions 0 Displacements **Business/Other Properties**: 13 Partial Acquisitions 0 Displacements	**Partial Acquisitions:** 1 Park and Recreational Area **No Displacements**	**Low-Density Residential**: 1 acre **Commercial**: 1 acre **Institutional**: 1 acre **Open Urban Land**: 1 acre **Other Land**: 5 acres
Kent Island	Alternatives B and C	**Residential Properties**: 2 Partial Acquisitions 0 Displacement **Business/Other Properties**: 20 Partial Acquisitions 0 Displacements	**Partial Acquisitions:** 1 Educational Facility 1 Place of Worship 2 Parks and Recreational Areas 1 Transportation Facility 1 Marina 1 Public Utility **No Displacements**	**Low-Density Residential**: <1 acre **Medium-Density Residential**: <1 acre **Commercial**: 3 acres **Institutional**: <1 acre **Other Land**: 11 - 12 acres
	Alternatives D and E	**Residential Properties**: 2 Partial Acquisitions 0 Displacement **Business/Other Properties**: 60 Partial Acquisitions 0 Displacement	**Partial Acquisitions:** 1 Educational Facility 2 Places of Worship 1 Cemetery 2 Health Care Facilities 6 Parks and Recreational Areas 1 Public Institution 2 Transportation Facilities 2 Marinas 1 Public Utility **No Displacements**	**Low-Density Residential**: 1 acre **Medium-Density Residential**: <1 acre **High-Density Residential**: <1 acre **Commercial**: 108 acres **Institutional**: <1 acre **Open Urban Land**: <1 acre **Water**: 9 acres **Other Land**: 14 - 15 acres

Community	Alternative	Residential and Business Property Impacts (#)	Community Facilities Property Impacts (#)	Existing Land Use Conversion to Transportation Right-of-way (acres)
	Alternatives F and G	**Residential Properties**: 2 Partial Acquisitions 0 Displacements **Business/Other Properties**: 62 Partial Acquisitions 0 Displacement	**Partial Acquisitions:** 1 Educational Facility 2 Places of Worship 1 Cemetery 2 Health Care Facilities 6 Parks and Recreational Areas 1 Public Institutions 2 Transportation Facilities 2 Marinas 1 Public Utility **No Displacements**	**Low-Density Residential**: <1 acre **Medium-Density Residential**: <1 acre **High-Density Residential**: <1 acre **Commercial**: 9 acres **Industrial:** <1 acre **Institutional**: <1 acre **Other Land**: 15 - 16 acres
	Preferred Alternative	**Residential Properties**: 2 Partial Acquisitions 0 Displacement **Business/Other Properties**: 20 Partial Acquisitions 0 Displacements	**Partial Acquisitions:** 1 Educational Facility 1 Place of Worship 2 Parks and Recreational Areas 1 Transportation Facility 1 Marina 1 Public Utility **No Displacements**	**Low-Density Residential**: <1 acre **Medium-Density Residential**: <1 acre **Commercial**: 3 acres **Institutional**: <1 acre **Other Land**: 12 acres
Kent Narrows/ Grasonville	Alternatives B and C	None	None	None
	Alternatives D, E, F, and G	**Residential Properties**: 0 Partial Acquisition 0 Displacements **Business/Other Properties**: 30 Partial Acquisitions 0 Displacements	**Partial Acquisitions:** 1 Health Care Facility 1 Park and Recreational Area **No Displacements**	**Very Low-Density Residential**: <1 acre **Low-Density Residential**: <1 acre **Medium-Density Residential**: <1 acre **Commercial**: 2 acres **Industrial**: <1 acre **Institutional**: <1 acre **Open Urban Land**: 4 acres **Other Land**: 6 acres
	Preferred Alternative	None	None	None
Queenstown	Alternatives B and C	None	None	None

Community	Alternative	Residential and Business Property Impacts (#)	Community Facilities Property Impacts (#)	Existing Land Use Conversion to Transportation Right-of-way (acres)
	Alternatives D, E, F, and G	**Residential Properties**: 4 Partial Acquisitions 0 Displacements **Business/Other Properties**: 12 Partial Acquisitions 0 Displacements	**Partial Acquisitions:** 1 Park and Recreational Area **No Displacements**	**Low-Density Residential**: <1 acre **Medium-Density Residential**: <1 acre **Commercial**: 1 acre **Open Urban Land**: <1 acre **Other Land**: 10 acres
	Preferred Alternative	None	None	None

As noted in **Section 5.1.4.1**, under the Preferred Alternative, inclusion of the optional SUP would require additional partial acquisition from Terrapin Nature Park located in the Kent Island Community and would impact an additional property in the Broadneck Community containing two community facilities: Sandy Point State Park and MDNR Police - Southern Region Broadneck Office. The inclusion of the optional SUP for the other build alternatives would not impact additional community facilities; however, it would require additional partial acquisition from Sandy Point State Park, located in the Broadneck Community, and Terrapin Nature Park, located in the Kent Island Community. The optional SUP could include or improve access to existing and proposed trails, such as the Cross Island Trail network, Broadneck Peninsula Trail, and Baydale Road Bike Path.

5.3 Visual Resources

Visual and aesthetic resources are the 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. Specific visual features create the visual environment of the study area. These include the area's landform or topography, the vegetation that covers the land surface, the water surfaces that contrast with the land, and the man-made development that defines much of the suburban landscape of the study area. The viewsheds of the study area vary, from limited suburban type views with U.S. 50/301 visible to large expansive views of the Chesapeake Bay and Bay Bridge. For more information on the visual resources, see the *Socioeconomics and Land Use Technical Report, Appendix E, Visual and Aesthetic Resources*.

Site visits, reviews of local planning documents, and desktop reviews of satellite imagery and Geographic Information Systems (GIS) data were conducted to identify potential effects of the build alternatives on the surrounding viewshed. Static (such as what neighbors of the road see) and dynamic viewsheds (what travelers on the road see) have been considered in determining the Area of Visual Effect (AVE) of the build alternatives. The existing conditions in the AVE were determined by the area's visual quality, character, and its viewer groups. The visual impact of the alternatives is determined by assessing the change in visual resources due to the alternatives and predicting viewer response to that change.

5.3.1 Affected Environment

The AVE encompasses a mix of residential, industrial, institutional, commercial, government, and open space land and water uses. The AVE varies greatly, from limited suburban-type views with U.S. 50/301 visible to large expansive water views of the Chesapeake Bay from the Bay Bridge and the shorelines of the Bay. The topography in the region is generally flat, with landward viewsheds limited by vegetation or structures. Several visually sensitive resources, such as state parks and National Historic Trails, are located within the AVE. Visual impacts to historic properties are assessed under Section 106 of the National Historic Preservation Act (NHPA) and are documented in the *Final Section 4(f) Evaluation* (**Appendix E**). The AVE is divided into three landscape units (Western Shore, Chesapeake Bay, Eastern Shore) which are further described in the following sections.

5.3.2 Environmental Consequences

5.3.2.1 Western Shore Landscape Unit

The Western Shore landscape unit includes the portion of the study area located in Anne Arundel County on the Western Shore. It follows U.S. 50/301 from the MD 2/MD 450 interchange to the Chesapeake Bay Bridge tie-ins on the Western Shore. U.S. 50/301 is a well-traveled highway with six lanes of traffic on the Western Shore, with three lanes in each direction. Generally, the Western Shore landscape unit is defined by dense vegetation and deciduous trees, as well as commercial areas and businesses adjacent to U.S. 50/301 (**Figure 5-7**). Section 4(f) park/recreation area properties adjacent to U.S. 50/301 on the Western Shore include the Broadneck Peninsula Trail, Sandy Point State Park, and Holly Beach Farm, which are considered sensitive visual resources within the landscape unit.

Figure 5-7: Motorists View of U.S. 50/301 on the Western Shore



The No-Build Alternative maintains the Bay Bridge's current U.S. 50/301 alignment and lane configuration for commuters, recreational, and commercial traffic, with no changes to the visual character of any Landscape Units.

The build alternatives, including the Preferred Alternative, include an increase in travel lanes along U.S. 50/301 and visual impacts on the Western Shore would be noticeable by viewers. Widening of U.S. 50/301 associated with the build alternatives may result in the clearing of vegetation along the roadway, which may make the road more visible from surrounding land uses. Additionally, the widening may result in visual impacts to adjacent properties, as well as residential or business displacements. The construction process itself would also temporarily disrupt the landscape, with cranes, scaffolding, and other equipment altering the view.

The expanded bridge would likely dominate the skyline even more prominently, altering the current scenic views of the Bay and surrounding areas. The increased width and additional infrastructure could lead to a more industrial appearance, potentially affecting the aesthetic qualities of the region. The optional SUP would have minimal additional visual impact since it would be constructed on the new bridge structure.

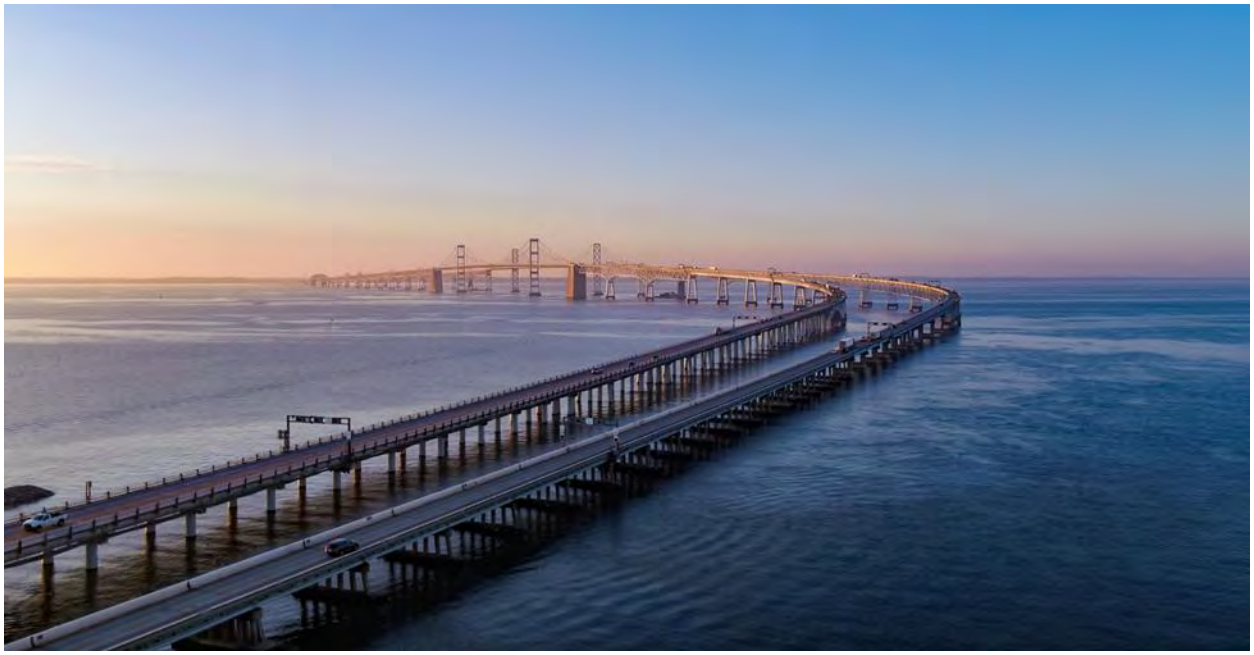
The south and north bridge alignments would have noticeably different impacts at the bridge tie-ins on the Western Shore. The northern bridge alignment would be closer to Sandy Point State Park, impacting the viewshed from the park to a greater degree than the southern alignment. With the northern alignment, piers would be located closer to Sandy Point State Park. It is likely the northern bridge alignment would affect a greater number of sensitive viewers, such as park visitors and recreational users. The most notable visual change would be the increased prominence of the bridge in the skyline given the increased height of the bridge. This change would be most noticeable from key vantage points such as Sandy Point State Park and residential areas along the shore.

The Severn River is outside the study limits just west of MD 2/MD 450 and is designated as a State Scenic River. While outside the study limits, the increased height of a new bridge may be visible from the Severn River, particularly at the mouth of the river. Coordination with MDNR and the Severn River Commission as design progresses will be required regarding potential effects to the scenic river.

5.3.2.2 Chesapeake Bay Landscape Unit

The Chesapeake Bay landscape unit encompasses the Chesapeake Bay and Bay Bridge, including the shorelines on the Western Shore and Eastern Shore. The Bay Bridge consists of two parallel bridge spans carrying U.S. 50/301 over the Chesapeake Bay, connecting Anne Arundel County on the Western Shore to Queen Anne's County on the Eastern Shore. The bridge spans 4.3 miles across the Bay. When the original span was built, it was the world's longest continuous over-water steel structure and, at the time, the third longest bridge in the world (**Figure 5-8**).

Figure 5-8: Aerial Photo of the Bay Bridge (Facing East)

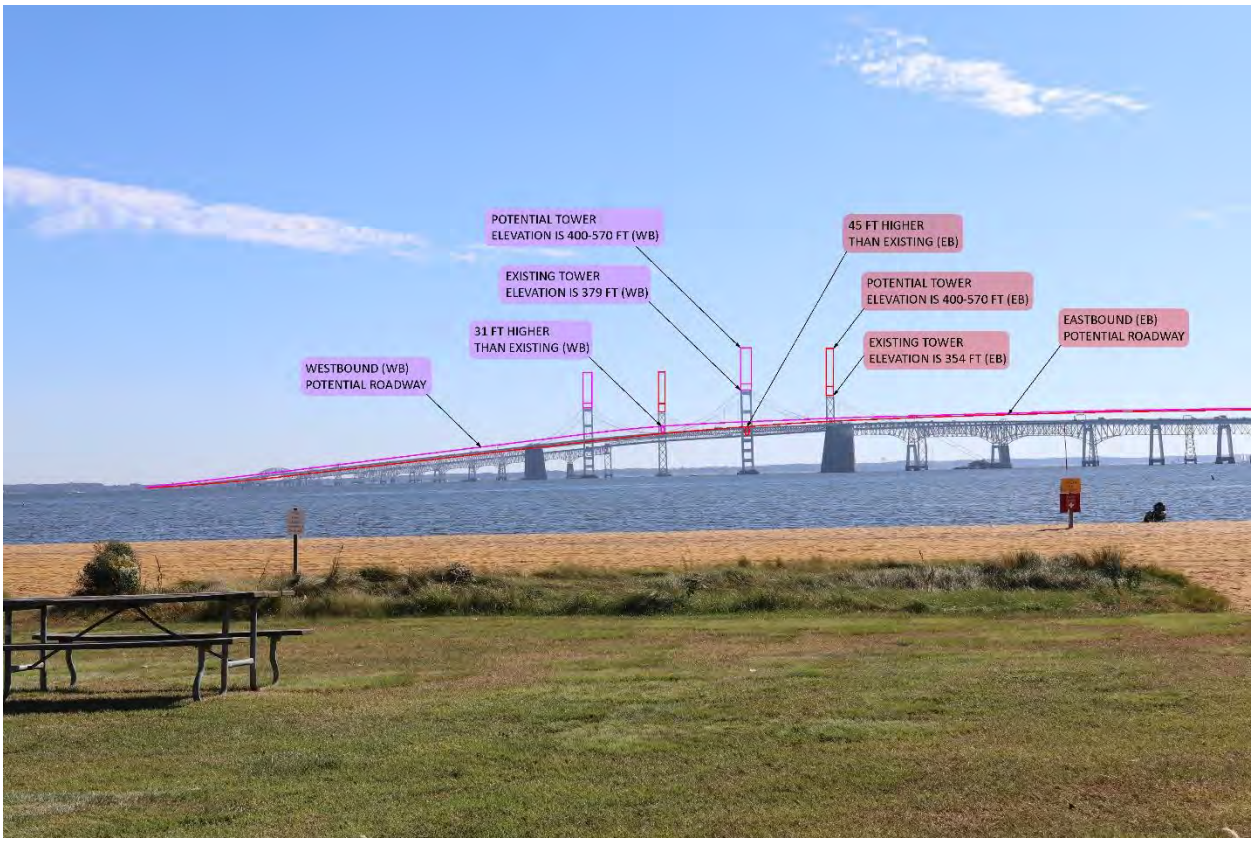


The Chesapeake Bay is the most prominent and valued visual resource in the corridor. The Bay is one of Maryland's most important scenic, natural, economic, and cultural resources that has historically shaped the region's identity, culture, and traditions.

The stunning views of the Chesapeake Bay are only interrupted by the Bay Bridge, Maryland's sole crossing of this vast body of water. Although the Bay Bridge disrupts the Bay's natural expanse, it stands as one of Maryland's most iconic and recognizable landmarks. This remarkable structure offers a unique opportunity for people to experience the Bay in a way that would be impossible from the shore, providing a spectacular birds-eye view of the Bay and its picturesque shorelines. Travelers on U.S. 50/301 enjoy this dynamic and captivating viewshed as they cross the Chesapeake Bay. The Bay Bridge's wide viewshed includes picturesque views east-west across the Bay, as well as north-south along the Bay.

The visual impacts of the build alternatives, including the Preferred Alternative, on the Chesapeake Bay Landscape Unit could include increased structural presence with an increase in lanes and bridge height. **Figure 5-9** shows the proposed height and profile of what a new bridge would look like against the existing Bay Bridge. The bridge itself would be higher to accommodate the increased navigational clearance, and its towers would be taller to support the larger bridge structure. The increased height of the bridge and towers is shown to display the magnitude of difference between the existing and proposed bridge. The increased height of the structure would make the bridge more prominent across the Bay and in the viewshed from the Eastern Shore and Western Shore.

Figure 5-9: Existing Bay Bridge and Proposed Bridge Profile (from Sandy Point State Park)



A cable-stayed or suspension bridge that was assumed in this analysis would alter the viewshed of motorists traveling across the bridge. Additionally, the presence of cables would be a visual change from the existing bridges. The increased number of lanes could lead to more visible traffic, which could detract from the scenic experience. To accommodate additional lanes, there would likely be more lighting and signage. The construction process itself would also temporarily disrupt the landscape, with cranes, scaffolding, and other equipment altering the view.

The optional SUP would be a visual change from the existing structure; however, it would have minimal additional visual impact since it would be constructed on the new bridge structure. The optional SUP would be most noticeable for motorists driving on the span with the facility. Pedestrians and bicyclists are not currently permitted on the Bay Bridge, and the use of the recreational facility would be a visual change. Additionally, the optional SUP would require additional lighting features that would be a visual change. For users of the facility, the optional SUP would provide new views of the Chesapeake Bay and nearby shorelines from the new bridge.

The current Bay Bridge is not lit, except for overhead gantry systems, as well as necessary lighting for navigation and aviation. The Bay Bridge does not have roadway lighting or aesthetic lighting on the structural elements of the bridge. As Maryland's only crossing of the Chesapeake Bay, the Bay Bridge is also the only source of lighting in the Bay. The minimal lighting currently on the Bay Bridge does not significantly disturb the view at night over the Bay.

The lighting of a proposed new bridge may have a visual impact if it includes more lighting than what is currently present on the Bay Bridge. While a lighting system for the Bay Bridge will not

be determined until final design, if there is additional lighting than what is currently on the Bay Bridge, such as roadway and aesthetic lighting, there would be a visual impact to the Bay. Additional lighting would be more visible at night, especially since it is the only source of lighting across the Bay. The lighting design may have potential environmental impacts, including energy consumption, visual aesthetics, and ecological effects. Artificial lighting can disrupt nocturnal wildlife, including migratory birds, sea turtles, and aquatic species by altering behavior, disorienting navigation, or affecting reproductive cycles.

Overall, the build alternatives, including the Preferred Alternative, could have a considerable impact on visual aesthetics in the Chesapeake Bay landscape unit. A new bridge would be larger and may be a different structure type than the existing bridge. However, the existing bridge itself is an iconic and recognizable landmark to the region, and a new Bay Bridge would likely have a similar visual appeal. Public comments received on visual resources have noted a desire for an aesthetically pleasing bridge that enhances lighting on a new bridge.

5.3.2.3 Eastern Shore Landscape Unit

The Eastern Shore landscape unit includes the portion of the study area located in Queen Anne's County. It follows U.S. 50/301 from the eastern end of the Bay Bridge to the U.S. 50/301 split in Queen Anne's County. Similar to the Western Shore, U.S. 50/301 on the Eastern Shore is a highly traveled roadway with six lanes of traffic. Several overpasses carry roads over U.S. 50/301. The overpasses are concrete and steel structures with chain link fencing. Adjacent to U.S. 50/301 are commercial areas and businesses, often accessed by service roads parallel to the highway. Commercial areas and businesses in this landscape unit are most concentrated on Kent Island, where businesses are located directly adjacent to U.S. 50/301 for much of the roadway. **Figure 5-10** shows U.S. 50/301 on the Eastern Shore, heading west towards the Bay Bridge.

Figure 5-10: Motorists View of U.S. 50/301 on the Eastern Shore



There are several Section 4(f) properties adjacent to U.S. 50/301 on the Eastern Shore including Terrapin Nature Park, Cross Island Trail, and the Kent Narrows Bridge. These Section 4(f) properties are considered sensitive visual resources in the landscape unit.

The build alternatives, including the Preferred Alternative, include an increase in travel lanes along U.S. 50/301 and visual impacts on the Eastern Shore would be noticeable to viewers. Widening of U.S. 50/301 associated with the build alternatives may result in the clearing of vegetation along the roadway, which may make the road more visible from surrounding land uses. Additionally, the widening would result in visual impacts to adjacent properties, as well as residential or business displacements. This may alter the viewshed of U.S. 50/301; however, changes would be mostly consistent with the existing conditions of today's roadway.

From key vantage points such as Kent Island and nearby residential areas, the expanded bridge would create a more imposing presence. While the existing Bay Bridge is already a pronounced disruption of the Bay, the bridge itself is an iconic and recognizable landmark. A new Bay Bridge would likely have a similar visual appeal against the backdrop of Chesapeake Bay. The optional SUP would have minimal additional visual impact since it would be constructed on the new bridge structure.

While some areas might experience more noticeable changes in the viewshed, these effects could be limited to specific locations where the bridge is most visible. In other areas, the impact would be less pronounced, especially where natural or built features partially obscure the bridge. The construction process itself would also temporarily disrupt the landscape, with cranes, scaffolding, and other equipment altering the view.

The Eastern Shore's marshy, low-lying areas are ideal for birdwatching and nature trails. A new bridge's visual impact could detract from the natural scenery, particularly if it requires additional impervious surfaces or land disturbance. Beaches near the bridge may see increased use due to improved access but could lose some appeal if the bridge's expanded footprint or construction visually intrudes on the landscape.

5.3.3 Mitigation

Mitigation measures to lessen the visual impact of the improvements would be considered, as appropriate. Incorporating aesthetic elements into the project design can reduce visual impacts and enhance the viewer's experience and acceptance of the visual change. The design of the highway elements and new Bay Bridge could incorporate elements that enhance visual appeal. This may include landscaping enhancements on the approach roadways and aesthetic architectural elements on a new bridge, as well as the lighting design.

Measures to ensure safety, navigational compliance, and minimize impacts on the environment and natural species, particularly within the ecologically sensitive Chesapeake Bay region, may be considered in the lighting design. These considerations may include the use of energy-efficient lighting systems installed along the main span, approaches, and support piers to provide uniform illumination for vehicular traffic, maintenance operations, and emergency access. Mitigation measures could include full-cutoff luminaires to prevent light spill into adjacent habitat, as well as consideration of DarkSky International guidelines to protect nocturnal species.[23] Navigational lighting, as required by the USCG, may utilize shielded, downward-directed fixtures to reduce glare and light trespass into the Chesapeake Bay's sensitive aquatic and avian habitats.

[23] https://darksky.org/resources/guides-and-how-tos/lighting-principles/

Aesthetic lighting may be considered for the bridge towers, with the option of employing programmable low-intensity lighting to adhere to dark-sky principles to minimize impacts on migratory birds and the scenic viewsheds of the Chesapeake Bay. Full-cutoff fixtures with warm-toned wavelengths (below 3000 Kelvin) to reduce skyglow and light trespass into critical habitats, such as adjacent wetlands and spawning grounds, may be considered. Additionally, adaptive controls can dim lights during low-traffic periods to minimize energy consumption and ecological disturbance.

The MDTA will commit to developing a lighting plan for a new bridge during final design. Elements of the lighting plan would depend on structure type of the new bridge and whether the optional SUP is included.

5.4 Cultural Resources

Section 106 of the NHPA of 1966 (as amended), 54 United States Code (USC) 306108 and its implementing regulations at 36 CFR Part 800, requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. Historic properties are defined as buildings, structures, sites, districts, and objects, generally at least 50 years of age, which are listed in or eligible for listing in the National Register of Historic Places (NRHP).

FHWA is serving as the Lead Federal Agency and fulfilling the collective responsibilities for all Federal agencies under the requirements of Section 106. In accordance with the *Programmatic Agreement Implementing Section 106 of the NHPA for FHWA Undertakings in Maryland*, FHWA has delegated responsibility to the MDTA to initiate Section 106 review and consultation. Additional participants in the Tier 2 Study's Section 106 process include ACHP; Maryland Historical Trust (MHT), which serves as the Maryland State Historic Preservation Officer (SHPO); Tribal Governments; Local Governments; other Consulting Parties with a demonstrated interest; and the public.

The MDTA and FHWA initiated the Section 106 consultation process during the Tier 1 Study and resumed Section 106 consultation during the Tier 2 Study. A four-volume *Cultural Resources Technical Report* was prepared to support the Tier 2 Study EIS. The technical cultural resources studies undertaken to date include *Volume 1: Overview, Volume 2: Cultural Resources Gap Analysis, Volume 3: Architectural Historic Properties Identification*, and *Volume 4: Phase I Archaeological Survey Within MDTA and SHA Right-of-Way*.

An Area of Potential Effects (APE) was initially developed during the Tier 1 Study and updated following development of the Tier 2 Study ARDS. The APE is the geographic area where the ARDS may directly or indirectly cause alterations in the character or use of historic properties. The MDTA identified historic properties and evaluated effects to historic properties within the APE in consultation with MHT and other consulting parties. MHT agreed with the APE update in May 2025. More information on the data sources, methodology, and regulatory context used is included in the *Cultural Resources Technical Report*.

5.4.1 Affected Environment

5.4.1.1 Architectural Resources

The MDTA identified 17 architectural historic properties within the APE (**Table 5-14**).

Table 5-14: Architectural Historic Properties within the APE

MIHP #	Name	Period of Significance	NRHP Status and Criteria[1]
AA-0047-0048	Chesapeake Bay Bridge (William Preston Lane Jr. Memorial Bridge)	1949-1952, 1969-1973	Eligible: A, C
AA-0074	Holly Beach Farm	1907-1949	Eligible: A, B, C
AA-166	Sandy Point Shoal Light Station	1883-1952	NRHP Listed: A, C
AA-322	Weedon Farmhouse	--	Inaccessible, will be considered eligible during review
AA-330	Sandy Point Farmhouse	Ca. 1815	Eligible: A, C
AA-2305	Sandy Point State Park	1952 and 1956	Eligible: A
AA-2511	Asbury Broadneck Methodist Church and Cemetery	1884-1977	Eligible: A
AA-2592	Westinghouse Ocean Research and Engineering Center (Westinghouse Oceanic Division)	1967-1996	Eligible: A, C
AA-2594	Skidmore	1930-1968	Eligible: A
AA-2603	Dutch Mill Farm Restaurant (Old Mill Pancake House)	1954-1967	Eligible: A, C
QA-125	Eareckson House (Nathan Morris House)	Ca. 1850	Eligible: C
QA-221	Clayland Price Farm	--	Inaccessible, will be considered eligible during review
QA-270	Belle Vue (Blue Bay Farm)	Ca. 1760-1790	Eligible: C
QA-542	SHA Bridge No. 1700600	1951	Eligible: A, C
QA-545-547	Matapeake Ferry Terminal, Club House, Shop	1930-1952	Eligible: A
QA-633	William E. Denny Farm	1920-1952	Eligible: A, C
QA-723	Piney Narrows Yacht Haven	1966-1982	Eligible: A, C

[1] NRHP listed or eligible properties must be significant under at least one of the following four criteria: association with a significant event (Criterion A); association with a significant person (Criterion B); embody characteristics of a type, period, or method of construction, or that represent the work of a master (Criterion C); or have potential to yield information important to history or prehistory (Criterion D). For more information, see 36 CFR § 60.4.

5.4.1.2 Archaeological Resources

There are no archaeological historic properties within the LOD for the Preferred Alternative. There is one archaeological historic property within the LOD for Alternatives D through G (**Table 5-15**).

There are 13 unevaluated archaeological sites within the LOD of the build alternatives that would require additional archaeological survey or evaluation, as identified in the *Cultural Resources Gap Analysis*: 18AN534, 18AN672, 18AN871, 18AN1192, 18QU51, 18QU63, 18QU66, 18QU216, 18QU235, 18QU236, 18QU237, 18QU238, and 18QU411. None of these sites are within the Preferred Alternative LOD.

Table 5-15: Archaeological Historic Properties within the LOD for Alternatives D through G

Site #	Name	Period of Significance	NRHP Status and Criteria
18AN652	Sharpe-Ridout-Boone Mill	18th to 20th century	Eligible: D

5.4.2 Environmental Consequences

The MDTA and FHWA consulted with MHT and other consulting parties to evaluate effects on historic properties per Section 106. The MDTA and FHWA determined that the Preferred Alternative would have an adverse effect on historic properties. The effects letter was sent on January 23, 2026, and MHT concurred on February 26, 2026 (**Appendix C**). The effects evaluation is provided in the *Section 106 Effects Assessment Report*.

5.4.2.1 Architectural Resources

The MDTA has considered how the ARDS might affect the 17 architectural historic properties located within the APE by applying the criteria of adverse effect (36 CFR Part 800.5[a][1]). An adverse effect may occur when there is a direct or indirect alteration to the characteristics of a historic property qualifying 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.

The No-Build Alternative would not result in any Tier 2 Study-related construction and there would be no historic properties affected.

Of the 17 architectural historic properties within the APE, two will be adversely affected by the Preferred Alternative (**Table 5-16**). The Chesapeake Bay Bridge (William Preston Lane Jr. Memorial Bridge) (AA-0047/0048) will be adversely affected due to demolition of the historic bridge spans. Skidmore (AA-2594) will be adversely affected due to diminishment of the property's integrity of setting, feeling, and association contributing to the cumulative effects of highway expansion and development.

Two additional architectural historic properties within the APE would be adversely affected by some of the build alternatives. The Dutch Mill Farm Restaurant (AA-2603) would be adversely affected by Alternatives D, E, F, and G due to right-of-way acquisition and demolition of the restaurant building. Sandy Point State Park (AA-2305) would be adversely affected by Alternatives B, D, and F because of the construction of bridge piers on South Beach.

Table 5-16: Architectural Historic Properties Adversely Affected

MIHP #	Name	Period of Significance	NRHP Status and Criteria	Nature of Effect	Alternatives Adversely Affecting the Historic Property
AA-0047-0048	Chesapeake Bay Bridge (William Preston Lane Jr. Memorial Bridge)	1949-1952, 1969-1973	Eligible: A, C	Complete destruction	B, C, D, E, F, G, and the Preferred Alternative
AA-2305	Sandy Point State Park	1952 and 1956	Eligible: A	Bridge piers located on South Beach; access to area of beach will be permanently restricted, resulting in diminished integrity of setting and design	B, D and F

MIHP #	Name	Period of Significance	NRHP Status and Criteria	Nature of Effect	Alternatives Adversely Affecting the Historic Property
AA-2594	Skidmore	1930-1968	Eligible: A	Diminishment and cumulative effects to the integrity of setting, feeling, and association from highway construction since the mid-20th century	B, C, D, E, F, G, and the Preferred Alternative
AA-2603	Dutch Mill Farm Restaurant (Old Mill Pancake House)	1954-1967	Eligible: A, C	Complete destruction	D, E, F, and G

The remainder of the architectural historic properties will either not be affected by the build alternatives or alterations resulting from the build alternatives will not diminish the integrity of the historic properties. **Table 5-17** shows effects on architectural historic properties for each build alternative.

Table 5-17: Summary of Effects on Historic Architectural Properties by Build Alternative

MIHP #	Name	Build Alternative						
		B	C	D	E	F	G	**Preferred Alternative**
AA-0047-0048	Chesapeake Bay Bridge (William Preston Lane Jr. Memorial Bridge)	Adversely Affected	Adversely Affected	Adversely Affected	Adversely Affected	Adversely Affected	Adversely Affected	Adversely Affected
AA-0074	Holly Beach Farm	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment
AA-166	Sandy Point Shoal Light Station	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment
AA-322	Weedon Farmhouse	Not Affected	Not Affected	Not Affected	Not Affected	Not Affected	Not Affected	Not Affected
AA-330	Sandy Point Farmhouse	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment
AA-2305	Sandy Point State Park	Adversely Affected	No Diminishment	Adversely Affected	No Diminishment	Adversely Affected	No Diminishment	No Diminishment
AA-2511	Asbury Broadneck Methodist Church and Cemetery	Not Affected	Not Affected	No Diminishment	No Diminishment	No Diminishment	No Diminishment	Not Affected
AA-2592	Westinghouse Ocean Research and Engineering Center (Westinghouse Oceanic Division)	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment
AA-2594	Skidmore	Adversely Affected	Adversely Affected	Adversely Affected	Adversely Affected	Adversely Affected	Adversely Affected	Adversely Affected
AA-2603	Dutch Mill Farm Restaurant (Old Mill Pancake House)	Not Affected	Not Affected	Adversely Affected	Adversely Affected	Adversely Affected	Adversely Affected	Not Affected

MIHP #	Name	Build Alternative						
		B	C	D	E	F	G	**Preferred Alternative**
QA-125	Eareckson House (Nathan Morris House)	Not Affected	Not Affected	Not Affected	Not Affected	Not Affected	Not Affected	Not Affected
QA-221	Clayland Price Farm	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment
QA-270	Belle Vue (Blue Bay Farm)	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment
QA-542	SHA Bridge No. 1700600	Not Affected	Not Affected	No Diminishment	No Diminishment	No Diminishment	No Diminishment	Not Affected
QA-545-547	Matapeake Ferry Terminal, Club House, Shop	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment
QA-633	William E. Denny Farm	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment	No Diminishment
QA-723	Piney Narrows Yacht Haven	Not Affected	Not Affected	No Diminishment	No Diminishment	No Diminishment	No Diminishment	Not Affected

The optional SUP would not change any of the effect determinations for architectural historic properties. Under Alternatives B, D, and F, the addition of an SUP option would increase the area of piers and the size of the bridge within the boundary of Sandy Point State Park; thus, Alternatives B, D, and F would continue to have an adverse effect on the historic property. Under Alternatives C, E, G, and the Preferred Alternative a small amount of right-of-way would be required along the edge of Sandy Point State Park to construct the SUP; these impacts would not diminish the integrity of the historic property or change the effects of Alternatives C, E, G, and the Preferred Alternative.

5.4.2.2 Archaeological Resources

The No-Build Alternative would not result in any Tier 2 Study-related construction and archaeological resources would not be affected. Alternative B, C, and the Preferred Alternative would also avoid effects to archaeological resources.

The Sharpe-Ridout-Boone Mill (18AN652) archaeological site would be adversely affected by Alternatives D, E, F, and G due to complete or partial destruction or significant diminishment in all aspects of integrity (**Table 5-18**).

Through the Section 106 consultation process, the MDTA will continue to identify and evaluate archaeological resources through a commitment to complete underwater archaeological survey and additional terrestrial survey if needed.

Table 5-18: Archaeological Historic Properties with an Adverse Effect

Site #	Name	Period of Significance	NRHP Status and Criteria	Nature of Adverse Effect	Alternatives Resulting in an Adverse Effect
18AN652	Sharpe-Ridout-Boone Mill	18th to 20th century	Eligible: D	Partial or complete destruction or significant diminishment in all aspects of integrity	D, E, F, and G

There are no identified archaeological historic properties within the LOD for the build alternatives, including the Preferred Alternative, for the optional SUP.

5.4.3 Cemeteries

Alternatives D, E, F, and G would impact the Gardner Family Cemetery. The boundaries of the Gardner Cemetery have not been fully delineated, and additional studies are needed to confirm boundaries and ensure no burial would be affected. Non-invasive research was conducted, and the cemetery was evaluated for NRHP eligibility as an architectural resource; it was determined not eligible for inclusion in the NRHP in July 2025. Alternatives D, E, F, or G would require additional investigations to inform avoidance, minimization, and treatment under the Programmatic Agreement (PA). There are no cemeteries within the LOD for the Preferred Alternative or the LOD for the optional SUP.

5.4.4 Mitigation

FHWA and the MDTA executed a PA on August 6, 2026, to resolve adverse effects, as described at 36 CFR Part 800.14(b). The executed PA is included in **Appendix D**. FHWA, in coordination with the MDTA, determined that the project will have adverse effects on historic properties; MHT concurred with this determination on February 26, 2026. The PA provides for the resolution of

adverse effects to historic properties, and establishes procedures for continued consultation as design advances, including additional historic properties identification for in-water portions of the Preferred Alternative LOD, any stream and wetland mitigation sites, or future expansion of the APE or archaeological survey area. While FHWA retains ultimate responsibility for Section 106 compliance, the MDTA will oversee day-to-day implementation of the PA as the project continues.

FHWA and the MDTA consulted with Section 106 consulting parties to identify mitigation included in the PA for the Chesapeake Bay Bridge and Skidmore. Mitigation for the Chesapeake Bay Bridge includes photographic and digital documentation, interpretive panels, online interpretive content, and a playground/outdoor interactive interpretive area. Skidmore mitigation includes drafting a Multiple Property Documentation form for Broadneck Peninsula descendant communities, interpretive panels, and a booklet with information about the history of Skidmore and Broadneck Peninsula descendant communities. The PA includes provisions for avoidance, minimization, or mitigation of adverse effects should any underwater archaeological resources be determined NRHP-eligible.

The PA includes mandatory procedures in the event of inadvertent discovery of archaeological resources or human remains in addition to further evaluation of known resources.

5.5 Natural Resources

The purpose of this section is to identify and describe the presence of natural resources, summarize the existing conditions, and provide a comparison of the potential impacts to these resources for the different alternatives. Natural resources in the study corridor were identified within defined resource review areas that varied in width by the resource evaluated. The minimum resource review area extended 300 feet on either side of U.S. 50/301 for detailed wetland field investigations, while the largest resource review area extended two miles on either side of the corridor for aquatic biota. The resource review area evaluated for each resource is detailed in the *Natural Environment Technical Report*.

The ARDS would result in minimal or no impact to Geology and Topography, Coastal Barrier Resources, and Wastewater. Therefore, discussion of these natural resources is not included in this section and is instead covered in the *Natural Environment Technical Report*. The *Natural Environment Technical Report*, *Biological Assessments for the Northern Long-Eared and Tricolored Bat and Atlantic Sturgeon, Shortnose Sturgeon and Sea Turtles* and *EFH Assessment* also provide additional information on many resources to support the summarized information in this Final EIS.

5.5.1 Soils and Farmland Soils

The Farmland Protection Policy Act (FPPA) of 1981 was created “to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses” and is regulated by the Natural Resources Conservation Service (NRCS). All farmland identified as prime, unique, or of statewide or local importance is subject to the FPPA. Under the FPPA, farmland does not include land already in or committed to urban development, including lands identified as urbanized area on the 2020 Census urban area-based reference map, or lands within existing transportation right-of-way.

The MDTA reviewed recent aerial imagery from 2023 and 2024 to identify potential active farmland activities within the resource review area. The MDTA conducted an analysis of soil resources in the resource review area based on publicly available desktop information from

NRCS, USGS, and the U.S. Census Bureau. More detail on analysis methodologies is provided in the *Natural Environment Technical Report*.

5.5.1.1 Affected Environment

Soils within the resource review area are primarily silty loam to sandy loam, with hydric soils occurring within some of the lowland areas. Soils within the review area generally have a low shrink-swell potential. Four soil map units (all in Anne Arundel County) comprising 46 acres (1.9% of the resource review area) are described as “severe” or “very severe” for potential erodibility. Most soil types within the resource review area have "moderate" to "high" risk of corrosion of steel/concrete. Soil map units and detailed soil series descriptions are provided in the *Natural Environment Technical Report*.

Prime Farmland Soils and Farmland Soils of Statewide Importance occur within the resource review area and are shown in **Figure 5-11** and **Figure 5-12**. Unique Farmland Soils or Farmland Soils of Local Importance were not identified. Most of the NRCS-mapped soils were ultimately excluded from consideration as farmland under the FPPA, because they are within census-designated urban areas.

5.5.1.2 Environmental Consequences

The No-Build Alternative would have no impact to soils.

The primary impact to soils from all build alternatives, including the Preferred Alternative, would be soil displacement due to construction activities such as cut/cover, excavation, filling, cutting, pile driving, vegetation clearing, addition of impervious surfaces, and introduction of physical elements. Soils may also be compacted from heavy equipment over non-paved areas during construction, which can reduce infiltration rates and exacerbate surface water runoff. **Table 5-19** and **Table 5-20** provide the acreage of impact to hydric soils from each build alternative, including the Preferred Alternative, and the additional impacts that would result from an SUP option associated with each build alternative, including the Preferred Alternative, respectively.

Table 5-19: Hydric Soil Impacts (Acres)

No-Build	Build Alternative						
	B	C	D	E	F	G	Preferred Alternative
0	4.4	4.5	25.5	25.6	28.0	28.1	4.4

Table 5-20: SUP Hydric Soil Impacts (Acres)

No-Build	Build Alternative						
	B	C	D	E	F	G	Preferred Alternative
0	0.3	0.4	0.3	0.4	0.3	0.4	0.4

Table 5-21 shows permanent impacts to Prime Farmland Soils and Farmland Soils of Statewide Importance beyond the limits of census-designated urban areas and existing transportation right-of-way for each build alternative, including the Preferred Alternative. **Table 5-22** shows permanent impacts to Prime Farmland Soils and Farmland Soils of Statewide Importance beyond the limits of census-designated urban areas and existing transportation right-of-way associated with an SUP for each build alternative, including the Preferred Alternative. The conversion of

farmland soils (regardless of whether they are actively farmed) to a non-agricultural use, such as transportation, constitutes a direct impact. The build alternatives, including the Preferred Alternative, would result in the conversion of 19.6 to 71.6 acres of farmland soils to transportation use. Although small areas of active farming were observed within the resource review area, active farmland was not identified within the LOD of any of the build alternatives, including the Preferred Alternative. Thus, there would be no impact to currently active farmland from any of the ARDS. The optional SUP would convert an additional 0.9 to 1.2 acres of farmland soils to transportation use.

As shown in **Table 5-21**, refinements made to the Preferred Alternative reduced impacts to Farmland Soils of Statewide Importance by 0.8 acre compared to impacts for Alternative C.

Table 5-21: Farmland Soil Impacts (Acres)

Resource	No-Build	Build Alternative						
		B	C	D	E	F	G	**Preferred Alternative**
Prime Farmland Soils	0	3.9	3.9	17.2	17.2	19.4	19.4	3.9
Farmland Soils of Statewide Importance	0	16.5	16.5	52.0	52.0	52.2	52.2	15.7
Total Farmland Soils	**0**	**20.4**	**20.4**	**69.2**	**69.2**	**71.6**	**71.6**	**19.6**

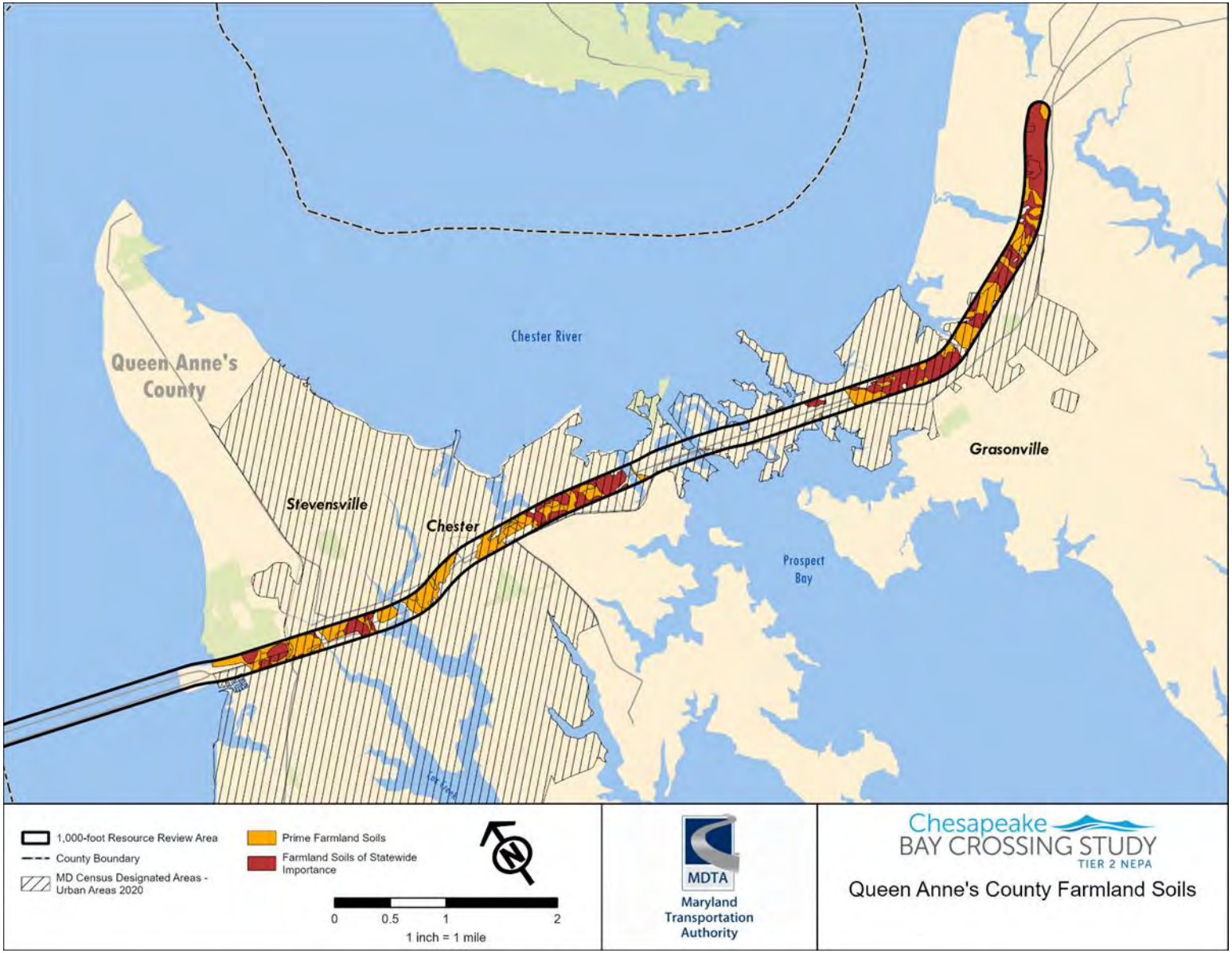
Table 5-22: SUP Farmland Soil Impacts (Acres)

Resource	No-Build	Build Alternative						
		B	C	D	E	F	G	**Preferred Alternative**
Prime Farmland Soils	0	0.9	0.6	0.9	0.6	0.7	0.4	0.6
Farmland Soils of Statewide Importance	0	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Farmland Soils	**0**	**1.2**	**0.9**	**1.2**	**0.9**	**1.0**	**0.7**	**0.9**

Figure 5-11: Farmland Soils – Anne Arundel County



Figure 5-12: Farmland Soils – Queen Anne's County



5.5.1.3 Minimization and Mitigation

The MDTA will approach design and development of the Selected Alternative with the goal of further avoiding and minimizing impacts to soils and farmland soils. The MDTA has prepared the NRCS-CPA-106 (Farmland Conversion Impact Rating for Corridor Type Projects) form in accordance with the FPPA for the Preferred Alternative. The NRCS-CPA-106 form was submitted to NRCS on May 26, 2026. A response was received from NRCS on June 8, 2026, stating that the FPPA does not apply for the Preferred Alternative. The NRCS correspondence is included in **Appendix C**. The MDTA will prepare an Erosion and Sediment Control (ESC) Plan during final design in accordance with Maryland Department of the Environment (MDE) guidelines and ensure the appropriate BMPs are in place during construction to minimize impacts to soils, especially in the areas of highly erodible soils in Anne Arundel County.

5.5.2 Groundwater

The following regulations and programs apply to groundwater within the resource review area:

- The Clean Water Act (CWA),[24]
- Safe Drinking Water Act (SDWA) of 1974 (Public Law 93-523, 42 USC 300 et. seq) Amended and reauthorized in 1986 and 1996;
- Sole Source Aquifer (SSA) Program, authorized by Section 1424(e) of the SDWA;
- Maryland Wellhead Protection Program of 1991; and
- Maryland Water Appropriations and Use Permit process (Code of Maryland Regulations [COMAR] 26.17.06 and 26.17.07).

For more information about groundwater regulations, as well as the methodologies used in this analysis, see the *Natural Environment Technical Report.*

The MDTA gathered publicly available information on groundwater resources, including GIS data from the Anne Arundel County Department of Public Works and Queen Anne's County Department of Public Works, MDE Water Supply Program, MDNR Maryland Geological Survey (MGS), USGS, and USEPA.

5.5.2.1 Affected Environment

Within the resource review area, Anne Arundel County relies almost entirely on groundwater from the Magothy and Aquia aquifers for its municipal water supply and for well water that serves individual homes (Anne Arundel County, 2021). Groundwater from the Magothy and Aquia aquifers is also the main source for municipal, industrial, and private water supplies in the portion of Queen Anne's County that is within the resource review area. Groundwater from these aquifers is of good to moderate quality (Queen Anne's County, 2011).

Figure 5-13 depicts the aquifer outcrop area for the Magothy Aquifer, which serves as the primary recharge zone for the aquifer. Note that the Magothy Aquifer extends underground to where its outcropping is shown on **Figure 5-14** and underlies the area where the Aquia Aquifer is shown in the figure on the Western Shore of the Chesapeake Bay, extending eastward beneath the adjoining counties on the Eastern Shore.

According to the USGS National Water Information System mapper, there are 19 active groundwater monitoring wells and 202 inactive groundwater wells within and near the resource review area (**Figure 5-14**), and well data indicates a shallow groundwater table (USGS, 2025).

[24] The CWA primarily regulates pollutant discharges to surface waters and may only indirectly affect groundwater.

Inactive groundwater wells are shown in addition to active groundwater wells, as requested by USGS, since impacts to either type of well could affect the underlying aquifer. Since groundwater is a regional resource and not directly indicative of surface conditions immediately above a given location in the aquifer, 16 monitoring wells near the resource review area have also been included to further characterize the resource. There were no municipal or private wells identified within or near the resource review area. See the *Natural Environment Technical Report* for more information regarding these groundwater wells.

5.5.2.2 Environmental Consequences

The No-Build Alternative would have no impact to groundwater resources. The Preferred Alternative would impact five inactive and no active groundwater wells.

Existing private wells are set back far enough from the roadway alignment that they would not be impacted by the build alternatives, including the Preferred Alternative. Wellhead protection areas (WHPAs) are not located within or near the resource review area and impacts to WHPAs are not anticipated. Each of the build alternatives, including the Preferred Alternative, could impact the quantity and quality of groundwater recharge that enters the Magothy and Aquia aquifers due to the increase in impervious surfaces that redirects potential groundwater recharge to surface water bodies. The build alternatives, including the Preferred Alternative, would accommodate more traffic, which would increase pollutants that could then be conveyed to the groundwater via new impervious surfaces. The amount of impervious surface increase estimated for each build alternative, including the Preferred Alternative, is shown in **Table 5-29**. Alternatives B and C would result in the least increase in impervious surface, ranging from 95.7 to 96.7 acres, while Alternatives D, E, F and G would result in more than one-and-a-half times the amount of Alternatives B and C, ranging from 160.8 and 185.5 acres of new impervious surface. The optional SUP would result in 11.6 to 12.1 acres of new impervious surface. As shown in **Table 5-29**, the Preferred Alternative will result in 98.4 acres of new impervious surface, which is slightly more than shown for Alternative C in the Draft EIS. As described in **Section 4.3**, this increase is due to the shift of Skidmore Drive to avoid impacts to Holly Beach Farm.

For more information regarding sources of groundwater contaminants, see the *Natural Environment Technical Report*. Additional information on impacts to general water quality that affects both groundwater and surface waters is discussed in **Section 5.5.4.3**.

5.5.2.3 Minimization and Mitigation

The MDTA will continue to evaluate measures to avoid and minimize impacts to groundwater resources by incorporating ESD SWM measures to manage surface runoff in a way that mimics natural infiltration and to meet (and exceed where feasible) water quality protection requirements. The MDTA will strictly adhere to MDE approved ESC plans and use its existing operational procedures to work with MDE to contain and remediate areas contaminated by emergency spills. The effects of road salt on groundwater may be mitigated by using alternative anti-icing techniques, such as pre-application of brine or other appropriate BMPs included in the Maryland Salt Management Plan. The MDTA will submit an application to MDE for a Water Appropriations and Use Permit for non-agricultural withdrawal of water for construction activities (making concrete, concrete curing, dust control, hydroseeding, and construction dewatering). The source of the water supply and how much water will be pumped will be determined during final design of the Selected Alternative. Additional information on minimization and mitigation measures for general water quality impacts to both groundwater and surface waters are discussed in **Section**

5.5.4.2, Water Quality. The MDTA will coordinate with USGS and the MDE Water Supply Program during final design and construction to determine potential impacts to active and inactive groundwater wells; determine if any groundwater wells require abandonment and if so, coordinate the abandonment procedures; and determine if mitigation, such as well relocation, is required for these impacts.

Figure 5-13: Aquifers



Figure 5-14: Groundwater Monitoring Wells



5.5.3 Floodplains

The following regulations and programs apply to floodplains within the resource review area:

- 23 CFR 650 Subpart A – Location and Hydraulic Design of Encroachments on Flood Plains
- COMAR 26.17.04, Construction in Nontidal Waters and Floodplains
- Maryland's Tidal Wetlands Act
- Chesapeake Bay Critical Area Law

The 100-year floodplain is also known as the base floodplain and is the area that has a 1% or greater chance of flooding in any given year. FEMA issues Flood Insurance Rate Maps (FIRM) to identify the regulatory 100-year floodplain and floodways for the National Flood Insurance Program (NFIP). All construction occurring within FEMA designated floodplains must comply with FEMA-approved local floodplain construction requirements. These requirements consider structural evaluations, fill levels, and grading elevations.

FHWA regulations prescribe policies and procedures to avoid and minimize potential floodplain encroachment from Federal Highway projects (23 CFR 650 Subpart A). A project-related floodplain impact is considered a significant encroachment under 23 CFR 650 Subpart A if the encroachment results in "a significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route; a significant risk, or a significant adverse impact on natural and beneficial floodplain values."

The Maryland Waterway Construction Regulations implemented by MDE state that projects cannot increase the risk of flooding to properties not owned by the project applicant (COMAR 26.17.04.11.B(6)). The regulation stipulates no specific amount of increase; however, through policy, MDE has applied a maximum of a 0.1-foot increase criteria when detailed hydraulic modeling has been performed.

Tidal floodplains are not regulated by MDE; however, tidal floodplain areas are managed through the Maryland Tidal Wetlands Act and CBCA regulations. For more information regarding floodplain regulations and the methodologies used in this analysis, see the *Natural Environment Technical Report*.

5.5.3.1 Affected Environment

There are no FEMA regulatory floodways within the resource review area. The FEMA FIRMs identify approximately 380 acres of mapped tidal and nontidal FEMA 100-year floodplain in the floodplain review area (**Figures 5-15** and **5-16**). There are nontidal floodplains associated with Mill Creek, Whitehall Creek, Meredith Creek, and tidal floodplain adjacent to the Chesapeake Bay and within Mezick Pond and Westinghouse Bay in Anne Arundel County. Large areas of floodplain are located in Queen Anne's County and include those associated with the shoreline of the Chesapeake Bay, Thompson Creek, Cox Creek, Macum Creek, Piney Creek, Kent Island Narrows, and Chester River tributaries such as Muddy Creek, Jackson Creek, Winchester Creek and Walsey Creek along the northern side of the floodplain review area, and the Wye River along the southern side at the far eastern study limit. The existing U.S. 50/301 roadway is generally elevated above the 100-year floodplain in all but a few small areas, the largest of which are Mill Creek on the Western Shore and Winchester Creek on the Eastern Shore, where both floodplains cross over the roadway. See the *Natural Environment Technical Report* for a more detailed discussion.

5.5.3.2 Environmental Consequences

The No-Build Alternative (Alternative A) would have no impacts to floodplains.

In accordance with 23 CFR 650 Subpart A, a location hydraulic study was performed to determine if the build alternatives would result in a floodplain encroachment and the risks associated with any encroachments.

FEMA 100-Year Floodplain Encroachments

Due to floodplain locations relative to existing U.S. 50/301, and the Tier 2 Study's purpose in evaluating a crossing of the Chesapeake Bay, a large tidal waterway, all build alternatives, including the Preferred Alternative, would result in unavoidable impacts to 100-year floodplains that constitute a floodplain encroachment. An encroachment is any temporary or permanent action within the 100-year floodplain. Potential encroachments on the FEMA 100-year boundaries identified for each waterway within the LOD of the build alternatives, including the Preferred Alternative, are included in **Table 5-23**. **Table 5-24** shows the additional potential 100-year floodplain encroachments associated with the SUP option for each build alternative, including the Preferred Alternative. More detailed floodplain mapping showing areas of encroachment by alternative is provided in **Appendices A-1 and A-2**. Permanent encroachments include fill for roadway widening and culvert extensions to carry flows beneath the widened roadway. Temporary encroachments include construction-related activities, such as vegetation clearing, ESC, and space for construction activities. Temporary and permanent encroachments will be broken out during final design.

Table 5-23: FEMA 100-Year Floodplain Encroachments (Acres)

Floodplain	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
Mill Creek	0	0.0	0.0	1.9	1.9	1.9	1.9	**0.0**
Whitehall Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Meredith Creek	0	0.4	0.4	0.4	0.4	0.5	0.5	**0.4**
Mezick Pond	0	2.0	0.7	2.0	0.7	2.0	0.7	**0.6**
Chesapeake Bay	0	29.1	33.4	29.1	33.4	29.1	33.4	**32.5**
Thompson Creek	0	0.3	0.3	0.3	0.3	0.3	0.3	**0.2**
Cox Creek	0	1.9	1.9	1.9	1.9	2.6	2.6	**1.8**
Macum Creek	0	0.0	0.0	0.3	0.3	0.3	0.3	**0.0**
Piney Creek	0	0.0	0.0	3.7	3.7	3.7	3.7	**0.0**
Kent Narrows & Chester River Tribs.	0	0.0	0.0	15.2	15.2	15.2	15.2	**0.0**
Winchester Creek	0	0.0	0.0	2.1	2.1	2.1	2.1	**0.0**
Walsey Creek	0	0.0	0.0	0.5	0.5	0.5	0.5	**0.0**
Total Floodplain*	**0**	**33.5**	**36.7**	**57.0**	**59.0**	**59.1**	**60.7**	**35.6**

Due to rounding, totals may not equal the sum of all individual floodplain encroachments.

Table 5-24: SUP FEMA 100-Year Floodplain Encroachments (Acres)

Floodplain	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
Mill Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Whitehall Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Meredith Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Mezick Pond	0	0.9	0.9	0.9	0.9	1.1	0.9	**0.9**
Chesapeake Bay	0	0.7	0.5	0.7	0.5	0.9	0.5	**0.4**
Thompson Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Cox Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Macum Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Piney Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Kent Narrows & Chester River Tribs.	0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Winchester Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Walsey Creek	0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Total Floodplain	**0**	**1.6**	**1.4**	**1.6**	**1.4**	**1.9**	**1.4**	**1.3**

** Due to rounding, totals may not equal the sum of all individual floodplain encroachments.*

All build alternatives, including the Preferred Alternative, would result in longitudinal encroachments at various locations where culverts are extended. Fill would be placed in the floodplain to support road widening for additional lanes, and where the proposed bridge structure meets the Chesapeake Bay shorelines. Alternatives B, C, and the Preferred Alternative, have the lowest potential for floodplain encroachments because these alternatives do not extend as far to the east and west as the other build alternatives. Alternatives B, C, and the Preferred Alternative, only cross the mapped 100-year floodplain at the eastern and western approaches to the Chesapeake Bay, as well as areas of mapped floodplain associated with Meredith Creek and Mezick Pond in Anne Arundel County and Thompson Creek and Cox Creek in Queen Anne's County. The most substantial floodplain encroachments for Alternatives B, C, and the Preferred Alternative, would be to the floodplain of the Chesapeake Bay itself, primarily on the Eastern Shore where additional fill would be required to build additional or widened causeways connecting the bridge structure to existing grades. The existing U.S. 50/301 roadway is above the 100-year flood elevation for all floodplains within the resource review area. The widened sections of roadway would be designed to meet or, in the case of the new bridge spans, exceed the height of the existing elevations of the roadway above the floodplain.

Alternatives D, E, F, and G have much greater potential for floodplain encroachments because they extend further to the east and west. They cross the same floodplains as Alternatives B, C, and the Preferred Alternative, but also cross additional mapped floodplain areas associated with Mill Creek in Anne Arundel County and Macum Creek, Piney Creek, Kent Narrows, Walsey Creek, and Winchester Creek, in Queen Anne's County. Existing U.S. 50/301 is above the 100-year flood elevation in all but two of the floodplains crossed by Alternatives D, E, F, and G. Mill Creek on the Western Shore and Winchester Creek on the Eastern Shore are shown by the FIRM as crossing above the roadway rather than entirely within the culvert beneath the road. Additional culvert capacity would be evaluated to reduce potential flood flows across the roadway in later phases of design. The U.S. 50/301 bridge over Kent Narrows is also shown as being within the

floodplain by the FIRM; however, the 100-year flood elevation of 5 feet is well below the bridge deck height of 65 feet. Alternatives D, E, F, and G would have similar encroachments on floodplains, but Alternative G would have the largest encroachment. Similar to Alternatives B, C, and the Preferred Alternative, the largest encroachments would be within the Chesapeake Bay floodplain for Alternatives D, E, F, and G due to the new or expanded causeways on the Eastern Shore. As shown in **Table 5-23**, refinements to the LOD for the Preferred Alternative slightly reduced floodplain impacts relative to Alternative C.

Practicability of Alternatives to Encroachments

Floodplain encroachments are unavoidable with the implementation of any of the build alternatives, including the Preferred Alternative. The alternatives, including the Preferred Alternative, would widen an existing roadway that already crosses the 100-year floodplain at the locations discussed above. Bridging these floodplains to avoid all floodplain impacts would not be practicable, as it would require rebuilding the entire existing roadway at each floodplain, and in some cases on the Eastern Shore, bridges would still require encroachments for bridge piers as the floodplains abut the existing roadway for thousands of feet in some locations. However, Alternatives B, C, and the Preferred Alternative, would result in fewer unavoidable floodplain encroachments. The MDTA will continue to minimize and mitigate encroachments in later phases of design as discussed in **Section 5.5.3.3**.

Floodplain Encroachment Risks

Risks associated with floodplain encroachments anticipated under any of the build alternatives, including the Preferred Alternative, would include:

- reduced floodplain capacity and retention time;
- increased flooding in surrounding areas;
- increased risk of loss of life and property;
- disruption of a critical transportation and emergency evacuation route; and
- loss of beneficial floodplain values.

Some beneficial floodplain values that could be lost include flood moderation, plant and animal habitat, water quality maintenance, groundwater recharge in nontidal floodplains, natural beauty, and recreation. Many of these impacts and risks already exist along the study corridor due to the location of the project and past floodplain encroachments from the existing U.S. 50/301 corridor. For instance, currently, if a major flood event were to close either of the existing approaches to the Bay Bridge, this would disrupt the only crossing of the Chesapeake Bay for many miles, cutting off a critical travel route and a major emergency evacuation route for much of the Eastern Shore. However, such a closure would not be substantially more likely due to any of the build alternatives, including the Preferred Alternative.

Additional floodplain encroachments from a build alternative, including the Preferred Alternative, have the potential to add to the existing risk within the U.S. 50/301 corridor. The potential for additional risks would be greatest under Alternatives D, E, F, and G due to the additional floodplains impacted. These alternatives also include encroachments on the only floodplains that cross over (rather than under) existing U.S. 50/301 within the study limits, further increasing the potential for hazardous conditions from roadway flooding. Alternatives B, C, and the Preferred Alternative, would result in the least additional risk.

Natural and Beneficial Floodplain Values

Natural and beneficial floodplain values would be impacted by all build alternatives, including the Preferred Alternative. Encroachments for road widening and culvert extensions necessary to implement the build alternatives would result in permanent loss of vegetation and floodplain capacity in floodplain areas. This loss of vegetated floodplain would reduce the floodplain's ability to naturally moderate flood flows, capture sediment and pollutants to maintain water quality, and provide wildlife habitat and natural areas that may provide natural beauty for human enjoyment. Encroachments to the nontidal floodplains on the Western Shore could also reduce floodplain areas providing groundwater recharge. Temporary encroachments from construction activities would include short-term loss of vegetation and habitat and potential for compaction of floodplain soils and loss of capacity from sedimentation. Alternatives D, E, F, and G would result in the greatest potential impact to beneficial floodplain values due to their higher acreage of floodplain impacts. Alternatives B, C, and the Preferred Alternative, would result in the least potential impact to beneficial floodplain values.

Support of Incompatible Floodplain Development and Significant Encroachments

None of the alternatives support probable incompatible floodplain development.

Hydraulic and Hydrologic Analysis

Analysis of potential project related changes to hydraulic function and elevation of floodplains will be determined using hydraulic and hydrologic (H&H) floodplain modeling as part of the engineering process for culverts, bridges, and other structures 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 or augmenting culvert and stormwater structures to ensure that no property damage or impacts to other natural resources outside of direct effects from fill result. Detailed analysis and design solutions will be required to accommodate increased flood volumes to eliminate impacts to adjacent properties. Roadway expansion and extended culverts may increase the size of existing floodplain encroachments but will not result in new significant encroachments into the floodplain as defined in 23 CFR 650.105(q).

5.5.3.3 Minimization and Mitigation of Floodplain Encroachments

Encroachments, including longitudinal encroachments, within floodplains from the build alternatives are unavoidable due to the location of existing U.S. 50/301 and the crossing of the Chesapeake Bay and its tributaries. The MDTA will incorporate minimization and mitigation strategies for potential floodplain encroachments associated with the Selected Alternative, once it is identified, in accordance with 23 CFR 650 Subpart A, thus reducing impacts to beneficial floodplain values and overall risks.

FEMA 100-year floodplain encroachments associated with the build alternatives, including the Preferred Alternative, were avoided and minimized to the greatest extent practicable. Preliminary designs have avoided or reduced encroachments on large, vegetated floodplains to maintain hydrologic function and wildlife habitat, where practicable, using steeper slopes, retaining walls, and other measures to reduce the LOD of the build alternatives. Most of the acreage of potential encroachment is along the edge of floodplains rather than across the main channel flow of the associated waterway, and in many cases the encroachments will be primarily temporary from construction rather than permanent fill. Further impact minimization will be achieved by

incorporating BMPs as identified in COMAR 26.17.01 for ESC and COMAR 26.17.02 for SWM to minimize the risks or impacts to beneficial floodplain values due to encroachments.

A detailed H&H study will be prepared during final design to identify the existing storm discharge and floodplain extent. All construction occurring within the FEMA designated floodplains must comply with FEMA-approved local floodplain construction requirements. These requirements consider structural evaluations, fill levels, and grading elevations. All hydraulic structures will be designed to accommodate flood flows without causing substantial impact. Culverts and bridges will be designed to limit the increase of the regulatory flood elevation to protect structures from flooding risks. The use of standard hydraulic design techniques for all waterway openings will be utilized, where feasible, to maintain current flow regimes and limit adjacent flood risk (COMAR 26.17.04). Where opportunity for standard design is limited by the characteristics of an existing culvert, capacity will be augmented with secondary culverts in accordance with MDE requirements.

If H&H studies find that an encroachment would change the flood elevation, mitigation or other actions would be required in accordance with floodplain regulations, including submittal of a Conditional Letter of Map Revision (CLOMR) and subsequent Letter of Map Revision (LOMR) if elevations are determined to increase by greater than 0.1 foot. The MDTA 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, and 23 CFR 650 Subpart A. Improvements to existing culverts are required to maintain existing 100-year flood high water elevations. Culvert improvements and new culvert design would ensure that flood risk to adjacent properties is not increased, a requirement of COMAR 26.17.04.11. 23 CFR 650.115(a) will be applied for the design selected with any encroachments.

H&H studies will be conducted at nontidal floodplain and waterway crossings, and drainage structures would be designed to maintain current flow regimes per COMAR 26.17.04. Hydraulic modeling based on final design of a new bridge will be conducted to evaluate current and future flow patterns, scour potential, tidal movements, and water level fluctuations at the proposed Bay Bridge under the Selected Alternative. Analysis of current and future tidal floodplain elevations where widening is proposed along existing U.S. 50/301 will also be analyzed during final design to ensure a Selected Alternative is resilient to tidal fluctuations.

Measures to Restore and Preserve Floodplain Values

Minimizing areas of bare soil, revegetating and seeding areas of temporary disturbance, and avoiding compaction of soils during construction would help to minimize the loss of floodplain function and value. Temporary impacts to wetlands within floodplains will be restored in accordance with MDE tidal and nontidal wetland regulations, which require restoration of wetland and floodplain elevations and vegetation. The MDTA will work to avoid placement of temporary staging and stockpile areas within floodplains, as practicable. The MDTA will continue avoidance and minimization efforts in final design and coordinate with MDE to determine the encroachments on regulated floodplains and potential mitigation measures. See the *Natural Environment Technical Repo*rt for further discussion of floodplain impact minimization and mitigation.

Figure 5-15: FEMA Floodplain – Anne Arundel County

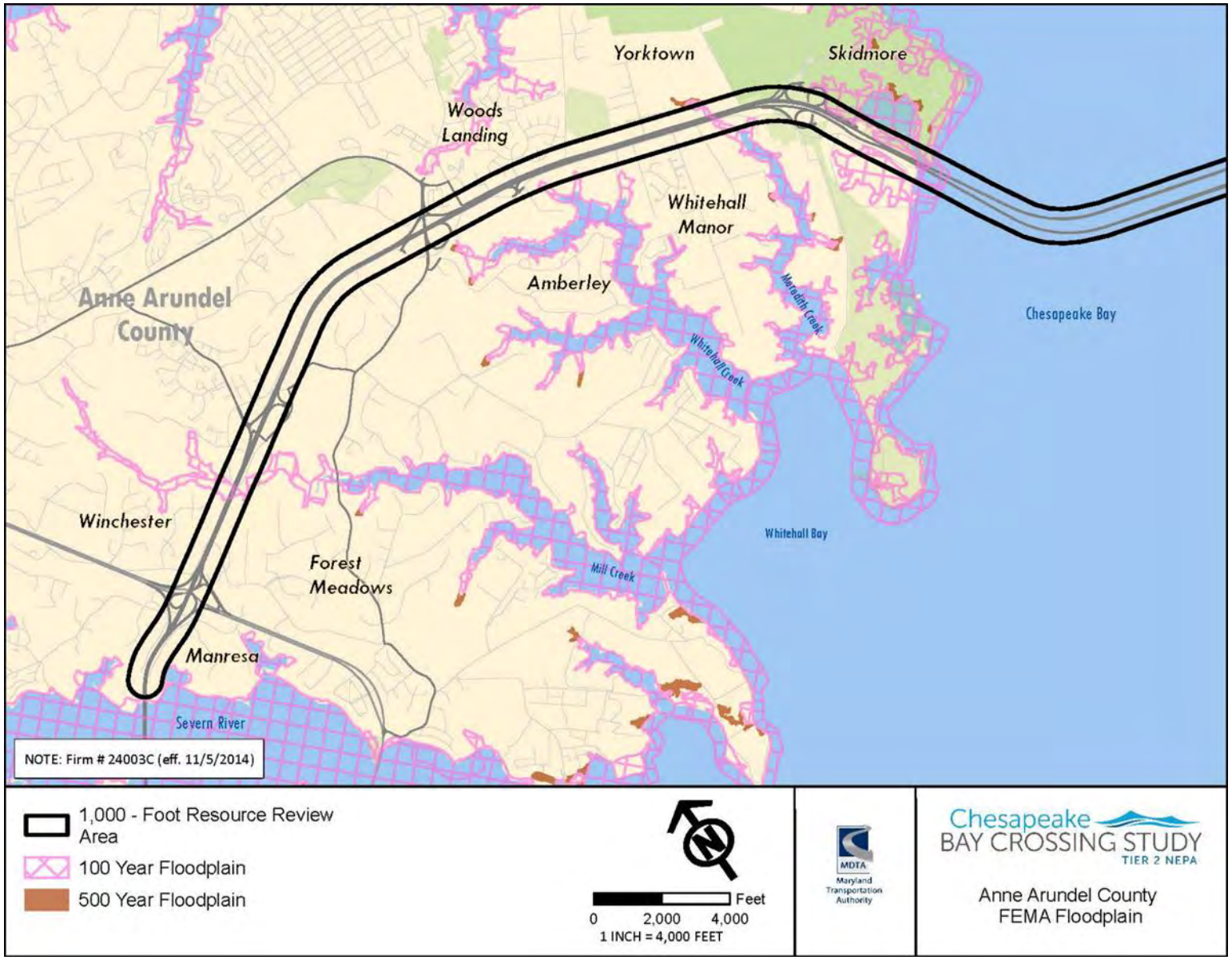
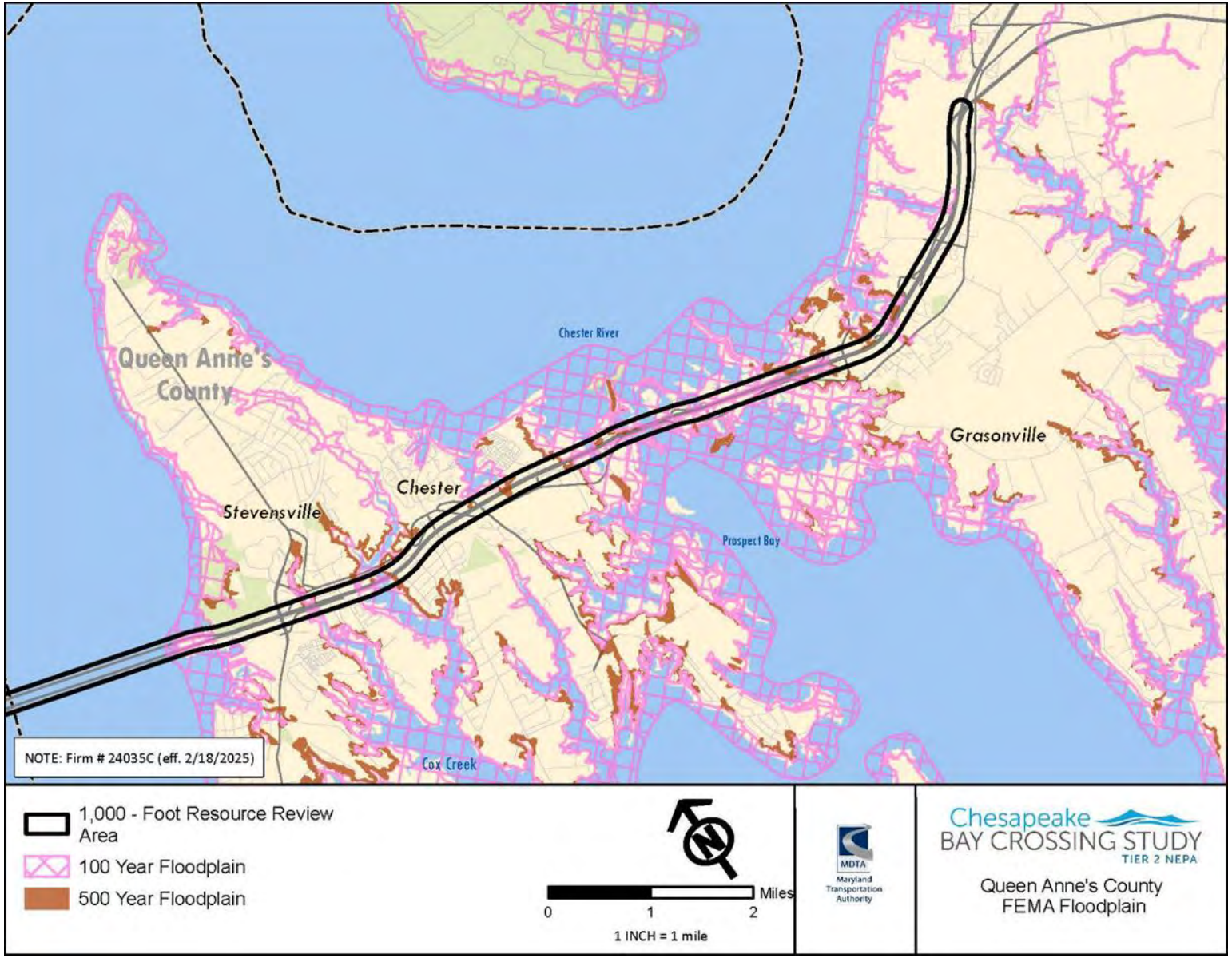


Figure 5-16: FEMA Floodplain – Queen Anne's County



5.5.4 Surface Water Resources

5.5.4.1 Watersheds

The following regulations and programs apply to watersheds within the resource review area:

- EO 13508, Chesapeake Bay Protection and Restoration of 2009;
- CWA Sections 303(d), 305(b), and 314;
- SDWA of 1974 (Public Law 93-523, 42 USC 300 et. seq) - amended and reauthorized in 1986 and 1996; and
- NPDES Municipal Separate Storm Sewer System Phase I permit - originally issued in 2015 and modified in 2019.

Total acreage of impact to MD 12-digit watersheds was determined in GIS by overlaying the build alternative LODs with the 12-digit watershed boundaries. MDE's Searchable Integrated Report Database (Combined 303[d]/305[b] List) was used to compile information on 303(d) listings for impaired waterbodies and watersheds. Information on completed Total Maximum Daily Loads (TMDLs) (Category 4a), Category 5 impairment listings, and salt chloride impairments (Category 5s) were compiled for each watershed crossed by the resource review area. For more information regarding watershed regulations and the methodologies used in this analysis, see the *Natural Environment Technical Report*.

Affected Environment

The resource review area spans three major state-designated 6-digit watersheds: West Chesapeake Bay, Chesapeake Bay Proper, and the Chester River. Each of these major watersheds is comprised of smaller 8-digit watersheds, which are shown in **Figure 5-17**. Each of the MD 8-digit watersheds crossed by the resource review area (see **Table 5-25**) has been placed on the 303(d) impaired waters list. TMDLs have been completed for many of the pollutants, though some listings are Category 5 and will require a TMDL in the future. Pollutants such as fecal coliform, polychlorinated biphenyls (PCBs) in fish tissue, elevated levels of phosphorus and nitrogen, total suspended solids (TSS), and unknown pollutants (based on benthic Indices of Biotic Integrity or IBIs) have been observed. **Table 5-25** includes 303(d) listings for completed TMDLs (Category 4a) and Category 5 impairment listings. **Table 5-26** presents a summary of watershed characteristics, including designated stream use classes. Note that Use Class II waters are generally tidal and become Use Class I when they transition to a non-tidal classification.

Table 5-25: 303(d) Impairment Listings for Completed TMDLs and Category 5

MDE Watershed		Completed TMDL (Category 4a)	TMDL Potentially Needed (Category 5)
6-digit Name (Number)	8-digit Name (Number)		
West Chesapeake Bay (021310)	Severn River (02131002)	PCBs (tidal segments); TSS (tidal segments); nitrogen (tidal segments); phosphorus (tidal segments); fecal coliform (tidal segments)	Unknown pollutants based on benthic IBIs (tidal segments); unknown pollutants based on fish and benthic IBIs (1st to 4th order streams)
	Magothy River (02131001)	PCBs in fish tissue (tidal segments); TSS (tidal segments); nitrogen (tidal segments); phosphorus (tidal segments); fecal coliform (tidal segments)	Unknown pollutants based on fish and benthic IBIs (tidal segments); chloride (1st through 4th order streams)

MDE Watershed		Completed TMDL (Category 4a)	TMDL Potentially Needed (Category 5)
6-digit Name (Number)	8-digit Name (Number)		
Chesapeake Bay Proper (021399)	Lower Chesapeake Bay (02139998)	TSS (tidal segments); nitrogen (tidal segments); phosphorus (tidal segments)	Unknown pollutants based on benthic IBIs (tidal segments)
Chester River (021305)	Kent Island Bay (02130511)	TSS (tidal segments); nitrogen (tidal segments); phosphorus (tidal segments)	Unknown pollutants based on benthic IBIs (tidal segments); fecal coliform (tidal segments)
	Eastern Bay (02130501)	TSS (tidal segments); nitrogen (tidal segments); phosphorus (tidal segments)	Unknown pollutants based on benthic IBIs (tidal segments); fecal coliform (tidal segments)
	Kent Narrows (02130504)	TSS (tidal segments); nitrogen (tidal segments); phosphorus (tidal segments); fecal coliform (tidal segments)	Unknown pollutants based on benthic IBIs (tidal segments)
	Wye River (02130503)	TSS (tidal segments); nitrogen (tidal segments); phosphorus (tidal segments); fecal coliform (tidal segments)	Unknown pollutants based on benthic IBIs (tidal segments)
	Lower Chester River (02130505)	TSS (tidal segments); nitrogen (tidal segments); phosphorus (tidal segments); fecal coliform (tidal segments)	Unknown pollutants based on benthic IBIs (tidal segments); PCB (tidal segments)

Table 5-26: Overall Watershed Characteristics Summary

MD Watershed			Watershed Drainage Area (acres)	Impervious Surface Percent[1]	Designated Streams Use Class
6-digit Name (Number)	8-digit Name (Number)	12-digit Name (Number)			
West Chesapeake Bay (021310)	Severn River (02131002)	Lower Severn River (021310020997)	21,242	30%	I; II
	Magothy River (02131001)	Magothy River South Shore (021310011003)	10,484	31%	I; II
Chesapeake Bay Proper (021399)	Lower Chesapeake Bay (02139998)	Northwest Lower Chesapeake Bay (021399981091)	4,301	--	II
		Annapolis Shore (021399981093)	11,610	--	II
		Kent Island True Bay (021399981092)	23,367	--	II
Chester River (021305)	Kent Island Bay (02130511)	Kent Island Shore (021305110428)	5,754	13%	I; II
	Eastern Bay (02130501)	Northern Eastern Bay (021305010429)	35,258	11%	I; II
	Kent Narrows (02130504)	Grasonville South (021305040431)	12,647	7%	I; II
	Wye River (02130503)	Upper Wye River (021305030433)	9,716	5%	I; II
	Lower Chester River (02130505)	Chester River South (021305050390)	29,607	8%	I; II

1 *Impervious surface was not determined for 12-digit watersheds that are comprised entirely of tidal open water. Impervious surface acreages are for the entire watershed, which may include areas upstream and downstream of the review area Use Class I: Water Contact Recreation, and Protection of Nontidal Warmwater Aquatic Life; Use Class II: Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting. Sources: MDNR, 2026; MDE, 2008; MDE, 2019a*

Environmental Consequences

The No-Build Alternative would have no impact on watersheds. Each of the build alternatives, including the Preferred Alternative, crosses several watersheds. Alternatives B, C, and the Preferred Alternative, would result in no impacts to the Magothy River South Shore, Grasonville South, Upper Wye River, and Chester River South watersheds. **Figure 5-17** shows the watershed boundaries. **Table 5-27** identifies the total acreage of impact to each MD 12-digit watershed associated with the alternatives, including the Preferred Alternative. **Table 5-28** represents potential impacts associated with the SUP option for each alternative, including the Preferred Alternative.

Table 5-27: Impacts to MD 12-Digit Watersheds (Acres)

12-Digit Watershed	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
Lower Severn River	0	126.5	123.7	311.0	308.2	313.6	310.1	120.6
Magothy River South Shore	0	0	0	5.9	5.9	5.9	5.9	0
Watersheds within Chesapeake Bay*	0	124.5	123.9	124.5	123.9	127.2	126.7	123.9
Kent Island Shore	0	48.5	52.2	48.5	52.2	57.6	61.2	52.2
Northern Eastern Bay	0	52.3	52.3	81.8	81.8	88.5	88.5	52.1
Grasonville South	0	0	0	31.5	31.5	31.5	31.5	0
Upper Wye River	0	0	0	32.1	32.1	32.1	32.1	0
Chester River South	0	0	0	223.7	223.7	223.7	223.7	0
Totals**	0	351.6	351.9	858.5	858.8	879.6	879.2	348.8

** Annapolis Shore and Kent Island True Bay watersheds*

*** Due to rounding, totals may not equal the sum of all individual watershed impacts.*

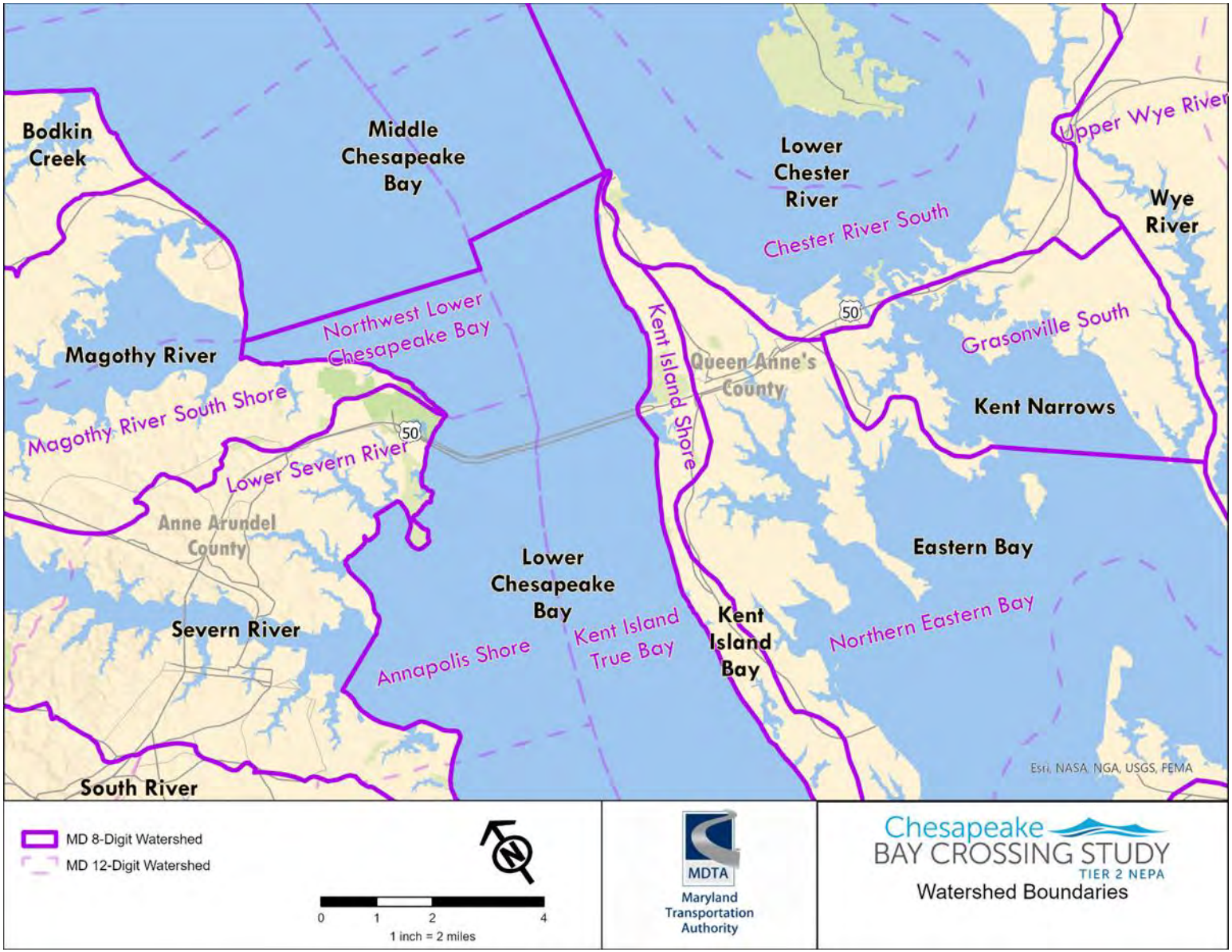
Table 5-28: SUP Impacts to MD 12-Digit Watersheds (Acres)

12-Digit Watershed	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
Lower Severn River	0	2.0	2.0	2.0	2.0	2.0	2.1	2.0
Magothy River South Shore	0	0	0	0	0	0	0	0
Watersheds within Chesapeake Bay*	0	3.7	3.7	3.7	3.7	3.7	4.0	2.0
Kent Island Shore	0	2.5	1.5	2.5	1.5	2.2	1.1	1.5
Northern Eastern Bay	0	0	0	0	0	0	0	0
Grasonville South	0	0	0	0	0	0	0	0
Upper Wye River	0	0	0	0	0	0	0	0
Chester River South	0	0	0	0	0	0	0	0
Totals**	0	8.0	7.1	8.0	7.1	7.7	7.1	5.5

** Annapolis Shore and Kent Island True Bay watersheds*

*** Due to rounding, totals do not equal the sum of all individual watershed impacts.*

Figure 5-17: Watershed Boundaries



All build alternatives, including the Preferred Alternative, have the potential to affect watersheds due to the increase in impervious surfaces, whether on land or from bridges spanning over water. Increased impervious surface would impact drainage and flow and additional contaminants could potentially be introduced to surface waters and groundwater from the additional traffic supported by the wider roadway. The addition of contaminants to surface waters would potentially increase water impairment and affect the TMDLs of these waterways. The MDTA will ensure that all SWM and ESC requirements are met or exceeded to limit the potential for additional contaminants to be introduced to waterways.

The greatest impacts within a watershed would occur from Alternatives F and G, due to their greater overall LODs, extending both east and west several miles beyond the LODs for Alternatives B, C, and the Preferred Alternative, and having the largest proposed bridges over the Chesapeake Bay. **Table 5-29** shows the increase in impervious surfaces for each of the build alternatives, including the Preferred Alternative, and **Table 5-30** shows increased impervious surfaces for the SUP option associated with each build alternative, including the Preferred Alternative. Alternatives F and G would require the highest increase in impervious surfaces due to their greater length and width. The watershed with the greatest overall impact is the Lower Severn River. Alternatives D, E, F, and G have a greater potential for increased stormwater runoff that could make its way to downstream waters. As described in **Section 4.3**, new impervious surface increased slightly for the Preferred Alternative due to the shift in Skidmore Drive to avoid impacts to Holly Beach Farm. As shown in **Table 5-27**, the Magothy River South Shore 12-digit watershed would be impacted the least by all build alternatives, including the Preferred Alternative, which avoids impacts within this watershed.

Table 5-29: Increase in Impervious Surfaces (Acres)

No-Build	Build Alternatives						
	B	C	D	E	F	G	Preferred Alternative
0	96.7	95.7	161.8	160.8	185.5	184.3	98.4

Table 5-30: SUP Increase in Impervious Surfaces (Acres)

No-Build	Build Alternative						
	B	C	D	E	F	G	Preferred Alternative
0	11.6	12.1	11.6	12.1	11.6	11.6	12.3

Minimization and Mitigation

The MDTA will continue to avoid and minimize impacts to watersheds through design and construction of the Selected Alternative, providing SWM systems to help control runoff and reduce peak flows in accordance with COMAR 26.17.02. The design will also aim to maintain existing flow patterns and mitigate any increase in impervious areas. Strict ESC measures will be required during construction to minimize erosion and prevent sedimentation downstream. Approved ESC plans will be implemented in accordance with COMAR 26.17.01.

5.5.4.2 Water Quality

The following laws, Executive Orders, and regulations apply to water quality within the resource review area:

Federal:

- Statute
  - CWA Section 401 and Section 402 (33 USC 1341 and 1342)
- Executive Orders
  - EO 13508 Chesapeake Bay Protection and Restoration
- Regulation
  - 40 CFR 131.12 Antidegradation Policy and Implementation Methods

State:

- Statute
  - Stormwater Management Act of 2007
  - Nontidal Wetlands Protection Act
  - Tidal Wetlands Act of 1970
- Regulation
  - COMAR 26.08.02 Water Quality
  - Maryland Erosion and Sediment Control Law

Water quality monitoring sites reviewed for this Tier 2 Study are included in **Figure 5-18**. Nontidal and tidal waterways have different state and Federally regulated water quality criteria. They also have guidelines that are not regulated criteria but intended to identify stress levels for aquatic biota. For more information regarding water quality regulations, criteria, and methodology, see the *Natural Environment Technical Report*.

Affected Environment

Existing nontidal and tidal water quality data collected within and surrounding the resource review area indicates samples from many water sampling locations are well within compliance of current state and Federal criteria and acceptable ranges of predicted stressors to aquatic biota. However, there are also areas identified within the resource review area that exceed regulated criteria. According to MDE, there are no Tier II High Quality waters located within the resource review area, therefore, additional antidegradation protections per COMAR 26.08.02.04-1 would not apply.

Nontidal tributaries in Anne Arundel County fall outside acceptable ranges for total phosphorus, ammonia nitrogen, and nitrite. These monitoring results exist both upstream and downstream of the LODs of the build alternatives. Nontidal sampling locations on Mill Creek met criteria for dissolved oxygen (DO), temperature, and turbidity; however, one of the sites fell below criteria for pH. Nontidal sampling data from Cat Branch met COMAR criteria for DO, temperature, and turbidity, but two of the seven sites did not meet pH standards. High pH can be caused by industrial discharges, alkaline geology and soils, asphalt disposal, input of agricultural lime, as well as other industrial and agricultural inputs. High pH levels can result in decreased fish reproduction, growth, biodiversity, and organ damage and long-term exposures of fish to high pH levels can result in death (EPA CADDIS, 2025). High pH levels could also affect the distribution of SAV within the resource review area.

In Queen Anne's County, the most recent nontidal water quality data indicates that 23 to 46 percent of samples from three National Water Quality Monitoring Council sites have bacteria levels that exceed COMAR criteria. High bacteria levels can indirectly impact fish by depleting oxygen levels.

In the tidal portions of the resource review area, pH levels extend above regulated water quality criteria in some areas. *Enterococcus* and fecal coliform bacteria levels sampled within the tidal portions of the resource review area also reach levels above regulated water quality criteria. Existing DO levels within the tidal portions of the review area are below the regulated water quality criteria in some areas. Low DO can result from industrial point sources of nutrients and agricultural and urban nutrient runoff throughout the entire watershed. DO conditions in the Chesapeake Bay also vary seasonally due to natural processes such as stratification. High turbidity can also contribute to low DO, since it limits photosynthesis and plant production of oxygen. High turbidity environments with low DO are unlikely to be able to support SAV. Low DO can have effects on aquatic community structure by altering the food web in favor of species and life stages that are more tolerant to low oxygen conditions. Low DO can also have acute effects on aquatic life resulting in biological impairments and even death. For more information regarding water quality within the resource review area, see the *Natural Environment Technical Report*.

Environmental Consequences

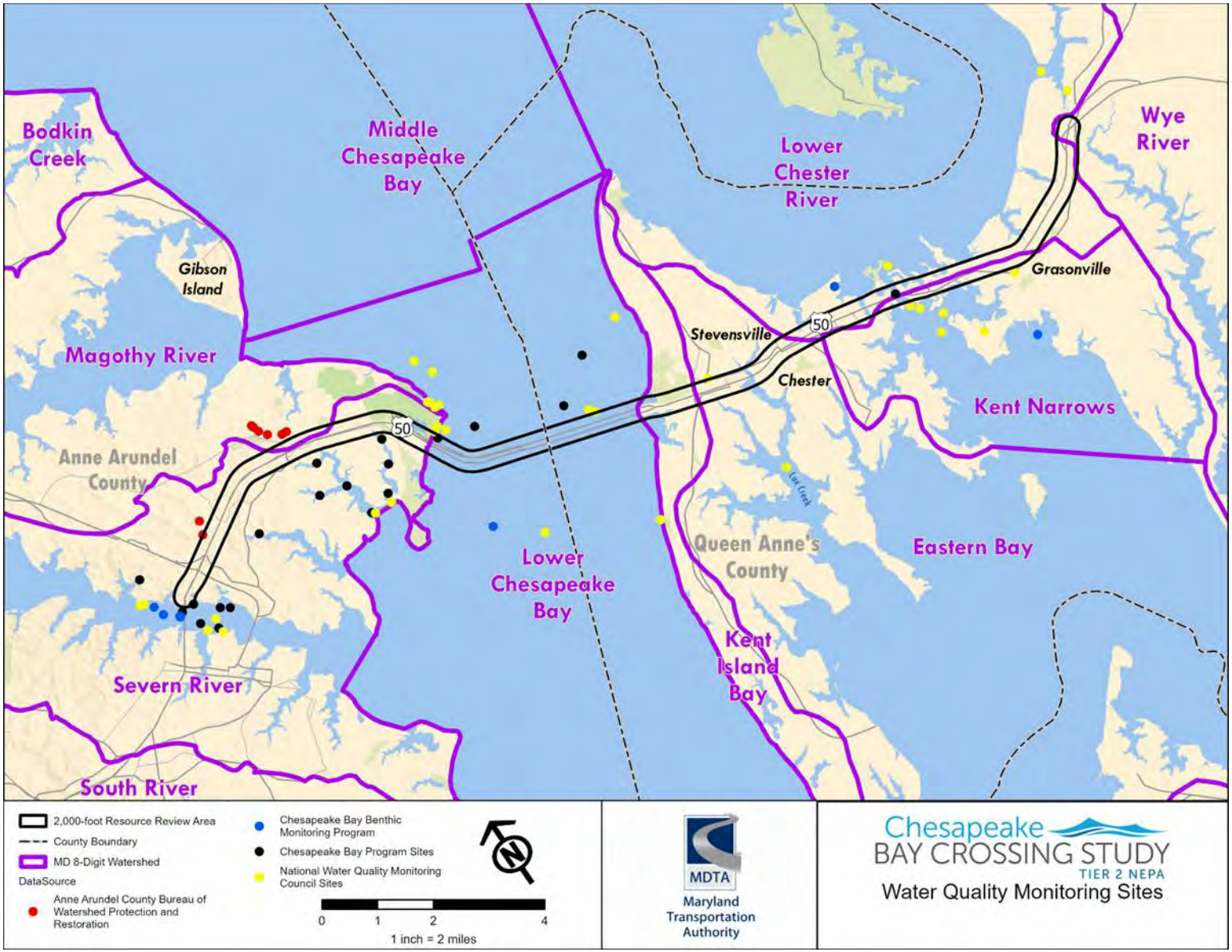
Alternative A, the No-Build Alternative, would not result in an increase in impervious surfaces and would have no impacts to water quality from increased runoff.

The amount of new impervious surface estimated for each build alternative and the Preferred Alternative is shown in **Tables 5-29** and **5-30**. Alternatives F and G include the largest proposed bridge size and greatest new impervious surface coverage. Therefore, these alternatives have the greatest potential for impacts to water quality through short-term effects associated with construction and through long-term effects associated with the increase of impervious area and associated roadway runoff.

All build alternatives, including the Preferred Alternative, have the potential to affect downstream water quality conditions and exacerbate exceedances of regulated criteria due to increases in impervious surface. Alternatives B, C, and the Preferred Alternative have the least potential for impacts to water quality within the Chesapeake Bay and its tributaries, with only the Bay and three tributaries as well as Mezick Pond and its connection to the Chesapeake Bay affected by these alternatives. Alternatives D, E, F, and G would have greater water quality impacts than Alternatives B, C, and the Preferred Alternative, affecting at least eight additional waterways. As described in **Section 4.3**, new impervious surface increased slightly for the Preferred Alternative due to the shift in Skidmore Drive to avoid impacts to Holly Beach Farm.

Short-term construction effects have the potential to increase turbidity due to erosion and sediment disturbance, which can decrease the ability of SAV to grow, and decrease DO levels in the water column, affecting other aquatic biota. Grading operations associated with any build alternative, including the Preferred Alternative, could expose large areas of soil that are highly susceptible to erosion through rain or wind. These construction activities can lead to sediment entering stream channels, destabilizing the channel, and damaging aquatic habitat. Sedimentation in channels can also reduce channel capacity, which could lead to flooding.

Figure 5-18: Water Quality Monitoring Sites



Long-term effects from stormwater runoff have the potential to increase the level of contaminants entering surface waters. Roadway runoff contains many natural and anthropogenic constituents. Sources of roadway runoff constituents include local and regional atmospheric deposition, wind-blown soils and vegetation, vehicular sources (including tire wear, lubricants, brake linings, exhaust gases, antifreeze, and windshield fluids), right-of-way sources (including road-surface wear, corrosion of metal structures, right-of-way soils and plantings, and breakdown of roadway elements and drainage systems), litter and debris from passengers and cargo, winter maintenance materials, and runoff from adjacent land covers. Many of these sources generate particulates, which can be measured as total suspended solids or suspended sediment concentrations. Many roadway runoff constituents are part of these particulates or are carried by these particulates. These constituents include nutrients, metals, and organic compounds, which may be particulate bound or in what is commonly described as the dissolved phase. Runoff from all land covers also commonly carries bacteria from natural and human sources. Winter maintenance materials include application of particulates for traction and deicing chemicals for melting ice and snow. Deicing chemicals commonly are comprised of calcium-, potassium-, and sodium-chloride salts. Winter maintenance materials can be applied in large quantities resulting in very high concentrations and loads. These contaminants can make their way through stormwater runoff into roadside culverts or through bridge deck drainage systems, and into adjacent waterways. Bridge and culvert expansion over waterways may also result in changes in water temperatures, which could affect aquatic habitat, wetlands, and vegetation acting as filters to protect water quality. Increased salinity and temperature can lower the ability of oxygen to dissolve in water, with the potential to affect aquatic biota.

Minimization and Mitigation

A Section 401 Water Quality Certification (WQC) will be required from MDE for the Selected Alternative. The MDTA will work with MDE to obtain approval that anticipated discharges from the project will comply with Federally mandated water quality standards; any limitation, standard, or other requirement under the CWA; Federal, state, or Tribal laws or regulations implementing the CWA; and state or Tribal water quality-related requirements. In support of the WQC requirements, avoidance and minimization measures will be further evaluated during future design phases. SWM will be developed in compliance with all applicable MDE regulations and guidance and designed in accordance with MDE's 2000 Maryland Stormwater Design Manual (Rev. May 2009) and the SWM Act of 2007. The 2007 SWM Act requires establishing a comprehensive approach to SWM through the implementation of ESD to the maximum extent practicable and only using structural practices where necessary. The MDTA will implement strict ESC measures and SWM techniques to reduce waterway and water quality impacts. These techniques will reduce impacts related to sediment and contaminants, which could otherwise result in increased turbidity, decreased DO, and varying water quality impacts to surface waters. The MDTA will also develop a Stormwater Pollution Prevention Plan to ensure that rainwater and stormwater runoff does not intercept potentially harmful chemicals, hazardous materials, sanitary and other wastes, wash waters, and any other potential pollutants that may be found at a construction site. SWM systems will be designed to help control runoff, reduce peak flows, and filter sediment and pollutants from the runoff before entering a downstream system. These stormwater systems will aim to eliminate any impacts to or improve the performance of meeting TMDL goals.

5.5.4.3 Wild and Scenic Rivers

The Federal Wild and Scenic Rivers system was created to protect "rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values", and is administered by the Bureau of Land Management, National Park Service (NPS), U.S. Forest Service, and U.S. Fish and Wildlife Service (USFWS) (USDOI, 2023). The Maryland Scenic and Wild Rivers (MSWR) Act of 1968 established the MSWR 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 (MDNR, 2023a). MDNR administers the MSWR program and coordinates with each designated river's advisory board, which is charged with making recommendations on issues potentially impacting the river's scenic and wild quality.

Affected Environment

There are no Federally designated Wild or Scenic Rivers in Maryland. The Severn River, a tidal tributary of the Chesapeake Bay located on the western end of the resource review area and extending from Annapolis northwestward about 10 miles, is a state-designated Scenic and Wild River (Severn River Association, 2024). The Severn River Commission is the advisory Board for the Severn River.

Environmental Consequences

Alternative A, the No-Build Alternative, would have no impacts to the Severn River or its viewshed, defined as the geographic area visible from the Severn River.

No impacts to the Severn River, or viewshed changes surrounding the vast majority of the river, are anticipated from any of the build alternatives, including the Preferred Alternative, because the LODs end at the MD 2/MD 450 interchange, just east of the Severn River Bridge. However, the existing Chesapeake Bay Bridge is visible from the mouth of Severn River where it meets the Bay, and any new bridge will also be visible from this location.

A new bridge will be generally consistent with the existing views but could vary somewhat visually from the existing bridge due to the larger structure required to accommodate increased vertical clearance and additional travel lanes. Temporary visual impacts during construction include visible construction equipment and activity over a number of years. None of these potential impacts are expected to substantially impact the overall scenic nature of the river. The MDTA will continue to coordinate with MDNR and the Severn River Commission in accordance with MSWR Act throughout the design process to ensure any impacts to vistas from the mouth of the Severn River are minimized to the extent practicable.

Minimization and Mitigation

Substantial impacts to Wild and Scenic Rivers are not anticipated with any of the build alternatives. Potential minimization of visual impacts from the mouth of the Severn River will be coordinated with MDNR and the Severn River Commission. Refer to **Section 5.3** for discussion of the visual impacts from the build alternatives and potential mitigation measures.

5.5.5 Waters of the U.S., Including Wetlands

5.5.5.1 Regulated Wetlands and Waterways

Federal jurisdiction of waterways and wetlands, or WOTUS, that are regulated by the U.S. Army Corps of Engineers (USACE) and USEPA is granted by Section 404 of the CWA, and Section 10

of the Rivers and Harbors Act. USACE and USEPA regulate the discharge of dredged or fill material into WOTUS. Under Section 404(b)(1) Guidelines of the CWA, non-fill related impacts to WOTUS that result in permanent loss of wetland functions or services are also considered by USACE, including wetland conversion from one type to another and hydrologic loss due to nearby direct impacts.

State jurisdiction of waterways and wetlands that are regulated by MDE is granted by the Nontidal Wetlands Protection Act (Md. Code Ann. Environment § 5-9) and the Tidal Wetlands Act (Md. Code Ann. Natural Resources § 16-101). Maryland regulates waterways, or Waters of the State, and wetlands, which are collectively also Federally regulated as WOTUS. However, Maryland regulates the following resources that the USACE does not:

- non-adjacent wetlands;
- 25-foot nontidal wetland buffers and expanded wetland buffers; and
- Wetlands of Special State Concern (WSSC), state-designated high-quality wetlands.

Additional wetlands and waterways regulations include:

- Final rule on the "Revised Definition of 'Waters of the United States'"; Conforming (88 Federal Register 61964, published September 08, 2023)
- EO 11990, Protection of Wetlands (42 Federal Register 26961, May 24, 1977)
- United States Department of Transportation (USDOT) Order 5660.1A, Preservation of the Nation's Wetlands
- COMAR Title 26; Subtitle 23 Nontidal Wetlands, Subtitle 24 Tidal Wetlands, Subtitle 17 Section 04 Construction on Nontidal Waters and Floodplains; and Subtitle 23, Section 6, Wetlands of Special State Concern
- MDE Nontidal Wetlands Protection Act and Program and the Tidal Wetlands Act and Program
- Anne Arundel County Office of Planning and Zoning Protections and Minimum Mitigation Conditions for Nontidal Wetlands (OPZ-20-06)

Field delineations were conducted in accordance with the USACE Wetlands Delineation Manual (USACE, 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual, *Atlantic and Gulf Coastal Plain Region*, *Version 2.0* (USACE, 2010). These methods rely on the three-parameter approach to delineating wetlands, which can be used year-round to identify permanent indicators of seasonally wet conditions in the landscape based on vegetation, soils, and hydrology. Resource boundaries were located in the field using Trimble™ and Catalyst sub-meter accuracy global positioning system (GPS) equipment, or equivalent. The boundary between tidal and nontidal wetlands was determined based on topography, vegetation changes, wrack lines, and other field indicators of tidal influence. Tidal wetland boundaries, including determination of State versus private wetlands will be refined for permitting in later phases of design. Not all properties within the field study limits could be physically accessed; therefore, approximate resource locations are shown in the resource mapping for those locations in the *Wetland Delineation Report (MDTA 2024a)*. For details regarding the wetland and waterway field methodology, see the *Natural Environment Technical Report*.

Affected Environment

In Anne Arundel County, wetlands are largely associated with four main waterways: Severn River, Mill Creek, Whitehall Creek, and Meredith Creek. Each of these waterways drains south to the

Chesapeake Bay, south of or immediately adjacent to the Chesapeake Bay Bridge. Wetlands and ponds within the field delineated study limits, located along the eastern shoreline of the Severn River, have a tidal influence. Wetlands associated with Mill Creek and Whitehall Creek are identified as nontidal waterways with adjacent palustrine (freshwater) nontidal systems. Nearly all mapped systems associated with Meredith Creek within the field delineation study area are within tidal limits, classified as estuarine and marine subtidal waterways and both subtidal and intertidal wetlands. Estuarine ponds are located on either side of U.S. 50/301 just prior to the Chesapeake Bay Bridge.

Mapped wetlands in Queen Anne's County are associated with the following mostly tidal classified estuarine and marine systems: Thompson Creek, Cox Creek, Macum Creek, Piney Creek, Kent Island Narrows, Prospect Bay (including Marshy Creek), Chester River (including Muddy Creek, Jackson Creek, Winchester Creek, and Walsey Creek), and the Wye River. The 1972 Tidal Wetland Boundary largely abuts U.S. 50/301 either to the north or south, or on both sides of the roadway in most waterway locations. Palustrine nontidal wetlands are located beyond tidal boundaries.

There are no WSSCs in the resource review area. A summary of systems delineated within the field delineation study limits is presented in **Table 5-31**.

Table 5-31: Wetlands and Waterways within Limits of Field Delineation

Resource	Classification	Number of Systems
Wetland*	Palustrine Emergent (PEM) Palustrine Scrub/Shrub (PSS) Palustrine Forested (PFO) Palustrine Unconsolidated Bottom (PUB) Estuarine Emergent (E2EM) Estuarine Scrub/Shrub or Forested (E2SS or E2FO)	36 6 58 9 31 4
Total # of Wetland Systems		**144**
Waterway	Nontidal Perennial R2) Nontidal Intermittent** (R4) Tidal (E1)	16 23 19
Total # of Waterways		**58**

**Details regarding non-adjacent wetlands vs. connected nontidal wetlands will be determined during final design.*
***Intermittent streams identified meet the definition of relatively permanent WOTUS (88 Federal Register 61964).*

Specific locations of waters and wetlands are shown on alternatives mapping in **Appendices A-1 and A-2**. Detailed descriptions of wetland and waterway resources and their locations within the field delineation study limits and delineation methods are included in the *Wetland Delineation Report* (*Natural Environment Technical Report Appendix D*).

Environmental Consequences

Impacts to wetlands and waterways may be temporary and largely associated with construction, or permanent from roadway grading, pavement or structures. Alternative A, the No-Build Alternative, would have no impacts to waterways or wetlands.

Table 5-32 identifies the total impacts to tidal and nontidal waterways associated with each build alternative, including the Preferred Alternative. **Table 5-33** provides a summary of potential impacts to waterways due to the SUP option associated with each build alternative, including the Preferred Alternative. Impacts in **Table 5-32** and **Table 5-33** exclude the Chesapeake Bay (See **Section 5.5.5.2** for Bay impacts). A breakdown of temporary and permanent impacts will be determined during more detailed design and engineering of the Selected Alternative. In general, linear footage of impacts to nontidal and tidal waterways is similar between Alternatives D, E, F, and G, with Alternative F having the greatest impact. Similarly, Alternatives B, C, and the Preferred Alternative, have nearly equivalent nontidal and tidal waterway impacts, which are much lower than the other build alternatives. Acreages of tidal waterway impacts differ due to the variation in width of the waterways. Many tidal systems are of substantial width, paralleling both north and south of U.S. 50/301, such as Cox Creek, Piney Creek, and Kent Narrows. Therefore, a wider area of the tidal channel would be impacted by Alternatives D, E, F, and G, which have a wider footprint and span more tidal waterways than Alternatives B, C, and the Preferred Alternative. However, each alternative would result in relatively few linear feet of waterway impacts.

Table 5-32: Waterway Impact Summary (Acres/Linear Feet)

Resource Classification	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
Nontidal Perennial (R2)	0	0.1 / 290	0.1 / 290	0.8 / 2,740	0.8 / 2,740	0.8 / 2,740	0.8 / 2,740	0.1 / 290
Nontidal Intermittent* (R4)	0	<0.1 / 410	<0.1 / 380	0.1 / 790	0.1 / 760	0.1 / 870	0.1 / 820	<0.1 / 380
Nontidal Waterway TOTAL**	**0**	**0.1 / 700**	**0.1 / 670**	**0.9 / 3,520**	**0.9 / 3,490**	**0.9 / 3,600**	**0.9 / 3,550**	**0.1 / 670**
Tidal Waterway* (E1) TOTAL**	**0**	**1.1 / 290**	**1.0 / 290**	**4.9 / 860**	**4.7 / 860**	**5.4 / 900**	**5.3 / 900**	**1.0 / 290**

**Intermittent streams identified meet the definition of relatively permanent WOTUS (88 Federal Register 61964).*

*** Due to rounding, totals may not equal the sum of all individual waterway impacts.*

****Impacts do not include the Chesapeake Bay. See Section 5.5.5.2 for discussion of the Bay.*

Table 5-33: SUP Waterway Impact Summary (Acres/Linear Feet)

Resource Classification	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
Nontidal Perennial (R2)	0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
Nontidal Intermittent* (R4)	0	<0.1 / 20	<0.1 / 30	<0.1 / 20	<0.1 / 30	0 / 0	<0.1 / 50	<0.1 / 30
Nontidal Waterway TOTAL	**0**	**<0.1 / 20**	**<0.1 /30**	**<0.1 / 20**	**<0.1 / 30**	**<0.1 / 0**	**<0.1 / 50**	<0.1 / 30
Tidal Waterway (E1) TOTAL**	**0**	**<0.1 / 0**	**<0.1 / 0**	**<0.1 / 0**	**<0.1 / 0**	**<0.1 / 0**	**<0.1 / 0**	<0.1 / 0

**Intermittent streams identified meet the definition of relatively permanent WOTUS (88 Federal Register 61964).*

***Impacts do not include the Chesapeake Bay. See Section 5.5.5.2 for discussion of the Bay.*

Alternatives B, C, and the Preferred Alternative would have approximately one-third of the linear footage of tidal waterway impact, and one-fifth of the nontidal waterway impact compared to Alternatives D, E, F, and G, as these alternatives will only impact four tributaries: Meredith Creek,

Thompson Creek, Cox Creek, and the Mezick Pond connection to the Chesapeake Bay. For a more in-depth discussion of impacts to waterways, including impacts to culverted waterways and waterway crossings, see Section 9.1.3 of the *Natural Environment Technical Report*.

Impacts to tidal and nontidal wetlands are provided in **Table 5-34** by alternative and in **Table 5-35** for potential impacts by the SUP option associated with each alternative, including the Preferred Alternative.

Table 5-34: Tidal and Nontidal Wetland Impact Summary (Acres)

Resource Classification	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
PEM	0	0.7	0.9	1.2	1.4	1.2	1.4	0.9
PSS	0	<0.1	<0.1	0.9	0.9	0.9	0.9	<0.1
PFO	0	3.3	3.3	6.5	6.5	6.6	6.6	3.3
PUB	0	0	0	0.4	0.4	0.4	0.4	0
Nontidal Wetland Total	**0**	**4.0**	**4.2**	**9.0**	**9.2**	**9.1**	**9.3**	**4.2**
E2EM	0	2.0	1.4	2.7	2.1	3.0	2.3	1.4
E2SS/E2FO	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Tidal Wetland Total	**0**	**2.1**	**1.5**	**2.8**	**2.2**	**3.1**	**2.4**	**1.5**
TOTAL*	**0**	**6.0**	**5.6**	**11.5**	**11.1**	**12.0**	**11.5**	**5.6**

**Due to rounding, totals may not equal the sum of all individual wetland impacts.*

Table 5-35: SUP Tidal and Nontidal Wetland Impact Summary (Acres)

Resource Classification	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
PEM	0	0	0	0	0	0	0	0
PSS	0	0	0	0	0	0	0	0
PFO	0	0	0	0	0	0	0	0
PUB	0	0	0	0	0	0	0	0
Nontidal Wetland Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
E2EM	0	0.7	0.7	0.7	0.7	0.8	0.7	0.7
E2SS/E2FO	0	0	0	0	0	0	0	0
Tidal Wetland Total	**0**	**0.7**	**0.7**	**0.7**	**0.7**	**0.8**	**0.7**	**0.7**
TOTAL	**0**	**0.7**	**0.7**	**0.7**	**0.7**	**0.8**	**0.7**	**0.7**

Alternatives D, E, F, and G would have over double the impact to tidal and nontidal wetlands than Alternatives B, C, and the Preferred Alternative. The northern alignment alternatives would impact tidal wetlands more than the southern alignment alternatives with the same number of lanes, with Alternative F having the greatest tidal wetland impact of all the build alternatives, including the Preferred Alternative. Impacts located in Anne Arundel County within roadside nontidal wetland ditches and systems within the interchanges of Oceanic Drive and U.S. 50/301 are consistent for all build alternatives, including the Preferred Alternative. These are situated

near the headwaters of Meredith Creek and drain south/southeast towards Mezick Pond and Westinghouse Bay. The greatest impact to tidal wetlands is in Queen Anne's County, to emergent systems adjacent to U.S. 50/301 that would be affected by roadway widening associated with Alternatives D, E, F and G. For a more detailed discussion of potential wetland impacts, see the *Natural Environment Technical Report*.

Tables 5-36 and 5-37 provide a summary of the state-regulated 25-foot wetland buffer impacts associated with nontidal wetlands from the ARDS and optional SUP, including the Preferred Alternative. Alternatives D, E, F, and G would have almost double the acreage of wetland buffer impact of Alternatives B, C, and the Preferred Alternative. Most of the wetland buffer impacts associated with any build alternative are located within the existing right-of-way for U.S. 50/301 and intersecting roadways. As shown in **Table 5-36**, refinements to the LOD for the Preferred Alternative slightly reduced wetland buffer impacts relative to Alternative C.

Table 5-36: Nontidal Wetland Buffer Impact Summary (Acres)

No-Build	Build Alternative						
	B	C	D	E	F	G	Preferred Alternative
0	9.4	10.0	17.2	17.8	17.5	17.9	9.8

Table 5-37: SUP Nontidal Wetland Buffer Impact Summary (Acres)

No-Build	Build Alternative						
	B	C	D	E	F	G	Preferred Alternative
0	0	0	0	0	0	0	0

Minimization and Mitigation

Preliminary design has avoided or reduced impacts to WOTUS, including wetlands, where practicable, using steeper slopes, retaining walls, and other measures to reduce the LOD of the build alternatives. The MDTA will continue to avoid and minimize impacts as more detailed designs are developed in later phases of the project and will work with the regulatory agencies to incorporate appropriate BMPs for resources that cannot be avoided. During final design, the MDTA will use MDE's *Best Management Practices for Working in Nontidal Wetlands, Wetland Buffers, Waterways, and 100-Year Floodplains* (MDE, n.d.), the National Oceanic and Atmospheric Administration (NOAA) Fisheries/FHWA *Best Management Practices Manual for Transportation Activities in the Greater Atlantic Region*, and other recommended tidal resource BMPs to minimize impacts to WOTUS, including wetlands.

During final design, existing U.S. 50/301 roadway culverts will be evaluated in accordance with SHA's Highway Drainage Manual (MD SHA, September 2023) to determine if culverts need to be augmented with additional flow capacity or replaced. Where new culverts are warranted, bottomless or natural channel bottom designs will be included to the extent practicable, and all new culverts will be constructed so that the placement of riprap does not impede movement of aquatic species. If existing culverts do not meet current aquatic life passage standards and are being extended rather than replaced, then opportunities for improving aquatic life passage are limited; however, the MDTA will work to maintain or improve aquatic life passage where practicable. Tidal bridge and culvert extensions or replacements will take tidal flows into account

to ensure maintenance of existing and estimated future tidal regimes to avoid impacts to aquatic organism passage and tidal flushing.

Federal and state agencies will require compensatory mitigation for unavoidable adverse impacts to all wetlands and waterways. The type and amount of compensation will be coordinated directly with the regulatory agencies as well as supporting resource agencies. Compensation will focus on qualitative measures, such as a replacement of direct loss of a wetland or waterway function, and those quantitative impacts identified in final permitting packages for specified acreages of wetland and waterway loss and/or construction activities. Mitigation will adhere to the USACE mitigation hierarchy, as described in the 2008 mitigation rule (33 CFR 332.4(c)), and the NOAA Mitigation Policy for Trust Resources (NOAA, 2022); the order of preference is mitigation banking, in-lieu fee, and then permittee-responsible mitigation. Hierarchy preference may be influenced by availability of mitigation banks that serve the study area, as well as availability of approved in-lieu fee programs.

The Maryland Stream Mitigation Framework (MSMF) Stream Calculator was used to determine mitigation requirements for the 670 linear feet (LF) of nontidal stream impact associated with the Preferred Alternative. Based on the stream calculator, 324 functional feet of nontidal stream mitigation will be required. The optional SUP would impact an additional 30 linear feet of nontidal stream, requiring an additional eight (8) functional feet of mitigation. **Table 5-38** summarizes the mitigation requirements for nontidal and tidal wetlands associated with the Preferred Alternative. Impacts associated with the optional SUP would result in an additional mitigation requirement of 1.4 acres of E2EM wetland. Tidal waterway mitigation needs are included in **Section 5.5.5.2**, Chesapeake Bay. For a further discussion of wetlands and waterways impact minimization and mitigation, see the *Preferred Alternative and Conceptual Mitigation Concurrence Package*.

Table 5-38: Preferred Alternative Tidal and Nontidal Wetland Mitigation Requirements (Acres)

Resource Classification	Impact	Mitigation Ratio	Mitigation Requirement
PEM	0.9	1:1	0.9
PSS	<0.1	2:1	<0.1
PFO	3.3	2:1	6.6
PUB	0	--	0
Nontidal Wetland Total	**4.2**	**--**	**7.5**
E2EM	1.4	2:1	2.8
E2SS	0.1	2:1	0.1
E2FO	0	2:1	0
Tidal Wetland Total	**1.5**	**--**	**2.9**
TOTAL*	**5.6**	**--**	**10.3**

**Due to rounding, totals may not equal the sum of all individual wetland impacts.*

5.5.5.2 Chesapeake Bay

Section 404 of the CWA, Permits for Dredged or Fill Material (33 USC 1344), regulates the discharge of dredged and fill material into WOTUS, including wetlands. Section 404(b)(1) Guidelines of the CWA require the selection of the LEDPA. The Maryland Dredged Material Management Act specifically regulates dredging and dredged material disposal and placement. Several associated Federal and state laws define and regulate activities anticipated to cause impacts to the Chesapeake Bay substrate, including the following.

Federal

- CWA - Section 403 - Ocean Discharge Criteria (33 USC 1343)
- CWA - Section 402 - NPDES (33 USC 1342)
- CWA - Section 401 - State and Tribal Certification of Water Quality (33 USC 1341)
- Rivers & Harbors Act of 1899 - Section 10 (33 USC 403) establishes a program to regulate activities affecting navigation in United States waters, including tidal wetlands
- 40 CFR 232.2 defines regulated discharges of dredged or fill material including material placed in WOTUS
- Coastal Zone Management Act, Section 307 Federal Consistency Requirements
- Marine Protection, Research, and Sanctuaries Act (16 USC 1431 and 33 USC 1401) prohibits transportation of material from the United States for the purpose of ocean dumping without a permit from USACE, following USEPA guidelines.
- Magnuson Stevens Fishery Conservation and Management Act, Section 305(b)(4)(B)

Maryland

- Dredged Material Management Act
- Environment Article Title 16; COMAR 26.24; (Tidal Wetlands)
- State Tidal Wetlands Licensing Procedures; Environmental Article Title 16; COMAR 23.02.04

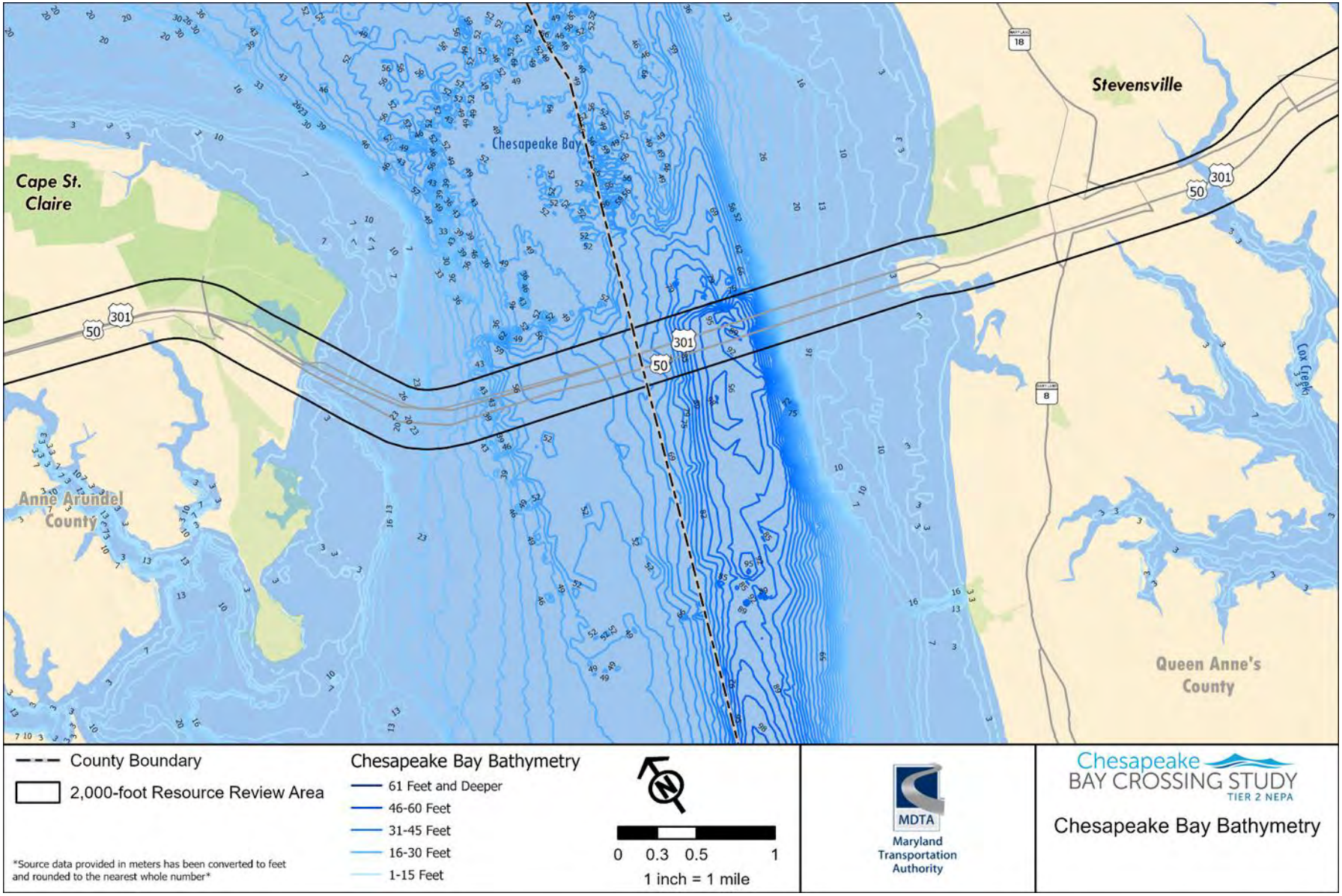
The MDTA used comparisons between existing and design conditions to assess the impacts of each build alternative on the Chesapeake Bay bottom. A hydrodynamics model was developed to assess potential changes in bathymetry due to sedimentation from erosion or settlement of suspended sediment, current patterns, water circulation, water fluctuation, wind and wave action, and salinity. See the *Hydrodynamics Report* for the model methodology. A shoreline change assessment (*Natural Environment Technical Report, Appendix G*) was also performed in the vicinity of the resource review area to provide an understanding of the existing conditions and potential future conditions of the Chesapeake Bay shoreline.

Affected Environment

The Chesapeake Bay bottom is primarily formed by layers of the Magothy, Matawan, and Monmouth formations, which are overlaid by sandy material in the shallow areas and loose silty clay material in the deeper channels. Surficial sand is generally found in the areas that are most affected by wave action and tidal fluctuations. The waves and tide move fine silt, clay, and organic material out of the sand and deposit them in lower energy areas along the bottom.

Within the resource review area, the Chesapeake Bay is deepest within the navigation channel identified as the Chesapeake Bay Auxiliary Channel. As expected, the depth becomes increasingly shallow towards the shorelines. The Chesapeake Bay has an average depth of approximately 40 feet, with the main channel depth approximately 56 feet, and the Chesapeake Bay Auxiliary Channel depth approximately 92 feet. **Figure 5-19** illustrates the bathymetry of the Chesapeake Bay, with negative numbers representing contours for the depth below sea level, and the close contours indicative of varying steep slopes within the deeper areas.

Figure 5-19: Chesapeake Bay Bathymetry



The shallows of the Chesapeake Bay (1 to 3 feet) extend channelward approximately 800 to 950 feet from the western shoreline in Anne Arundel County, and approximately 1,200 to 1,300 feet from the eastern shoreline in Queen Anne's County. Areas with depths from approximately 3 feet to 12 feet generally extend from about 2,100 to 2,200 feet from the western shoreline and 3,900 to 4,700 feet from the eastern shoreline.

The Chesapeake Bay is deep enough for barge-mounted construction equipment and material barges to perform work adjacent to the existing Chesapeake Bay Bridge, except in the shallow areas along the Anne Arundel and Queen Anne's shorelines.

Hydrodynamics modeling of existing conditions demonstrates a spatial variation in current velocity across the study area due to the Chesapeake Bay's bathymetry, coastline morphology, and structures (e.g., existing Bay Bridge). Deeper channels represented by the model bathymetry exhibit stronger tidal currents, while shallower regions and tributary mouths experience reduced velocities. For example, faster currents are found in the constricted parts of the Chesapeake Bay (e.g., between Sandy Point and Kent Island) in the vicinity of the existing Bay Bridge. Peak velocities in the vicinity of the Bay Bridge during a spring tide are relatively consistent along the bridge channel between the piers, with average peak velocities between 0.73 m/s and 0.93 m/s. The maximum velocity of 0.93 m/s is found near the Sandy Point Shoal Light. Other locations within the Chesapeake Bay with above average peak velocities include Howell Point (0.59 m/s) and near Taylor's Island (0.71 m/s). See the *Hydrodynamics Report* for more information.

Environmental Consequences

Estimated impacts to the Chesapeake Bay have been evaluated separately in this section, to address the anticipated construction impacts to the tidal open waters and substrate of the bay. Permanent impacts to the Chesapeake Bay substrate are anticipated from the placement of new structures on the bay bottom. The MDTA assumes that dredging within the Chesapeake Bay will be required to gain access to shallow areas along the western and eastern shorelines.

Alternative A, the No-Build Alternative, would have no impacts to the Chesapeake Bay and its substrate. Impacts for each build alternative, including the Preferred Alternative, to construct new bridges and demolish existing bridges are summarized in **Table 5-39**.

Table 5-39: Chesapeake Bay Tidal Water Impacts (Acres) from New Bridge Construction and Old Bridge Pier Removal

No-Build	Build Alternative						
	B	C	D	E	F	G	**Preferred Alternative**
0	130.7	131.9	130.7	131.9	134.1	135.0	131.9

Alternatives F and G include 10 lanes for the new bridge and would have the largest impact within the Chesapeake Bay. The addition of the SUP option would require slightly larger piers, resulting in 1.9 acres of additional pier footprint in the Bay substrate for all build alternatives, including the Preferred Alternative, except for the Alternative G SUP option, which would have 2.0 acres of additional impact. The impact totals include sufficient area to allow temporary construction access within the channel through whatever means are determined during final design and allow for movement of construction barges carrying equipment and materials within the immediate areas of construction. Staging areas for barges/vessels have not yet been identified.

Analysis of modeled velocity magnitude differences between existing and proposed conditions in the hydrodynamics model developed to evaluate impacts on the Bay bottom from the placement of new bridge piers (*Hydrodynamics Report*) indicates that there would be areas of increases in near-bed velocity primarily within the immediate vicinity of bridge piers. The piers and pier spacing modify near-bed flow velocities, turbulence, and shear stresses, leading to changes in sediment deposition and erosion patterns. These changes to sediment transport and deposition patterns, in turn, impact aquatic habitats such as SAV, oyster reefs, and other benthic organisms that depend on stable substrates and water quality conditions.

In general, areas within 500 feet of the piers may experience slight increases in shear stress, promoting sediment resuspension. Resuspension and downstream transport may alter the sediment composition, leading to shifts from coarser to finer substrates or vice versa. Such changes can be a benefit or detriment to different benthic communities, potentially changing habitat suitability and nutrient dynamics for species adapted to the existing sediment type. Modeled changes in flow velocities and sediment transport near the proposed bridge piers are relatively modest, localized impacts to benthic habitat from increased deposition of silty fine sediments are possible soon after the construction of the new bridge piers. Alternatives F and G would require the largest bridge piers and would thus have the greatest potential for changes to flows, sediment transport and benthic habitats.

Based on the findings of the shoreline change assessment (*Hydrodynamics Report*), the build alternatives, including the Preferred Alternative, are not expected to substantially exacerbate shoreline currents. Modeled velocities remain below the critical threshold for erosion, suggesting that the bridge structures themselves will not significantly contribute to shoreline retreat through current-driven processes. While there are some localized increases in current velocity near the northern Anne Arundel shoreline at Sandy Point, these increases are not substantial enough to initiate erosion. The velocities remain below the critical threshold required to mobilize sediment in the near-shore area. Instead, future erosion is anticipated to be primarily driven by wind wave action within the Bay. As water elevations change with time, deeper water will allow wave energy to propagate further landward, increasing the potential for wave-induced erosion along vulnerable shorelines. The bridge piers are not expected to influence these wave dynamics and are therefore not anticipated to substantially affect long-term shoreline change.

Temporary impacts from all build alternatives, including the Preferred Alternative, include geotechnical investigations, dredging, temporary mooring piles or mooring ball anchors to stabilize the barges and vessels at the staging areas, in-water BMPs (e.g., turbidity curtains, bubble curtain/cans, cofferdams), and demolition activities for the existing spans. These individual impacts will be defined during later design phases. Although these activities are temporary in the sense that they will at some point in the future be removed/restored, the duration of impact for many of these activities will be several years. For instance, dredging for the eastbound bridge will occur in years 1 and 2 of construction and remain in place until all construction has been completed, a minimum of 15 years. Similarly, temporary mooring piles will be in place for the full extent of the construction period. Other temporary activities will be in place for less than a year, during specific stages of construction. For instance, turbidity curtains would be in place during active dredging operations, which are estimated to take about 14 days for the eastbound bridge and about 7 days for the westbound bridge. See **Section 3** for the estimated sequence of construction and duration of major construction phases.

Permanent impacts within the Chesapeake Bay are anticipated to be those areas of permanent fill for construction of bridge substructure elements including piers, pier protection systems, and pier islands, as well as any temporary impacts that last longer than one year. Final design will dictate the size and type of piles or footings proposed for pier construction and impacts will be calculated based on the area of new structure/fill at or below the mudline.

Based on existing conditions within the Chesapeake Bay, it is expected that dredging will be necessary to create access channels to support construction and demolition activities. **Table 5-40** identifies the amount of dredging anticipated per build alternative, including the Preferred Alternative. No additional dredging is anticipated from the SUP options associated with each build alternative.

Table 5-40: Chesapeake Bay Substrate Impacts from Dredging (Acres and Cubic Yards)

Dredging	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
Dredging (acres)	0	50.1	50.4	50.1	50.4	49.8	50.1	50. 2
Dredging (cubic yards)	0	329,900	317,400	329,900	317,400	329,900	317,400	308,800

The potential impacts of dredging for any build alternative, including the Preferred Alternative, include direct impact to benthic organisms; impact of new work dredging (i.e., dredging an area that hasn't been previously dredged) in shallow water areas, which can alter bottom substrate and depth characteristics that provide habitat for oysters, crabs, SAV, potentially displacing species that utilize the shallow areas and impacting sandy bottom habitat; increased turbidity in the water column that can negatively affect fish and SAV health; wildlife mortality from dredge equipment; and re-suspension of contaminants and/or nutrients. See **Section 5.5.7.1 Aquatic Habitat** for more information regarding aquatic habitat and **Figure 5-23** for the locations of oyster beds and habitat.

Dredging may be combined with the construction of temporary trestles or causeways that facilitate the loading and unloading of barges and support vessels. Multiple access points (dredged channels, causeways, or trestles) may be needed depending on the work configuration and the specific construction equipment needed. Current engineering estimates prepared for the northern alignments (Alternatives B, D, and F) assume a total of approximately 329,900 cubic yards of dredging would be required, which is approximately 21,100 cubic yards more than the Preferred Alternative and 12,500 cubic yards more than the other southern alignments (Alternatives C, E, and G). Dredging calculations assume a depth of 9 feet at mean low water level and exclude the footprints of the proposed piers. Access and dredging details will be evaluated in future design phases. Alternatives D, E, F, and G may also require dredging at Kent Narrows. See the mapping in **Appendices A-1 and A-2** for the estimated location of dredging for each of the build alternatives, including the Preferred Alternative. Dredging for the eastbound bridge will occur in years 1 and 2 of construction. This will include approximately two-thirds of the total dredge area, and the remaining one-third will be dredged for the westbound bridge in years 7 and 8 of construction. The dredge duration is estimated to be approximately 14 days for the eastbound bridge, and the dredged area will remain for the entire construction period, a minimum of 15 years. The dredge duration for the westbound bridge is estimated to be about 7 days and will remain in

place until all construction and demolition activities have been completed. Dredge effects to aquatic biota will be long-term, removing existing benthic habitat in the shallows and affecting water quality and clarity during dredging. Once dredge areas are restored to their prior elevations at the end of the construction period, benthic habitats can begin to re-establish, but this will take time.

The hydrodynamics model confirms that the Chesapeake Bay has high flow velocities within the resource review area. The MDTA anticipates that the final design will have similar overall flow characteristics to the existing structures within the resource review area, despite localized differences in velocity, turbulence, and shear stress resulting from a new bridge.

Minimization and Mitigation

Since impact to the Chesapeake Bay would largely be from dredging and construction methods, opportunities to avoid and minimize impacts to the Chesapeake Bay open waters and substrate will be determined during a later phase of design and early phase of construction. The MDTA will avoid and minimize impacts to the Chesapeake Bay substrate to the greatest extent practicable. In addition, more detailed hydraulic modeling will be conducted in final design when pier locations and size, and pier protection designs, are available to determine flow dynamics and the need for any additional scour protection for the new bridge structures. If future modeling results in substantially different flow dynamics, those effects will be coordinated with regulatory agencies as necessary.

Dredging is restricted within 500 yards of SAV beds from April 15 through October 15 of any year. Dredging within 500 yards of the boundaries of an NOB would have the following time of year restrictions under MDE tidal wetland regulations: no mechanical dredging during the periods December 16 through March 14 and June 1 through September 30 of any year and no hydraulic dredging from June 1 through September 30 of any year. The time of year restriction for dredging within the boundaries of an NOB, regardless of method, extends from December 16 through March 14 and June 1 through September 30 of any year. The MDTA has minimized potential dredging impacts by committing to only using mechanical dredging rather than hydraulic dredging, which has the potential for greater impacts to aquatic habitats and species. Operational BMPs could be employed to further reduce impact to the Chesapeake Bay bottom, which would help protect water quality. The MDTA will prepare a Dredge Material Management Plan, which will include final methods proposed, minimization measures specific to dredging operations, and detailed information regarding the transport and management of dredged materials. Dredged material is anticipated to be transported by barge to an approved and permitted DMCF. Several dredged material placement sites are available. The Maryland Port Administration has developed the Masonville and Cox Creek DMCF. Masonville DMCF has 10.4 million cubic yards (mcy) of capacity on 101 acres located in South Baltimore along the Patapsco River. Cox Creek has 14.7 million cubic yards (mcy) of capacity on 241 acres located in northern Anne Arundel County along the Patapsco River. Port Tobacco at Weanack is a privately owned DMCF on 280 acres in Charles City, VA along the James River. All three DMCF have the ability to accept the anticipated dredged material. The anticipated dredged material can be transported by barge to Masonville, Cox Creek, or Port Tobacco at Weanack for efficient off-loading. The anticipated volume is between 200 and 250 barge loads over the course of the project. Shorter distances to Masonville and Cox Creek would result in more efficient transport than delivering the material to Port Tobacco at Weanack. The proposed transport routes will run through Federally designated navigational channels in the Chesapeake Bay and either the Patapsco River or James River.

Detailed coordination with the regulatory and resource agencies will dictate and inform minimization measures, methods for dredging, construction, and demolition within the Chesapeake Bay. Compensatory mitigation will be required for impacts to the Chesapeake Bay substrate due to dredging. New work dredging in shallow water areas (three feet or less at mean low water) will require mitigation. Also, any dredging or bottom disturbance within NOB boundaries will require mitigation. The possibility of restoration of bottom contours through natural sedimentation or adaptive management at deeper depths, as well as potential for beneficial reuse of appropriate dredge material will be explored and discussed with the resource agencies during later phases of design.

Table 5-41 summarizes the mitigation requirements for impacts to tidal waterways associated with the Preferred Alternative. **Table 5-42** summarizes the mitigation requirements for impacts to tidal waterways associated with the optional SUP.

Table 5-41: Preferred Alternative Tidal Waterway Mitigation Summary (Acres)

Resource Classification	Impacts	Mitigation Ratio	Mitigation Requirement
Chesapeake Bay (E1)	131.9	2:1	263.8
Other Tidal Waterways (E1)	1.0	2:1	2.0
Tidal Waterway TOTAL*	**132.9**	**2:1**	**265.8**

** Due to rounding, totals may not equal the sum of all individual waterway impacts.*

Table 5-42: Optional SUP Tidal Waterway Mitigation Summary (Acres)

Resource Classification	Impacts	Mitigation Ratio	Mitigation Requirement
Chesapeake Bay (E1)	1.9	2:1	3.8
Other Tidal Waterways (E1)	<0.1	2:1	<0.1
Tidal Waterway TOTAL*	**1.9**	**2:1**	**3.8**

** Due to rounding, totals may not equal the sum of all individual waterway impacts.*

Several tidal waterway mitigation options were investigated to determine those with the most potential to compensate for unavoidable adverse tidal open water impacts associated with the Preferred Alternative. The following types of tidal open water mitigation were investigated:

- Oyster Seeding and Substrate Expansion
- SAV Planting
- Fish Passage Restoration
- Tidal Fill Removal
- *Phragmites* Treatment
- Derelict Crab Pot Removal
- Fish or Oyster Hatchery Funding
- Artificial Reef Creation

For further discussion of minimization and mitigation of impacts to the Chesapeake Bay substrate and other tidal waterways, see the *Preferred Alternative and Conceptual Mitigation Concurrence Package*.

5.5.5.3 Maintained Navigational Channels and Civil Works Projects

The USACE Civil Works Program constructs, operates, and maintains more than 290 miles of Federal navigation channels within the Chesapeake Bay and associated waterways that are essential for the movement of commercial cargo and are marked on official navigation charts to guide vessels. This work includes dredging, employing cutting-edge technology to conduct underwater surveys, and applying its fleet of debris removal vessels to clear floating hazards from Federal channels (USACE, 2023). The Civil Works Program covers the Federally maintained channels in the Chesapeake Bay that facilitate access to the Baltimore Harbor from the Atlantic Ocean. For more information regarding regulations and methodology related to maintained navigational channels, see the *Natural Environment Technical Report*.

Affected Environment

Navigable waters with marked channels are located throughout the resource review area. Many of the channels are Federally maintained and facilitate intrastate, interstate, and international navigation. Other channels are State, County, or privately maintained and provide important recreational, law enforcement, and commercial boating access to the Bay. The Federally maintained channels within the resource review area that are considered Section 408 (USACE Civil Works) projects include the Chesapeake Bay Bridge Channel, Kent Island Narrows Channel, Wells Cove Channel, Chester River Channel, and Severn River Channel. **Figure 5-20** depicts the channels in the Chesapeake Bay that facilitate access to the Baltimore Harbor from the Atlantic Ocean.

There are also channels that are not Federally maintained, and serve local communities, marinas, parks, and provide water access for small recreation and commercial vessels, including channels on Mill Creek, Whitehall Creek, Jackson Creek, at the Chesapeake Bay Bridge Marina, Mezick Pond access channel, and the Sandy Point Channel. For more information regarding navigation channels, see the *Natural Environment Technical Report*.

Environmental Consequences

The No-Build Alternative would have no impacts to navigation or USACE Civil Works projects.

All build alternatives, including the Preferred Alternative, would require work in navigational channels and USACE Civil Works projects. Encroaching on the navigational channels may restrict large vessel navigation and result in rerouted shipping or dredging for alternative access. The channels where a relatively continuous construction presence is anticipated include the Chesapeake Bay Bridge Federal channel and Chesapeake Bay Auxiliary Channel. No permanent impacts would result from any build alternative, including the Preferred Alternative, with all construction impacts occurring temporarily and dependent upon the type of work occurring. It is anticipated that the greatest temporary impacts would result from Alternatives F and G, due to the larger structure proposed and longer duration of in-water construction compared to the other build alternatives. Refer to **Table 5-43** for Federal and local channels affected by the build alternatives, including the Preferred Alternative. The local channels accessing Whitehall Creek, Mill Creek, and Jackson Creek would not be affected.

Figure 5-20: Navigation Channels

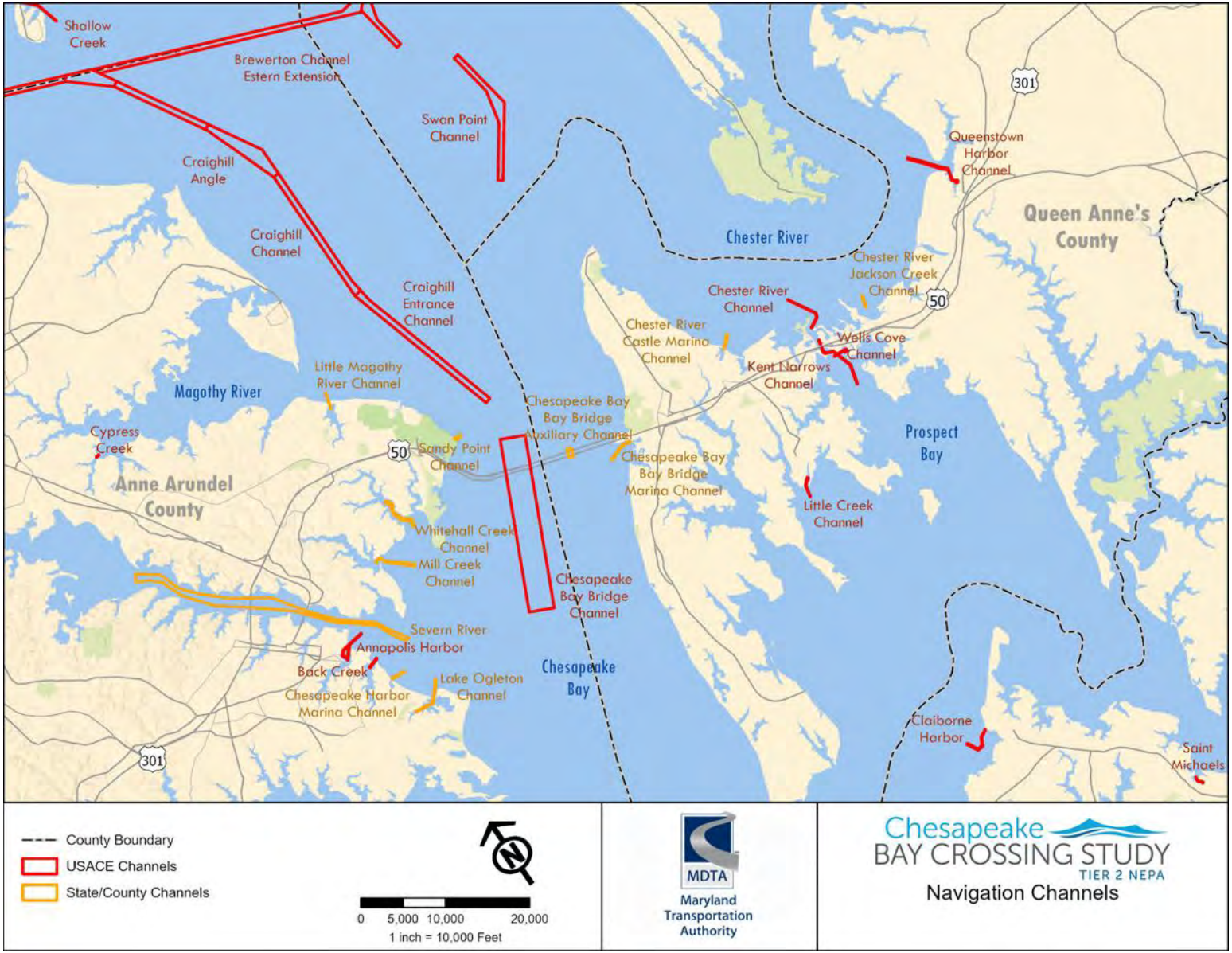


Table 5-43: Navigation Channels Affected by Build Alternatives

Navigation Channels	Build Alternative							
	No-Build	B	C	D	E	F	G	Preferred Alternative
Chesapeake Bay Bridge Channel	-	X	X	X	X	X	X	X
Kent Narrows Channel	-	-	-	X	X	X	X	-
Wells Cove Channel	-	-	-	-	-	-	-	-
Severn River Channel	-	-	-	-	-	-	-	-
Chester River Channel	-	-	-	X	X	X	X	-
Chesapeake Bay Auxiliary Channel	-	X	X	X	X	X	X	X
Local Navigation Channels								
Sandy Point Channel	-	-	-	-	-	-	-	-
Bay Bridge Marina Channel	-	-	X	-	X	-	X	X
Mezick Pond	-	X	X	X	X	X	X	X

"X" Denotes that the waterway is crossed by the alternative structures or temporarily impeded by areas of dredging, active construction, or demolition activity.

"-" Denotes the waterway is not crossed by the alternative.

Federal/Other Channels: All build alternatives, including the Preferred Alternative, would impact the Chesapeake Bay Bridge Channel. The Kent Narrows Channel would be impacted by Alternatives D, E, F, and G. These alternatives include widening the existing Kent Narrows Bridge, requiring the use of large equipment within the channel. This channel would likely require temporary closings during construction, as there would not be sufficient safe passage for navigation.

The Chester River Channel would be impacted by Alternatives D, E, F, and G, as this channel would be utilized by construction vessels/barges carrying equipment and materials for access to work occurring within Kent Narrows. The Chesapeake Bay Auxiliary Channel would be impacted by all build alternatives, but only for brief time periods as construction vessels/barges traverse through the LODs. The Wells Cove and Severn River Channels would not be impacted by any build alternative, including the Preferred Alternative.

Local Channels: The Sandy Point Channel would not be impacted by any build alternative. It is anticipated that the Bay Bridge Marina Channel may have temporary closings during in-river construction directly adjacent to the eastern shoreline of the Chesapeake Bay, as there would not be sufficient safe passage for navigation. It is anticipated that only the southern alignment build alternatives (Alternatives C, E, G, and the Preferred Alternative) would impact the Bay Bridge Marina Channel. The entrance to Mezick Pond would be directly impacted by the northern alignment build alternatives (Alternatives B, D, and F). The westbound bridge span for Alternatives B, D, and F would require the placement of bridge piers on the south end of Sandy Point Beach, near the existing rock jetty, and the bridge structure would span the mouth of the channel. It is anticipated that this is the only channel that would require construction of a completely new bridge feature along with an analysis of required dimensions, but only if a northern alignment alternative is selected. The southern alternatives (Alternatives C, E, and G), including the Preferred Alternative, would avoid the need for a new structure across the Mezick Pond entrance channel for the new Bay Bridge span, thus avoiding any permanent impacts or new

height restrictions to the channel. All build alternatives, including the Preferred Alternative, would temporarily impact the entrance of Mezick Pond due to temporary closings during in-river construction directly adjacent to the western shoreline of the Chesapeake Bay.

Potential impacts could also result from temporary construction trestles built immediately adjacent to channels for construction equipment and work access; in-channel activities such as dredging, geotechnical soil borings, and pile driving; and loading of barges. Dredging for the build alternatives, including the Preferred Alternative, in an area not previously dredged or where dredging would exceed the previously authorized dimensions would have a permanent impact to the Chesapeake Bay bottom.

Minimization and Mitigation

The MDTA will maintain close coordination with USACE and USCG to obtain final permits and approvals regarding construction in or near the Federal navigation channels and elsewhere in the Chesapeake Bay and navigable tributaries. As part of the USCG permit process, a Navigation Impact Report was prepared for the Chesapeake Bay, and a PNCD was received from the USCG on November 28, 2025 (**Appendix F**). The MDTA will work closely with the USCG to ensure the safety of boaters utilizing Federal, state, and local channels. It is expected that the conditions of the permits would help ensure that any construction effects to ongoing navigation are minimized and mitigated (if required); and that the safety of workers, inspectors, mariners, and recreational boaters remains paramount. Potential conditions of the permits include:

- Coordinating Local Notices to Mariners with the USCG to inform vessel captains of changing construction conditions, including temporary channel closures needed for construction over the channel and restricting access to areas within the construction safety zone outside the navigation channels;
- Establishing safe anchorages for construction vessels outside the navigation channel to avoid interfering with normal navigation patterns when possible, including installation of mooring piles and buoys;
- Establishing vessel speed restrictions within the navigation channel adjacent to the construction safety zone to reduce wake impacts to construction vessels; and
- Adhering to the requirements of the U.S. Aids to Navigation System for temporary navigation marking and lighting within the construction safety zone, including establishing the construction zone perimeter with buoys, beacons, and the installation of lights on vessels and obstructions within the construction safety zone.

The MDTA will coordinate temporary closures of the Bay Bridge Marina channel and Mezick Pond access with the USCG, MDNR, marina operators, and emergency services. The MDTA will develop and coordinate a Maintenance of Access Plan with MDNR during design that includes: a schedule of anticipated activities that could result in temporary closures of Mezick Pond, procedures for communication of closures, and processes for coordinating modifications to the plan.

5.5.6 Chesapeake Bay Critical Area

All development projects within 1,000 feet of tidal waters, including partially or wholly funded state projects, are required to comply with Maryland's CBCA regulations. CBCAs are regulated in Maryland as a result of the:

- Chesapeake Bay Critical Area Protection Act of 1984

There are three land classifications designated within the Critical Area:

- Intensely Developed Area (IDA), where higher density development is allowed;
- Limited Development Area (LDA), where controlled development is allowed; and
- Resource Conservation Area (RCA), where natural resources and habitats are preserved and development is strictly regulated.

Rare habitats for both plants and animals are regulated within the Critical Area, including colonial bird nesting areas; FIDS habitat; waterfowl staging areas; tidal wetlands; anadromous fish spawning areas; and rare, threatened, and endangered (RTE) species habitat. For more information regarding Chesapeake Bay Critical Area regulatory context and the methodology used in this analysis, see the *Natural Environment Technical Report*.

The 100-foot Critical Area Buffer is assigned to tidal waters, tidal wetlands, and tributary streams, and is expanded beyond 100 feet to include hydric soils, steep slopes and highly erodible soils. The expanded Critical Area Buffer is not designated until a project is submitted for authorization.

5.5.6.1 Affected Environment

Table 5-44 provides a breakdown of the total area (acres) and percentage of IDA, LDA, and RCA identified within the resource review area.

Table 5-44: Chesapeake Bay Critical Area

Land Classification	Size within Review Area (AC)	Percentage of Total Review Area
IDA	645	13%
LDA	1,930	39%
RCA	675	14%
Total	**3,250**	**66%**

Figures 5-21 and 5-22 identify the location and distribution of Critical Area within the limits of the resource review area. The resource review area contains approximately 3,250 acres of land within the Critical Area. Most of this land is classified as LDA, but the resource review area also contains relatively large areas classified as RCA and IDA. Within Anne Arundel County, the Critical Area is primarily associated with the Severn River and the western shoreline of the Chesapeake Bay. The majority of the resource review area within Queen Anne's County is located within the Critical Area, and the majority of IDA identified occurs on Kent Island due to the high level of existing development. Critical Area also exists along the Wye River and Chester River.

Figure 5-21: Critical Areas – Anne Arundel County

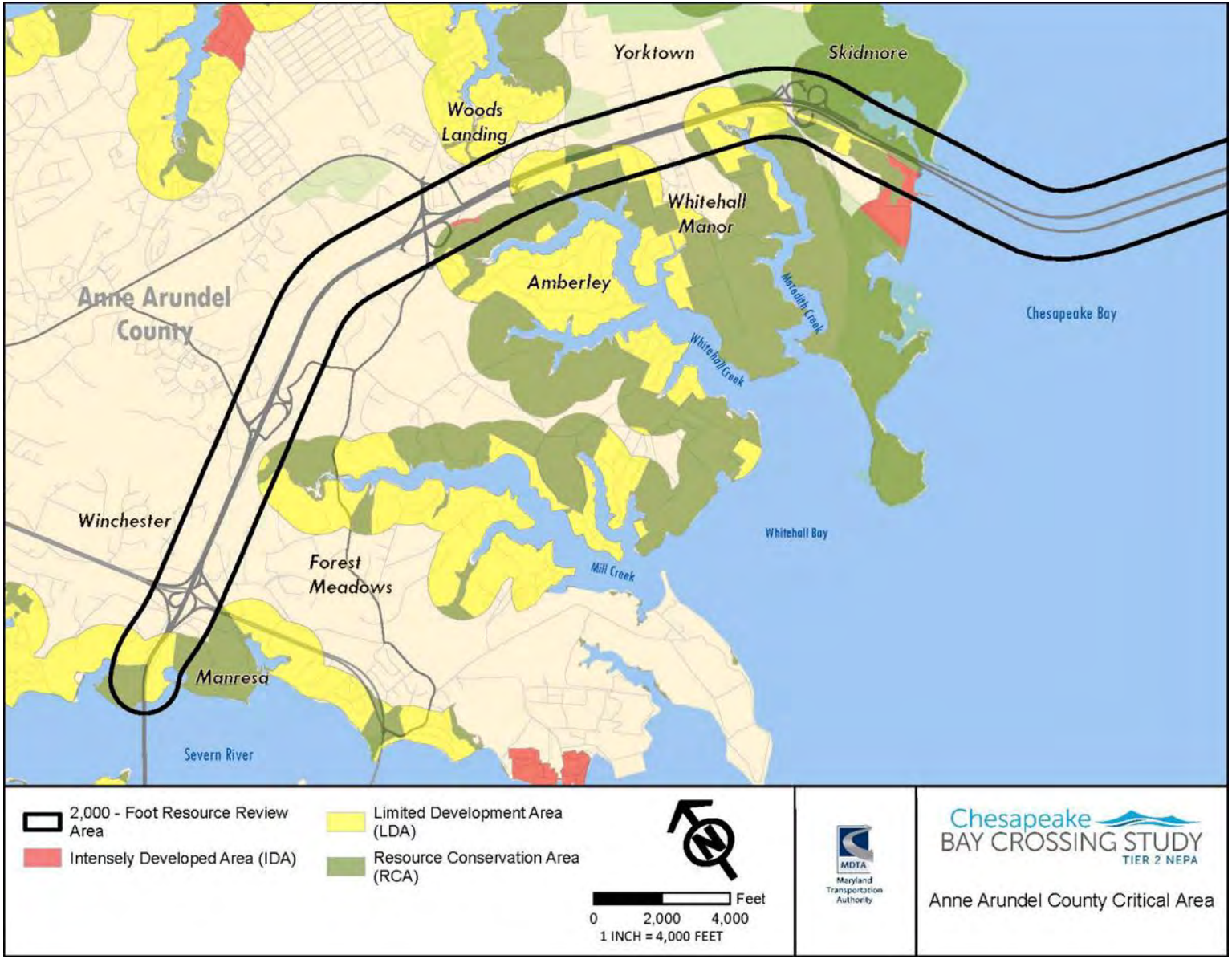
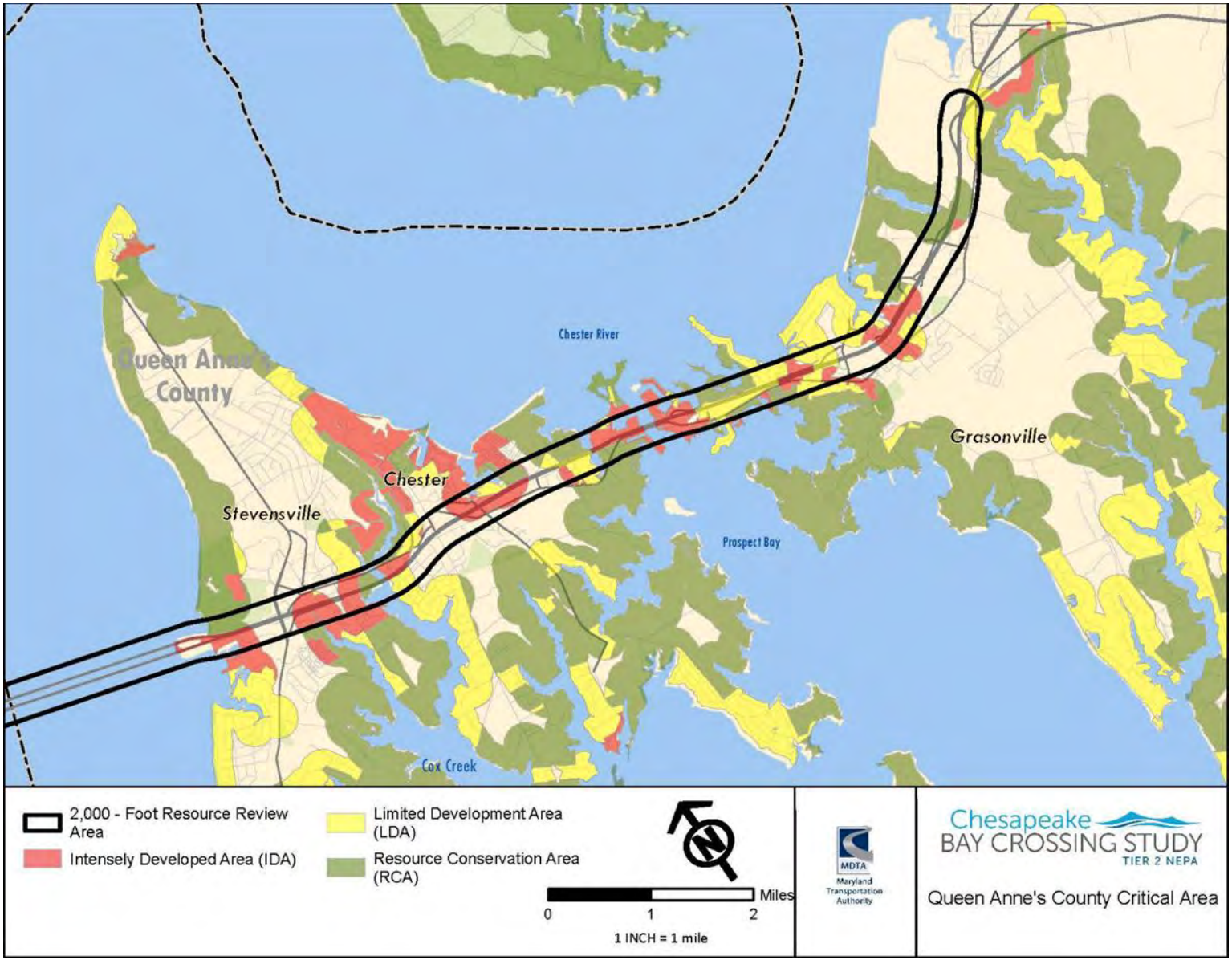


Figure 5-22: Critical Areas – Queen Anne's County



Figures 5-23 and 54 show FIDS habitat, which totals approximately 370 acres (MD iMap Data Catalog, 2017) and comprises 8 percent of the total resource review area. The largest concentrations occur within Anne Arundel County, which contains relatively large areas of forest interspersed with residential development.

5.5.6.2 Environmental Consequences

The No-Build Alternative would have no Critical Area impacts.

The build alternatives, including the Preferred Alternative, may result in impacts to aquatic habitats and other sensitive Critical Area resources, which could lead to increased sedimentation and degraded water quality. The addition of impervious surfaces (see **Section 5.5.4.1, Watersheds**, **Table 5-29** and **Table 5-30**) and structural supports could alter natural water flow, potentially leading to increased erosion and changes in shoreline stability. Furthermore, the build alternatives, including the Preferred Alternative, may contribute to pollution from stormwater runoff and potential spills, all of which could harm the Chesapeake Bay's delicate ecosystem. Construction could also lead to displacement of FIDS habitat and SSPRA within the Critical Area.

Table 5-45 provides a comparison of the total amount of Critical Area land that would be impacted by the alternatives, including the Preferred Alternative, as well as impacts to mapped FIDS habitat and SSPRA identified within the Critical Area. **Table 5-46** provides a comparison of the total amount of Critical Area land that would be impacted by the SUP option associated with each of the build alternatives, including the Preferred Alternative. The tables also provide a comparative analysis of impacts to mapped FIDS habitat and SSPRA identified within the limits of the Critical Area associated with the alternatives. SSPRA have been included since they represent several categories of sensitive resources under the Critical Area criteria. Refer to the *Natural Environment Technical Report* for more information on SSPRA.

Table 5-45: Impacts to Critical Area Land Use (Acres)

Critical Area Land Use Classification	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
IDA	0	58.5	59.3	164.3	165.1	166.5	167.2	59.3
RCA	0	69.9	66.7	112.8	109.6	113.9	110.0	66.1
LDA	0	38.2	38.2	120.7	120.7	121.7	121.7	37.2
Total*	**0**	**166.5**	**164.1**	**397.7**	**395.4**	**402.0**	**398.8**	**162.5**
Critical Area 100-foot Buffer	0	19.0	17.7	28.2	26.9	28.8	27.3	17.7
Critical Area Expanded Buffer**	0	30.4	29.1	54.5	53.2	55.8	53.9	29.1
FIDS Habitat	0	10.4	10.4	14.2	14.2	14.5	14.5	9.8
SSPRA	0	47.1	45.8	49.1	47.7	50.5	48.5	45.8

**Due to rounding, totals may not equal the sum of all individual classification impacts.*
***These numbers include the Critical Area 100-foot buffer plus expansions for wetlands, highly erodible soils, hydric soils, etc.*

Table 5-46: SUP Impacts to Critical Area Land Use (Acres)

Critical Area Land Use Classification	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
IDA	0	1.0	0.5	1.0	0.5	0.7	0.3	0.5
RCA	0	2.5	2.0	2.5	2.0	2.7	2.3	2.0
LDA	0	0	0	0	0	0	0	0
Total*	**0**	**3.4**	**2.5**	**3.4**	**2.5**	**3.3**	**2.6**	**2.5**
Critical Area 100-foot Buffer	0	1.2	1.0	1.2	1.0	1.2	1.0	1.0
Critical Area Expanded Buffer	0	1.7	1.5	1.7	1.5	1.6	1.4	1.5
FIDS Habitat	0	0	0	0	0	0	0	0
SSPRA	0	2.0	2.1	2.0	2.1	2.0	2.1	2.1

**Due to rounding, totals may not equal the sum of all individual classification impacts.*

Critical Area and FIDS habitat impacts are similar for Alternatives B, C, and the Preferred Alternative, and considerably higher for Alternatives D, E, F, and G. Alternatives B, C, and the Preferred Alternative, would impact less than half of the Critical Area and FIDS habitat affected by Alternatives D, E, F, and G. Due to their shorter overall length, Alternatives B, C, and the Preferred Alternative, avoid more substantial FIDS habitat identified along Mill Creek and Whitehall Creek in Anne Arundel County, and the substantial forested area near the U.S. 50/301 split in Queen Anne's County. As discussed in **Section 4.3**, Alternative C was refined after it was identified as the Preferred Alternative to further avoid and minimize impacts. As a result, impacts to LDA and RCA portions of the Critical Area were reduced, which reduced total impacts to the Critical Area by 1.6 acres for the Preferred Alternative relative to Alternative C. FIDS habitat impacts within the Critical Area were also reduced by 0.6 acres for the Preferred Alternative relative to Alternative C.

All build alternatives, including the Preferred Alternative, would impact SSPRA within the Critical Area in Anne Arundel County associated with Sandy Point State Park, and in Queen Anne's County within an area on Kent Island near Cox Creek. Alternatives D, E, F, and G would also impact SSPRA within the eastern portion of Queen Anne's County. The largest SSPRA is located on the north side of U.S. 50/301 between the roadway and the Chesapeake Bay. This area is categorized as a MET Easement and located within a relatively large, forested tract.

Table 5-47 identifies the total impacts to forests and woody clusters (areas of woody vegetation that do not meet the definition of a forest) within the Critical Area associated with the Preferred Alternative and optional SUP. Field delineations were completed during refinement of the Preferred Alternative and the impacts were calculated using the field delineated forest and woody cluster survey data.

Table 5-47: Preferred Alternative Impacts to Forests and Woody Clusters within the Critical Area (Acres)

Critical Area Classification	Impacts	Additional Optional SUP Impacts
Critical Area (outside of Expanded Buffer)	39.2	0.7
Critical Area Expanded Buffer**	8.2	0.6
Total*	**47.4**	**1.3**

**Due to rounding, totals may not equal the sum of all individual classification impacts.*
***These numbers include the Critical Area 100-foot buffer plus expansions for wetlands, highly erodible soils, hydric soils, etc.*

5.5.6.3 Minimization and Mitigation

Design of the Selected Alternative will include efforts to avoid or minimize impacts on water quality, FIDS and FIDS habitat, SSPRA, forests and woody clusters, and other habitats and riparian buffers. The MDTA will coordinate with the Chesapeake Bay Critical Area Commission and adhere to the requirements established within any impact authorization provided under COMAR 27.01. The MDTA will prioritize minimization by reducing the roadway footprint in Critical Area habitats and natural shorelines through the use of 2:1 slopes and other ESD measures where practicable.

The MDTA will incorporate mitigation strategies to address both short-term and long-term impacts. Restoring damaged habitats, such as replanting impacted vegetation communities or creating new wetlands, can help offset ecological losses. Mitigation will be required for impacts to all forest within the Critical Area at a ratio ranging from 1:1 to 3:1 depending on the percent of forest and woody cluster acreage cleared, designated land use classification, and whether impacts fall within the identified Critical Area Buffer.

Outside the 100-foot Critical Area Buffer land use designation, the following forest mitigation replacement ratios will apply:

- If less than 20% of the onsite forest cover is cleared in the RCA or LDA, the mitigation ratio would be 1:1.
- If 20-30% of onsite forest cover is cleared in the RCA or LDA, the mitigation ratio would be 1.5:1.
- If more than 30% of the onsite forest cover is cleared in the RCA or LDA a variance from the local government may be required, and when permitted, a 3:1 mitigation ratio would be required.

Final mitigation ratios will be coordinated with the Critical Area Commission during design. However, to estimate mitigation needs, the MDTA assumed that the mitigation ratio for impacts within the Critical Area (outside the Expanded Buffer) is 2:1 and the ratio for impacts within the Expanded Buffer is 3:1. **Table 5-48** summarizes the estimated forest and woody cluster mitigation needs associated with the Preferred Alternative and optional SUP.

Table 5-48: Preferred Alternative Estimated Forest and Woody Cluster Mitigation Needs (Acres)

Critical Area Land Use Classification	Preferred Alternative			Additional Optional SUP Impacts		
	Impact	Mitigation Ratio	Estimated Mitigation	Impact	Mitigation Ratio	Estimated Mitigation
Critical Area (outside Expanded Buffer)	39.2	2:1	78.4	0.7	2:1	1.4
Critical Area Expanded Buffer*	8.2	3:1	24.6	0.6	3:1	1.8
Total	**47.4**	**--**	**103.0**	**1.3**	**--**	**3.2**

**These numbers include the Critical Area 100-foot buffer plus expansions for wetlands, highly erodible soils, hydric soils, etc.*

Within the 100-foot Critical Area Buffer, when a variance has been approved for new development or re-development, trees or vegetation must be replaced at a 3:1 mitigation ratio. However, Buffer Exemption Areas and Shoreline Access require a 2:1 mitigation ratio, and Shore Erosion Control requires 1:1 replacement. In IDAs, there are no Critical Area reforestation requirements.

The MDTA will replace impacted trees and forests within the LOD where practicable; however, it is expected that all required reforestation and/or afforestation is not feasible on-site. A desktop search and windshield survey were completed to identify potential off-site mitigation opportunities within the Critical Area. Fifty-six (56) potential sites totaling 1,790.7 acres fell entirely or partially within the Critical Area. On-site investigations and coordination with the Critical Area Commission will be completed during final design to select a mitigation site for off-site reforestation/afforestation. All forest and woody cluster mitigation will be completed using native species and gaps identified in the HCN database will be targeted for both on-site and off-site restoration.

The MDTA will work with MDE to develop ESC/SWM plans to further protect Critical Area resources in accordance with Critical Area regulations. The MDTA will be required to design the Preferred Alternative to reduce stormwater runoff pollution by at least 10 percent below that of existing land use within impact areas associated with the IDA of the Critical Area.

Figure 5-23: FIDS Habitat – Anne Arundel County

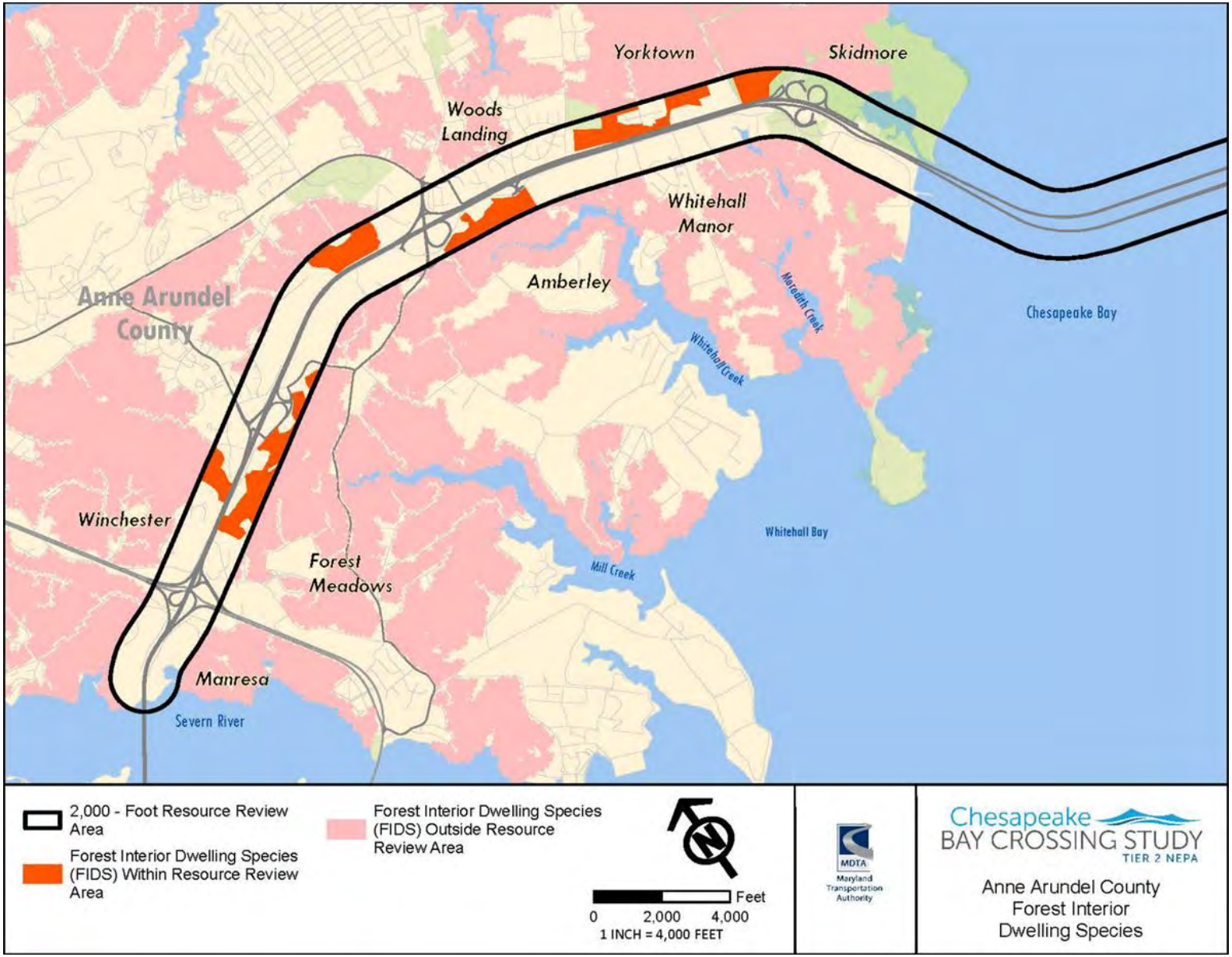
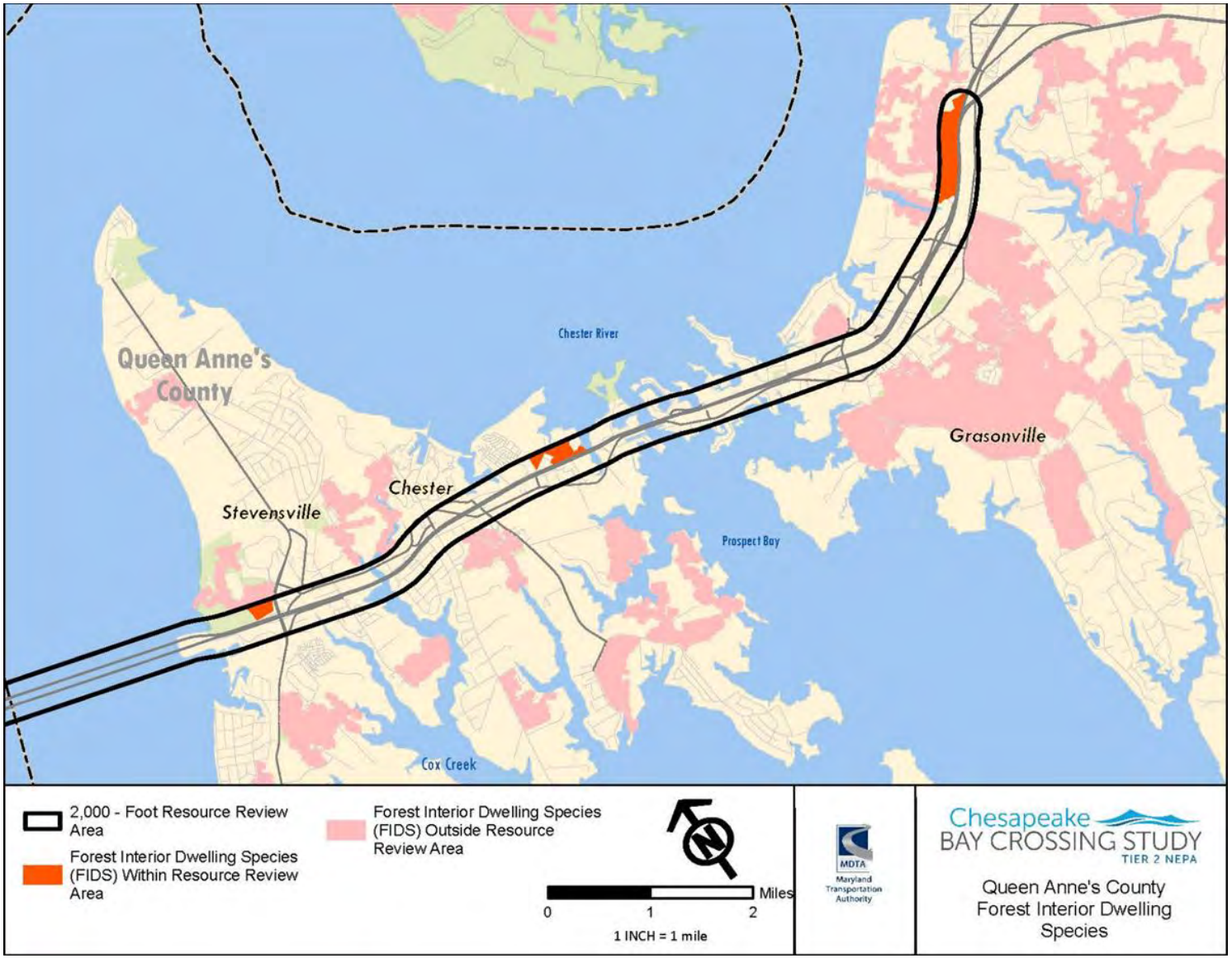


Figure 5-24: FIDS Habitat – Queen Anne's County



5.5.7 Aquatic Habitat and Biota

5.5.7.1 Aquatic Habitat

Aquatic habitats are protected under state and Federal regulations that apply to specific habitat types or designations, including waterfowl staging and concentration areas, colonial waterbird nesting areas, Essential Fish Habitat (EFH), Habitat Areas of Particular Concern (HAPC), and SAV. Aquatic habitats are also regulated as WOTUS, which are discussed in **Section 5.5.5**.

Waterfowl Staging and Concentration Areas

Waterfowl staging and concentration areas are protected through COMAR Title 27, the MDNR Critical Area Commission for the Chesapeake and Atlantic Coastal Bays. Therefore, these habitat areas are regulated within the 1,000-foot Critical Area boundary and the 100-foot Critical Area Buffer. The location of waterfowl staging and concentration areas within the resource review area was determined through a review of the Maryland Living Resources – Waterfowl Areas, a GIS data polygon layer (MD iMap, 2023), and through coordination with MDNR Wildlife and Heritage Service (WHS).

Colonial Waterbird Nesting Areas

Correspondence with MDNR WHS indicated the potential presence of colonial nesting waterbirds using the pier "islands" associated with the Bay Bridge as nesting sites. Species identified to use these areas include the Great Egret (*Ardea alba*), Snowy Egret (*Egretta thula*), Cattle Egret (*Bubulcus ibis*), and Black-Crowned Night Heron (*Nycticorax nycticorax*).

Nests of Great Blue Herons are found in colonies, high up in trees close to water, and one colony has been documented within the resource review area. According to MDNR WHS, there is an active colony at Mezick Pond in Sandy Point State Park in Anne Arundel County.

Several publicly available data sources were used to characterize tidal and nontidal aquatic habitat, including the Atlantic Coastal Fish Habitat Partnership (ACFHP) species-habitat matrix, data from the Anne Arundel County Bureau of Water Protection and Restoration (AABWPR), and other GIS data sources. For more information regarding aquatic habitat regulations and methodology, see the *Natural Environment Technical Report*.

EFH, SAV, and HAPC

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the primary Federal law that governs fisheries resources and management in the United States. NOAA Fisheries regulates EFH and HAPC within the tidal waters of the resource review area. Pursuant to Section 305(b)(2) of the MSA, FHWA and the MDTA, acting as FHWA's designated non-Federal representative, have prepared an *EFH Assessment*. FHWA submitted the *EFH Assessment* and a letter requesting initiation of consultation for EFH to NOAA Fisheries on November 28, 2025 (See **Appendix C**). Coordination with NOAA Fisheries for EFH will continue through the design process. EFH includes various habitat types such as SAV, mudflats, salt marsh, and tidal waters. To evaluate the presence of EFH and HAPC within the resource review area, the NOAA Fisheries online EFH Mapper (NOAA Fisheries, 2021) was used to identify potential EFH and HAPCs. The results of the EFH Mapper were refined based on species habitat parameters outlined in the EFH text descriptions and the fishery management plans prepared by the Mid-Atlantic Fishery Management Council (MAFMC) and Atlantic States Marine Fisheries Commission (ASMFC) in coordination with NOAA Fisheries.

SAV is protected under several Federal and state regulations. SAV provides valuable habitat for Federally managed and resident fishes, crustaceans, sea turtles, birds, and marine mammals. SAV is Federally regulated under Section 404 of the CWA (33 USC 1344) and Section 10 of the Rivers and Harbors Act (33 USC 403). SAV is also regulated by NOAA Fisheries as a HAPC for summer flounder within the resource review area and is included in the *EFH Assessment* located in **Appendix C** and provided as a supporting technical document. SAV is directly protected under the Coastal Zone Management Act (15 CFR 930.11) as a "resource." The Maryland Tidal Wetlands Act and the related COMAR 26.24 protect SAV as a tidal wetland resource regulated by MDE.

Affected Environment

Nontidal and Tidal Aquatic Habitat

Nontidal aquatic habitats within the resource review area include nontidal stream reaches and ponds. These habitats support a diverse array of biota, including resident and migratory fish, crustaceans such as crayfish, amphibians, including salamanders and frogs, a diverse array of benthic macroinvertebrates, and SAV. In Anne Arundel County within the Lower Severn River MD 12-digit watershed, AABWPR assessed nontidal aquatic habitat at two sites just upstream of U.S. 50/301 on Mill Creek and an unnamed tributary to Mill Creek. Compared to reference streams, the nontidal aquatic habitat quality in Anne Arundel County is highly variable and ranges from degraded to supporting a few of the reference habitat functions. Recent nontidal aquatic habitat data was not available for the Queen Anne's County watersheds that cross the resource review area, as these small, nontidal stream reaches have not been assessed in recent years by state or county nontidal monitoring programs. Nontidal stream health for the watersheds located on Kent Island is rated as "Poor" to "Fair" according to the benthic macroinvertebrate stream health index (Chessie BIBI) developed by the Interstate Commission on the Potomac River Basin (ICPRB) and applied to Chesapeake Bay watersheds (ICPRB, 2025). The stream health rating for these watersheds was determined from historic MBSS benthic macroinvertebrate data that was collected between 2000 and 2017 and the sites closest to the resource review area were assessed from 2002 to 2008. In tidal areas, bottom substrates such as mud, sand, man-made and natural oyster rubble, man-made oyster reef, and rock reef provide habitat for benthic organisms and support oyster reef habitat that provides nursery and foraging grounds for a rich diversity of species, including resident and migratory fish, such as striped bass, croaker, and summer flounder, blue crabs, shrimp, mussels, sea anemones, and many others. Shallow water areas provide habitat for blue crabs, horseshoe crabs, SAV, and many fish species. Deep water habitats support numerous fish species, blue crabs, bottlenose dolphins, and sea turtles. See **Section 5.5.7.2** for further discussion of aquatic biota and **Section 5.5.5.2** for further discussion of the Chesapeake Bay and its substrate. Vernal pools are typically associated with aquatic habitat during certain times of the year. These are seasonal, shallow wetlands, characterized by their temporary presence of water that forms a "pool" largely in the winter and spring. They provide a unique habitat for species adapted to these temporary aquatic environments, including salamanders, frogs, and shrimp. Of the 144 total wetlands delineated, 13 were identified as potential vernal pools. See **Section 5.5.5** for further discussion of wetland habitats.

EFH, SAV, and HAPC

A review of the NOAA Fisheries EFH Mapper revealed that the entire tidal in-water portion of the resource review area is considered EFH. This includes the Chesapeake Bay and tidal portions of all major waterways.

SAV has been designated as HAPC for summer flounder by the MAFMC and is considered a priority habitat by NOAA Fisheries and MDNR resource managers. The largest concentrations of SAV are in the tidal creeks of Queen Anne's County surrounding Kent Island Narrows and eastward, including Winchester Creek, Muddy Creek, and Marshy Creek. These locations are generally in shallow, gentle-current water bodies with silty and sandy bottoms. SAV is also found on the eastern shoreline of the Chesapeake Bay mainstem along Terrapin Nature Park, north of the existing Chesapeake Bay Bridge. Most of the SAV beds mapped in 2023 were identified as dense SAV beds (>70% cover).

Historical mapping shows that SAV beds were much more abundant from 1971 through the early 2000s than they are currently. Numerous studies suggest that increased nutrient loading is the primary cause of declines in SAV beds. SAV likely to grow within the resource review area ranges from freshwater to mesohaline species that can tolerate moderate salinity levels. Fourteen different SAV species were documented within the resource review area in the past five years (2019-2023). SAV beds are shown in **Figure 5-25**.

Waterfowl Staging and Concentration Areas

According to the MDNR WHS, which provided a response letter dated January 18, 2024 (see *Appendix M* of the *Natural Environment Technical Report*), three waterfowl staging and concentration areas overlap the resource review area. One area is located on the western shoreline of the Chesapeake Bay, south of U.S. 50/301, and includes shorelines of Meredith Creek, and Whitehall Creek. A second area is located along the eastern shoreline of the Chesapeake Bay, north of U.S. 50/301 and west of Kent Island. The third area is in Prospect Bay, south of U.S. 50/301 and east of Kent Island. Waterfowl areas are shown in **Figure 5-26**.

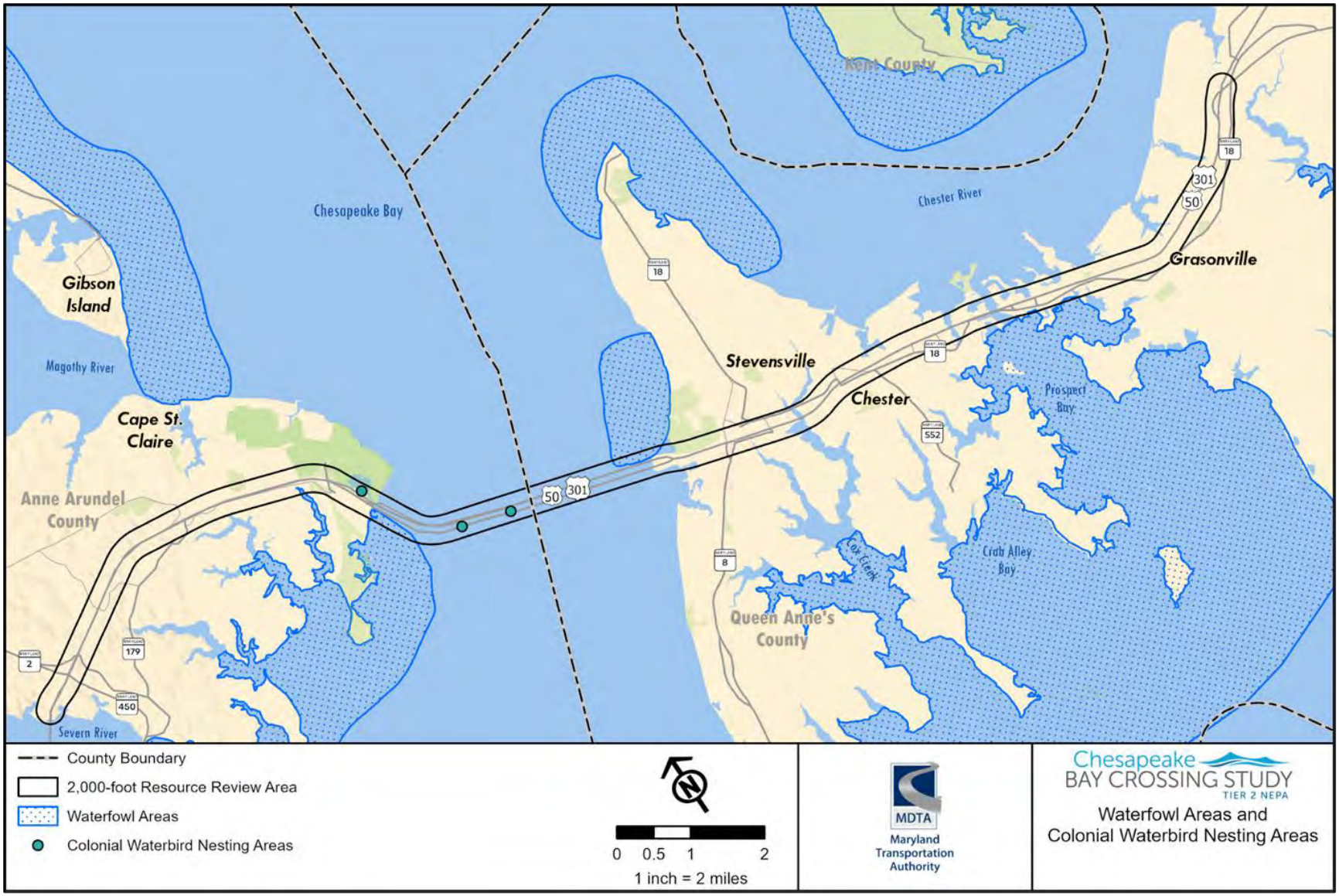
Colonial Waterbird Nesting Areas

Based on the MDNR WHS letter dated January 18, 2024 (see *Appendix M* of the *Natural Environment Technical Report*), the pier "islands" associated with the Chesapeake Bay Bridge are used by various colonial waterbird species as nesting sites. The species include the Great Egret (*Ardea alba*), Snowy Egret (*Egretta thula*), Cattle Egret (*Bubulcus ibis*), and Black-Crowned Night Heron (*Nycticorax nycticorax*). An active Great Blue Heron nesting colony has been documented by MDNR at Mezick Pond in Sandy Point State Park in Anne Arundel County. A 660-foot protection buffer is afforded to nesting colonies of Great Blue Heron. Colonial waterbird nesting areas are shown in **Figure 5-26**.

Figure 5-25: Submerged Aquatic Vegetation



Figure 5-26: Waterfowl Areas and Colonial Waterbird Nesting Areas



Environmental Consequences

The No-Build Alternative would have no impacts to nontidal and tidal aquatic habitat.

The build alternatives, including the Preferred Alternative, would impact aquatic habitat and biota by removing or altering aquatic habitat during construction and/or would degrade habitat and affect biota during operation of a build alternative. Bridge design resulting in reduced channel width can alter flow regimes; sedimentation can result from increased turbidity caused by in-water construction, dredging, and equipment deployment; dredging results in a change in substrate composition; blasting and pile driving result in increased underwater noise; and constructing a wider bridge can increase shading on underwater habitats below. All build alternatives, including the Preferred Alternative, would have similar types of potential impact to aquatic habitats. The primary difference between build alternatives, including the Preferred Alternative, is the magnitude of those impacts, with the wider alternatives across the Bay (Alternatives F and G) requiring larger bridge piers, and the longer alternatives (Alternatives D, E, F, and G) including additional proposed construction at the Kent Narrows and other tidal waterways east of the Bay. Alternatives B, C, and the Preferred Alternative have the fewest aquatic habitat impacts relative to the other build alternatives. Impacts to aquatic habitat relate to the number and size of bridge piers needed, pier placement, construction techniques, construction access and duration, and the success of implemented ESC and stormwater BMPs. Impacts to aquatic habitat associated with bridge and roadway operations are consistent with current conditions and include potential water quality degradation from pollutants washed into waterways by stormwater runoff from increased impervious surfaces. **Table 5-49** provides a summary of how aquatic habitats may be altered by construction and operation of the build alternatives, including the Preferred Alternative, and the likely effects on biota.

Table 5-49: Impacts to Aquatic Habitat and Biota

Type of Impact	Effects on Aquatic Biota
Increased flow volumes	• Alterations in habitat complexity • Changes in availability of food organisms • Reduced prey diversity • Scour-related mortality • Accelerated streambank erosion and/or sedimentation • Increasing bed load movement decreases the permanence of benthic habitats
Decreased base flows	• Crowding and increased competition for foraging sites • Increased vulnerability to predation • Increased fine sediment deposition • More extreme water quality conditions (e.g., higher summer temperatures or contaminant concentrations)
Sedimentation or siltation	• Reduced survival of eggs and young, loss of spawning habitat due to deposition • Reduced macroinvertebrate reproduction from siltation of pools • Reduction in SAV bed area or density
Changes in substrate composition	• Reduced survival of eggs • Reduced aquatic insect production • Reduced species diversity and abundance
Changes in depth characteristics	• Changes in movement patterns • Alteration of species composition (e.g., loss of shallow water species)

Type of Impact	Effects on Aquatic Biota
Increase in water temperature	• Changes in movement patterns • Increased metabolic activity; increased susceptibility to disease and parasites • Increased mortality of sensitive fish species
Water quality degradation	• Reduced survival of eggs and young • Acute and chronic toxicity to juveniles and adult fish • Loss of sensitive species, including localized extirpation • Increased physiological stress
Increased turbidity	• Reduced survival of eggs • Reduced plant productivity • Physiological stress on aquatic organisms
Increased underwater noise (pressure waves)	• Injury or direct mortality • Behavior modifications (e.g., avoidance and alteration of movement patterns, including spawning disruption)
Increased shading	• Behavior modifications for aquatic biota • Alteration of community structure (e.g., reduced benthic macroinvertebrate density or diversity) • Reduction in photic zone for SAV

There is an array of aquatic habitat types and biota living within these systems. These include SAV, oyster bars/bottom, EFH, fish, blue crabs and horseshoe crabs, waterfowl staging and concentration areas, colonial waterbird nesting areas, and marine mammals. **Table 5-50** provides the quantitative impacts to aquatic habitat and biota by build alternative, including the Preferred Alternative, and **Table 5-51** provides the potential impacts from the SUP option for each build alternative, including the Preferred Alternative. As shown in **Table 5-50**, refinements made to the Preferred Alternative reduced impacts to nontidal and tidal waterways by 0.1 acre compared to impacts for Alternative C. Additionally, **Table 5-51** shows the reduction in impacts to NOBs, historic oyster bottom, public shellfisheries, and EFH due to refinements made to the Preferred Alternative SUP option.

Table 5-50: Aquatic Habitat Impacts

Habitat	No-Build	Build Alternative						
		B	C	D	E	F	G	**Preferred Alternative**
Nontidal and Tidal Wetlands* (Acres)	0	6.0	5.6	11.5	11.1	12.0	11.5	5.6
Nontidal and Tidal Waterways* (Acres)	0	1.2	1.2	5.8	5.6	6.3	6.2	1.1
5-Year SAV 2019-2023 (Acres)	0	0.4	0	0.7	0.4	0.9	0.4	0
Past SAV 2000-2018 (Acres)	0	0.3	0	0.7	0.5	0.9	0.5	0
NOB (Acres)	0	9.4	10.2	12.6	13.3	13.8	14.6	10.2
Historic Oyster Bottom (Acres)	0	24.8	24.1	28.7	28.0	29.5	28.9	24.1
Oyster Plantings (Acres)	0	0	0	0	0	0	0	0
Oyster Sanctuaries (Acres)	0	0.6	0.6	1.1	1.1	1.6	1.6	0.6

Habitat	No-Build	Build Alternative						
		B	C	D	E	F	G	**Preferred Alternative**
Public Shellfisheries (Acres)	0	5.6	6.1	8.8	9.3	9.3	9.8	6.1
EFH** (Acres)	0	133.2	136.0	137.0	139.8	140.4	143.5	136.0
Horseshoe Crab Habitat (Linear Feet)	0	2,100	290	2,100	290	2,240	290	290
Waterfowl Staging and Concentration Areas (Acres)	0	7.1	2.5	7.1	2.5	7.1	2.5	2.5
Colonial Waterbird Nesting Areas (Location)	0	Mezick Pond, Bay Bridge Pier Islands						
Marine Mammals (Location)	0	Chesapeake Bay						

**Nontidal and Tidal wetland and waterway Impacts do not include habitat within the Chesapeake Bay.*
***Impacts within the Chesapeake Bay and other tidal waters reported in **Section 5.5.5** do not equal the EFH impact areas reported here, since the EFH impact estimate does not take into account engineering details such as pier/pier protection area.*

Table 5-51: SUP Aquatic Habitat Impacts

Habitat	No-Build	Build Alternative						
		B	C	D	E	F	G	**Preferred Alternative**
Nontidal and Tidal Wetlands* (Acres)	0	0.7	0.7	0.7	0.7	0.8	0.7	0.7
Nontidal and Tidal Waterways* (Acres)	0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
5-Year SAV 2019-2023 (Acres)	0	0.3	0	0.3	0	0.4	0	0
Past SAV 2000-2018 (Acres)	0	0.3	0	0.3	0	0.5	0	0
NOB (Acres)	0	0.8	0.9	0.8	0.9	0.8	0.9	0.6
Historic Oyster Bottom (Acres)	0	1.0	1.0	1.0	1.0	1.0	1.1	0.6
Oyster Plantings (Acres)	0	0	0	0	0	0	0	0
Oyster Sanctuaries (Acres)	0	0	0	0	0	0	0	0
Public Shellfisheries (Acres)	0	0.5	0.6	0.5	0.6	0.5	0.6	0.4
EFH (Acres)	0	4.0	4.0	4.0	4.0	4.2	4.3	2.4
Horseshoe Crab Habitat (Linear Feet)	0	430	0	430	0	300	0	0
Waterfowl Staging and Concentration Areas (Acres)	0	0.1	0	0.1	0	0.1	0	0
Colonial Waterbird Nesting Areas (Location)	0	Mezick Pond, Bay Bridge Pier Islands						
Marine Mammals (Location)	0	Chesapeake Bay						

**Nontidal and Tidal wetland and waterway Impacts do not include habitat within the Chesapeake Bay.*

All build alternatives, including the Preferred Alternative, would affect EFH within the Chesapeake Bay, as the entire Chesapeake Bay and tidal waterways within the LOD of all build alternatives are considered EFH. All build alternatives, including the Preferred Alternative, would have permanent impacts from the placement of structures on the Chesapeake Bay bottom, noise and

vibration impacts from pile driving and blasting, and temporary construction impacts. The primary difference between build alternatives, including the Preferred Alternative, is the magnitude of those impacts.

Alternatives B, C, and the Preferred Alternative encompass approximately 133 to 136 acres of EFH within their LOD and include existing bridge crossings over the Chesapeake Bay and Cox Creek. Alternatives D, E, F, and G encompass approximately 137 to 143 acres of EFH within their LOD and include existing bridge crossings over the Chesapeake Bay and Cox Creek, and additional crossings over Piney Creek and Kent Narrows. New construction over waters, as opposed to only adjacent to waterways, can increase risk for materials debris, accidental spills directly within the waterway, and/or alter hydrology due to equipment or materials, even if only temporarily. Therefore, Alternatives D, E, F, and G would have a greater potential to impact EFH. Direct impacts to EFH include increased turbidity, stirring up sediment within the water column, which can deplete DO; permanent fills and associated irretrievable loss of EFH; noise and vibration impacts; and habitat conversion (e.g., soft bottom habitat to riprap).

The build alternatives, including the Preferred Alternative, would impact SAV by direct removal during dredging operations and indirectly through changes in shallow water depth regimes, increased turbidity, sedimentation, and shading. Additional impacts to SAV through modification of aquatic habitat are detailed in **Table 5-50**. Alternative C and the Preferred Alternative are anticipated to avoid direct impacts to SAV, including SAV beds recorded in the last 5-years and historic SAV beds. Based on 5-year data, Alternative B would impact 0.4 acre of SAV and Alternatives D, E, F, and G range in SAV impacts from 0.4 to 0.9 acre. Impacts to historic SAV beds (2000-2018) would be similar to SAV beds mapped in the last 5-years, with Alternative B impacting 0.3 acre of historic SAV and other alternatives ranging from 0.5 acres for Alternatives E and G to 0.9 acres for Alternative F. Alternative F would have the greatest impact to SAV. SAV beds located closest to U.S. 50/301 are found in Piney Creek and Winchester Creek, as well as the eastern shoreline of Queen Anne's County, north of the Bay Bridge. As the widest alternatives, Alternatives F and G would have the largest shading impacts, reducing the amount of light reaching the photic zone and affecting the ability of plants to photosynthesize, and potentially altering community structure (e.g., reduced benthic macroinvertebrate density). Specific shading impacts would be determined in final design. The build alternatives, including the Preferred Alternative, will adversely affect summer flounder HAPC (SAV), as indicated in the *EFH Assessment*. Alternatives D, E, F, and G have the greatest potential to impact SAV due largely to their encroachment into additional waterways beyond those affected by Alternatives B, C, and the Preferred Alternative, specifically Piney Creek and Kent Narrows.

The existing Bay Bridge and associated underwater structures provide important habitat for numerous aquatic biota, including recreationally and commercially-valuable species (e.g., striped bass and white perch), acting as a congregation area for biota seeking shelter and food. This aggregation is, to some extent, influenced by the hydrodynamic effects of the bridge (e.g., flow refugia in eddies behind piers). The demolition of the existing bridge spans would result in permanent loss of these habitat features. The new bridge spans proposed for the build alternatives would create new underwater habitat structures, but the congregation areas associated with the old bridge structures would be lost.

Dredged areas will be in place throughout the construction duration. Although the exact timing of the dredging is unknown, an estimated two thirds of the dredging will take place in the first and second years of construction to accommodate the eastbound bridge. This initial dredged area

will remain in place for 15 years or more if there is a gap between construction of the two bridges. The remaining one third of dredging will take place at the start of construction of the westbound bridge and is estimated to be in place for 8 years. Dredging for the eastbound bridge is estimated to take up to 14 days to complete and dredging for the westbound bridge is estimated to take up to 7 days to complete. During these approximately 21 days of dredging in the shallow areas of the Chesapeake Bay within the Preferred Alternative LOD, increases in sedimentation and turbidity will likely impact fish behavior and biology throughout the EFH action area, as fish avoid shallow waters and respond to increased turbidity. Due to the duration of the placement of dredge material, any pre-existing habitat within the proposed dredging footprint would be considered permanently lost. Within the dredged area, benthic contours would be restored, and benthic habitat would begin to re-establish after the construction period. Other potential impacts of dredging to all Federally managed species and life stages present within the EFH action area for the Preferred Alternative include:

- the generation of suspended solids/turbidity and the resultant degradation of surface water quality and sediment quality;
- a decreased photic zone due to increased turbidity;
- elimination of benthic populations within the dredging zone;
- deposition of dredge-induced suspended sediment on benthic populations downstream of the dredging zone;
- alteration of bottom substrate and depth characteristics of niche habitats in shallow waters potentially displacing species adapted to those habitats;
- fish mortality from dredge equipment;
- disruption of normal foraging or spawning behaviors of fauna;
- gill injury to fish from exposure to local increases in turbidity; and/or
- re-suspension of contaminants, and/or release of nutrients resulting in eutrophication of the waters and increase biological oxygen demand and subsequent reduction of dissolved oxygen.

5.5.7.2 Aquatic Biota

Aquatic biota that are also considered RTE species, such as sea turtles and sturgeon, are included in **Section 5.5.9** and not in this section. For more information regarding regulations and methodology for aquatic biota, see the *Natural Environment Technical Report*.

Benthic Macroinvertebrates

As required by the CWA (Sections 305b and 303d), MDE uses biological monitoring data to determine impaired waterbodies within Maryland. MDE assesses waterbodies using Index of Biotic Integrity (IBI) ratings for benthic macroinvertebrates and fish to determine if the water quality is impaired.

Fish

NOAA Fisheries and MDNR both regulate fish species, and NOAA regulates EFH and fish species that rely on this habitat. See **Section 5.5.7.1 Aquatic Habitat** for information regarding the MSA and EFH regulations. Impacts to Federally managed species including migratory fish and species identified by the NOAA Fisheries online EFH Mapper (NOAA Fisheries, 2021) were considered in the *EFH Assessment*. The Chesapeake Fish Passage Prioritization database and MDNR's diadromous fish GIS data were used to identify fish species within the resource review area. Tidal data from the Chesapeake Bay Multispecies Monitoring and Assessment Program were received

from the Virginia Institute of Marine Science. Telemetry data on tagged fish movements in the vicinity of the resource review area was obtained from NOAA Fisheries and partners through the Mid-Atlantic Acoustic Telemetry Observation System. NOAA Fisheries provided a summary of telemetry data in the vicinity of the Chesapeake Bay Bridge and associated figures on October 1, 2025.

SAV

SAV regulations are summarized in **Section 5.5.7.1 Aquatic Habitat**.

Oysters

Maryland's oyster laws include seasonal restrictions to protect key periods of oyster growth and reproduction, specifically related to legally described NOBs (COMAR 08.02.23.02) and to areas open to recreational and commercial harvest, known as Public Shellfish Fishery Areas ([PSFA]; COMAR 08.02.04.17). Oyster sanctuaries, or designated non-harvest zones, aim to foster oyster growth and reproduction without disruption (COMAR 08.02.04.15). MDNR issues a public notice annually, no later than July 1, which establishes the yearly parameters for Maryland's recreational and commercial oyster fishery (COMAR 08.02.04.02).

Blue Crabs and Horseshoe Crab

MDNR regulates Maryland's blue crab (*Callinectes sapidus*) harvest for sustainability and ecosystem health, including size limits, seasonal and gender restrictions, guidelines for harvesting methods, bushel limits, and licensing requirements. MDNR partners with the ASMFC to regulate Maryland's horseshoe crab harvest for sustainable commercial and medical use as well as for ecological function.

Marine Mammals

The Marine Mammal Protection Act (MMPA) prohibits "any person, vessel, or conveyance to take any marine mammal in waters or on lands under the jurisdiction of the United States." NOAA Fisheries may approve small takes of marine mammals incidental to specified activities during periods of not more than five consecutive years (16 USC § 1361).

Affected Environment

Benthic Macroinvertebrates

In Anne Arundel County, AABWPR assessed benthic macroinvertebrate communities at two sites in the resource review area. One site on the nontidal Mill Creek in the Lower Severn River watershed, just upstream of U.S. 50/301, had a "Poor" benthic macroinvertebrate community health rating, which indicates some habitat degradation.

Nontidal benthic macroinvertebrate data was not available for the Queen Anne's County watersheds that cross the resource review area, as these small, nontidal stream reaches have not been assessed in recent years by state or county nontidal monitoring programs. Nontidal stream health for the watersheds located on Kent Island is rated as "Poor" to "Fair" according to the Chessie BIBI (ICPRB, 2025). The stream health rating for these watersheds was determined from historic MBSS benthic macroinvertebrate data that was collected between 2000 and 2017 and the sites closest to the resource review area were assessed from 2002 to 2008. Watershed conditions and stream health may have changed somewhat since these assessments but would be expected to remain in the "Poor" to "Fair" category or be further reduced in quality due to ongoing agricultural use and increased development in these watersheds.

MDNR tidal benthic macroinvertebrate data was available for the Lower Severn River, Annapolis Shore, Grasonville South, and Chester River South MD 12-digit watersheds, with IBI scores ranging from “meets restoration goals” to “severely degraded”.

Fish

MDNR ERP indicated a diverse range of resident and migratory finfish species inhabiting the tidal portion of the Chesapeake Bay, which have the potential to occur in the vicinity of the resource review area. These species support important commercial and recreational fisheries for striped bass (*Morone saxatilis*), white perch (*Morone americana*), Atlantic menhaden (*Brevoortia tyrannus*), spot (*Leiostomus xanthurus*), Atlantic croaker (*Micropogonias undulatus*), red drum (*Sciaenops ocellatus*), black drum (*Pogonias cromis*), weakfish (*Cynoscion regalis*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), and walleye (*Sander vitreus*). Important forage fish also occur, including Atlantic menhaden and bay anchovy (*Anchoa mitchilli*). NOAA Fisheries telemetry data from just south of the Bay Bridge documents the presence and seasonal patterns of nine different species: alewife (*Alosa pseudoharengus*), American eel (*Anguilla rostrata*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), blueback herring (*Alosa aestivalis*), cownose ray (*Rhinoptera bonasus*), gizzard shad (*Dorosoma cepedianum*), red drum, striped bass, and white perch. The Chesapeake Bay Bridge is a hotspot for recreational and commercial fishing activities.

The existing bridge structure provides important habitat for recreational and commercial fish species, acting as a congregation area for fish seeking shelter and food. The mainstem Chesapeake Bay is a significant migratory pathway for all diadromous species migrating/emigrating to/from the upper Bay and its tributaries. Tidal data from the Chesapeake Bay Multispecies Monitoring and Assessment Program were received from the Virginia Institute of Marine Science on January 18, 2024. Twenty-six species were detected at stations sampled from 2013 through 2023 and falling within five miles of the Chesapeake Bay Bridge. The Chesapeake Fish Passage Prioritization database and MDNR’s diadromous fish GIS data indicate there are various diadromous fish species within the resource review area, including American shad (*Alosa sapidissima*) and hickory shad (*Alosa mediocris*), in addition to many of the species listed above. However, there are several migration barriers within the Magothy River South Shore 12-digit watershed, the Lower Severn River 12-digit watershed, and the Chester River South 12-digit watershed, which affect the historical range of the diadromous fish species that utilize these watersheds.

Fish community health is moderately degraded along the nontidal Cat Branch within the Magothy River South Shore MD 12-digit watershed, ranging from “poor” to “fair” based on fish IBI ratings. Eleven fish species are documented along Cat Branch during the AABWPR assessment, all of which are considered tolerant of degraded conditions or have no tolerance designation. Nontidal fish data was not available for the Eastern Shore watersheds crossed by the resource review area. However, MDNR Environmental Review Program (ERP) indicated that nine fish species have been previously documented on the Wye River, which falls within the Upper Wye River MD 12-digit watershed. See the *Natural Environment Technical Report* for additional information regarding fish species.

The January 14, 2025, results from the EFH Mapper refined with EFH text descriptions and FMP habitat parameters indicate the presence of EFH for the following species and life stages within the resource review area: juvenile and adult black sea bass (*Centropristis striata*); juvenile and adult bluefish (*Pomatomus saltatrix*); juvenile and adult windowpane flounder (*Scophthalmus*

aquosus); larvae, juvenile, and adult summer flounder (*Paralichthys dentatus*); egg, larvae, juvenile, and adult Atlantic butterfish (*Peprilus triacanthus*); and juvenile and adult scup (*Stenotomus chrysops*).

The HAPC identified within the resource review area is for summer flounder and includes "all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH; in locations where native species have been eliminated from an area, then exotic species are included."[25]

SAV

SAV is an aquatic habitat as well as a living aquatic resource. Presence of SAV is discussed in **Section 5.5.7.1 Aquatic Habitat, Affected Environment**.

Oysters

The eastern oyster (*Crassostrea virginica*) is an important commercial fishery in the Chesapeake Bay and its tributaries. Oyster beds are located throughout the Chesapeake Bay (**Figure 5-28**). NOBs exist in the shallow areas of the Severn River and from approximately 1,500 feet to 4,500 feet off the Anne Arundel County shoreline towards the main channel and extend north and south of the Chesapeake Bay Bridge. NOBs exist from approximately 4,100 feet to 6,200 feet off the Queen Anne's County shoreline towards the main channel, extending north and south of the Chesapeake Bay Bridge. Most tidal crossings along Kent Island cross NOBs, including Thompson Creek, Cox Creek, Kent Island Narrows, and Marshy Creek.

Historic oyster bottom habitat generally falls in the same areas as NOBs, with differences in specific boundaries. Cultch areas are found in concentrated areas along both the Anne Arundel and Queen Anne's County shorelines.

One oyster planting area, Sandy Point South, is located at the edge of the resource review area, south of the Chesapeake Bay Bridge and approximately 3,500 feet from the Anne Arundel County shoreline towards the main channel.

Oyster sanctuaries are present where the resource review area crosses the Severn River, Thompson Creek, Cox Creek, Macum Creek, and Piney Creek.

PSFAs overlap NOBs off the Anne Arundel County shoreline towards the main channel and within Kent Island Narrows and adjacent tidal connections.

Blue Crabs and Horseshoe Crabs

An important recreational and commercial fishery of the Chesapeake Bay, blue crab populations are naturally highly variable from year to year. The total blue crab population has had an overall declining trend since 2019. There are several factors that are likely contributing to blue crab population declines, including harvest, water quality, loss of critical habitat such as SAV and marshes, increased predation, rising water temperatures, and changes in ocean currents, which affect juvenile recruitment to nursery areas. Blue crab habitat includes SAV beds, oyster reefs, wetlands, shallows, brackish waters, and deep saltier waters. They tend to be abundant in shallow-water areas during warm weather. As the water temperature drops each year, they burrow into sediment in the deeper parts of the Chesapeake Bay for the winter. See Section 13.7.2 of *Natural Environment Technical Report* for additional information regarding blue crabs.

[25] *Amendment 12 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan* (1998).

Horseshoe crab habitat exists on both the Anne Arundel County and Queen Anne's County shorelines, north of the Chesapeake Bay Bridge (**Figure 5-27**). On the Western Shore, documented habitat exists along the shoreline of Sandy Point State Park and into Mezick Pond, occurring on beaches, vegetation, and structures. On the eastern shoreline of the Chesapeake Bay at Kent Island, horseshoe crab habitat occurs from Terrapin Nature Park south to the Chesapeake Bay Bridge, occurring both on beaches and structures (including the bridge itself). It is worth noting that horseshoe crab habitat areas in MDNR's Living Resources – Chesapeake Bay Horseshoe Crab Habitat GIS layer were derived from sightings that were confirmed by MDNR Fisheries Service; therefore, this data source does not include all potential horseshoe crab habitat. Per coordination with MDNR, horseshoe crab stock in the Chesapeake Bay has not been assessed; however, their abundance is low compared to the coastal stock. Horseshoe crab spawning and nesting have been documented to occur on beaches in the vicinity of this project along the bridge, north of the bridge, and elsewhere.

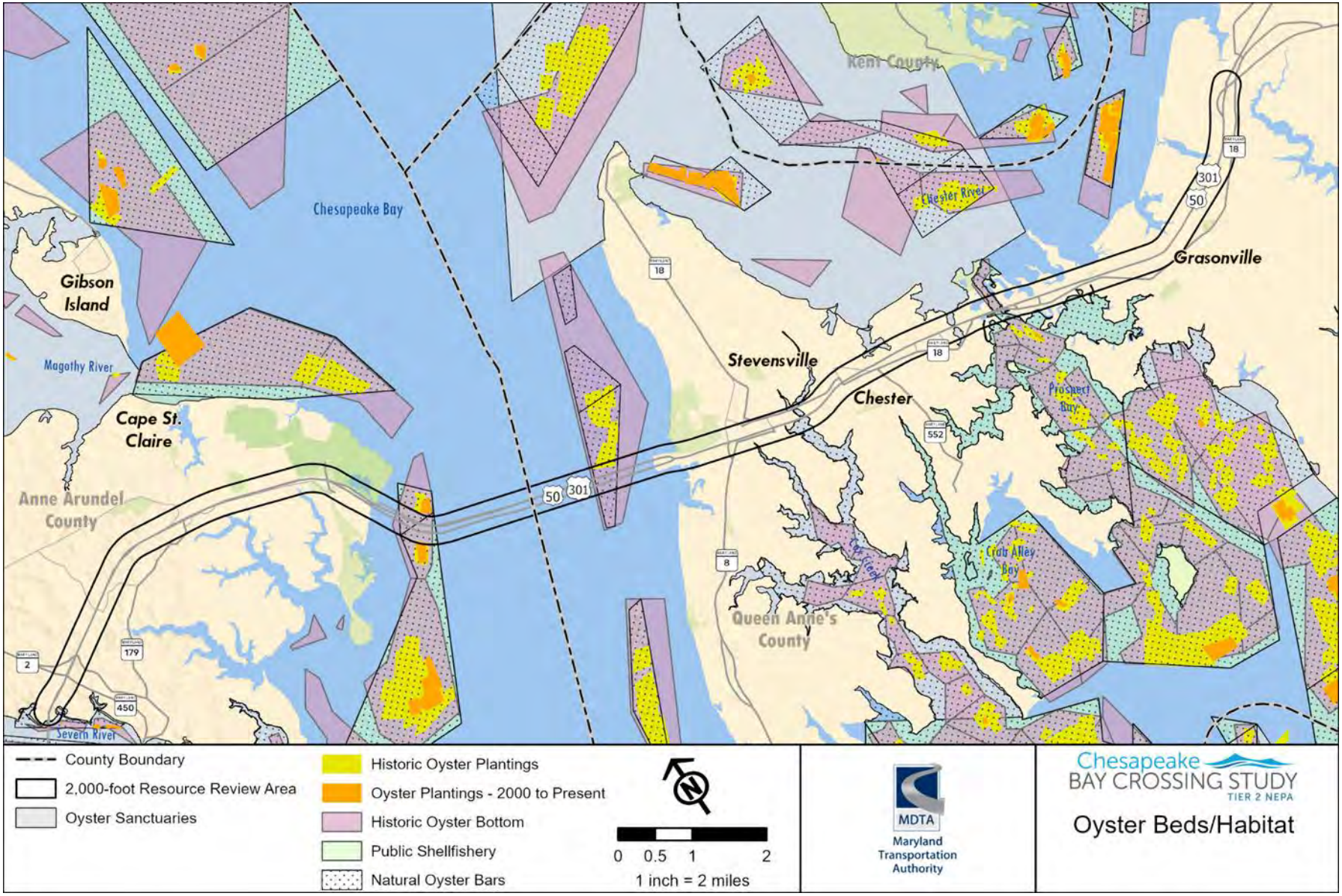
Marine Mammals

The University of Maryland Center for Environmental Science (UMCES) Chesapeake DolphinWatch program compiles reported sightings of bottlenose dolphins from the public and verifies them. A review of the Chesapeake DolphinWatch website indicates that there were nearly 2,000 dolphin sightings in the Chesapeake Bay in 2022 and about 1,500 dolphin sightings in 2023 (UMCES, 2023). Dolphins are typically seen in the Bay from May through October, including around the Bay Bridge. Rodriguez, et al, 2021 analyzed the DolphinWatch data and indicates that dolphins are reported in the Middle Chesapeake Bay, where the project is located, from June through the end of October. Dolphin sightings between June 2017 and October 2019 were fairly evenly distributed, with a total of 1,788 confirmed sightings throughout the Chesapeake Bay, 556 of which were within the Middle Chesapeake Bay. Other species of marine mammals are also found in the Chesapeake Bay and may be transient visitors to this part of the Bay. Harbor seals and harbor porpoises are known to frequent the Bay, while manatees, fin whales, minke whales, North Atlantic right whales, and humpback whales are more rare visitors.

Figure 5-27: Horseshoe Crab Habitat



Figure 5-28: Oyster Beds/Habitat



Environmental Consequences

The No-Build Alternative would have no impact to aquatic biota.

Benthic Macroinvertebrates

All build alternatives, including the Preferred Alternative, would impact benthic macroinvertebrates through dredging, which would result in direct mortality and alter aquatic habitat, as detailed in **Table 5-50**. Temporary and localized increases in turbidity from dredging operations associated with all build alternatives, including the Preferred Alternative, could cause deposition of silt over benthic organisms and destroy benthic food sources. Benthic habitat would also be affected by increased impervious land cover, and habitat loss and direct mortality would occur through the placement of fill/structure for piers, pier protection systems, and pier islands. **Table 5-39** illustrates the overall circumference of new structure/fill proposed within the Chesapeake Bay substrate associated with the build alternatives, including the Preferred Alternative, and **Table 5-40** identifies the amount of dredging anticipated per build alternative. Relative impacts to bottom substrate would be similar across the build alternatives, including the Preferred Alternative, with Alternatives B, D, and F resulting in slightly greater dredging impacts by volume and Alternatives F and G resulting in slightly greater impacts to Bay bottom substrate from pier elements. It may be determined that Kent Narrows would also require dredging, which would increase the potential impacts from Alternatives D, E, F, and G. Alternatives F and G would have the greatest impact to benthic macroinvertebrates from water quality effects of increased impervious area. See **Tables 5-29** and **5-30** for a comparison of impervious surface increases by alternative, including the Preferred Alternative.

Fish

Fish species within the Bay have the potential to be impacted by all build alternatives, including the Preferred Alternative, through direct mortality and alterations in aquatic habitat, as detailed in **Table 5-50**. The effects of noise, turbidity, and habitat disturbance from pile driving, dredging, and demolition all have the potential to affect fisheries resources, including important recreational and commercial species, during construction. Economic affects to fisheries are discussed in **Section 5.1.3**. All build alternatives, including the Preferred Alternative, would also impact tidal and nontidal fish species by increasing impervious land cover. Alternatives F and G would have the greatest fish impacts from degraded water quality due to increased impervious area. High impervious surface coverage can negatively affect fish species diversity and reproductive success in anadromous species (CWP, 2003). See **Tables 5-29** and **5-30** for a comparison of impervious surface increases by alternative, including the Preferred Alternative. Alternatives D, E, F, and G have the greatest potential to impact fish due largely to their encroachment into additional waterways beyond those affected by Alternatives B, C, and the Preferred Alternative, specifically Piney Creek and Kent Narrows. These waters are currently bridged and therefore have a higher probability of affecting fish during construction. Alternatives F and G would result in the greatest potential impact to fish, as they involve construction of the largest new bridge structures, with 10 lanes, which would require a higher number of and larger size piers, increasing the duration and impact of pile driving activities. All build alternatives, including the Preferred Alternative, would also impact nontidal fish communities by widening the roadway and impacting non-tidal streams. Impacts could range from mortality of fish 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 or aquatic connectivity (e.g., fish passage). Alternatives B, C, and the Preferred Alternative would have approximately one-fifth of the nontidal waterway impacts by

length than Alternatives D, E, F, and G, and about one-ninth of the impact by area, as indicated in **Table 5-34**.

Impacts to EFH as a habitat, including dredge effects, are included in **Section 5.5.7.1**, **Environmental Consequences**. Although noise and vibration impact these areas as habitat, the following describes noise and vibration impacts to Federally managed fish species. It should be noted that vibration impacts would impact all fish species within the vicinity of the pile driving activities, not just those that are Federally managed. This includes potential impacts to commercially and recreationally important fish species (e.g., striped bass) that inhabit the project area, as well as migrating anadromous species, depending on the time of year. However, the NOAA Fisheries Multi-Species Pile Driving Calculator was developed by NOAA Fisheries for ESA-listed species and is the methodology used to determine pile driving impacts on Federally managed fish species summarized below. NOAA Fisheries requested that the MDTA use this tool to determine impacts to Federally managed fish species within the project area. While the results of the tool could likely be extrapolated to include other fish species within this habitat, the data used to determine the calculations and proxies is specific to ESA-listed species; therefore, the impact distances determined may not apply to all fish species within this habitat. All build alternatives, including the Preferred Alternative, would have the potential to impact EFH via increased underwater noise from blasting and pile driving activities, which can include behavioral impacts (i.e., changes in foraging or movements) and physiological effects (i.e., affecting the hearing, swim bladders, and tissue of fish). As shown in **Figure 5-29**, the distance of the noise effects of pile driving on fish is dependent upon the pile size, material, and methods used. The area of noise effects is depicted using underwater noise isopleths. Note that the extent of pile driving isopleths by pile type are shown on **Figure 5-29**, but in practice, not all piles would be driven at the same time. For this analysis, the MDTA assumed that up to 16 piles could be driven per day. For detailed information regarding EFH species noise thresholds, construction related noise and vibration assumptions, and noise impact quantification, see the *EFH Assessment*.

The NOAA Fisheries Multi-Species Pile Driving Calculator (NMFS, 2025) estimates the spatial extent of sound impact to marine species. See the resulting NOAA Fisheries calculator outputs included in the *EFH Assessment,* Appendix B. According to the NOAA Fisheries calculator, repeated exposure to vibrations from pressure waves due to impact pile driving may physically injure fish within 7,068 feet (1.3 miles) of the impact. Pressure waves are also likely to affect fish behavior. The behavior modification impact isopleths generated from pile driving indicate that impact hammering would affect fish behavior within roughly 383 feet (0.07 miles) of the 36” square concrete piles, 5,200 feet (0.9 miles) of the 36” steel pipe piles, between 4,460 to 7,068 feet (0.8-1.3 miles) of the 48” steel pipe piles, 32,808 feet (6.2 miles) of the 96” steel pipe piles, 4,460 feet (0.8 miles) of the 14” Steel H-Piles, and 7,068 feet (1.3 miles) of the sheet piles.

All life stages of Federally managed fish species within the EFH action area would be affected by underwater noise, since the current design assumptions indicate that pile driving would likely occur throughout years 1 through 3 of construction of the eastbound bridge and its pier protection, and years 7 through 12 for the westbound bridge and its pier protection, for a total of 9 years of intermittent pile driving. Pile driving is estimated to occur on about 120 days for the eastbound bridge within the 3-year pile driving window, and about 138 days for the westbound bridge within a 6-year window. It is important to understand that although the pile driving time will be protracted, it will not happen on a daily basis and when it occurs, it will not always occur for full days. Exact timing for pile driving has not been determined, but it could possibly take place throughout multiple seasons of the year, with breaks for time-of-year restrictions to protect aquatic species, for

adverse weather conditions, to set-up or break-down equipment, and to conduct other construction activities.

While there will be a 12-hour quiet period implemented each day within the Preferred Alternative LOD in which pile driving will not be conducted, extended periods of noise throughout the middle Chesapeake Bay are likely to affect migration and spawning patterns. These effects will likely affect population numbers, as multiple year classes of Federally managed fish and their prey are affected by far-reaching and high-intensity underwater vibration and pressure caused by pile driving. The fact that pile driving for the eastbound and westbound bridges will be separated by at least a 3-year gap will provide some time for Federally managed fish species to rebound from adverse effects before entering a new phase of noise impact. Accurate fish stock counts for the middle Chesapeake Bay are not known at this time; therefore, exact mortality and behavior modification numbers for Federally managed fish species cannot be determined. The MDTA has coordinated with NOAA Fisheries to obtain fisheries telemetry data for the area just south of the Bay Bridge through the Mid-Atlantic Acoustic Telemetry Observation System. However, the fish species documented in the telemetry studies do not have designated EFH within the study area and therefore do not allow for stock counts of the Federally managed species with designated EFH. Other recent fish stock count data for the portion of the Chesapeake Bay in the vicinity of the study area is available through the Virginia Institute of Marine Science Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP), however the only Federally managed fish species with designated EFH included in this study are bluefish and summer flounder. Chesapeake Bay fish stock assessments for bluefish and summer flounder could be conducted by a fisheries stock assessment biologist based on this recent ChesMMAP data; however, no stock assessment specific to the Chesapeake Bay currently exists, as these species are managed as a coastwide stock.

Blasting requirements are unknown at this preliminary stage of design; however, based on the depth and size of some existing piers, the MDTA assumes blasting would be required to remove select bridge elements. For planning purposes, the Nice-Middleton Bridge pier demolition performed in late 2023 was used as a proxy for the proposed demolition of the existing Bay Bridge, due to structural and environmental similarities, to obtain a rough estimate for the magnitude of effects of explosive underwater demolition. Further information regarding the expected demolition methodology, potential impacts, and justification for using the Nice-Middleton Bridge demolition as a proxy are located in the *Atlantic Sturgeon, Shortnose Sturgeon and Sea Turtles Biological Assessment* in **Appendix C** and as supporting technical documents. According to current design assumptions, blasting would occur in years 6 and 7 for the eastbound bridge, totaling 18 blast events, and would occur again in years 14 and 15 for the westbound bridge, totaling 16 blasting events. Blasting instances are considered intense, discrete impact events and therefore the timing of these events can be scheduled to minimize impacts to Federally managed species. To minimize duration and magnitude of impact, any required blasting would take place during times of lower biological activity, from October 1 to December 15. During this period, juveniles and adults of all Federally managed fish species and larval summer flounder would be affected by blasting within the action area.

Blasting produces pressure waves that can cause swim bladders to rupture, causing severe injury or mortality. The acoustic effects of blasting affect fish hearing and tissues. Blasting can also increase water turbidity and sedimentation in the area surrounding the blasting event, resulting in decreased water quality and impacts on fish respiration. However, prior to blasting, scare charges

and fish deterrent boats will be used to minimize injury and mortality. A Demolition Plan will be developed in coordination with the appropriate regulatory agencies. Physical injury and behavior modification to Federally managed fish species are anticipated. However, the MDTA will work with NOAA Fisheries throughout design to minimize concurrent pile driving operations through carefully planned construction phasing and employ recommended BMPs to help minimize effects to aquatic habitat and biota.

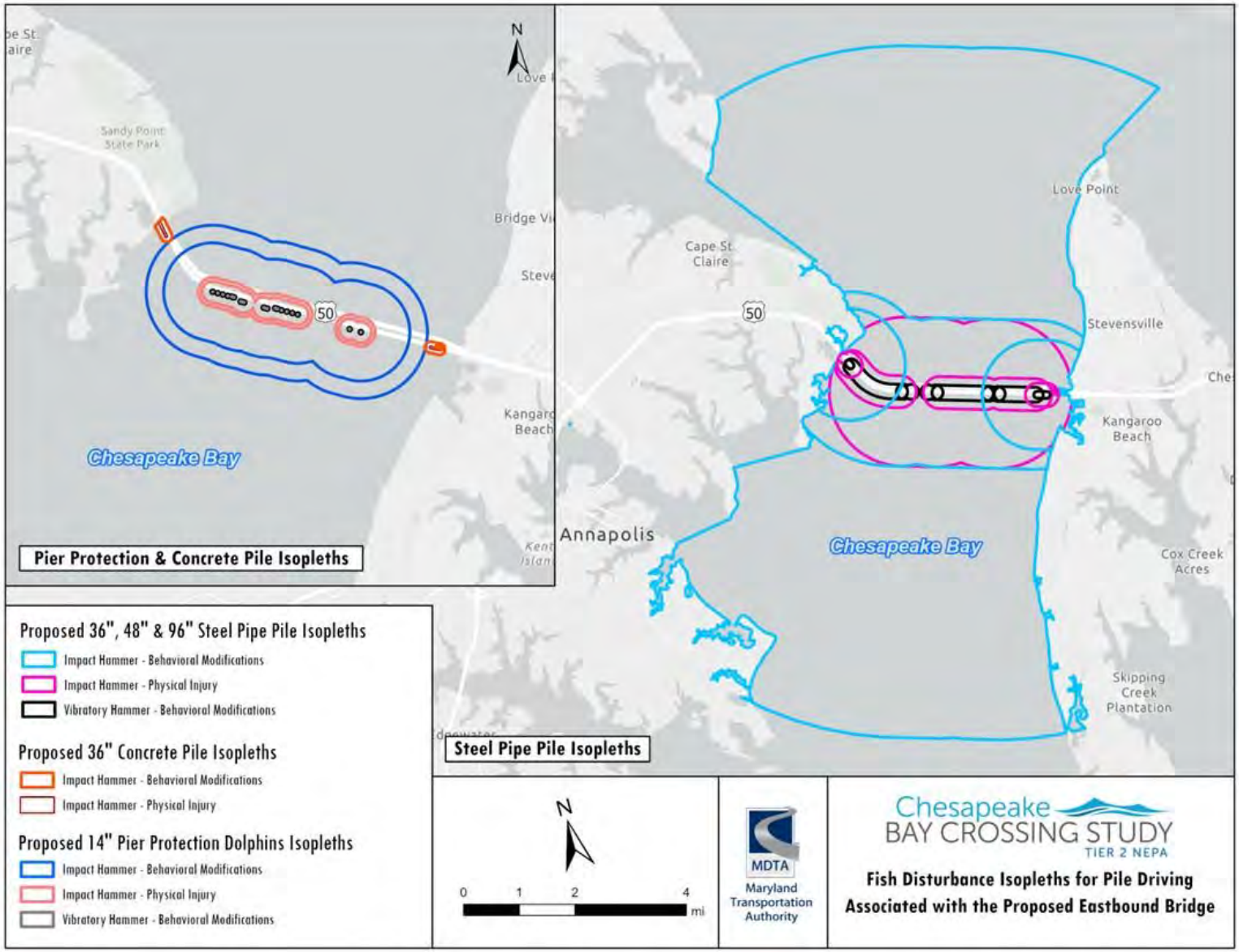
SAV

Impacts to SAV are included in **Section 5.5.7.1, Environmental Consequences**.

Oysters

Impacts related to dredging and pier placement could result in direct mortality to oysters and would alter aquatic habitat, as detailed in **Table 5-50.** Major habitat alteration would include increased turbidity and sedimentation associated with dredging, pile driving, and vessel traffic, which could lead to mortality or reduced feeding or growth. Economic effects to crabbing and oystering are discussed in **Section 5.1.3.1**. All build alternatives, including the Preferred Alternative, would impact NOBs, ranging from 9.4 acres for Alternative B to 14.6 acres for Alternative G. Greater impacts are directly associated with the wider limits of work within the Chesapeake Bay, and potential impacts within Kent Narrows. All build alternatives, including the Preferred Alternative, would also potentially impact oyster sanctuaries. Impacts to oyster sanctuaries are directly associated with Cox Creek and are the least with Alternatives B, C, and the Preferred Alternative (0.6 acres) and incrementally increase with Alternatives D and E (1.1 acres) and Alternatives F and G (1.6 acres). Although none of the build alternatives, including the Preferred Alternative, directly overlap oyster planting areas, they may affect both current and historic oyster plantings at Sandy Point South and Broad Creek as a result of bottom disturbing activities. Historic oyster plantings at Well Cove fall within 500 yards of Alternatives D, E, F, and G, and may also be affected by similar bottom disturbing activities. PSFA impacts range from 5.6 acres with Alternative B to 9.8 acres with Alternative G. The almost doubled impact between these build alternatives is due to the wider 10-lane Bay Bridge with Alternative G, and the PSFA located along the slight bend in the bridge alignment. Alternatives D, E, F, and G would also result in greater impacts because the alternatives extend over Kent Narrows.

Figure 5-29: NOAA Fisheries Fish Disturbance Isopleths for Pile Driving Associated with the Proposed Eastbound Bridge



Blue Crabs and Horseshoe Crabs

All build alternatives, including the Preferred Alternative, have the potential to impact blue crabs, horseshoe crabs, and their habitat. Impacts to blue crabs would largely be associated with the removal of suitable habitat, such as shoreline marshes, SAV, and benthic habitat, including deep water habitat for overwintering crabs. The effects of noise, turbidity, and habitat disturbance from pile driving, dredging, and demolition all have the potential to affect blue crabs and horseshoe crabs during construction. These effects could range from behavioral changes, such as avoiding certain areas during construction, to mortality. Economic effects to crabbing are discussed in **Section 5.1.3.1**. Horseshoe crab habitat impacts vary from 290 linear feet associated with southern alignment Alternatives C, E, G, and the Preferred Alternative, to 2,100 linear feet associated with northern alignment Alternatives B and D, and 2,240 linear feet associated with Alternative F. Most documented horseshoe crab habitat is located north of the Bay Bridge, which results in the major difference in potential impacts between build alternatives, including the Preferred Alternative. All build alternatives, including the Preferred Alternative, would impact the existing landside connection of the westbound lanes exiting the Eastern Shore, which is deemed structural horseshoe crab habitat. The northern alignment alternatives would also impact horseshoe crabs through the direct removal of beach habitat and shoreline alterations for construction of the northernmost bridge crossing over Sandy Point State Park beach and waterway entrance to Mezick Pond. These activities could result in mortality to horseshoe crab adults and/or eggs. Immediate impacts along shoreline habitat can also increase the opportunity for pollutants to be introduced into the water, impacting water quality and potentially harming horseshoe crabs.

Waterfowl

All build alternatives, including the Preferred Alternative, would impact waterfowl staging and concentration areas, as they would widen the U.S. 50/301 mainline of the Bay Bridge and overlap the edges of two mapped waterfowl staging and concentration areas within the Chesapeake Bay. However, Alternatives B, D, and F (northern alignments) would impact almost three times more mapped waterfowl staging and concentration areas, totaling approximately 7.1 acres. This difference in impacts is located on the north side of the westbound lanes, and near the shoreline of Queen Anne's County. Alternatives C, E, G, and the Preferred Alternative, are estimated to impact 2.5 acres of waterfowl habitat. Since these boundaries are largely situated within open water, it is anticipated that waterfowl would still be able to congregate north of the LODs of the proposed northern alignment alternatives (Alternatives B, D, and F).

Colonial Waterbirds

Impacts to colonial waterbird nesting areas are anticipated from all build alternatives, including the Preferred Alternative, due to documented presence of these species within Mezick Pond, per coordination with MDNR WHS. The precise location of these nesting areas is not known. It is assumed that Alternatives B, D, and F (northern alignments) would result in the greatest disturbance to potential colonial waterbird nesting areas, due to the significant portion of tidal wetland located at Mezick Pond that would require removal to create the westbound roadway connection to the Bay Bridge. In addition to direct impacts from loss of nesting trees, construction activity can flush birds from nests, leaving eggs and chicks exposed to predators and heat, leading to reduced nesting success and colony loss. Colonial waterbirds using the Bay Bridge pier islands as nesting sites would be disturbed by all build alternatives, including the Preferred Alternative, if

construction occurs during the breeding season (which cumulatively for these species is April 1 through August 15).

Marine Mammals

Bridge construction can negatively impact bottlenose dolphins through habitat alteration, noise and vibration impacts, and increased human activity. The disruptions from construction dredging can affect the natural substrate and shoreline, impacting dolphin foraging grounds. The loud noise generated by pile driving and blasting can disrupt dolphin communication and navigation and cause them stress. The increased human presence may cause dolphins to avoid areas of construction and lead to displacement from their typical habitat. Increased ship traffic associated with construction may also increase the potential for vessel strikes.

All build alternatives, including the Preferred Alternative, would have the potential to adversely impact dolphins through harassment via underwater noise impact from blasting and pile driving activities, which can disrupt dolphin communication, navigation, foraging patterns, and cause stress. Similar to the fish species described above, the area of noise effects to dolphins are depicted using underwater noise isopleths. Other marine mammals that rarely or extremely rarely occur within the study area are unlikely to be impacted.

As shown in **Figure 5-30**, the distance of the noise effects of pile driving on dolphins, which are considered high-frequency cetaceans (with a generalized hearing range of 150 Hz to 160 kHz), depends on the pile size, material, and methods used. Note that all pile driving isopleths are shown on **Figure 5-31**, but in practice, multiple piles may be driven at any given time, resulting in concurrent isopleths or zones of dolphin behavioral modification. For detailed information regarding marine mammal species noise thresholds, population density estimation, construction related noise and vibration assumptions, and noise impact quantification, see the *Natural Environment Technical Report*.

The NOAA Fisheries Multi-Species Pile Driving Calculator (NMFS, 2025) estimates the spatial extent of sound impact to marine species. According to the NOAA Fisheries calculator, cumulative effects of vibrations from pressure waves due to impact pile driving would likely cause auditory injury to dolphins within approximately 77 feet of the 36” square concrete piles, 1,049 feet of the 36” steel pipe piles, between 568 and 1,427 feet of the 48” steel pipe piles, 4,172 feet of the 96” steel pipe piles, 418 feet of the 14” H-piles, and 662 feet of the sheet piles. The behavior modification impact isopleths generated from pile driving indicate that impact hammering would affect dolphin behavior within about 7,068 feet, or 1.3 miles, of the impact, while vibratory hammering of piles would result in much larger behavioral effects to dolphins, with the potential to affect dolphin behavior up to 70,684 feet or 13.4 miles from the point of vibration. Based on estimation of dolphin densities in the area surrounding the Bay Bridge, vibratory hammering would modify the behavior of up to 66.67 dolphins per day. Vibratory hammering would have by far the most widespread impact to dolphins spatially and would impact the most individuals. According to preliminary bridge design assumptions, pile driving would occur during years 1 to 3 of construction for the eastbound bridge and during years 7 to 12 of construction for the westbound bridge. Pile driving would only occur on about 120 days within years 1 to 3 and about 138 days during years 7 to 12. Although the pile driving time will be protracted, it will not happen on a daily basis and when it occurs, it will not always occur for full days. Exact timing for pile driving has not been determined, but it could possibly take place throughout multiple seasons of the year, with breaks for time-of-year restrictions to protect aquatic species, for adverse weather conditions, to set-up or break-down equipment, and to conduct other construction activities.

While there will be a 12-hour quiet period implemented each day within the Preferred Alternative LOD in which pile driving will not be conducted, extended periods of noise throughout the middle Chesapeake Bay are likely to affect dolphin movements within the Chesapeake Bay by deterring dolphins from moving into the middle and upper parts of the Bay when pile driving activities are occurring. These effects will not likely affect population numbers, since dolphins are not solely dependent upon Chesapeake Bay habitat and can move to other estuaries to feed. The fact that pile driving for the eastbound and westbound bridges will be separated by at least a 3-year gap will provide dolphins with a period of no harassment in which they can return to more normal movement within the Chesapeake Bay.

Blasting requirements are unknown at this preliminary stage of design; however, based on the depth and size of some of the existing piers, the MDTA assumes discrete blasting events will be required to construct a build alternative, including the Preferred Alternative. Preliminary design assumes that mechanical demolition will be used wherever feasible; however, demolition of some pier elements require blasting because they are in deep water or are too large to demolish mechanically. For planning purposes, the Nice-Middleton Bridge pier demolition process performed in late 2023 was used as a proxy for the proposed demolition of the existing Bay Bridge, due to structural and environmental similarities, to obtain a rough estimate for the magnitude of effects of explosive underwater demolition. Further information regarding the expected demolition methodology, potential impacts, and justification for using the Nice-Middleton Bridge demolition as a proxy for the existing Bay Bridge are located in the *Atlantic Sturgeon, Shortnose Sturgeon and Sea Turtles Biological Assessment* in **Appendix C**. According to current design assumptions, blasting would occur in years 6 and 7 for the eastbound bridge, totaling 18 blast events, and would occur again in years 14 and 15 for the westbound bridge, totaling 16 blasting events. While blasting would have an acute effect on dolphins in close proximity to the charge, the duration of impact would be short. The MDTA will conduct blasting when dolphins are unlikely to be present in the study area to avoid potential injuries, scare charges will be used prior to blasting, and timing of blasting will be coordinated with NOAA Fisheries to ensure the least potential impact.

It is anticipated that all build alternatives would have comparable impacts to dolphins, though Alternatives F and G may impact dolphins for a longer duration due to the need for larger bridge piers.

Figure 5-30: Zone of Influence from Vibratory Pile Driving for High Frequency Cetaceans

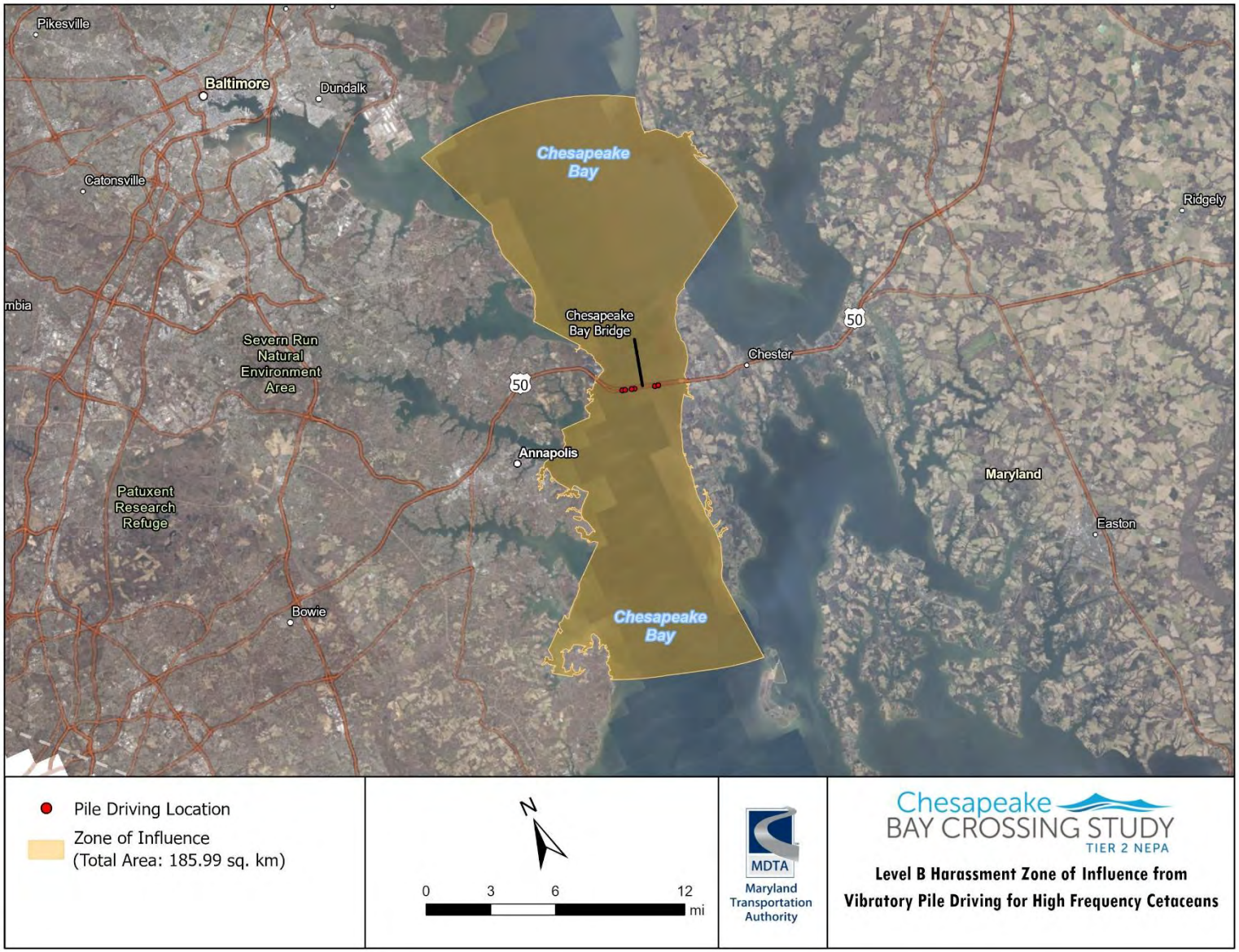
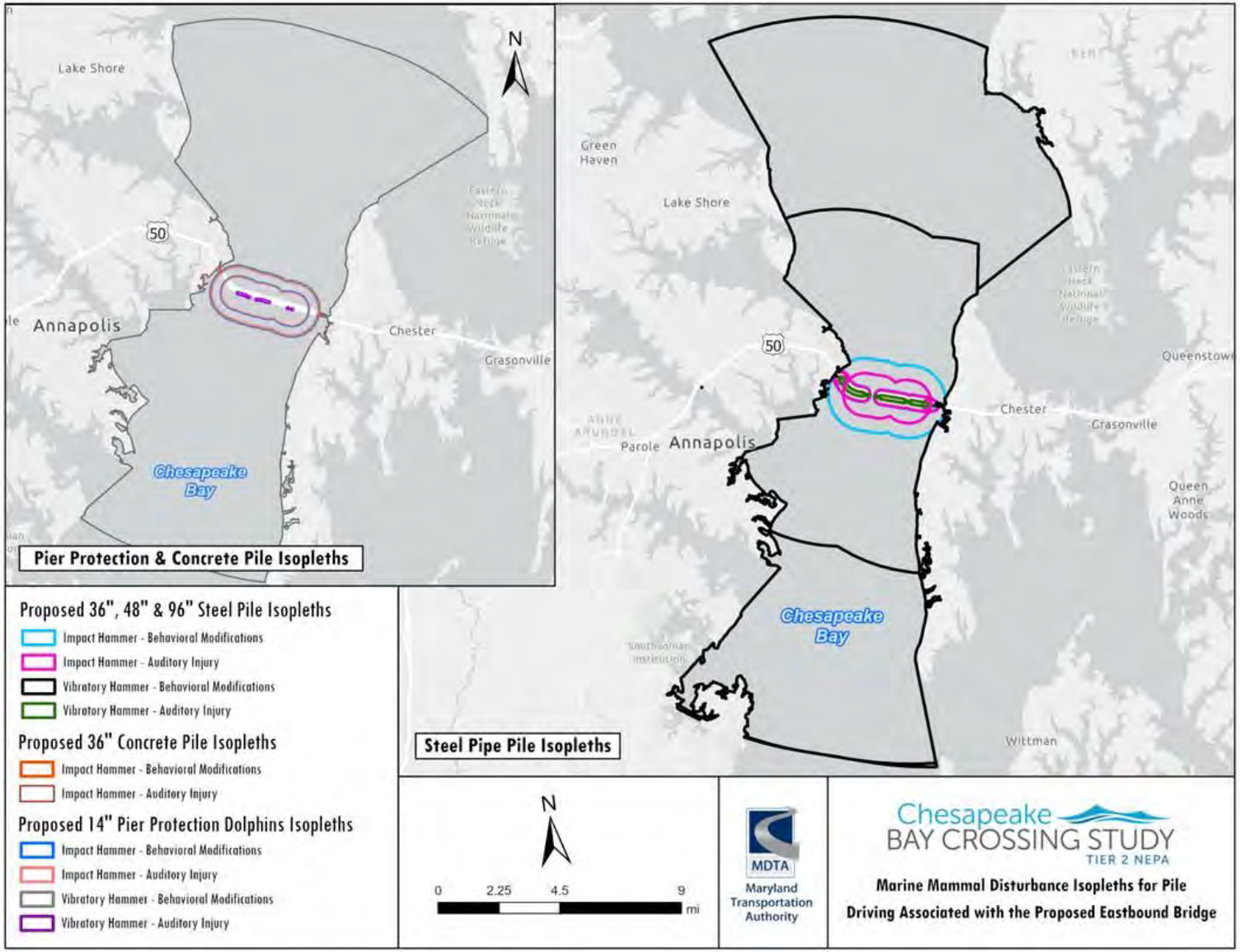


Figure 5-31: NOAA Fisheries Marine Mammal Disturbance Isopleths for Pile Driving Associated with the Proposed Eastbound Bridge



5.5.7.3 Minimization and Mitigation

The MDTA will consider all design opportunities to minimize the LOD of the Selected Alternative. Minimization efforts that could reduce impact to aquatic habitat and biota include employing less invasive in-water construction methods such as using concrete piles where possible to reduce noise and vibration impacts; longer bridge spans to minimize permanent fill within aquatic habitat; construction phasing to limit concurrent pile driving operations; and employing construction BMPs to reduce in-water noise.

Several time-of-year restrictions are relevant to aquatic species:

- February 15 through June 15, inclusive of any year, to protect anadromous fish and vulnerable life stages of finfish from dredging and underwater noise typically associated with pile driving activities.
- For Use I and II streams with anadromous fish, generally, no in-stream work is permitted from March 1 through June 15 of any given year to protect spawning fish.
- For Use I and II streams with yellow perch, generally, no in-stream work is permitted from February 15 through June 15 of any given year to protect spawning fish.
- To minimize disturbance to wintering and staging waterfowl, no water-dependent work would be conducted from November 15 through March 1 of any year.
- Colonial waterbirds using the bridge pier islands as nesting sites are afforded protection under Critical Area regulations as well as the MBTA. The cumulative breeding season for these species is April 1 through August 15 of any given year. Construction or human presence within the immediate area of the pier islands during the breeding season can cause nest abandonment and result in death of eggs or young and should be avoided.
- Great Blue Heron colonies are afforded protection by the MBTA and in the Critical Area during the breeding season (February 15 through July 31) and within a 660-foot radius of the colony site.
- In accordance with COMAR 26.24.02.06, dredging is prohibited during certain times of the year to protect shellfish, including oysters. Mechanical dredging within 500 yards of shellfish areas is prohibited from December 16 through March 14 and from June 1 through September 30 of any year. Dredging within the boundaries of NOBs is restricted during the periods of December 16 through March 14 and June 1 through September 30, regardless of the dredging method. Time-of-year restrictions for dredging within 500 yards of SAV, regardless of the method, are from April 15 through October 15 of any year.

The MDTA intends to observe the time-of-year restrictions for aquatic biota to the greatest extent practicable. It is anticipated that not all time-of-year restrictions will be able to be employed due to schedule constraints and the possibility of conflicting time-of-year restrictions. To address this, the MDTA will work with the resource and regulatory agencies to develop a construction plan and BMPs that provide protection for sensitive resources in compliance with all statutory requirements. Potential BMPs could include additional turbidity reduction measures, bird exclusion structures installed prior to the nesting season on pier islands, and monitoring of sensitive species or habitats during construction, as well as the underwater noise and other protection measures listed for marine mammals, Federally-listed aquatic species (sturgeon and sea turtles), EFH, and HAPC below. Further coordination with MDNR and NOAA Fisheries regarding the appropriate time-of-

year restriction for this work will continue as design progresses. The MDTA will use telemetry tagging to understand when certain fish species may be more vulnerable to project impacts and inform time-of-year restrictions. The MDTA will fund additional telemetry deployments prior to production pile driving when information more relevant to construction of the project is available and the project is fully funded for final design. The MDTA will collect at least two years (two springs and two summers) of pre-construction data to monitor migratory behavior and validate ZSFP efficacy. The MDTA will coordinate with the agencies on the details of the initial deployment and two-year data collection and will consider the potential for long-term management of the arrays by resource agencies during final design. There is also concern for young-of-the-year fish staging and migrating out of the project area from summer through fall. These juvenile fish may be more susceptible to noise impacts, injury, and mortality than adult fish. The MDTA will work with resource and regulatory agencies to identify appropriate time-of-year restrictions and implement BMPs to minimize impacts to young-of-the-year fish, and important recreational and commercial fisheries, to the extent practicable.

The MDTA contacted NOAA Fisheries' Permits and Conservation Division on July 8, 2025, regarding potential impacts to marine mammals. The Permits and Conservation Division responded on July 8, 2025, stating that MMPA coordination is not required during the NEPA process, and that the Permits and Conservation Division would work to perform any necessary analysis of marine mammal-related impacts during the design stage (see **Appendix C**). In accordance with the MMPA, the MDTA will coordinate with NOAA Permits and Conservation Division to secure an Incidental Harassment Authorization (IHA) for the Selected Alternative's impact on bottlenose dolphins. Once issued, the IHA would be valid for one year and would include appropriate BMPs to minimize harassment to the extent practicable. The IHA would be secured for subsequent years of construction as needed. Commitments and considerations related to reducing impact to marine mammals are included below.

The MDTA and FHWA determined a practicable ZSFP in coordination with NOAA Fisheries and MDNR. From January 15 through May 15 (the anadromous fish migratory period), the MDTA will ensure a minimum contiguous ZSFP within the Chesapeake Bay equivalent to approximately one-third the waterway width, or approximately 7,000 linear feet. The ZSFP will allow fish species, including migratory fish, to safely navigate around undesirable noise (i.e., above the 150 dB RMS behavioral threshold) and turbidity levels. The ZSFP will encompass the channel edges. The MDTA will work with NOAA Fisheries and MDNR to refine ZSFP locations and the migratory focal period during final design. Potential fish habitat and water quality impacts due to demolition, construction, and the increase in impervious surfaces related to the project would be managed through implementation of ESC BMPs along with water quality monitoring plans, which will ensure that construction activities comply with state water quality standards, and BMPs and specialized construction methods specific to EFH and HAPC. The demolition of the existing bridge spans would result in permanent loss of underwater habitat features used by fish, blue crabs, and other aquatic biota. The MDTA will continue to coordinate with resources and regulatory agencies and will evaluate whether any existing structures can be maintained, if deemed beneficial, as design progresses.

The MDTA will implement the following avoidance and minimization methods related to aquatic species and habitats, such as marine mammals, Federally listed aquatic species, EFH, and HAPC:

Underwater Noise/Hydroacoustic Energy

1) The bridge will be designed to meet structural integrity, engineering efficiency, and up-to-date engineering practices. Once these design criteria have been met, the MDTA will develop an alternatives analysis evaluating measures to minimize underwater noise generated during construction activities where practicable.
2) Use noise attenuation and minimization measures during pile driving, including:
   a) Use a bubble curtain system that achieves 10 dB or greater attenuation for bridge piles and 5 dB or greater attenuation for dolphin pier protection piles. The effectiveness of the bubble curtain attenuation will be demonstrated through underwater noise monitoring of each type of test pile prior to initiating production pile driving activities.
   b) Use a "soft start" or "ramping up" for pile driving (i.e., driving does not begin at 100% energy). Soft start parameters will be determined and coordinated with NOAA Fisheries in final design.
   c) Where softer sandy soils are at the surface, use a vibratory hammer for initial pile driving through the softer soils prior to using an impact hammer through stiffer materials as practicable and as appropriate.
   d) Use cushion blocks to drive concrete piles with an impact hammer, as practicable and as appropriate.
3) Develop an Underwater Noise Monitoring Plan (UNMP) that defines proposed measures to minimize, monitor, and adaptively manage hydroacoustic energy resulting from project pile installation and mechanical demolition activities, including the following elements:
   a) From January 15 through May 15 (the anadromous fish migratory period), ensure a minimum contiguous ZSFP equivalent to approximately one-third the waterway width - approximately 7,000 linear feet. The ZSFP will allow federally-managed fish species, including migratory fish, to safely navigate to their spawning grounds around undesirable noise (i.e., above the 150 dB RMS behavioral threshold) and turbidity levels. The ZSFP will encompass the channel edges.
   b) An adaptive management framework for construction activities and accompanying mitigation measures to minimize fish kills and maintain compliance with the 150 dB RMS threshold across the entire width of the ZSFP.
   c) Monitoring measures to describe the occurrence of fish that are stunned, injured, or killed. The MDTA will coordinate with the regulatory agencies during final design to determine fish kill thresholds that would trigger construction hold points and be described in the UNMP. The MDTA will coordinate with the regulatory agencies to define an optimization plan prior to resuming the triggering construction activities, which will be included in the UNMP.
4) Implement an effective quiet time of no pile driving for 12 continuous hours per 24-hour period.
5) Avoid explosive demolition to the maximum extent practicable. When explosive demolition is required, the MDTA will develop a detailed Demolition Plan in coordination with NOAA Fisheries and submit to NOAA Fisheries for review and approval, in advance of any detonation activity. The Demolition Plan will address the following measures:
   a) Detonation bore hole stemming, capping, or filling;
   b) Firing all charges in a single firing circuit with a delayed detonation between each charge;
   c) Focusing blast energy towards a solid substrate rather than towards the water column;
   d) Evaluating the feasibility of employing noise attenuating devices;
   e) Conducting the blasting during periods of low water or low tide;
   f) Using rubber blasting mats to reduce debris and acoustic signature;
   g) Employing scare charges;

h) Installing hydrophones to confirm the impact distance to adaptively manage the Demolition Plan;
i) Using explosive weights that result in injury/mortality thresholds remaining within 100 feet of the blasting source;
j) Using adaptive management actions between blast events to minimize fish mortality;
k) Conducting required blasting during times of lower biological activity (generally October 1 through December 15) with specific dates being determined during the development of the Demolition Plan and incorporating the best available data including any updated telemetry data; and
l) Coordinating with resource agencies to define how fish kills will be documented and offset during final design.

6) When explosive demolition is required, employ scare charges and fish deterrent sonar from boats, and monitor for the presence of tagged sturgeon, ahead of blasting activities. Use low weight/energy repellent charges that startle fish from the area prior to blasting, and minimize the time between repellent activities and blasting, such that fish are not allowed a recovery period to re-enter the blasting exclusion zone.
7) Employ species spotters to scan the work area for marine mammals and sea turtles prior to blasting to minimize impacts to these species.
8) Ensure monitoring boats scan the area for marine mammals prior to blasting. Blasting will not occur when marine mammals are present.

Turbidity and Sedimentation

1) Use only mechanical dredging.
2) Prevent sediment and debris from entering the water using geo-textile fabric, hay bales, or other methods. Use nets, tarps, and pans when demolishing bridge superstructures; remove demolition debris that falls into the water to the maximum extent practicable, and to the extent that removal of rubble would not result in greater harm to benthic environments compared to leaving demolition rubble in place. The decision to remove, re-use, or leave rubble in place, or use rubble to fill scour, will be determined prior to the start of demolition, using the best available data at the time and in coordination with NOAA Fisheries.
3) Limit the amount and extent of turbidity and sedimentation by using appropriate sedimentation and turbidity controls such as turbidity curtains, silt curtains, settling basins, bridge netting, and cofferdams. The MDTA will specify the measures to be used in the construction plans, including:
   a) Install ESC measures prior to ground disturbance;
   b) Inspect daily and maintain continuously in an effective operating condition all ESC measures until such time as they are removed with prior permission from the MDE inspector;
   c) Upon project completion, remove and stabilize all temporary construction materials with sediment and erosion control measures to prevent reentry into waterways.
4) Minimize the suspension of sediments and disturbance of the substrate when removing piles by implementing the following applicable techniques:
   a) Remove piles with a vibratory hammer, rather than by direct pull, jetting, or clamshell;
   b) Remove piles slowly to reduce sediment sloughing off in the water column;
   c) Strike or vibrate the pile to break the bond between the sediment and pile to minimize the pile breakage, and reduce the amount of sediment sloughing off the pile during removal;
   d) Place piles on a barge equipped with a basin to contain all attached sediment and runoff water after removal.

Reduced Water Quality

1) Only use clean fill in waters of the U.S., including wetlands.
2) Avoid, to the greatest extent practicable, the use of creosote piles or other in-water structures, and coordinate with NOAA Fisheries if there is an essential use identified by the contractor.
3) Remove cofferdams, turbidity curtains, silt curtains, or other diversion structures only after water quality is consistent with ambient levels outside the structure.
4) Minimize raw concrete or grout contact with the water to the maximum extent practicable
5) Remove contaminants and sediments from water prior to discharging it to aquatic habitats from construction activities such as excavations, cofferdams, settling basins, and sediment ponds.
6) Evaluate dredge material to determine the appropriate disposal method and location.
7) Manage concrete wash water and cooling water effluent from concrete saw operations to ensure they do not enter surface waters untreated.
8) Continue to evaluate opportunities to treat stormwater from the proposed bridge spans and roadway surfaces to the extent practicable during final design.

Habitat Alteration

1) Employ an Independent Environmental Monitor (IEM) to monitor compliance with environmental and conservation commitments and report to the regulatory agencies and MDTA concurrently.
2) Remove temporary structures and fills including monitoring devices in their entirety. Return aquatic habitats impacted by temporary activities, fills, or structures to pre-construction or better condition, including contours, elevations, substrate, and vegetation. Provide documentation of the post-demolition bottom elevation conditions to the agencies.
3) Coordinate with NOAA Fisheries and MDNR during final design to determine if SAV surveys would be informative of permit conditions. If so, conduct SAV surveys during the growing season, prior to construction, within nearshore areas of the Action Area to determine the presence and extent of SAV beds.
4) Incorporate necessary measures to avoid, minimize, or otherwise offset impacts to SAV, as appropriate. Impacts to SAV will be mitigated at a ratio of at least 3:1, depending upon the nature/scale of the impacts.
5) Stage construction activities to reduce intensity of disturbance where appropriate and practicable. Staging of construction activities will be coordinated with the agencies during final design.
6) Avoid areas where protected species congregate for spawning/foraging or overwintering if identified prior to or during construction. Currently, no specific spawning, foraging, or overwintering areas are known.
7) Develop a pre-construction and post-construction monitoring plan during final design to describe benthic recovery in dredged areas and identify and define measures to restore or otherwise offset documented losses of function, relative to a reference site, after three years in coordination with regulatory and resource agencies.
8) Consider operational BMPs to further reduce impact to oyster habitat and the Chesapeake Bay bottom during final design.

Fish Passage and Migration Habitat

1) From January 15 through May 15 (the anadromous fish migratory period), ensure a minimum contiguous ZSFP equivalent to approximately one-third the waterway width (approximately 7,000 linear feet). The ZSFP will allow Federally managed fish species, including migratory fish, to safely navigate to their spawning grounds around undesirable noise (i.e., above the 150 dB RMS behavioral threshold) and turbidity levels. The ZSFP will encompass the channel edges. To maintain the ZSFP, piles will not be driven from January 15 through May 15, unless underwater noise monitoring results demonstrate those piles can be driven while ensuring a minimum contiguous 7,000-foot-wide ZSFP. Pile driving underwater noise monitoring results will be used to determine an acceptable pile driving sequence of construction that ensures the ZSFP is achieved from January 15 through May 15. The MDTA will work with NOAA Fisheries and MDNR to refine and approve ZSFP locations and the migratory focal period during final design.

Vessel Interaction

1) Operate or moor vessels outside areas with SAV, and outside areas immediately adjacent to SAV, or in such a way that won't shade or otherwise impact SAV.
2) Operate construction vessels at reduced speeds (e.g., below 10 knots), with safety exemptions in place as needed.
3) Employ species spotters to reduce species/vessel collisions; and keep appropriate distance from protected species if spotted.

Impingement and Entrainment

1) Use of construction equipment that reduces potential for impingement and entrainment such as environmental buckets on mechanical dredges.
2) Employ a NOAA Fisheries approved observer during mechanical dredging/removal of demolition debris in case of accidental capture.

NOAA Fisheries provided conservation recommendations on June 1, 2026, in response to the *EFH Assessment*; FHWA responded to the conservation recommendations on June 30, 2026. Following further coordination regarding additional telemetry array deployment, FHWA provided a revised response to the conservation recommendations on July 28, 2026. NOAA Fisheries responded on July 30, 2026, concluding EFH consultation. NOAA Fisheries' conservation recommendations and FHWA's responses are included in **Appendix C**.

As the project progresses through design, avoidance and minimization measures will continue to be evaluated, including implementation of specialized construction methods to ensure the protection of sensitive resources. Specialized construction methods may include time-of-year restrictions, detailed monitoring plans, and project implementation schedules. A number of additional avoidance and minimization methods related to aquatic species and habitats, such as marine mammals, Federally listed aquatic species (sturgeon and sea turtles), EFH, and HAPC will be considered by the MDTA in coordination with the resource agencies as design progresses. These considerations are outlined in the *Atlantic Sturgeon, Shortnose Sturgeon and Sea Turtles Biological Assessment, Biological Opinion,* and *EFH Assessment* (see **Appendix C**).

The MDTA would also construct and extend culverts and place associated riprap so that movement of aquatic species is not obstructed, with the consideration of open-bottom culverts, where practicable. If existing culverts do not meet current aquatic life passage standards and are

being extended rather than replaced, then opportunities for improving aquatic life passage are limited. The MDTA will coordinate with MDNR in later phases of the project to confirm and locate active nesting colonies and coordinate avoidance and minimization such as colony disturbance buffers and time-of-year restrictions. Impacts to SAV would require mitigation at a 3:1 ratio for restoration or in-kind creation, and a 6:1 ratio for enhancement of out-of-kind creation, as regulated by MDE/BPW (COMAR 23.02.01.11).

During final design, the MDTA will develop a compensatory mitigation plan (CMP) for regulatory agency approval. The CMP will include the following: (1) replacement of biogenic impacts in-kind to the greatest extent practicable; (2) replacement of permanently impacted open water habitat through out-of-kind mitigation activities to be determined in coordination with regulatory and resource agencies; (3) compensation for the temporal loss of tidal open water habitat function; (4) prioritization of compensatory mitigation projects based on the USACE mitigation hierarchy, as described in the 2008 mitigation rule (33 CFR 332.4(c)), and the NOAA Mitigation Policy for Trust Resources; (5) implementation of a site protection instrument at mitigation sites for the project as necessary; (6) oyster mitigation will comply with MDE's requirement that oyster mitigation activities will occur at an oyster sanctuary; and (7) final mitigation ratios to be determined in coordination with regulatory agencies during final design.

Although SAV has not been identified within the Preferred Alternative LOD, if SAV is identified during final design, impacts to SAV would require mitigation at a 3:1 ratio for restoration or in-kind creation, and a 6:1 ratio for enhancement of out-of-kind creation, as regulated by MDE/BPW (COMAR 23.02.01.11). Impacts to NOBs require a 3:1 mitigation ratio resulting in 30.6 acres of NOB mitigation required for the Preferred Alternative and an additional 1.8 acres of NOB mitigation required for the optional SUP. Oyster seeding and substrate expansion would be used as in-kind mitigation for direct impacts to NOBs and potentially as out-of-kind mitigation for impacts to tidal open water. Forty-two potential oyster seeding areas, totaling approximately 1,651 acres, were identified through coordination with MDNR Shellfish Division as opportunities for tidal open water mitigation. In addition to oyster seeding opportunities, eight areas, totaling approximately 948 acres, were identified within the Eastern Bay MDE 8-digit watershed as potential oyster substrate expansion opportunities for tidal open water and NOB mitigation. For more information on oyster mitigation opportunities see the *Preferred Alternative and Conceptual Mitigation Concurrence Package*.

5.5.8 Terrestrial Habitat and Biota

5.5.8.1 Terrestrial Habitat

Most of the terrestrial areas within the resource review area consist of highly disturbed areas associated with development and transportation infrastructure. The undeveloped portions are characterized by a mix of habitats including coastal forests, dominated by pine and hardwoods, and wetland areas. Wetland areas are covered in **Section 5.5.5**.

Forest coverage, non-forest habitat types, and invasive species in the resource review area were identified using publicly available information. Forest cover within the resource review area was identified by cross-referencing the Chesapeake Conservancy Land Cover forest GIS layer with Maryland iMap Orthoimagery aerial photography, dated 2023 for Anne Arundel County and 2024 for Queen Anne's County. More information on evaluation methodologies is provided in the *Natural Environment Technical Report*. Forest impacts outside of the Critical Area for highway projects are regulated under Maryland Reforestation Law (Maryland Code, 2015 COMAR 08.19).

Reforestation Law applies to all highway construction projects with state funding. Replacement of forest cleared for highway projects must be performed on an acre-for-acre basis, on public lands, and within three growing seasons of project completion. Forest impacts within the Critical Area are regulated by the Critical Area Commission or the local jurisdiction. EO 13112, and as amended by EO 13751, mandate that Federal actions must not cause or promote the introduction or spread of invasive species.

A field survey to characterize forests and verify forest boundaries was completed during refinement of the Preferred Alternative. An updated forest stand delineation may be required, depending on time elapsed since the survey was completed, and a specimen tree survey will be completed to identify, evaluate, and locate any specimen trees once an LOD associated with the Selected Alternative is identified. Champion, large, and specimen trees will be identified for the Selected Alternative during final design, per Maryland Reforestation Law. Targeted field surveys for invasive species were not conducted; however, some invasive species were identified and recorded as part of the wetland field delineations and targeted invasive species surveys will be performed during final design.

Affected Environment

All of the build alternatives, including the Preferred Alternative, are contained within the resource review area and resources within the limits of the alternatives are the same among alternatives. Non-forest terrestrial habitats located within the resource review area include shorelines, field/grassland, scrub/shrub, low vegetation (mowed lawns and landscaping), barren land, and emergent wetlands. Several large tracts of freshwater and estuarine wetlands were identified and surveyed as part of the wetland field delineations performed. See **Section 5.5.5** for more information regarding these resources.

The most productive and undisturbed terrestrial habitats in the resource review area include forests and tidal and non-tidal wetlands. Wetlands are discussed in more detail in **Section 5.5.5**. The forest habitat encompasses a diverse array of forest communities dominated by a mix of hardwood and pine forests (**Figures 5-32 and 5-33**). Total forest cover is 960 acres, which is 20 percent of the total resource review area. Forest cover constitutes the largest land cover category within the Anne Arundel County portion of the resource review area. The largest forested tracts are along the stream valleys and floodplains of major waterways such as Mill Creek, Whitehall Creek, and Meredith Creek. The Queen Anne's County section of the resource review area contains fragmented areas of forested habitat from the Bay Bridge through the Kent Island area, due to the high level of development. The easternmost section of the resource review area transitions to forested tracts and agricultural land beyond the Kent Island area (Maryland iMap data, 2018). FIDS habitat is comprised of contiguous forest areas which are important habitat for a number of terrestrial species. FIDS habitat is discussed in **Section 5.5.6**.

Figure 5-32: Forest Cover – Anne Arundel County



Figure 5-33: Forest Cover – Queen Anne's County



Environmental Consequences

The No-Build Alternative would have no impact to terrestrial habitats. Potential impacts from all build alternatives, including the Preferred Alternative, include habitat fragmentation and the introduction and spread of invasive plant species. Construction of all build alternatives, including the Preferred Alternative, would involve the physical removal and disturbance of vegetated areas, including forests. Updated impacts from the build alternatives compared to those reported in the Draft EIS were evaluated based on the total acreage of terrestrial habitat mapped as forest through Maryland published GIS data and the field delineated forest and woody cluster survey data, within the limits of the alternatives. Impacts from the Preferred Alternative were evaluated based on the field delineated forest and woody cluster survey data. Impacts to wetlands that may also provide habitat to terrestrial species are identified in **Section 5.5.5**. **Table 5-52** identifies the total acreage of impacts to forested areas from the build alternatives, including the Preferred Alternative, and **Table 5-53** summarizes the potential forested area impacts from the SUP option. See FIDS habitat impacts in **Section 5.5.6**.

Table 5-52: Forest Impacts

Resource	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
Mapped Forested Area (acres)	0	60.3	59.5	147.9	147.2	155.2	153.9	57.7

Table 5-53: SUP Forest Impacts

Resource	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
Mapped Forested Area (acres)	0	2.3	1.4	2.3	1.4	1.1	0.9	1.4

Potential forest impacts would be at least two times greater for Alternatives D, E, F, and G, than they would for Alternatives B and C. This is directly correlated to the shorter length of Alternatives B and C along U.S. 50/301. The largest area of mapped forest in Anne Arundel County that would be impacted by all build alternatives is located within and east of Oceanic Drive, north of U.S. 50/301. This mapped forest largely surrounds Mezick Pond, adjacent to a Habitat Protection Area north of Mezick Pond (described in greater detail in **Section 5.5.9**). Based on the field delineated forest data, much of this area would meet the Maryland Forest Conservation Act definition of forest (trees and other woody plants covering a land area of 10,000 square feet or greater, containing at least 100 trees per acre with at least 50% of those trees having a 2 inch or greater diameter at 4.5 feet above the ground). However, there are areas that would not meet the definition of a forest but would still function as terrestrial habitat and was therefore classified as a woody cluster. More substantial areas of mapped forest in Anne Arundel County that would be impacted only by Alternatives D, E, F, and G include undeveloped areas near the headwaters of Mill Creek and Whitehall Creek.

The largest area of mapped forest in Queen Anne's County that would be impacted by all build alternatives, including the Preferred Alternative, is located between the eastern shoreline of the Chesapeake Bay and MD 8. More substantial areas of mapped forest that would be impacted

only by Alternatives D, E, F, and G include a large tract of forest north of U.S. 50/301, just west of the U.S. 50/301 split. Most of the proposed disturbance to terrestrial habitat from any build alternative, including the Preferred Alternative, is within areas of existing forest edge or fragmented habitat, typical of an existing transportation corridor like U.S. 50/301.

Minimization and Mitigation

The MDTA will continue to minimize impacts to terrestrial habitat during design of the Selected Alternative and will comply with all applicable mitigation requirements. Due to the lapse in time between the Fall 2025 forest surveys and when permit applications are anticipated, an updated forest stand delineation of the Selected Alternative would likely be performed to identify the limits of forested areas regulated under the Maryland Reforestation Law or Critical Area Law, and the location and condition of any specimen trees. The MDTA will adhere to Maryland Reforestation Law authorization requirements for forest impacts outside the Critical Area. The MDTA will adhere to the Critical Area authorization requirements for impacts to forests and trees within the Critical Area (See **Section 5.5.6.3** for a discussion on Critical Area forest and woody cluster mitigation requirements). Either authorization would require impact minimization and mitigation which may include:

- Tree Protection Zones (TPZ) – Establishment of clearly marked boundaries around forested areas to prevent encroachment during construction; protective fencing at the edge of individual trees critical root zones (1.5 times DBH); no heavy equipment storage or soil compaction within the TPZ.
- Erosion and Sediment Controls – Installation of silt fence or other erosion control measures to prevent excess sediment from damaging tree roots.
- Root Protection – Minimization of excavation and trenching near root zone.
- Monitoring and Maintenance – Perform regular inspections of tree protection measures throughout the construction period.

The MDTA will prioritize on-site restoration; however, it is expected that all required reforestation/afforestation is not feasible on-site. The Maryland Reforestation Law requires a 1:1 mitigation ratio resulting in 10.4 acres of required mitigation for the Preferred Alternative. A forest mitigation site search was completed (See the *Preferred Alternative and Conceptual Mitigation Concurrence Package*) to identify potential reforestation sites on public land to compensate for impacts from the Preferred Alternative as required for impacts subject to the Reforestation Law. A total of 162 acres of conceptual mitigation for forest and woody cluster impacts subject to the Reforestation Law was identified across 15 sites that will be further investigated and coordinated with the public landowners in final design for impacts that cannot be mitigated on-site. All mitigation will be completed using native species and gaps identified in the HCN database will be targeted for both on-site and off-site restoration.

Per the requirements established under EO 13112, the MDTA will prioritize minimization of the spread of existing, or introduction of additional, invasive species. During construction this would be accomplished by avoiding invasive species hot spots whenever possible and incorporating best practices, including:

- Cleaning equipment before entering or leaving the site to prevent transferring seeds or plant material.
- Limiting soil disturbance.

- Preserving native vegetation.
- Integrated Vegetation Management can also be an effective tool to control invasive plants and maintain native and diverse vegetation along the forest edge over the long term.

For unavoidable impacts, mitigation strategies would focus on controlling the spread of invasive species and restoring the affected areas. These include removing invasive species mechanically or chemically prior to the start of construction activities and replanting with native vegetation. The native vegetation would help to restore biodiversity.

Additional minimization and mitigation strategies related to terrestrial habitat are discussed in **Section 5.5.6** and **Section 5.5.9**.

5.5.8.2 Terrestrial Biota

Maryland is home to an estimated 39 species of terrestrial mammals, 93 species and subspecies of reptiles and amphibians, more than 400 species of birds, and an untold number of insect and other invertebrate species including crustaceans, spiders, and mollusks (MDNR, 2023b).

Several Federal and state regulations protect terrestrial wildlife in Maryland. The Endangered Species Act (ESA) (16 USC 1531-1543) protects Federally listed species and is discussed in **Section 5.5.9**. The protection of all migratory birds is governed by the Migratory Bird Treaty Act (MBTA). A list of migratory birds protected by the MBTA is included in 50 CFR 10.13 and includes most of the species found in Maryland. In accordance with the U.S. Department of the Interior Acting Solicitor's legal opinion (M-37085) dated April 11, 2025, the MBTA does not prohibit 'incidental' (i.e., accidental, not intentional) take of migratory birds, including occupied nests. Thus, only intentional take of migratory birds, including occupied nests, is prohibited by the MBTA. The Bald and Golden Eagle Protection Act (16 USC 668-668c) 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). The Act also prohibits disturbance of any bald or golden eagle.

Under the Fish and Wildlife Conservation Act (16 USC 2901-2912), USFWS has developed a list of migratory birds that might become candidates for listing under the ESA known as Birds of Conservation Concern (BCC) (USFWS, 2021). These BCC are particularly at risk from further degradation of their habitats, and Federal agencies are encouraged to consider these species in accordance with EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*.

The conservation of terrestrial wildlife in Maryland is managed through the implementation of the State Wildlife Action Plan (SWAP), which is overseen by the USFWS and requires determination of Species of Greatest Conservation Need (SGCN) as a condition for receiving funding through the State and Tribal Wildlife Grants program.

In Maryland, colonial waterbird nesting areas and FIDS habitat are regulated as protected resources within the Chesapeake Bay Critical Area and are discussed further in **Section 5.5.6** and **Section 5.5.7**. Colonial waterbirds, the Peregrine Falcon (*Falco peregrinus anatum*), and other migratory birds are also protected by the MBTA. No formal field investigations/surveys for terrestrial biota were conducted for the Tier 2 Study; however, incidental observations of species during the wetland delineations were recorded.

A review of publicly available data was conducted to identify mammals, reptiles and amphibians, and birds likely to occur in the resource review area. More information on specific sources and methods is provided in the *Natural Environment Technical Report*.

Affected Environment

Based on a review of field guides and range maps, 39 species of terrestrial mammals were identified as potentially occurring in the resource review area. Of these, 13 species are considered SGCN (MDNR, 2016). Forty-three species (22 reptile and 21 amphibian species) were documented by The *Maryland Amphibian and Reptile Atlas* (MARA; MDNR, 2018) as occurring in or near the resource review area; eight species are considered SGCN. Eight reptile species and four amphibian species were observed incidentally while conducting wetland delineation field work. See the *Natural Environment Technical Report* for the documented amphibian and reptile species.

The *Maryland & DC Breeding Bird Atlas 3* (MD-DC BBA3) documented 247 species of birds in or near the resource review area. The MD-DC BBA3 protocol assigns a breeding status (Observed, Possible, Probable, or Confirmed) to each documented species to identify the likelihood that the species is breeding within the block. Eighty-one (81) bird species were confirmed to be breeding in at least one portion of the resource review area (27 species were coded as "possible", 8 as "probable", and 131 as "observed"). Of the documented species, 92 are considered SGCN (MDNR, 2016), 22 are considered BCC by the USFWS (USFWS, 2021), and 19 species are considered FIDS (CAC, 2000). See the *Natural Environment Technical Report* for bird species documented and their breeding status. While conducting wetland delineation field work, 48 species of birds were observed incidentally.

A review of the Maryland Bird Conservation Partnership's Maryland Bald Eagle Nest Monitoring Program was conducted on June 23, 2025. One Bald Eagle nest is known to be present. The nest is in Stevensville, MD, located west of MD 8 approximately 1,200 feet north of U.S. 50/301. Correspondence with MDNR WHS (dated January 18, 2024) indicated the potential presence of several protected nesting bird species, including the Least Tern, Sora Rail, Peregrine Falcon, Great Egret, Snowy Egret, Cattle Egret, Black-Crowned Night Heron, and Great Blue Heron. The presence of these species is discussed further in **Section 5.5.9**, and the herons and egrets are also discussed in **Section 5.5.7.2**.

Environmental Consequences

The No-Build Alternative would have no impacts to terrestrial biota. All build alternatives, including the Preferred Alternative, would impact terrestrial biota through the direct loss of habitat, including forest cover, non-forested vegetated edge areas, and wetlands serving as transitional habitat between aquatic and terrestrial environments. Impacts to species can also be a direct result of active construction. Per the results identified in **Section 5.5.8.1** and **Section 5.5.5**, the largest potential for impacts to terrestrial wildlife is associated with Alternatives D, E, F, and G, as the LODs of these alternatives extend farther east and west along U.S. 50/301, and impact substantially more habitat. Alternatives B, C, and the Preferred Alternative, would result in approximately three times less mapped forest habitat impact, and approximately two times less delineated wetland habitat impact than the other build alternatives. The greatest potential project-related wildlife impacts would occur from Alternative F, which would result in the greatest forest and wetland impacts.

The majority of terrestrial biota impacts for all build alternatives, including the Preferred Alternative, occur within habitat edges along the existing roadways. These habitats have already been impacted by the increasingly developed landscape and the species they support are opportunistic edge-type species that are found in urban and suburban areas. In forested areas, impacts from roadway widening would remove existing edge habitat and shift the limits of edge

habitat towards more interior habitats. This shifting of edge habitat is not anticipated to alter the wildlife assemblages in these areas but may slightly shrink available interior habitats, potentially reducing populations of disturbance sensitive species like FIDS. This potential is greatest with Alternatives D, E, F, and G.

There are 24 total species of potential breeding birds in need of conservation (SGCN and BCC) in the resource review area and the number of species potentially impacted in each of the four habitat categories ranges from four (field/grassland) to nine (forest). The nine forest species are comprised mostly of FIDS, which generally avoid the fragmented forest patches or scrubby edge habitat that characterizes most of the forests impacted by the build alternatives, including the Preferred Alternative. As noted above, impacts to these species would primarily be related to a slight reduction in available interior habitat as the forest edge is shifted inward. Reductions in available habitat would be of particular concern for BCC species and SGCN, many of which are in decline due to habitat loss and other stressors. Alternatives B, C, and the Preferred Alternative, would impact habitat for these species the least (27.3 acres) while Alternatives D, E, F and G would impact three times more forest edge habitat.

Six species of documented birds of concern occupy wetland habitats during the breeding season, but only three of those (Snowy and Great Egrets and Great Blue Heron) were documented as confirmed breeders (birds showing strong evidence of nesting) in the resource review area during the MD-DC BBA3. The additional three species were documented as either possible breeders (birds observed in the habitat but showing no obvious nesting behavior) or probable breeders (birds showing behaviors implying they intend to nest or may be nesting). General effects to these species would primarily be a shift in their feeding grounds, as they have relatively diverse diets and can occur wherever there is water nearby. However, a Great Blue Heron colony is located on Mezick Pond that could be impacted, particularly by the northern alignment alternatives, Alternatives B, D, and F.

The fewest number of SGCN and BCC species in any habitat categories occupy shorelines or fields/grasslands, habitat categories that would see the least area of impact from any build alternative, including the Preferred Alternative, as shorelines occupy a relatively narrow zone, and grasslands/meadows are limited within the corridor. Most of the potential shoreline impacts, affecting shorebird habitat, are common to all build alternatives, including the Preferred Alternative, along the Chesapeake Bay and Cox Creek, but Alternatives D, E, F, and G could impact shoreline areas at Kent Narrows. Very few grassland or meadow habitats exist within the build alternatives, including the Preferred Alternative, and the small areas that do are at the eastern end of the Tier 2 Study limits. Impacts to these habitats and the SGCN or BCC species that could occupy them would be minimal for all build alternatives, including the Preferred Alternative, though slightly higher for Alternatives D, E, F, and G which extend to the eastern limits.

Less mobile wildlife (e.g., turtles, salamanders, or small mammals like moles and voles) have a greater potential to be killed during construction than more mobile species (e.g., birds, including waterfowl and falcons, and larger mammals like deer and foxes). Movement of species from construction disturbance also increases the potential for mortality from vehicle strikes. This effect would be most substantial within the smallest, already fragmented forest stands surrounded by development, where remaining habitat is already limited in its ability to adequately support wildlife populations. Since the project will improve an existing roadway corridor primarily populated by

edge and disturbance acclimated species, impacts are anticipated to be minimal. Construction activities also generate noise, vibration, and light pollution, disturbing wildlife behavior and stressing sensitive species. Noise from equipment can disrupt communications, mating calls, and predator-prey interactions.

Eagles occupying the known eagle nest located along MD 8 could potentially be impacted by the build alternatives, including the Preferred Alternative. USFWS guidance recommends a buffer of 660 feet for any activities visible from the nest, and activities in the vicinity of the nest that may cause disturbance should be avoided between December 15 and June 30 (or following fledging of young and dispersal from the nest area). The LOD for Alternatives B, C, D, E, and the Preferred Alternative is greater than 660 feet away from the nest location and based on the *National Bald Eagle Management Guidelines* (USFWS, 2007), is not likely to require an Eagle Disturbance Take permit under the Bald and Golden Eagle Protection Act. Alternatives F and G extend along MD 8 in close proximity to the nest location, and construction would be expected within less than 660 feet, and possibly within 330 feet of the nest. The MDTA will continue to coordinate with USFWS to evaluate potential impacts to eagles. If work for the Selected Alternative is deemed likely to cause disturbance to a nest, a "take" permit would be obtained from USFWS to allow the work to proceed during the active season and outline project-specific guidelines to reduce the likelihood of disturbance. Impacts to the nest itself would require a "take" permit regardless of season.

Minimization and Mitigation

The MDTA will continue to coordinate with USFWS and MDNR during more detailed design and construction to further minimize and mitigate impacts to terrestrial biota and ensure compliance with all applicable environmental regulations. A time-of-year restriction for construction within the bald eagle nesting period, generally late winter through early June, may be required by USFWS to protect the known bald eagle nest near MD 8. A time-of-year restriction for construction within the Peregrine Falcon nesting period may be required by USFWS within a designated buffer around any known peregrine falcon nests. The buffer distance will be determined in coordination with USFWS. Other avoidance and minimization techniques that may be considered in later phases of design to reduce impacts on Peregrine Falcons include alignment shifts to reduce clearing and maintain visual buffers between the nest and construction activities and seasonal nest monitoring during construction to ensure activities are not disturbing reproduction and rearing. Other possible BMPs to avoid incidental take of migratory birds can include time-of-year restrictions on tree clearing activities, bridge designs to reduce risk of bird collisions, and proactive management to discourage bird nesting on construction site and equipment. The MDTA will continue to coordinate with USFWS and MDNR regarding minimization of impacts and the need for any mitigation for bald eagles, raptors, and other MBTA-protected species as the project progresses, prior to construction. If any new occurrences are documented during future design phases, the MDTA will coordinate those resources with the agencies prior to construction.

A formal survey of forest and urban trees is required during final design, in accordance with the Maryland Reforestation Law. The MBTA prohibits intentional "take" of native and naturally occurring migratory birds including occupied nests. The MDTA will continue coordination with the MDNR during more detailed design and construction to ensure compliance with all applicable environmental regulations associated with terrestrial biota and will incorporate impact minimization and further mitigation strategies as directed, which may include:

- Pre-construction surveys and monitoring to identify species at risk and establish buffer zones around sensitive habitats.

- Adhering to construction-related time-of-year restrictions and species-specific time-of-year restrictions and avoiding tree clearing during bird nesting seasons.
- Limited nighttime construction and scheduling loud activities during daylight hours to reduce disturbance to nocturnal species.
- Incorporation of ESC measures to prevent habitat degradation.
- Incorporation of wildlife protection mechanisms during construction, including exclusion fencing and trenches to provide escape routes for reptiles and small mammals.
- Consideration of wildlife overpasses or underpasses into the engineering design to maintain ecological connectivity.
- Replanting of native trees and shrubs post-construction to restore lost habitat.
- Native forbs and grasses may be suitable for planting along highway clear zones and can restore lost habitat for pollinators.

5.5.9 Rare, Threatened, and Endangered (RTE) Species

The following laws and regulations apply to RTE species within the resource review area:

- Section 7 of the ESA of 1973 (16 USC Sections 1531-1544) and implementing regulations (50 CFR 402)
- Maryland Nongame Endangered Species Conservation Act (Md. Code Ann., Nat. Res. § 10-2A-01 through 09)

For more information regarding RTE species regulatory context and the methodology used in this analysis, see the *Natural Environment Technical Report*.

The Information for Planning and Consultation (IPaC) official species list was obtained from the USFWS IPaC website on April 28, 2025 (see *Appendix N* of the *Natural Environment Technical Report*) and a species list was obtained from the NOAA Fisheries Greater Atlantic Region ESA Section 7 Mapper website on February 5, 2025 (See *Appendix O* of the *Natural Environment Technical Report*). The IPaC species list was last updated on September 17, 2026 (see **Appendix C**), and will continue to be updated through design and any changes to species identified by IPaC will be coordinated as appropriate with USFWS. In accordance with Section 7 of the ESA, the MDTA and FHWA prepared Biological Assessments (BAs) to evaluate the potential impact of the Preferred Alternative on ESA-listed or proposed terrestrial and aquatic species. The BAs are included in **Appendix C** and as supporting technical reports to the Final EIS. FHWA submitted the BAs and letters requesting initiation of Section 7 consultation to USFWS and NOAA Fisheries on November 28, 2025 (See **Appendix C**). Section 7 consultation with USFWS concluded on March 4, 2026. Section 7 consultation with NOAA Fisheries concluded and a Biological Opinion was received on August 10, 2026 (See **Appendix C**). Development of the BAs was coordinated with USFWS and NOAA Fisheries and coordination will continue as the Tier 2 Study progresses, and additional engineering detail becomes available.

The MDNR WHS provided information on the potential for impacts to state-listed species on January 18, 2024 (see *Appendix M* of the *Natural Environment Technical Report*). In addition, mapped SSPRA were reviewed online to identify areas supporting or providing habitat buffers for RTE species within the resource review area. See **Section 5.5.10** for a detailed discussion of SSPRA. SSPRA are also discussed in the *Natural Environment Technical Report*.

5.5.9.1 Affected Environment

Federally Listed Species

USFWS Federally Listed Species

Federally listed and proposed species under USFWS jurisdiction are known to occur in the resource review area. The USFWS official species list indicated the potential presence of one listed species and two species proposed for listing, as shown in **Table 5-54**. Critical habitat has not been designated for any ESA-listed species under USFWS jurisdiction potentially occurring within the resource review area. There is no proposed designated critical habitat for the monarch butterfly within the resource review area.

Table 5-54: USFWS Federally Listed and Proposed Species

Common Name	Scientific Name	Federal Status
Northern long-eared bat	*Myotis septentrionalis*	Endangered
Tricolored bat	*Perimyotis subflavus*	Proposed Endangered
Monarch butterfly	*Danaus plexippus*	Proposed Threatened

Forests and other linear wooded features containing live trees and snags, especially those with exfoliating bark, crevices, cavities, or leaf clusters, provide suitable habitat for northern long-eared bat (NLEB) and tricolored bat (TCB). Streams and wetlands may provide NLEB and TCB with forage, water, and cover from predators. Expansion joints and other crevices on bridges can provide habitat for roosting bats by mimicking cave-like conditions. Cracks and crevices within culverts 36-inches or wider may mimic cave-like environments and provide suitable habitat for NLEB and TCB. Buildings may also provide habitat for these bat species. Grasslands and meadows are limited within the resource review area to small areas at the eastern end of the study limits. These grassland/meadow habitats and the wetlands identified within the resource review area, summarized in **Section 5.5.5**, may provide habitat for monarch butterflies.

NOAA Fisheries Federally Listed Species

The NOAA Fisheries Greater Atlantic Region ESA Section 7 Mapper shows Section 7 Consultation Areas for six Federally listed species under NOAA Fisheries jurisdiction, including two fish and four sea turtles, as shown in **Table 5-55**.

Table 5-55: NOAA Fisheries Federally Listed Species

Common Name	Scientific Name	Federal Status
Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	Endangered
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered
Loggerhead sea turtle	*Caretta caretta*	Endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
Green sea turtle	*Chelonia mydas*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered

Juvenile, subadult, and adult Atlantic sturgeon are found migrating and foraging throughout the Chesapeake Bay. Adult and subadult stages are present between late March and November, while juvenile stages are present year-round. Juvenile, subadult and adult Atlantic sturgeon opportunistically forage, particularly in areas with soft substrate. Juvenile prey items include aquatic insects, larvae, and other invertebrates, and subadult and adult stages feed on benthic prey such as mollusks, gastropods, amphipods, annelids, decapods, isopods, and fish. Telemetry

data collected from 2021 to 2024 and provided by NOAA Fisheries detected Atlantic sturgeon in the Chesapeake Bay North array (located just south of the Bay Bridge) mainly during warmer months. Telemetry data indicate that sturgeon use of the area is limited, which suggests that they may use the area for opportunistic foraging. The telemetry data provided by NOAA Fisheries are discussed further in the *Natural Environment Technical Report*. Atlantic sturgeon are bottom feeders, consuming invertebrates and bottom-dwelling fish. In the Chesapeake Bay, Atlantic sturgeon spawn between late summer and fall. They spawn in upstream habitat of large tidal rivers just below the fall line in areas with cobble habitat. Threats to the species include fisheries interactions and bycatch, habitat degradation, habitat impediments, and vessel strikes (NOAA Fisheries, 2022a; NOAA Fisheries, 2023a).

Adult stages of shortnose sturgeon are believed to be present year-round throughout the Chesapeake Bay (NOAA Fisheries, 2022a). NOAA Fisheries assumes that the shortnose sturgeon could be overwintering anywhere in the Bay from November 1 to February 28. Shortnose sturgeon are bottom feeders that feed on mollusks as well as benthic crustaceans and insects (Dadswell, 1979). Sturgeon feed opportunistically where appropriate forage items are available. They prefer highly productive foraging habitat that includes tidal mudflats, in SAV, and NOBs. In the mid-Atlantic region, shortnose sturgeon migrate upriver to spawn from April to May and return downstream after spawning. Threats to the species include habitat impediments, habitat degradation, and fisheries interactions and bycatch (NOAA Fisheries, 2023b).

Adult and juvenile stages of the loggerhead, Kemp's ridley, green, and leatherback sea turtles are found migrating and foraging in the Chesapeake Bay. These four species of sea turtles migrate north to the mid-Atlantic in the spring, arriving in May, and leave the area generally by the end of November (NOAA Fisheries, 2022b, 2023c, 2023d, and 2023e). Loggerhead sea turtles forage in coastal areas, feeding mostly on bottom dwelling invertebrates. Kemp's ridley sea turtles foraging in coastal areas consume mostly crabs and occasionally discarded bycatch. Green sea turtles are primarily herbivorous, feeding on algae and seagrasses (including SAV), and occasionally consuming sponges, invertebrates, and discarded fish. Leatherback sea turtles consume soft-bodied prey such as jellyfish. Threats to the loggerhead, Kemp's ridley, green, and leatherback sea turtles include bycatch in fishing gear, loss and degradation of nesting habitat, vessel strikes, direct harvest of the sea turtles and their eggs, and ocean pollution/marine debris. Additionally, threats to the Kemp's ridley sea turtle include predation of eggs and hatchlings, and threats to the green sea turtle include *Fibropapillomatosis*, a tumor-causing disease (NOAA Fisheries, 2022b, 2023c, 2023d, and 2023e). While these four species of sea turtles may be present in the vicinity of the Chesapeake Bay Bridge, their occurrence is considered a rare, transient, opportunistic event rather than indication of sustained use (See the *Biological Opinion*, **Appendix C**).

State-Listed Species

MDNR WHS indicated the presence or potential presence of several state-listed RTE species as shown in **Table 5-56**, and protected habitats, including a Habitat Protection Area in Sandy Point State Park for rare breeding birds.

Table 5-56: State Listed Species

Common Name	Scientific Name	State Status
Least Tern	*Sternula antillarum*	Threatened
Sora Rail	*Porzana carolina*	Rare
Eastern small-footed bat*	*Myotis leibii*	Endangered

Common Name	Scientific Name	State Status
Little brown bat*	*Myotis lucifugus*	Highly Rare

**Species could potentially be present based on recent data from neighboring states.*

Nesting sites for the Peregrine Falcon, a Species in Need of Conservation in Maryland and afforded protection under the MBTA, have been identified on structures underneath the roadway of the Chesapeake Bay Bridge near the suspension span and on the U.S. 50 bridge over the Severn River. Waterbird species that use the bridge pier "islands" for nesting are protected under the MBTA and Critical Area regulations and include Great Egret (*Ardea alba*), Snowy Egret (*Egretta thula*), Cattle Egret (*Bubulcus ibis*), and Black-Crowned Night Heron (*Nycticorax nycticorax*).

Based on comments received from MDNR on the Draft EIS (See **Appendix H**), recent findings from bridge and culvert surveys in Coastal Plain areas of New Jersey indicate that a number of sensitive bat species may roost in structures similar to those found within the resource review area (personal communication, April 6, 2026). These include two state-listed species: Eastern small-footed bat and little brown bat.

Known habitat for the Delmarva fox squirrel, a Species in Need of Conservation, is located north of U.S. 50/301 from Winchester Creek to Little Queenstown Creek in Queen Anne's County, including forests with relatively mature trees with a relatively sparse understory.

A nesting colony of Great Blue Herons (*Ardea herodias*) at Mezick Pond in Sandy Point State Park is protected under the MBTA and Critical Area regulations during their breeding season.

Waterfowl Concentration Areas, discussed in **Section 5.5.7**, are located along the shoreline of Whitehall Creek, Meredith Creek, the Chesapeake Bay south of the Bay Bridge in Anne Arundel County, along the shoreline of the Chesapeake Bay north of the Bay Bridge, and in Prospect Bay in Queen Anne's County.

5.5.9.2 Environmental Consequences

Alternative A, the No-Build Alternative, would have no impacts to Federal or state RTE species.

The build alternatives, including the Preferred Alternative, could potentially adversely impact RTE species from demolition, construction, and operational activities that could remove or degrade habitat, cause physical injury, or alter behavior. Impactful activities may include interaction with construction equipment or vessels, tree clearing and grubbing operations, dredging activities, water jetting, in-water construction/de-construction activities, equipment or gear deployment, pile driving), or cutting and filling of land. These activities would result in environmental effects such as underwater noise and increased turbidity and may include vessel strikes and entrainment/entrapment depending on construction means and methods employed. The addition of an SUP option with any of the build alternatives, including the Preferred Alternative, would not result in additional displacements of any listed species.

Federally Listed Species

USFWS Federally Listed Species

A preliminary assessment by USFWS in an email dated May 28, 2025, indicates that none of the build alternatives, are likely to jeopardize the continued existence of the monarch butterfly or TCB, and therefore conferencing is not required under Section 7 for these proposed species. Although

not required, conferencing with USFWS for TCB was chosen due to similar habitat requirements and life history to NLEB, allowing analysis of impacts to NLEB to be closely associated with impacts to TCB. A detailed analysis and discussion of potential impacts to bat species are presented in the *Northern Long-Eared Bat and Tricolored Bat Biological Assessment* located in **Appendix C**. Surveys to determine probable absence of listed bats were conducted in coordination with USFWS and based on the guidance of the *Range-wide Indiana Bat & Northern Long-eared Bat Survey Guidelines* (USFWS, 2024) and the *Acceptable Management Practices for Bat Species Inhabiting Transportation Infrastructure* (White-nose Syndrome Conservation and Recovery Working Group, 2018). Based on preliminary assessment of the information available to date, FHWA, in coordination with the MDTA, made a determination that the Preferred Alternative may affect but is not likely to adversely affect Federally listed or proposed bat species. USFWS concurred with the effect determination on March 4, 2026. As noted in **Section 5.5.8.1**, field verification of forest and woody cluster boundaries resulted in updated impacts compared to those reported in the Draft EIS, which were evaluated based on Maryland published GIS data. USFWS reviewed the updated impacts and, on June 2, 2026, determined that reinitiation for Section 7 consultation is not required as the LOD has not expanded. USFWS maintained their original concurrence from March 4, 2026. Further evaluation of impacts will be conducted during final design, and the effect determination will be re-assessed as more detailed construction means and methods are made available.

NLEB and TCB are both insectivorous species, however, they differ in foraging strategies, with NLEB having greater success, and are more likely to be found, in intact forests and TCB having greater success in forest edges and other open spaces. The build alternatives, including the Preferred Alternative, primarily affect forest edges and forest fragments, rather than undisturbed forest interiors. Regardless of habitat preference, NLEB and TCB may use any amount of suitable forest habitat to roost, forage, and travel. Although maternity roosts or hibernacula are not known to be located within the LOD of any build alternative, including the Preferred Alternative, the removal of larger forested areas (e.g., forest located at the U.S. 50/301 split in Queen Anne's County, or forest surrounding Whitehall Creek in Anne Arundel County) would impact suitable bat habitat. Due to proximity to roadways and invasive cover, these impacted forest areas provide low-quality habitat for NLEB and TCB, with higher quality forests remaining beyond the scope of all alternatives, including the Preferred Alternative. Forest clearing impacts that may affect NLEB and TCB suitable habitat have been determined based on the total amount of terrestrial habitat mapped as forest through Maryland published GIS data and the field delineated forest and woody cluster survey data. Details of forest clearing based on current design are outlined in **Section 5.5.8.2**. Impacted forest acreage ranges from 59.5 acres for Alternative C to 155.2 acres for Alternative F. Impacts from the Preferred Alternative were calculated based on the field delineated forest and woody cluster survey data, resulting in 57.7 acres of forest impacts.

Wetlands and waterways provide habitat, water, and foraging opportunities for NLEB and TCB. Details of wetland and waterway impacts based on current design are outlined in **Section 5.5.5.1**. Alternative B would impact 6.0 acres of nontidal and tidal wetlands. Alternative C would impact 5.6 acres of wetlands, which is the least wetland area impacted across all build alternatives. Alternatives D, E, F, and G would impact between 11.1 and 12.0 acres. Impacts to non-tidal waterways range from 670 linear feet for Alternative C to 3,600 linear feet for Alternative F. Impacts to tidal waterways range from 290 linear feet for Alternatives B and C to 900 feet for Alternatives F and G. The Preferred Alternative would impact 5.6 acres of tidal and non-tidal wetlands and 670 linear feet of non-tidal waterways.

Bridge removal and replacement may also affect NLEB and TCB habitat. Along with the Bay Bridge, the Cox Creek bridge would be modified under Alternatives B, C, and the Preferred Alternative. Alternatives D, E, F, and G would require widening of the Kent Narrows Bridge and the Piney Creek Bridge in addition to the Cox Creek bridge. Initial surveys revealed a lack of evidence for bat roosting in both the Bay Bridge and Cox Creek bridge; therefore, it is probable that bats are not actively roosting in these bridges. Additional surveys will be conducted to confirm this initial finding as the project advances. Alternatives D and E would require the removal and replacement of four overpasses and Alternatives F and G would include two additional overpass replacements.

Culvert extension and replacement may affect NLEB and TCB habitat. Alternatives B, C, and the Preferred Alternative include thirteen (13) 36-inch or greater culverts, Alternatives D and E include 77 culverts of that size, and Alternatives F and G include 78 culverts of that size. At this time, each of the build alternatives, including the Preferred Alternative, would impact three 36-inch or larger culverts, including the culvert carrying Meredith Creek and two additional reinforced concrete pipes (RCP), one on the Western Shore and one on the Eastern Shore. Lack of evidence of bat roosting indicated that NLEB and TCB are probably absent from the 13 culverts impacted, at minimum, by Alternatives B, C, and the Preferred Alternative. Based on USFWS recommendations provided in the *Range-wide Indiana Bat & Northern Long-eared Bat Survey Guidelines* (USFWS, 2024), culverts smaller than 36 inches were not assessed, but it is likely that most culverts would require capacity increases due to projected hydrologic conditions or to accommodate roadway widening.

Building/structure displacement (i.e. demolition/removal) may result in a reduction of NLEB and TCB habitat. Alternatives B and C would include the displacement of two commercial buildings; Alternatives D and E would include the displacement of seven buildings; and Alternatives F and G would involve the displacement of eight buildings. The Preferred Alternative avoids all building displacements. The SUP option would not result in additional displacements. Due to higher quality forest habitat nearby, high levels of artificial light, and disturbance from human use and occupancy, the buildings that would be displaced, at minimum by Alternatives B and C, are not likely to host roosting NLEB and TCB.

Construction activities for all build alternatives, including the Preferred Alternative, could cause direct mortality and disturb habitat for monarch butterflies along roadsides and in open fields adjacent to the roadways. Alternatives D, E, F, and G would have a greater potential for impact than Alternatives B, C, and the Preferred Alternative, due largely to the extension of proposed roadway improvements in Queen Anne's County included with these four alternatives, where there are more adjacent open fields and agriculture.

NOAA Fisheries Federally Listed Species

A detailed analysis and discussion of potential impacts to sturgeon and sea turtle species are presented in the *Atlantic Sturgeon, Shortnose Sturgeon and Sea Turtles Biological Assessment* and the *Biological Opinion* located in **Appendix C**. NOAA Fisheries issued their *Biological Opinion* on August 10, 2026 based on an assessment of the design information available to date; the current status of the species; the environmental baseline and cumulative effects in the action area; and the effects of the project. The *Biological Opinion* concluded that the Preferred Alternative may adversely affect, but is not likely to jeopardize the continued existence of shortnose sturgeon, or the New York Bight, Chesapeake Bay, Gulf of Maine, Carolina, and South Atlantic Distinct Population Segment (DPS) of Atlantic sturgeon, and that the Preferred Alternative

is not likely to adversely affect leatherback, Kemp's ridley, the Northwest Atlantic DPS of loggerhead, or the North Atlantic DPS of green sea turtles. Further evaluation of impacts will be conducted during final design, and the effects determination will be re-assessed as more detailed construction means and methods are made available.

Sturgeon

Adult, subadult, and juvenile Atlantic sturgeon and adult shortnose sturgeon could potentially be affected by construction activities due to their utilization of the area during seasonal breeding migrations; additionally, adult shortnose sturgeon and juvenile Atlantic sturgeon could be affected due to overwintering in the area. Atlantic and shortnose sturgeon are bottom feeders and opportunistic foragers and are therefore found throughout the Chesapeake Bay where suitable forage (e.g., benthic invertebrates such as mollusks and crustaceans) and appropriate habitat conditions (e.g., areas of SAV) are present. The physical disturbance of sediments and entrainment of associated benthic resources could reduce the availability of sturgeon prey species, although recolonization of the opportunistic benthic species would occur quickly. All build alternatives, including the Preferred Alternative, would have similar types of potential impact to sturgeon, including permanent impacts from the placement of piers on the Bay bottom, and temporary impacts related to construction activities. The primary difference between build alternatives, including the Preferred Alternative, is the magnitude of those impacts, with the wider alternatives across the Bay (Alternatives F and G) requiring larger bridge piers, and the longer alternatives, Alternatives D, E, F, and G, including construction at Kent Narrows. Although SAV is not identified within Kent Narrows, it is documented as present in Prospect Bay to the south; therefore, there is potential for sturgeon to be in the vicinity.

Dredges and other mechanisms have the ability to impinge or entrain sturgeon during routine operation. Details on the duration and timing of dredging based on current design assumptions are outlined in **Section 5.5.5.2**. Impingement/entrainment may cause injury or death in certain cases, though the risk of a sturgeon being captured by a mechanical dredge bucket is extremely low given the slow rate of bucket descent and closure and the small area of bottom affected during each pass. Increased turbidity resulting from dredging is not anticipated to affect sturgeon species, as the life stages most vulnerable to increased sediment are eggs and non-mobile larvae, which would not be present in these areas. Any sturgeon in the vicinity would be sufficiently mobile to avoid any sediment plume or reductions in dissolved oxygen (NOAA Fisheries, 2012). Changes in water quality parameters resulting from discharges, construction activities, and demolition may adversely affect sturgeon. Strikes from construction vessels are possible, but extremely unlikely since construction vessels would be within deeper waters and have shallow drafts, and sturgeon would typically be at greater depths, substantially minimizing construction vessel strike risk (Balazik et al., 2012). The analysis in the NOAA Fisheries *Biological Opinion* (**Appendix C**) also concluded that the probability of a project-related vessel striking a sturgeon is extremely remote, based on the anticipated size and type of vessel, travel routes, and number of trips as informed by relevant data from similar projects, the maintenance of a vertical clearance, and the lack of surface-oriented behavior in sturgeon.

Exposure to underwater noise levels can result in injury to sturgeon. The distance of the sound effects would be dependent upon the pile size, material, and methods of pile driving. Current pile driving assumptions, including anticipated sequence and duration, are included in **Section 5.5.7.2**. Though specific construction means and methods have not been developed, estimates of noise levels were calculated based on construction means and methods of similar projects,

including Nice-Middleton Bridge and Francis Scott Key Bridge, using the NOAA Fisheries Multi-Species Pile Driving Calculator (NMFS, 2025). Calculations were completed for multiple pile driving scenarios anticipated for the main structure, trestles, and pier protection dolphins based on the current Tier 2 Study high-level assumptions. These assumptions and the corresponding noise analysis will continue to be refined as the Tier 2 Study progresses. For this study, the maximum distance to the 206 dB Peak (the threshold for injury to sturgeon from a single pile strike) is estimated to be 60.6 feet, and the maximum distance to the 187dB cSEL (the threshold for injury to sturgeon from multiple exposures to noise over a period of time) is estimated to be 7,068.4 feet. To be exposed to potentially injurious levels of noise during impact pile driving of the steel piles, a sturgeon would need to be within 60.6 feet of the pile for a single strike or remain within 7,068.4 feet of the pile being driven for a prolonged time period (i.e., the duration of pile driving in one day). The expectation is that adult and juvenile sturgeon would modify their behavior and move away from the area upon exposure to underwater noise levels of 150 dB_{RMS} (the sound pressure threshold for causing behavioral effects to sturgeon), an area extending up to 32,808.4 feet from pile driving activities. The extent of pile driving isopleths for fish by pile type are shown on **Figure 5-29**, but in practice, not all piles would be driven at the same time. The initiation of daily pile driving with a soft start technique would also give sturgeon in the area time to move out of the range of any injurious sound waves. The analysis conducted by NOAA Fisheries and presented in their *Biological Opinion* concluded that, "all sturgeon in the action area are expected to be able to readily swim away from any ensonified area in time to avoid injury; therefore, injury of any type due to exposure to pile driving noise is extremely unlikely to occur and effects are discountable." Additionally, no effects to growth, reproduction, immune function, or long-term survival attributable to pile driving-related behavioral modification are anticipated.

Demolition of the existing structures may include mechanical means and controlled explosive demolition (blasting). Current blasting assumptions, including anticipated duration and time of year, are included in **Section 5.5.7.2**. Any required blasting will take place during times of lower biological activity from October 1 through December 15. Blasting generates pressure waves that have been shown to cause swim bladders to rupture, killing fish (Keevin and Hempen, 1997). . A limited number of adult and subadult Atlantic sturgeon may still be present in the Chesapeake Bay through early December, and adult shortnose sturgeon and juvenile Atlantic sturgeon are present year-round; therefore, blasting could result in serious injury or mortality. NOAA Fisheries has issued an Incidental Take Statement (ITS) included in the *Biological Opinion*, which states that the proposed action has the potential to result in the mortality or injury of one shortnose sturgeon and one Atlantic sturgeon due to blasting. Reasonable and Prudent Measures (RPMs) identified by NOAA Fisheries as necessary and appropriate to minimize and monitor impacts of the incidental take are included in **Section 5.5.9.3**. For the complete analysis and ITS, see the *Biological Opinion* (**Appendix C**).

Sea Turtles

Adult and juvenile leatherback, loggerhead, green, and Kemp's ridley turtles could potentially be affected by build alternative construction activities due to their utilization of the area (generally during the warmer months of April to November). Their presence would most likely be where suitable forage (e.g., benthic invertebrates such as mollusks and crustaceans) and appropriate habitat conditions are present (e.g., areas of SAV). All build alternatives, including the Preferred Alternative, have the potential to impact sea turtles due to proposed construction in the Chesapeake Bay. However, Alternatives D, E, F, and G are anticipated to have greater potential

for impact to sea turtles due to the proposed construction at Kent Narrows and the presence of SAV habitat identified to the south in Prospect Bay.

The physical disturbance of sediments and entrainment of associated benthic resources could reduce the availability of sea turtle prey, but the impacted benthic habitat represents an insignificant amount of the available habitat in the region, and recolonization of the opportunistic benthic species would occur quickly, making these localized impacts to sea turtle habitat and prey negligible. Sea turtles can mainly be affected by impaired water quality through the reduction of their forage base. Low DO, high temperatures, or release of pollutants that may detrimentally affect benthic communities and aquatic vegetation would directly impact sea turtle foraging and feeding.

Mechanical dredging will be used, and sea turtles are typically not susceptible to entrainment in mechanical dredging because bucket dredges are relatively stationary. The operation entails lowering the open bucket through the water column, closing the bucket after impact on the bottom, lifting the bucket up through the water column, and emptying the bucket into a barge at a slow pace. Details on the duration and timing of dredging based on current design assumptions are outlined in **Section 5.5.5.2**. Turbidity effects to sea turtles from dredging are not anticipated. One major issue associated with suspended sediments is its effect on the respiration of marine fauna. However, sea turtles breathe air and increased suspended sediments are not likely to affect turtle respiration. The most likely effect is if a sediment plume causes a barrier to normal behaviors. As sea turtles are highly mobile, they are likely to be able to avoid any sediment plume, which typically only last for a short duration near the bottom after the dredge passes. As mechanical dredging equipment will be employed, the likelihood of direct impacts to adult and juvenile sea turtles by entrainment or impingement is minimal.

Sea turtles are susceptible to vessel strikes from construction vessels since they spend time close to the surface; however, sea turtles are more vulnerable to being struck by faster moving vessels. Typically, dredge equipment, barges, and support vessels that will be used will move at slow speeds (i.e., on average 8 to 10 knots) and have shallow drafts. As noted in the *Biological Opinion* (**Appendix C**), vessel strikes to sea turtles are extremely unlikely to occur.

Sea turtle species can be adversely affected by noise generated by in-water activities, including pile driving. Current pile driving assumptions, including anticipated sequence and duration, are included in **Section 5.5.7.2**. Estimates of noise levels were calculated using the NOAA Fisheries Multi-Species Pile Driving Calculator (NMFS, 2025). Exposure to underwater noise levels can result in injury to sea turtles. For this study, the maximum distance to the 232 dB Peak during pile driving is expected to be 1.5 feet, and maximum distance to the 184 dB cSEL during impact pile driving is expected to be 28,069.2 feet. Exposure to the 232 dB Peak is unlikely to occur because sea turtles are extremely unlikely to be within 1.5 feet of the pile when pile driving begins. Sea turtles are expected to avoid areas where noise is above the 175 dB RMS behavioral threshold, an area estimated to extend up to 706.8 feet from the pile (during the most impactful pile-driving scenario, impact pile driving of the 96-inch diameter steel pipe piles). Sea turtles would be at risk of exposure to injurious levels of noise if they are within the 184 dB cSEL isopleth for a prolonged period of time during impact pile driving (i.e., the duration of pile driving in one day). The extent of the pile driving isopleths for sea turtles by pile type are shown on **Figure 5-34**, but in practice, not all piles would be driven at the same time.

Limited data is available regarding impacts of blasting on sea turtles, though some studies have demonstrated that blasting can result in mortality to sea turtles (Keevin and Hempen, 1997).

Current blasting assumptions, including anticipated duration and time of year, are included in **Section 5.5.7.2**. Any required blasting will take place during times of lower biological activity from October 1 through December 15.

The analysis conducted by NOAA Fisheries and presented in their *Biological Opinion* concluded that the proposed action is not likely to adversely affect leatherback, green, Kemp's ridley, or loggerhead turtles as they are unlikely to be present in the action area on any given day, and any presence would be infrequent, transient, and of short duration. Additionally, the implementation of BMPs (see **Section 5.5.7.3**) makes exposure to stressors unlikely. For the complete analysis, see the *Biological Opinion* (**Appendix C**).

State-Listed Species

No direct impacts to the Habitat Protection Area located between the Oceanic Drive interchange and Mezick Pond within Sandy Point State Park are anticipated from the build alternatives, including the Preferred Alternative, as the LODs immediately southeast of the interchange are located within existing right-of-way and further from area designated as habitat for the state-listed Least Tern and Sora Rail. However, the area between U.S. 50/301 and Mezick Pond, south of the Habitat Protection Area, contains estuarine habitat that could be used by nesting shorebirds and is within the LOD of the northern alignment alternatives (Alternatives B, D, and F).

Similar to Federally-listed bat species, state-listed bat species could be affected by removal of the existing Bay Bridge, widening of other corridor bridges, extension or replacement of road culverts, and forest impacts from the build alternatives. Alternatives B, C, and the Preferred Alternative would result in the lowest potential impacts to these species, while Alternatives D, E, F, and G would affect additional bridge structures, culverts, and forested areas, increasing the potential for impacts to these species. Based on preliminary surveys, it is probable that bats are not actively roosting in the structures associated with the Preferred Alternative. However, additional surveys will be performed to confirm this preliminary finding in coordination with MDNR.

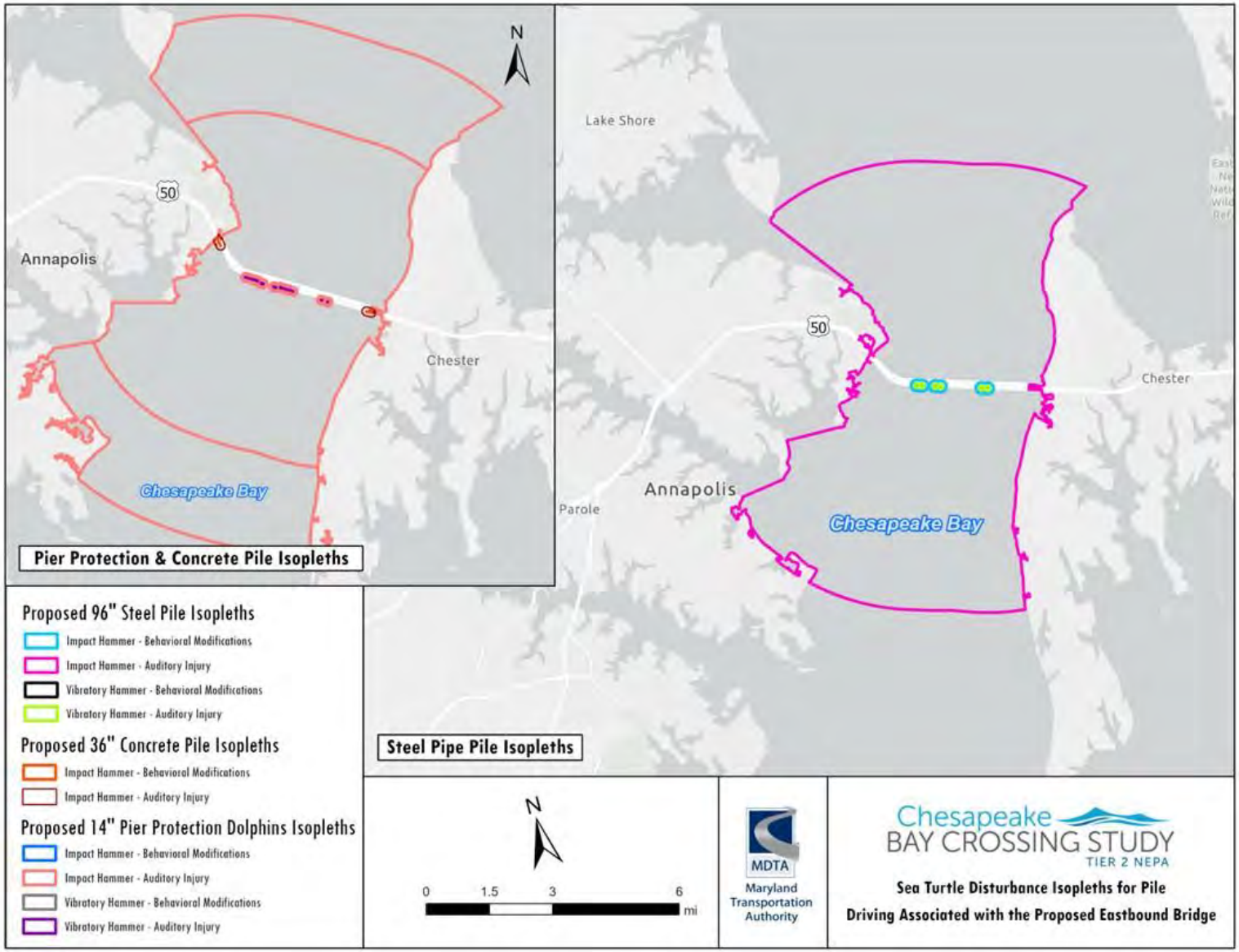
The structures underneath the Bay Bridge near the suspension span used by Peregrine Falcons, and the bridge pier "islands" used by nesting waterbirds, would be temporarily unavailable during construction of the new bridge, but the areas would be available for use by these species after the new bridge spans are constructed.

The Delmarva fox squirrel habitat located on the north side of U.S. 50/301, near the eastern study limits (east of Winchester Creek), would not be affected by Alternatives B, C, and the Preferred Alternative, as these build alternatives do not extend this far east. Alternatives D, E, F, and G do have the potential to affect the mature forest habitat between U.S. 50/301 just prior to the split, and the U.S. 50 westbound on-ramp from U.S. 301.

No impacts to Great Blue Heron nesting colonies are anticipated from the build alternatives, including the Preferred Alternative, as a 660-foot protection buffer is required during the breeding season of February 15 through July 31; these colonies are also protected under the Critical Area regulations. Upon identification of the Selected Alternative, current locations of Great Blue Heron nesting colonies would be obtained from MDNR to verify that no impacts to these colonies would occur.

Impacts to SSPRA are discussed in **Section 5.5.10.2**.

Figure 5-34: NOAA Fisheries Sea Turtle Disturbance Isopleths for Pile Driving Associated with the Proposed Eastbound Bridge



5.5.9.3 Minimization and Mitigation

The MDTA would approach design and development with the goal of minimizing and mitigating impacts to RTE species. All build alternatives, including the Preferred Alternative, are located immediately adjacent to the existing Bay Bridge and U.S. 50/301, minimizing the LODs to mostly previously impacted areas and habitats that may already experience human disturbances, thus minimizing impacts to RTE species and habitats. Although in-water construction and demolition may temporarily or permanently alter habitat for RTE species, minimization and mitigation measures will focus on maintaining habitat within the LOD of the Selected Alternative, as feasible, and providing clear limits protecting adjacent habitat. Proper ESC measures and fencing of the LOD would protect adjacent wooded foraging habitat for bats and open field habitat for monarchs. Avoidance of nighttime construction would also minimize potential impacts to bat species.

The *Northern Long-Eared Bat and Tricolored Bat Biological Assessment* located in **Appendix C** details avoidance and minimization measures that can be implemented to avoid and minimize impacts to protected bat species. The MDTA and FHWA will continue to consult with USFWS prior to construction to develop a bridge design and construction means and methods that avoid and minimize impacts. The following mitigation measures will be developed as the project progresses, to minimize the temporary construction impacts to bats associated with land-based activities:

- An ESC plan will be developed in final design; assumptions of the area needed for fulfillment of ESC requirements is already included in the LOD.
- A detailed SWM plan will be developed in final design. However, conceptual SWM has been included in the current LOD. The MDTA aims to incorporate ESD to meet (and exceed where feasible) surface water protection requirements along U.S. 50/301.

Any changes to temporary lighting will follow Occupational Safety and Health requirements and all changes to permanent lighting will follow the requirements of the MDOT and SHA Lighting Guidelines (MDTA, 2019). The MDTA will also consider DarkSky principles to minimize impacts to wildlife from permanent lighting changes.

Maryland Reforestation Law requires 1:1 replacement of impacted forest acreage. Where possible, the MDTA will replace trees within the area impacted; however, some off-site replacement is anticipated. The MDTA will prioritize off-site planting areas that expand existing forest habitats where practicable.

In the Critical Area, mitigation is required for impacts to all forest at a ratio ranging from 1:1 to 3:1 depending on the percent of forest acreage cleared, designated land use classification, and whether impacts fall within the identified Critical Area Buffer. For details regarding Critical Area forest mitigation ratios, see **Section 5.5.6.3**. During final design, the MDTA will evaluate options to replace affected trees and forest. It is expected that all reforestation and/or afforestation that would be required is not feasible on site. The MDTA will work with the MDNR Critical Area Commission to identify additional land within the Critical Area outside the LOD, and within the Critical Area Buffer, as appropriate, to fully address mitigation requirements.

The MDTA will continue to coordinate with USFWS and MDNR to minimize impacts to Federally and state-listed bat species. The MDTA assessed bridges, culverts, and buildings in accordance with USFWS guidance to evaluate the presence or absence of listed or proposed listed bat species. These assessments would be completed every two years and prior to construction activities at these structures to ensure probable absence of NLEB and TCB, as well as state-listed bat species. As outlined in USFWS guidance and refined in consultation with MDNR, surveys would be conducted in two seasons: Summer maternity pup season (May 15 to July 31) and Winter torpor season (December 15 to February 15). The MDTA has completed a forest habitat assessment to determine presence and relative value of forested habitat for bats within the study area. Tree clearing will be prohibited during the active season (April 1 to September 30) to avoid and minimize potential direct effects to NLEB and TCB in the action area.

Avoidance and minimization methods for aquatic RTE species that the MDTA will implement related to underwater noise/hydroacoustic energy; turbidity and sedimentation; reduced water quality; habitat alteration; and vessel interaction are included in **Section 5.5.7.3**. The MDTA has determined, in coordination with NOAA Fisheries and MDNR, a practicable ZSFP to maintain within the Chesapeake Bay during construction, as discussed in **Section 5.5.7.2**. A ZSFP would allow fish to move safely to their spawning grounds in the spring season. Methods to minimize the effects of turbidity may include the usage of silt curtains, time-of-year restrictions, and minimizing sediment plumes within migratory corridors.

In addition to the avoidance and minimization commitments included in **Section 5.5.7.3**, the MDTA will adhere to the following Reasonable and Prudent Measures (RPMs) provided by NOAA Fisheries through Section 7 consultation, which have been identified by NOAA Fisheries as necessary and appropriate to minimize and monitor impacts of incidental take on shortnose sturgeon and Atlantic sturgeon:

- RPM-1: All sturgeon captures, injuries, or mortalities in the immediate activity area will be reported to NOAA Fisheries within 24 hours.
- RPM-2: Any dead sturgeon will be held until proper disposal procedures can be discussed with NOAA Fisheries. The fish will be held in cold storage.
- RPM-3: All sturgeon over 75 centimeters total length that are captured will have a fin clip taken for genetic analysis. This sample will be transferred to a NOAA Fisheries-approved laboratory capable of performing the genetic analysis.
- RPM-4: During blasting, acoustic measurement of the first three detonations will be conducted to confirm the MDTA's estimated underwater pressure levels. If pressure levels exceed those estimates, the MDTA will contact NOAA Fisheries within 24 hours of the recorded measurement.
- RPM-5: The MDTA will submit a final blasting plan prior to demolition that includes final parameters for blasting, final mitigation measures, details of the deterrent system, and the noise and fish monitoring plan. The plan will require NOAA Fisheries approval before it is executed and ensure that any sturgeon killed during blasting are recorded.

The associated Terms and Conditions (T&Cs) of each RPM and justifications for RPMs and T&Cs are included in the *Biological Opinion* (**Appendix C**). As the design progresses through design , stressor characterizations and the associated effects determinations will be re-evaluated in coordination with NOAA Fisheries and consultation will be reinitiated if necessary.

Other methods to minimize potential effects to RTE species habitat could include proper siting and/or survey techniques to ensure suitable/productive habitat is avoided where feasible, restrictions on activities in productive benthic habitat (SAV, NOBs, and/or productive mudflats), restrictions in anadromous fish spawning areas/habitat (cobble areas in upstream locations), minimization of turbidity plumes, and reducing dredging in these areas. Construction and demolition activities that may interrupt spawning, rearing, foraging, overwintering, and/or migration of RTE species would be minimized to the greatest extent practicable. Pollutant discharges associated with authorized activities would meet all applicable water quality standards. Additionally, temperature and DO levels would remain within the appropriate ranges to reduce any effects to listed species under NOAA Fisheries jurisdiction. Activities that increase the uptake of heavy metals, other chemicals, or create areas of low dilution, would be minimized to the greatest extent practicable.

5.5.10 Unique and Sensitive Areas

For the purposes of the Tier 2 Study, unique and sensitive areas are defined as habitats and biological resources that have special environmental attributes worthy of protection and retention.

Maryland's GreenPrint Program was established to identify and preserve the most ecologically valuable natural lands in Maryland (Maryland's Green Infrastructure Assessment, 2023). These areas have been identified in MDNR's *Green Infrastructure Assessment*, which identifies the State's remaining large blocks of forest and wetlands (hubs) and the habitat pathways (corridors) that connect them. "Hubs," are defined as contiguous forests and wetland of at least 250 acres, rare or sensitive species habitats, biologically important rivers and streams, and existing conservation lands managed for natural values. "Corridors" are linear stretches of land, at least 1,100 feet wide, which help animals, plant seeds, water, and other important resources move between hubs (MDNR, 2016). In 2024, MDNR updated their Green Infrastructure (GI) data layers and renamed GI to Maryland's HCN. The HCN provides additional breakdown of habitat types and includes identification of restorable and non-restorable gaps within the hubs and corridors. The HCN also includes additional corridors that cross U.S. 50/301 not previously identified in Maryland's *GI Assessment* or the Draft EIS. The discussion of GI has been updated to reflect the HCN for this Final EIS.

Targeted Ecological Areas (TEA) are lands and watersheds of high ecological value that have been identified as conservation priorities by MDNR for natural resource protection. These areas, which include HCN hubs and corridors, represent the most ecologically valuable areas in Maryland. SSPRA is a digital map data layer developed by MDNR, representing the general locations of documented RTE species in Maryland. SSPRA are categorized into four groups: Group 1 includes Federally listed species; Group 2 includes state listed species; Group 3 includes species or natural communities of concern to MDNR; and Group 4 includes buffered locations of bald eagle nests. While the SSPRA boundary may not be specifically regulated, it serves as a habitat buffer for unique and sensitive habitats that may sustain regulated species.

Irreplaceable Natural Areas (INAs) are designated by MDNR and described as areas of state-owned land managed by MDNR that provide habitat necessary to support a unique natural community or threatened and endangered species. MDNR maintains a list of INAs and potential impacts require MDNR coordination.

While impacts to the HCN are not specifically regulated, identification and comparison of impacts to HCN from the Tier 2 Study alternatives is useful in evaluating the relative potential effects of the build alternatives on these ecologically valuable lands considered to be unique and sensitive to Maryland. Potential impacts to HCN and SSPRA will be coordinated with MDNR. More detail on analysis methodologies is provided in the *Natural Environment Technical Report*.

5.5.10.1 Affected Environment

The resource review area includes multiple SSPRA and crosses six HCN corridors that connect to associated hubs; two on the Western Shore and four on the Eastern Shore. **Figures 5-24 and 5-35** show the HCN hubs and corridors and SSPRA within the resource review area and surrounding environment, respectively.

Figure 5-35: HCN Corridors and Hubs

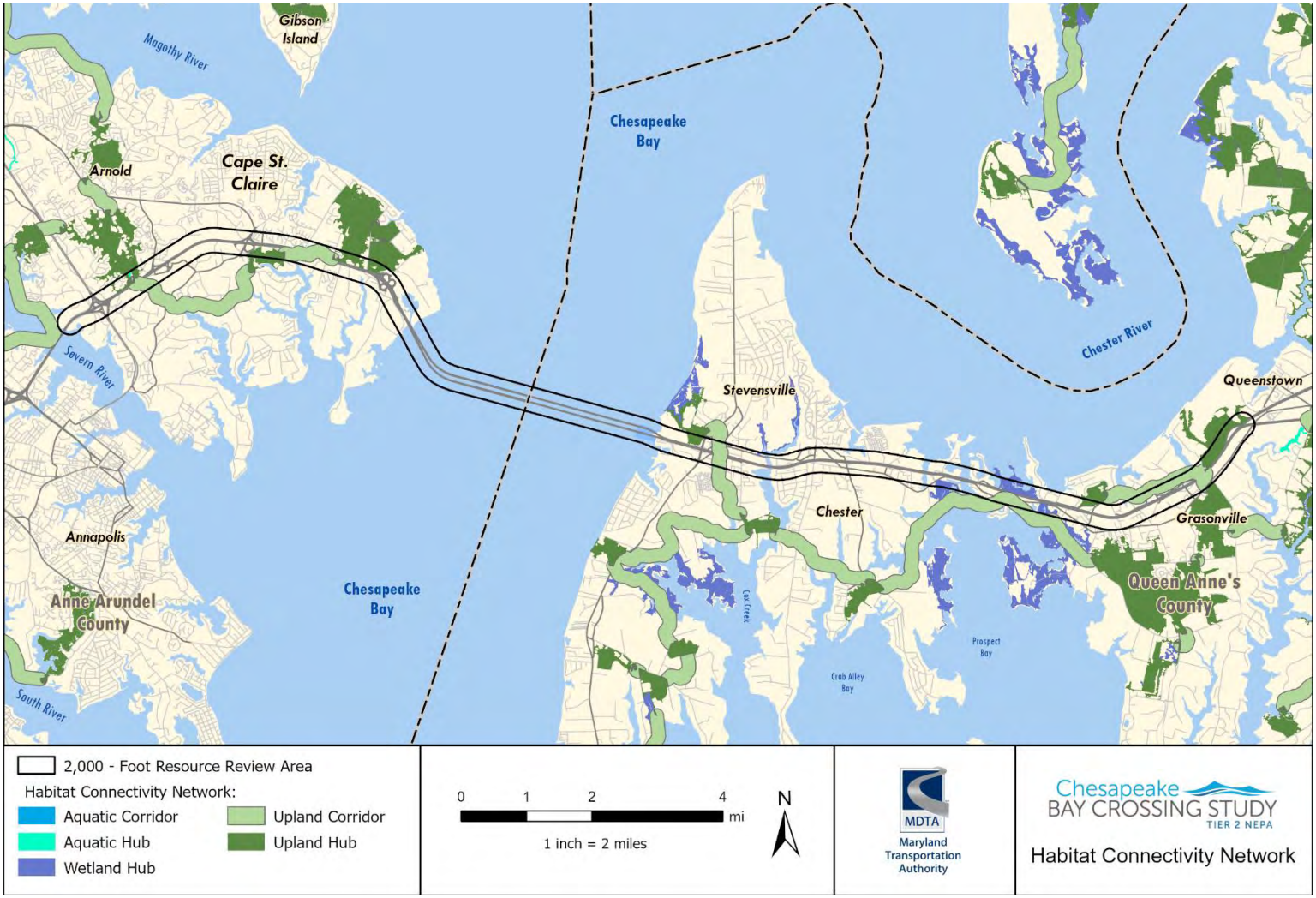
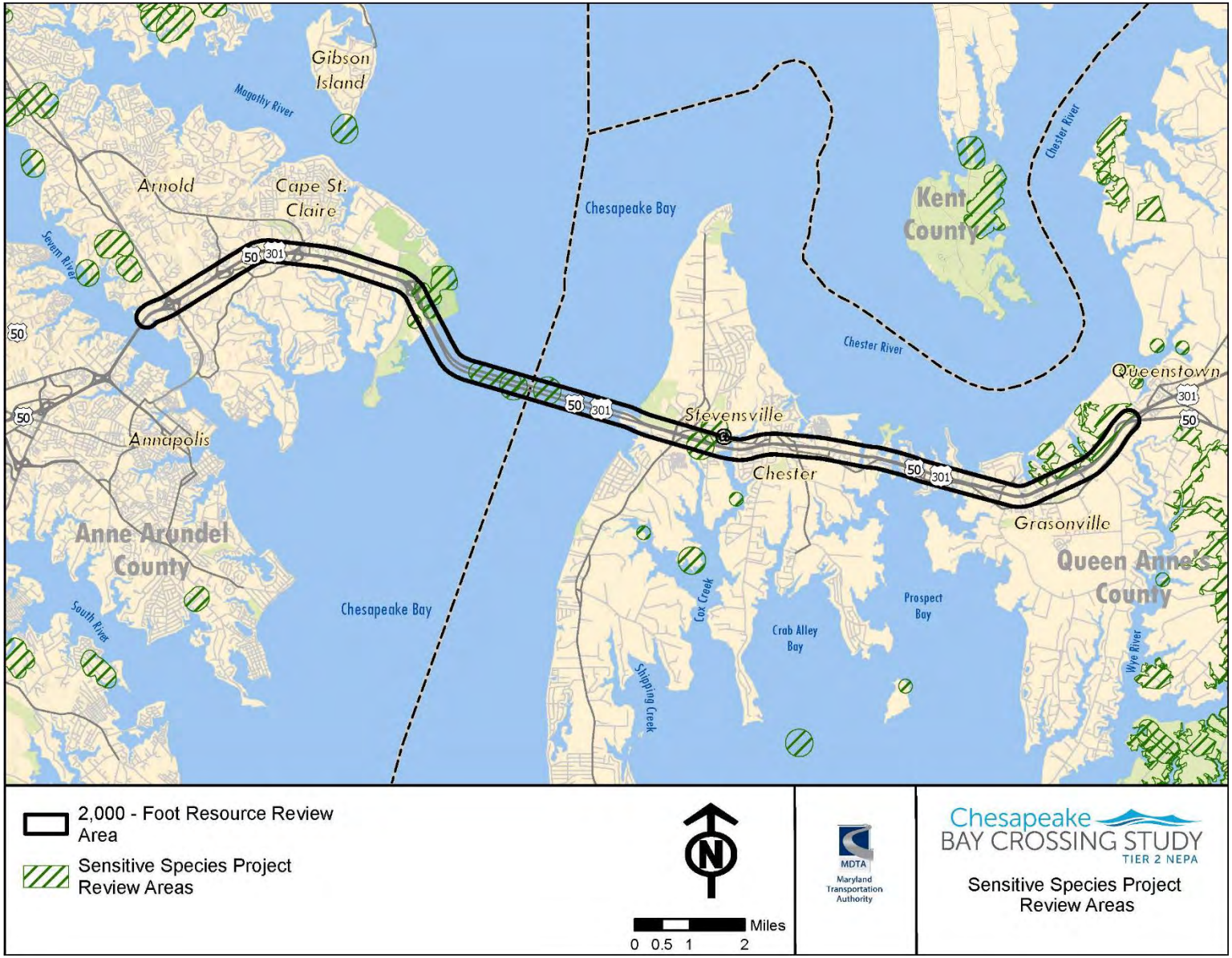


Figure 5-36: SSPRA



5.5.10.2 Environmental Consequences

The No-Build Alternative would have no impacts to the HCN and SSPRA unique and sensitive areas. **Table 5-57** depicts the total amount of potential impacts to HCN hubs and corridors and SSPRA associated with the build alternatives, including the Preferred Alternative, and **Table 5-58** summarizes the potential impacts to HCN hubs and corridors and SSPRA associated with the SUP option. As shown in **Table 5-57**, refinements made to the Alternative C after it was identified as the Preferred Alternative reduced impacts to HCN hubs and corridors and SSPRA Group 2 compared to impacts for Alternative C. **Table 5-58** shows a reduction in impacts associated with the optional SUP to SSPRA Group 2 due to refinements made to Alternative C.

Alternatives B, C, and the Preferred Alternative cross one HCN corridor at their western limit and relatively small sections of mapped HCN hubs associated with Sandy Point State Park, located along the north side of U.S. 50/301 in Anne Arundel County. In Queen Anne's County, Alternatives B, C, and the Preferred Alternative cross an HCN corridor associated with Thompson Creek. Alternatives D, E, F, and G impact these same HCN hubs and corridors to a higher degree. In addition, Alternatives D, E, F and G impact an HCN corridor between MD 2/MD 450 and Bay Dale Drive in Anne Arundel County and the edge of a corridor east of Kent Narrows as well as two corridors and a large HCN hub at the eastern study limit within Queen Anne's County. In areas where corridors cross U.S. 50/301, the roadway is considered a non-restorable gap in the HCN. Impacts to HCN from roadway widening would increase the area of non-restorable gaps in the network, further limiting habitat connectivity in these areas.

Table 5-57: Impacts to HCN Hubs and Corridors and SSPRA (Acres)*

Resource	No-Build	Build Alternative						
		B	C	D	E	F	G	**Preferred Alternative**
HCN Corridors	0	3.6	3.6	16.0	16.0	17.0	17.0	3.4
HCN Hubs	0	4.4	4.4	18.7	18.7	19.5	19.5	3.8
Total HCN	**0**	**8.0**	**8.0**	**34.7**	**34.7**	**36.5**	**36.5**	**7.2**
SSPRA Group 2	0	80.6	80.1	90.1	89.6	91.7	91.0	79.9
SSPRA Group 3	0	29.4	29.3	29.4	29.3	30.8	30.3	29.3
Total SSPRA**	**0**	**110.0**	**109.4**	**119.4**	**118.8**	**122.5**	**121.2**	**109.1**

Source: https://data.imap.maryland.gov/datasets/maryland:maryland-living-resources-sensitive-species-project-review-areas

**Impact totals exclude non-restorable corridor gaps.*

***Due to rounding, totals may not equal the sum of all individual SSPRA impacts*

Table 5-58: SUP Impacts to HCN Hubs and Corridors and SSPRA (Acres)

Resource	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
HCN Corridors	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HCN Hubs	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total HCN	**0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SSPRA Group 2	0	3.0	3.0	3.0	3.0	2.9	3.0	2.5
SSPRA Group 3	0	1.4	1.6	1.4	1.6	1.3	1.6	1.1
Total* SSPRA	**0**	4.3	4.5	4.3	4.5	4.2	4.6	3.5

Source: https://data.imap.maryland.gov/datasets/maryland:maryland-living-resources-sensitive-species-project-review-areas

**Due to rounding, totals may not equal the sum of all individual SSPRA impacts*

All identified SSPRA are either Group 2, areas associated with state-listed species, or Group 3, which includes species or natural communities of concern to MDNR. Alternative C and the Preferred Alternative contain the least amount of mapped SSPRA, while Alternative F contains the highest amount of mapped SSPRA. Most of the SSPRA within all build alternatives, including the Preferred Alternative, are for Group 2, state-listed species. Alternatives B, C, and the Preferred Alternative cross a relatively large SSPRA associated with Sandy Point State Park. The SSPRA in this area is classified as both Groups 2 and 3. Alternatives B and C, including the Preferred Alternative, also cross mapped SSPRA on Kent Island, just west of Cox Creek. The SSPRA in this area is classified as Group 2. All build alternatives, including the Preferred Alternative, cross SSPRA associated with the open waters of the Chesapeake Bay, between Kent Island and Anne Arundel County. The SSPRA within the open waters are classified as Group 2 and 3. Alternatives D, E, F, and G also cross the SSPRA associated with Sandy Point State Park and Kent Island; however, they also cross the relatively large SSPRA located near Wye Harbor. The SSPRA in this area is classified as Group 2. In general, Alternatives D, E, F, and G have the potential to impact more resources associated with SSPRA (approximately 10 acres more) than Alternatives B, C, and the Preferred Alternative. More species-specific potential impacts are described in **Section 5.5.9**.

5.5.10.3 Minimization and Mitigation

The MDTA will continue to coordinate with MDNR during the design, construction, and post-construction phases to ensure compliance with all applicable environmental regulations associated with unique and sensitive areas. Potential impact minimization and mitigation strategies may include considering designs that avoid or minimize impact to HCN hubs and corridors and mapped SSPRA to the maximum extent practicable; incorporating time-of-year restrictions to limit work during breeding or migration seasons for sensitive species; design of underpasses, overpasses, or culverts to allow safe animal movement between HCN hubs and corridors; and habitat restoration by replanting disturbed areas with native vegetation.

5.6 Hazardous Materials

Under NEPA, evaluation of hazardous materials, solid waste, and pollution prevention typically includes the evaluation of:

- Waste streams that would be generated by a project, potential for the wastes to impact environmental resources, and the impacts on waste handling and disposal facilities that would likely receive the wastes;
- Potential hazardous materials that could be used during construction and operation of a project, and applicable pollution prevention procedures;
- Potential to encounter existing hazardous materials at contaminated sites during construction, operation; and
- Potential to interfere with any ongoing remediation of existing contaminated sites at the proposed project site or in the immediate vicinity of a project site.

Federal laws that address various aspects of hazardous material generation, disposal and remediation include:

- Oil Pollution Act (OPA)
    - Establishes a comprehensive framework for preventing, responding to, and cleaning up oil spills, holding parties accountable, and compensating the public for damages (33 USC Code §2701).
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
    - Authorizes the EPA and cooperating agencies to respond to releases of hazardous substances, provides the legal framework for the Superfund program (42 USC § 9601) and establishes liability protections under the All Appropriate Inquiries (AAI) rule.
- Resource Conservation and Recovery Act (RCRA)
    - Establishes a “cradle-to-grave” regulatory system for managing hazardous waste including generation, treatment, storage, and disposal (42 USC §6901).
- Toxic Substances Control Act (TSCA)
    - Authorizes the EPA to regulate chemical substances in commerce, and establishes rules for reporting, testing, and managing chemicals as well as specific hazardous substances (15 USC §2601).

Analogous Maryland programs include: MDE Land Restoration Program (LRP), MDE Voluntary Cleanup Program (VCP), and MDE Controlled Hazardous Substance (CHS) Enforcement Division.

The MDTA has conducted an evaluation of the potential for hazardous materials for each build alternative, including the Preferred Alternative. The Initial Site Assessment was conducted to identify, to the extent feasible, recognized environmental conditions in connection with the study area, using guidelines set forth within the American Society for Testing Materials (ASTM) Standard Practice E1527-21. The results of this evaluation and further information about the methodology used are located in the *Hazardous Materials Technical Report*.

5.6.1 Affected Environment

A field reconnaissance of the study area was conducted to investigate sites of concern due to hazardous materials. The findings obtained from the site inspections are summarized as follows:

- **Aboveground Storage Tanks (ASTs).** Twenty (20) sites were observed as having ASTs within the study area. The standard materials stored in the ASTs included heating oil, gasoline, diesel, used oil and propane.
- **Maintenance and Repair Facilities.** Facilities performing automotive/equipment repair and maintenance services often store and handle petroleum products and hazardous substances. Thirty-five (35) automotive/equipment repair service facilities were observed. Facilities performing engine repair for marine vehicles were observed at nine sites.
- **Drum Storage.** Drum storages containing site-specific materials (such as waste oil, used oil filters, waste automotive fluids, oil contaminated debris, and non-hazardous cooking grease) were observed at numerous sites, including 24 gas stations, 35 auto maintenance facilities, and nine marine maintenance facilities also had designated drum storage areas.
- **Underground Storage Tanks (USTs).** Active UST fields were observed at twenty-four sites within the study area. Materials stored in the USTs included gasohol, diesel, heating oil, and kerosene.
- **Monitoring Wells.** Groundwater monitoring wells and/or extraction wells associated with active or former groundwater remediation systems were observed at all 24 gas stations located within the study area.
- **Laydown Yards/Equipment Storage Areas**. Several laydown areas with some containing automobiles, automotive parts/supplies, and various construction materials were observed within the study area. These areas were paved or partially paved and fenced off from the public.
- **Dry-Cleaning Facilities**. Two active dry-cleaning facilities and three historic dry-cleaning facilities were observed within the study area. Active and/or former dry-cleaning facilities have the potential to use and store chlorinated solvents, which may impact subsurface conditions.
- **Polychlorinated Biphenyls (PCBs)**. Numerous pole-mounted and pad-mounted transformers were observed within the study area. Several pad-mounted transformers had labels identifying them as not containing PCBs. However, the majority of pad-mounted poles were not labeled, and many of the pole-mounted transformers were too high to observe a label.
- **Per- and Polyfluoroalkyl Substances (PFAS).** Nine sites were identified as potentially encountering contamination from previous usage of PFAS within the study area.
- **Unregulated Dumping**. Unregulated dumping in various quantities was observed along the alignment at multiple properties. Materials consisted mostly of construction debris, household debris, and standard non-hazardous roadside debris. Additionally, municipal waste receptacles were located throughout the study area.

5.6.2 Environmental Consequences

The No-Build Alternative would not result in any project-related construction and would therefore not be impacted by any hazardous materials.

Within 500 feet of each build alternative, 159 sites of concern were identified. Ranked sites in close proximity to the existing roadway would have impacts to build alternatives, including the Preferred Alternative, located in similar areas. Ranked sites located along the northern or southern portion of the existing roadway would have the same impacts to the build alternatives due to proximity to the roadway and the anticipated construction activities associated with each build alternative. Alternatives B, C, and the Preferred Alternative would have the least impact of the build alternatives. Alternatives D, E, F, and G would have more impacts comparatively due to the additional 12.1 miles in length and larger width associated with the additional number of lanes. **Table 5-59** provides a summary of the number of ranked sites.

Table 5-59: Ranked Sites Located within 500 feet of Build Alternatives

Ranked Sites	No-Build	Build Alternative						
		B	C	D	E	F	G	Preferred Alternative
Sites with a High Potential for Impact (Rank 1 Sites)	0	25	25	55	55	55	55	25
Listed Sites (Rank 2 Sites)	0	0	0	1	1	1	1	0
Sites with a Medium/High Potential for Impact (Rank 3 Sites)	0	8	8	19	19	19	19	8
Sites with a Medium Potential for Impact (Rank 4 Sites)	0	3	3	10	10	10	10	3
Sites with a Low Potential for Impact (Rank 5 Sites)	0	10	10	28	28	28	28	10
Total Ranked Sites (Ranks 1 – 5)	**0**	**46**	**46**	**113**	**113**	**113**	**113**	**46**

The majority of potential impacts would occur at greater depth due to releases associated with USTs, gasoline stations, and various commercial properties that are not anticipated to be encountered during surficial construction activities. However, surficial impacts may be associated with releases or spills from dry-cleaning facilities, laydown areas, or other activities resulting in surface spills (e.g., fueling ASTs, leaking ASTs, improper handling of petroleum products, etc.) at properties located along U.S. 50/301.

5.6.3 Mitigation

The build alternatives, including the Preferred Alternative, include improvements such as: potential reconfiguration of interchanges, roadway widening, and construction of SWM facilities. A full ASTM-compliant Phase I Environmental Site Assessment will be conducted prior to property acquisition. In areas where sites have been assigned a 1, 2, or 3 ranking, the construction contractor should be prepared to encounter impacted surface soils, subsurface soils, and/or groundwater if the proposed construction activities require earth disturbance activities. To determine the extent of potential impacts based on ground disturbance activities, additional environmental investigations will be conducted for sites that have a high potential to need mitigation for contaminated materials exposed during construction.

A project-specific materials management plan (or similar document) will be developed during the final design phase and implemented during the construction phase. The materials management plan will establish procedures for identifying, handling, transporting, and disposing of contaminated materials, soils, or groundwater discovered, or construction materials generated during construction. Detailed site analyses will be conducted during final design. Mitigation, if needed, will comply with applicable Federal and state regulations and will be determined in the materials management plan including any specific handling and disposal requirements in certain areas along the corridor. The materials management plan will ensure that contaminated and/or hazardous materials encountered during construction are managed in a manner that protects human health and the environment.

5.7 Air Quality

The Clean Air Act (CAA) and subsequent amendments regulate air quality in the U.S. The CAA requires the USEPA to set standards for air pollutants, approve state plans, and enforce deadlines for reducing air pollution, among many other responsibilities. As required by the CAA, USEPA 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, USEPA 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. NAAQS have not been established for MSATs.

USEPA's transportation conformity rule (40 CFR 93) provides the criteria and procedures for implementing the transportation conformity provisions of the CAA. Additional details regarding the air quality analysis methodology are located in the *Air Quality Technical Report*.

5.7.1 Affected Environment

The MDE Air and Radiation Management Administration operates a statewide network of air quality monitors that continuously measure air quality. This data is made available through the USEPA's AirData website.[26] This data, discussed in the *Air Quality Technical Report*, shows that the measured ambient air concentrations of CO closest to the Tier 2 Study location were well below the corresponding NAAQS. All monitoring locations also had measured concentrations which were well below the 2012 $PM_{2.5}$ NAAQS. Some of the monitoring locations approached or slightly exceeded the 2024 $PM_{2.5}$ standard for which nonattainment areas have not been designated. Several of the monitoring locations had O_3 concentrations that exceeded the 2015 8-hour O_3 standard.

The alternatives are located in a region (Anne Arundel and Queen Anne's counties) where the maintenance period for CO has expired, and the CO NAAQS and USEPA project-level ("hot-spot") transportation conformity requirements do not apply. The counties were redesignated from nonattainment to attainment and entered a 20-year maintenance period for CO in March 1996. The area was considered a CO maintenance area for the 20 years following until March 2016 when the counties completed the maintenance period. Since the counties have completed the maintenance period, transportation conformity no longer applies for CO.

[26] https://www.epa.gov/outdoor-air-quality-data/monitor-values-report

Anne Arundel and Queen Anne's counties are in attainment (meaning these counties meet the NAAQS) for fine particulate matter ($PM_{2.5}$), therefore, transportation conformity requirements pertaining to $PM_{2.5}$ do not apply for this Tier 2 Study[27] and no further analysis of $PM_{2.5}$ emissions were evaluated per FHWA guidance.

The USEPA Green Book[28] lists Anne Arundel and Queen Anne's counties, Maryland, as in attainment for all NAAQS with the exception of the O_3 standard for which the counties are nonattainment. The Tier 2 Study falls under the jurisdiction of the BRTB Metropolitan Planning Organization (MPO) and is within Anne Arundel County's 2015 O_3 nonattainment area and Queen Anne's County's 1997 O_3 maintenance area. The easternmost portion of the study limits (near the U.S. 50/301 split) is within a 1997 O_3 maintenance area that is not governed by an MPO. Federal conformity requirements, including 40 CFR 93.114 and 40 CFR 93.115, state 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)).

To meet federal conformity requirements at 40 CFR 93.114 and 40 CFR 93.115, BRTB approved and adopted the current Long-Range Transportation Plan (Resilience 2050) and the RegionNow 2027-2030 Transportation Improvement Program (TIP), which both include the Preferred Alternative, on July 28, 2026. The Preferred Alternative is best characterized as having "higher potential MSATs effects" since the projected 2045 Design Year traffic is expected to reach or exceed the 140,000 to 150,000 annual average daily traffic (AADT) criteria. A quantitative MSAT analysis was conducted consistent with the latest guidance including the 2023 FHWA *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents* and the 2023 *FHWA Frequently Asked Questions (FAQ) Conducting Quantitative MSATs Analysis for FHWA NEPA Documents*.[29] To develop the affected network, the MDTA screened each alternative using FHWA selection criteria for identifying segments or links within the transportation network where meaningful changes were expected. These criteria included:

- Changes greater than or equal to five percent or more in AADT on congested highway links of Level of Service (LOS) D or worse;
- Changes greater than or equal to ten percent or more in AADT on uncongested highway links of LOS C or better; and
- Changes greater than or equal to ten percent or more in travel time.

A fourth criteria, changes greater than or equal to ten percent or more in intersection delay, was not included in the affected network selection criteria because intersection delay data is not included in the MSTM, the traffic model used for the Tier 2 Study. Per FHWA MSAT Guidance, the affected network area is defined based on available project-specific information. Once links were identified that met the above criteria, a 30-mile buffer from the Bay Bridge was applied to create the area of "reasonable" influence for the affected network links. Links that were not

[27] Final rule (81 FR 58010), effective October 24, 2016, on "Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements
https://www.gpo.gov/fdsys/pkg/FR-2016-08-24/pdf/2016-18768.pdf
[28] https://www.epa.gov/green-book

[29] https://www.fhwa.dot.gov/environMent/air_quality/air_toxics/policy_and_guidance/msat/

contiguous within the buffer were considered modeling artifacts based on engineering judgement and were removed to create the final affected network for MSAT analysis.

5.7.2 Environmental Consequences

In accordance with 40 CFR 93.114 and 40 CFR 93.115, the Preferred Alternative is included in the 2027-2030 approved BRTB TIP and accompanying conformity determination. The 2027-2030 TIP was approved by FHWA on October 8, 2026. The Tier 2 Study is currently included in the amended BRTB Resilience2050 LRTP.

As presented in the *Air Quality Technical Report*, in general, all the MSAT emissions are expected to remain the same or increase slightly for the build alternative conditions, including the Preferred Alternative, when compared to Alternative A (No-Build) for the 2045 design year. All MSAT pollutant emissions are expected to substantially decline in the design year when compared to existing conditions. These reductions occur despite projected 25 to 28 percent increase in vehicle miles traveled (VMT) from 2022 to the 2045 build scenarios. Information is currently incomplete or unavailable to credibly predict the Tier 2 Study-specific health impacts due to changes in MSAT emissions associated with each build alternative. Under each build alternative, there may be slightly higher or lower MSAT 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 MSAT levels in a few localized areas where VMT increases. However, lower MSAT levels are expected in the future due to cleaner engine standards coupled with fleet turnover. The magnitude of the USEPA-projected reductions is so great that, even after accounting for VMT growth, MSAT emissions would be substantially lower in the future than they are today, regardless of the alternative selected.[30]

Because any of the project's construction phases are not expected to last more than five years in any single location, construction impacts are considered to be temporary as discussed in the following section. The optional SUP could slightly increase temporary air quality impacts during construction.

5.7.3 Mitigation

All required construction-related permits will be obtained from MDE prior to construction. The MDTA will coordinate with the contractor to implement measures to minimize and mitigate, to the greatest extent practicable, temporary construction impacts to air quality. Potential measures include:

- Minimize traffic disruption to the extent possible, especially during peak travel hours.
- Institute idle-reduction practices for construction vehicles and equipment.
- Include Diesel Emission Reduction specifications or performance standards in contracts.
- Establish a Diesel Emission Reduction Policy for construction projects.
- Encourage participation in the Clean Construction USA program.
- Minimize land disturbance.
- Cover trucks when hauling soil, stone, and debris.
- Use water trucks to minimize dust.
- Use dust suppressants if environmentally acceptable.
- Stabilize or cover stockpiles.

[30] *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents January 18, 2023* https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/

- Construct stabilized construction entrances per construction standard specifications.
- Regularly sweep all paved areas including public roads.
- Stabilize onsite haul roads using stone.
- Temporarily stabilize disturbed areas per MDE erosion and sediment standards.

Since the build alternatives, including the Preferred Alternative, are not predicted to increase emission burdens compared to the No-Build Alternative, nor cause or contribute to a violation of the NAAQS, long-term or regional air quality impacts are not anticipated, and no permanent mitigation measures are warranted.

5.8 Noise

As defined in FHWA's Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR Part 772), the Tier 2 Study is classified as a Type I project[31] for the noise analysis. The objective of this noise analysis is to identify the predicted loudest-hour build traffic noise levels for the entire project, determine if these noise levels cause a traffic noise impact, and if so, evaluate where noise barriers are likely to be feasible and reasonable along the Tier 2 Study corridor. All prediction modeling was performed using FHWA's Traffic Noise Model v2.5. Further information on methodology used are located in the *Noise Technical Report*.

5.8.1 Affected Environment

Within the Tier 2 Study corridor, 157 noise sensitive areas (NSAs) were identified in accordance with SHA Highway Noise Abatement Planning and Engineering Guidelines and FHWA highway noise policies and guidelines[32]. The NSAs are comprised of areas that have consistent land use activity categories and share a common noise environment. Geographically, 38 of the NSAs are located on the Western Shore and 119 of the NSAs are located on the Eastern Shore.

There are two existing Type I noise barriers on the Western Shore within the Tier 2 Study corridor. Neither existing noise barrier is within the LOD for the build alternatives; therefore, no replacement barriers have been analyzed as part of this Tier 2 Study. Potential modifications to existing barriers will be re-evaluated during the final design process for the Selected Alternative.

5.8.2 Environmental Consequences

Noise impacts were determined for each build alternative and are presented in *Appendix E* of the *Noise Technical Report*. Impacts for the Preferred Alternative are noted in this Final EIS. Noise impact analysis will be re-evaluated based on the Selected Alternative during final design. Noise Study sections along U.S. 50/301 were established for analysis manageability:

- Section 1: Severn River Bridge to MD 179
- Section 2: MD 179 to the Chesapeake Bay
- Section 3: Chesapeake Bay to Kent Narrows Bridge
- Section 4: Kent Narrows Bridge to the U.S. 50/U.S. 301 split

Twenty-one NSAs were evaluated for impacts along U.S. 50/301 within Noise Study Section 1 on the Western Shore. Nine of these NSAs would be impacted by the build alternatives, including

[31] 23 CFR Part 772.5 (1 through 8) defines Type I Projects. The Tier 2 Study proposes the addition of through-traffic lanes. This qualifies the Tier 2 Study as a Type I Project according to 772.5(3).
[32] MDOT SHA Highway Noise Abatement Planning and Engineering Guidelines (https://roads.maryland.gov/ohd2/SHA_Noise_Policy.pdf)
FHWA 23 CFR 772 (https://www.govinfo.gov/content/pkg/FR-2010-07-13/pdf/2010-15848.pdf)

the Preferred Alternative, as described in **Table 5-60**. Alternatives B, C, and the Preferred Alternative do not impact NSA 1-10-C.

Table 5-60: Impact Determination in Noise Study Section 1

NSA	Alternatives That Impact NSA (# of receptors impacted)	Location in Section 1	Impact determination
1-05-C	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	The Red Hot & Blue restaurant southeast of the Bay Dale Drive overpass	**Warrants consideration of noise abatement (NSAs combined due to proximity)**
1-06-B	B/C (1), D/E (4), F/G (4), Preferred Alternative (1)	Single-family detached residences southeast of the Bay Dale Drive overpass	
1-04-B	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	Single-family detached residences southeast of the MD 2/MD 450 interchange	Since less than three impacts, noise abatement is not reasonable, no further analysis is required
1-10-C	D/E (1), F/G (1), Preferred Alternative (0)	The Asbury Broadneck United Methodist Church northwest of the MD 197 interchange	Since less than three impacts, noise abatement is not reasonable, no further analysis is required
1-13-B	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	The Element at Mill Creek Condominiums northeast of the Bay Dale Drive interchange	Community is under construction with areas of frequent human use shielded by berm and proposed building, noise abatement is not reasonable, no further analysis is required
1-15-E	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	The High Tide Offices of Annapolis office building and the Village Inn Motel northeast of the Bay Dale Drive interchange	Current development does not contain outdoor facilities for frequent human use, noise abatement is not reasonable, no further analysis is required
1-18-B	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	Single-family detached residences northwest of the Bay Dale Drive interchange	Since less than three impacts, noise abatement is not reasonable, no further analysis is required
1-01-B	B/C (2), D/E (2), F/G (2), Preferred Alternative (2)	Single-family detached residences southwest of the MD 2/MD 450 interchange	Community with existing barrier which will not require relocation, analysis demonstrates design goals continue to be met, no further analysis is required
1-21-B	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	Single-family detached residences northwest of the MD 2/MD 450 interchange	Community with existing barrier which will not require relocation, analysis demonstrates design goals continue to be met, no further analysis is required

Seventeen NSAs were evaluated for impacts along U.S. 50/301 within Noise Study Section 2 on the Western Shore. Seven NSAs would be impacted by the build alternatives as described in **Table 5-61**. Alternatives B, C, and the Preferred Alternative do not impact NSA 2-12-B.

Table 5-61: Impact Determination in Noise Study Section 2

NSA	Alternatives That Impact NSA (# of receptors impacted)	Location in Section 2	Impact determination
2-06-B	B/C (3), D/E (3), F/G (3), Preferred Alternative (3)	Single-family detached residences southwest of the Oceanic Drive interchange	**Warrants consideration of noise abatement**
2-09-B	B/C (5), D/E (5), F/G (5), Preferred Alternative (5)	Single-family detached residences along Log Inn Road and E College Parkway northwest of the Oceanic Drive interchange	**Warrants consideration of noise abatement (NSAs combined due to proximity)**
2-10-B	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	Single-family detached residences along Yorktown Road and Yorktown Manor Court northwest of the Oceanic Drive interchange	
2-12-B	D/E (1), F/G (1), Preferred Alternative (0)	Three single-family detached residences along Bay Head Road northwest of the Oceanic Drive interchange	**Warrants consideration of noise abatement**
2-13-B	B/C (2), D/E (24), F/G (24), Preferred Alternative (2)	Single-family detached residences northeast of the MD 179 interchange	**Warrants consideration of noise abatement**
2-17-B	B/C (20), D/E (20), F/G (20), Preferred Alternative (20)	Single-family condominiums northeast of the MD 179 interchange	**Warrants consideration of noise abatement**
2-08-C	B/C (3/1), D/E (2/1), F/G (3/2), Preferred Alternative (1)	Sandy Point State Park northeast of the Oceanic Drive interchange along the western shore of the Chesapeake Bay	A limited portion of the beach as well as a rock jetty used for fishing are impacted In accordance with SHA's highway noise guidelines, based on the linear frontage of the usage area (700 ft / 125 = 5.6) and the applied use-time percentage (UTP) adjustment (open every month, every day, from 7AM to sunset, UTP = 12/12 * 7/7 * 12/24 = 0.5), the equivalent residences that are impacted at this location (ER = 5.6 * 0.5 = 2.8) is fewer than three; therefore, noise abatement is not reasonable, and further analysis is not required

Sixty-nine NSAs were evaluated for impacts along U.S. 50/301 within Noise Study Section 3 on the Eastern Shore. Fourteen NSAs would be impacted by the build alternatives as described in **Table 5-62**. Alternatives B, C, and the Preferred Alternative do not impact NSAs 3-16-B and 3-26-B, Alternatives B, C, D, E, and the Preferred Alternative do not impact NSA 3-59-B, and Alternatives B, C, D, E, F, and the Preferred Alternative do not impact NSA 3-02-E.

Table 5-62: Impact Determination in Noise Study Section 3

NSA	Alternatives That Impact NSA (# of receptors impacted)	Location in Section 3	Impact determination
3-09-B	B/C (13), D/E (13), F/G (14), Preferred Alternative (13)	Single-family detached residences along Sherman Drive, Anchorage Drive, Harrington Road, and Harbor Drive southwest of the Cox Neck Road intersection	**Warrants consideration of noise abatement (NSAs combined due to proximity)**
3-10-B	B/C (4), D/E (4), F/G (4), Preferred Alternative (4)	The Kent Island Village Apartment complex southwest of the Cox Neck Road intersection	
3-12-B	B/C (2), D/E (2), F/G (2), Preferred Alternative (2)	The Stevensville Village Apartment complex southwest of the Cox Neck Road intersection	
3-13-B	B/C (12), D/E (14), F/G (13), Preferred Alternative (12)	Single-family detached residences along Sherman Drive, Anchorage Drive, and Cecil Drive, southwest of the Cox Neck Road intersection	
3-16-B	D/E (1), F/G (1), Preferred Alternative (0)	Single-family detached residences along Cox Neck Road, Bridgepointe Drive, and Wesley Lane, southeast of the Cox Neck Road intersection	Since less than three impacts, noise abatement is not reasonable, no further analysis is required
3-26-E	D/E (1), F/G (1), Preferred Alternative (0)	Burger King, Taco Bell, and Dairy Queen in the Kent Towne Market shopping center located southeast of the Dominion Road intersection	Since only the Dairy Queen has outdoor seating there are less than three impacts, noise abatement is not reasonable, no further analysis is required
3-46-C	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	The Anne Arundel Medical Center northwest of the MD 18 overpass	Since less than three impacts based on exterior usage and no interior impacts, noise abatement is not reasonable, no further analysis is required
3-51-E	B/C (2), D/E (2), F/G (2), Preferred Alternative (2)	Dunkin and Hardee's northwest of the Castle Marina Road intersection	Since less than three impacts, noise abatement is not reasonable, no further analysis is required
3-57-B	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	Two single-family detached residences along Main Street northeast of the Duke Street intersection	Since less than three impacts, noise abatement is not reasonable, no further analysis is required
3-59-B	F/G (1), Preferred Alternative (0)	Single-family detached residences along Duke Street north of the Duke Street intersection	Since less than three impacts, noise abatement is not reasonable, no further analysis is required

NSA	Alternatives That Impact NSA (# of receptors impacted)	Location in Section 3	Impact determination
3-55-C	B/C (16), D/E (16), F/G (17), Preferred Alternative (16)	The Stevensville Cemetery northeast of the Duke Street intersection	Less than three impacts based on usage time percentage, barrier is not reasonable, no further analysis is required
3-58-C	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	The Stevensville Middle School northeast of the Duke Street intersection	In accordance with SHA's highway noise guidelines, based on the linear frontage of the usage area (750ft / 125 = 6.0) and the applied use-time percentage adjustment (open 9 months a year, 7:45AM to 3PM, also assuming suage in evenings and on weekends for recreation UTP=9/12*7/7*12/24=0.375), the equivalent residences that are impacted at this location (ER = 6.0 * 0.375 = 2.3) is fewer than three; therefore, noise abatement is not reasonable, and further analysis is not required
3-70-C	B/C (27), D/E (27), F/G (27), Preferred Alternative (27)	The Terrapin Nature Park northwest of the MD 8 interchange	Usage within the park adjacent to U.S. 50/301 includes a trail with no gathering or stationary outdoor recreation areas; therefore, noise abatement is not reasonable, and no further analysis is required
3-02-E	G(2), Preferred Alternative (0)	The Inn at Chesapeake Bay Beach Club southwest of the MD 8 interchange	Areas of frequent human use are shielded by the building; therefore, noise abatement is not reasonable, and no further analysis is required

Forty-six NSAs were evaluated for impacts along U.S. 50/301 within Noise Study Section 4 on the Eastern Shore. Nine NSAs would be impacted by the build alternatives as described in **Table 5-63**. Alternatives B, C, and the Preferred Alternative do not impact NSAs 4-08-B, 4-36-B, and 4-42-B, Alternatives B, C, D, E, and the Preferred Alternative do not impact NSA 4-37-B and 4-45-B.

Table 5-63: Impact Determination in Noise Study Section 4

NSA	Alternatives That Impact NSA (# of receptors impacted)	Location in Section 4	Impact determination
4-36-B	D/E (7), F/G (7), Preferred Alternative (0)	Single-family detached residences along Winchester Creek Road and Winchester Avenue, northeast of the VFW Avenue intersection	**Warrants consideration of noise abatement**

NSA	Alternatives That Impact NSA (# of receptors impacted)	Location in Section 4	Impact determination
4-37-B	F/G (1), Preferred Alternative (0)	Single-family detached residences along Mousley Road, Clevenger Lane, VFW Avenue, and Radcliffe Road, north of the VFW Avenue intersection	**Warrants consideration of noise abatement**
4-42-B	D/E (1), F/G (8), Preferred Alternative (0)	Single-family detached residences within the Beach Harbor Camper's Co-Op northwest of the Chester River Beach Road interchange	**Warrants consideration of noise abatement**
4-08-B	D/E (1), F/G (2), Preferred Alternative (0)	Single-family detached residences in the Osprey Pointe by the Narrows community southeast of the Kent Narrows Road South intersection	Since less than three impacts, noise abatement is not reasonable, no further analysis is required
4-14-C	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	The Grasonville Seventh-day Adventist Church southeast of the Exit 43A intersection	Since less than three impacts, noise abatement is not reasonable, no further analysis is required
4-24-B	B/C (1), D/E (2), F/G (2), Preferred Alternative (1)	Single-family detached residences southeast of the Hess Road intersection	Since less than three impacts, noise abatement is not reasonable, no further analysis is required
4-29-B	B/C (1), D/E (1), F/G (1), Preferred Alternative (1)	Single-family detached residences along Main Street, Hampton Lane, Taylor Drive and Norman Wilson Lane, south of the U.S. 50/301 split	Since less than three impacts, noise abatement is not reasonable, no further analysis is required
4-43-C	B/C (7), D/E (14), F/G (14), Preferred Alternative (7)	Long Point Park north of the Jackson Creek Road intersection	Usage is transient in nature, noise abatement is not reasonable, no further analysis is required
4-45-B	F/G (1), Preferred Alternative (0)	Multi-family townhomes within the Bayview at Kent Narrows Community northwest of the Jackson Creek Road intersection	Since less than three impacts, noise abatement is not reasonable, no further analysis is required

Construction activities could also result in temporary noise disturbance. Construction of the optional SUP would have minimal to no additional noise impact due to the proximity of the existing highway and the construction noise generated from construction of the Preferred Alternative.

5.8.3 Mitigation

The MDTA follows the SHA Highway Noise Abatement Planning and Engineering Guidelines to evaluate highway noise projects. FHWA regulations (23 CFR 772) and SHA Highway Noise Abatement Planning and Engineering Guidelines 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. At the 15 NSAs where noise abatement was found to be 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 SHA Highway Noise Abatement Planning and Engineering Guidelines and presented in the *Noise Technical Report*.

Noise abatement in the form of a barrier was preliminarily studied for the NSAs reflected in **Table 5-64**. This analysis determined the required length and acoustic height of abatement, which then can be applied to any form of abatement such as a berm, or berm/barrier combination, using the same abatement length and height features. While additional forms of abatement may be considered during final design, barriers typically minimize other impacts such as property acquisition. The resulting indications of likely abatement measures are based upon preliminary design for barrier square footage equal to or less than the maximum amount allowed per benefitted residence. The final determination of barrier material will be made during final design of the Selected Alternative. Preliminary horizontal and vertical alignments for the noise barriers have been identified. However, final determination of whether barriers would be implemented, and the location, dimensions, and materials of these potential barriers, will be made during final design of the Selected Alternative.

Table 5-64: Summary of Preliminary Barrier System Mitigation Analysis

NSA	Preliminary Barrier System	Preliminary Barrier Mitigation Results by Build Alternative			Preliminary Barrier Dimensions (ft)		Cost-Reasonableness*
		Alts B and C	Alts D and E	Alts F and G	Length	Height	Square Footage per Benefitted Residence
1-05-C & 1-06-B	WEST-1	Barrier is considered not reasonable for all alternatives**			1,424	11.4	3,231 SF-p-r
2-06-B	WEST-2	Barrier is considered not reasonable for all alternatives			2,736	11.4	4,440 SF-p-r
2-09-B & 2-10-B	WEST-3	Barrier is considered not reasonable for all alternatives			3,360	13.5	5,042 SF-p-r
2-12-B & 2-13-B	WEST-4	**Barrier is considered feasible and reasonable for all alternatives**			3,312	14.3	**1,246 SF-p-r**
2-17-B	WEST-5	**Barrier is considered feasible and reasonable for all alternatives**			1,216	15.7	**636 SF-p-r**
3-09-B, 3-10-B, 3-12-B & 3-13-B	EAST-1	**Barrier is considered feasible and reasonable for all alternatives**			3,390	12.1	**894 SF-p-r**
4-36-B & 4-37-B	EAST-2	Barrier is considered not reasonable for all alternatives			1,824	14.4	3,757 SF-p-r
4-42-B	EAST-3	Barrier is considered not reasonable for all alternatives			1,696	14.1	3,420 SF-p-r

** Cost-Reasonableness threshold for all preliminary barrier systems is 2,700 SF-p-r (square feet of barrier per benefited residence).*
*** "All alternatives" in this table includes the Preferred Alternative.*

Construction equipment will be regularly and thoroughly maintained to minimize temporary noise disturbance. Additional mitigation procedures to minimize public exposure to temporary construction noise will be considered during final design, such as limiting the time of day that pile driving operations can occur, equipment adjustments, construction of noise barriers first where possible, and alteration of construction activity areas and temporary noise barriers.

5.9 Summary

Table 5-65 quantifies potential environmental impacts from the ARDS and the Preferred Alternative for construction of approach roadways and new bridge spans. The impact values are estimated based on the LODs of the build alternatives, including the Preferred Alternative, and include impacts to properties, community resources, historic resources, natural resources, and preservation areas. Because the SUP is being advanced independently as an option to the build alternatives, **Table 5-66** separately quantifies the potential environmental impacts from the optional SUP. Refer to technical reports to review detailed impacts to specific properties or community, historic, or natural resources, and the mapping in **Appendices A-1 and A-2**.

Given the sensitive environmental resources located adjacent to U.S. 50/301 throughout the corridor and the MDTA's commitment to environmental responsibility, the LODs for all build alternatives, including the Preferred Alternative, incorporate preliminary measures to avoid and minimize impacts to sensitive resources. Where appropriate, the roadside design reduces impacts to sensitive resources adjacent to the roadway. In certain locations where space would allow, small shifts in the proposed roadway alignment were made to avoid impacts to these sensitive resources, if the shift did not result in increased impacts to other resources.

As discussed in **Section 4.3**, refinements to the Preferred Alternative were made to further avoid and minimize impacts to sensitive resources. Impact values for the Preferred Alternative are included in the tables below to compare changes between Alternative C and the Preferred Alternative (Refined Alternative C).

As discussed throughout this chapter, the No-Build Alternative would not result in impacts to environmental resources in the study area. As shown in **Table 5-65**, longer and wider build alternatives (Alternatives D, E, F, G) result in substantially greater environmental impacts. Alternatives B, C, and the Preferred Alternative, which have a 6-8-6 lane configuration, have lower impacts than Alternatives D and E (8-8-8 lane configuration), and Alternatives F and G (8-10-8 lane configuration), largely due to the additional widening along U.S. 50/301 and greater length of improvements to accommodate additional lanes. This is especially true for key natural resources including wetlands, tidal and non-tidal surface waters, Critical Areas and Critical Area buffers, oyster bottom, SAV, and forested areas. Property and community facility impacts are higher for the longer build alternatives, as well as historic and park properties. Additionally, the shorter build alternatives have the least impacts to residential and business properties.

In general, the northern bridge alignment alternatives (Alternatives B, D, and F) would impact more community facilities, historic properties, and park properties because more facilities are present north of U.S. 50/301. These properties include Sandy Point State Park and Terrapin Nature Park which are both located just north of the roadway at the bridge approaches.

Green shading in **Table 5-65** represents the lowest impact per category by alternative (excluding the No-Build, which would not have any direct environmental impacts); this emphasizes that Alternatives B and C (6-8-6 lane configuration) and the southern alignments have the least environmental impacts of the build alternatives and the Preferred Alternative, which further avoids and minimizes impacts, has the least impact overall.

Forest area impacts increased for the build alternatives, including the Preferred Alternative, compared to the forest area impacts documented in the Draft EIS. These changes are reflected in **Table 5-65** and throughout this Final EIS. The increase in forest impacts is due to field verification of the forest boundaries within the LOD of the Preferred Alternative. Additional areas that meet the Maryland Forest Conservation Act definition of forest were identified during field surveys. These areas are primarily located within the interchange loops of Oceanic Drive as well as smaller forest edge areas just west of Oceanic Drive and at the northwest corner of MD 8 and U.S. 50/301.

Table 5-65: Summary of Potential Impacts from the Alternatives without the Optional SUP

Resource Type[33]	Resource	Unit	Alt A No-Build, 6-5-6	Alt B 6-8-6 North	Alt C 6-8-6 South	Alt D 8-8-8 North	Alt E 8-8-8 South	Alt F 8-10-8 North	Alt G 8-10-8 South	Preferred Alternative
Alternative Area[1]	Total Length of Build Alternative	miles	N/A	8.3	8.3	20.4	20.4	20.4	20.4	8.3
	Total Area of Build Alternative	acres	N/A	357.2	357.2	858.5	858.7	879.6	879.2	348.5
Community Resources	Residential Property Displacements	#	0	0	0	0	0	1	1	0
	Commercial Property Displacements	#	0	2	2	7	7	7	7	0
	Partial Acquisitions	#	0	46	46	204	204	207	207	45
	Total Property Impact	#	0	48	48	211	211	215	215	45
	Total Property Impact	acres	0	20.5	20.8	82.0	82.3	86.2	86.4	18.2
	Number of Community Facilities	#	0	8	8	26	26	26	26	7
	Community Facility Property Area	acres	0	9.2	9.5	16.4	16.7	18.2	18.4	7.8
	Number of Parks	#	0	4	4	9	9	9	9	2
	Park Property Area	acres	0	2.8	2.4	3.9	3.5	4.7	4.2	0.8
Historic Resources	Number of Historic Properties[2]	#	0	3	3	4	4	4	4	2
	Historic Property Area	acres	0	1.3	0.9	1.4	1.0	1.9	1.3	0.4
Natural Resources	Agricultural Land	acres	0	0	0	1.5	1.5	1.5	1.5	0
	100-Year Floodplain Area	acres	0	33.5	35.6	57.0	59.0	59.1	60.7	35.6
	Wetlands (Field Delineated)	acres	0	5.9	5.6	11.5	11.2	12.1	11.6	5.6
	Surface Waters - Non-tidal	acres	0	0.1	0.1	0.9	0.9	0.9	0.9	0.1
		linear ft	0	700	670	3520	3490	3600	3550	670

[33] This table includes key impacts, further impact details are located in respective Technical Reports.

Resource Type[33]	Resource	Unit	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Preferred Alternative
			No-Build, 6-5-6	6-8-6 North	6-8-6 South	8-8-8 North	8-8-8 South	8-10-8 North	8-10-8 South	
Natural Resources	Surface Waters – Tidal[3]	acres	0	1.1	1.0	4.9	4.7	5.4	5.3	1.0
		linear ft	0	290	290	860	860	900	900	290
	Chesapeake Bay Tidal Water Impacts[4]	acres	0	130.7	131.9	130.7	131.9	134.1	135.0	131.9
	Critical Areas	acres	0	166.5	164.1	397.7	395.4	402.0	398.8	162.5
	Critical Area (100-ft) Buffer	acres	0	19.0	17.7	28.2	26.9	28.8	27.3	17.7
	Submerged Aquatic Vegetation (2019-2023)	acres	0	0.4	0	0.7	0.4	0.9	0.4	0
	Public Shellfishery Areas	acres	0	5.6	6.1	8.8	9.3	9.3	9.8	6.1
	Oyster Sanctuaries	acres	0	0.6	0.6	1.1	1.1	1.6	1.6	0.6
	Natural Oyster Bars	acres	0	9.4	10.2	12.6	13.3	13.8	14.6	10.2
	Essential Fish Habitat	acres	0	133.2	136.0	137.0	139.8	140.4	143.5	136.0
	Waterfowl Staging and Concentration Areas	Acres	0	7.1	2.5	7.1	2.5	7.1	2.5	2.5
	FIDS Habitat	acres	0	12.1	12.1	33.3	33.3	34.5	34.5	11.4
	SSPRA Habitat	#	0	7	7	8	8	8	8	7
		acres	0	110.0	109.4	119.4	118.8	122.5	121.2	109.1
	Forest Areas	acres	0	60.3	59.5	147.9	147.2	155.2	153.9	57.7
Noise	Noise Sensitive Areas	#	0	28	28	35	35	38	39	28

Resource Type[33]	Resource	Unit	Alt A No-Build, 6-5-6	Alt B 6-8-6 North	Alt C 6-8-6 South	Alt D 8-8-8 North	Alt E 8-8-8 South	Alt F 8-10-8 North	Alt G 8-10-8 South	Preferred Alternative
Other Resources/ Preservation Areas	Number of Section 4(f) Properties	#	0	9	9	13	13	13	13	6
	Section 4(f) Properties	acres	0	3.1	2.7	4.5	4.1	5.3	4.7	0.9
	Number of Section 6(f) Properties	#	0	2	2	2	2	2	2	0
	Conservation Easements	acres	0	2.1	1.7	2.1	1.7	2.3	1.7	0
	Habitat Connectivity Network	acres	0	8.0	8.0	34.7	34.7	36.5	36.5	7.2
	Local Protected Land	acres	0	0.7	0.7	1.4	1.4	1.9	1.9	0.7
	Environmental Trust Easements	acres	0	2.1	0	4.7	4.7	4.7	4.7	0
Cost Estimate		2025 $	$3.8 Billion[5]	$15.1 - $16.6 Billion	$14.8 - $16.4 Billion	$17.5 - $19.0 Billion	$17.3 - $18.8 Billion	$19.5 - $21.1 Billion	$19.2 - $20.8 Billion	$14.8 - $16.4 Billion

[1] Not representative of impacts. Includes the total area of the build alternatives, including existing right-of-way.
[2] Historic properties also include two bridges, the Chesapeake Bay Bridge and the MD 18 Kent Narrows Bridge. These historic bridges are not included in the impact area calculations.
[3] Impacts do not include the Chesapeake Bay proper.
[4] Includes impacts from new bridge construction and old bridge pier removal.
[5] Estimated cost of maintenance and rehabilitation of the existing bridge spans from 2024 through 2065.

Note: Green shading represents the lowest impact per category by alternative (excluding the No-Build, which would not have any direct impacts).

Table 5-66: Summary of Additional Potential Impacts from the Optional SUP

Resource Type[34]	Resource	Unit	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Preferred Alternative
			No-Build, 6-5-6	6-8-6 North	6-8-6 South	8-8-8 North	8-8-8 South	8-10-8 North	8-10-8 South	
Community Resources	Total Area of Additional Right-of-way	acres	0	2.2	2.0	2.2	2.0	2.2	1.9	2.0
	Total Property Impact	#	0	0	0	0	0	0	0	0
	Total Property Impact	acres	0	1.8	1.2	1.8	1.2	1.9	1.2	1.2
	Number of Community Facilities	#	0	0	0	0	0	0	0	0
	Community Facility Property Area	acres	0	1.8	1.2	1.8	1.2	1.9	1.2	1.2
	Number of Parks	#	0	0	0	0	0	0	0	0
	Park Property Area	acres	0	1.8	1.2	1.8	1.2	1.9	1.2	1.2
Historic Resources	Number of Historic Properties[1]	#	0	0	0	0	0	0	0	0
	Historic Property Area	acres	0	0.7	0.6	0.7	0.6	0.7	0.6	0.6
Natural Resources	Agricultural Land	acres	0	0	0	0	0	0	0	0
	100-Year Floodplain Area	acres	0	1.6	1.4	1.6	1.4	1.9	1.4	1.3
	Wetlands (Field Delineated)	acres	0	0.7	0.7	0.7	0.7	0.8	0.7	0.7
	Surface Waters - Non-tidal	acres	0	<0.1	<0.1	<0.1	<0.1	0	<0.1	<0.1
		linear ft	0	20	30	20	30	0	50	30
	Surface Waters – Tidal[1]	acres	0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
		linear ft	0	0	0	0	0	0	0	0
	Chesapeake Bay Tidal Water Impacts[2]	acres	0	1.9	1.9	1.9	1.9	1.9	2.0	1.9
	Critical Areas	acres	0	3.4	2.5	3.4	2.5	3.3	2.6	2.5

[34] *This table includes key impacts, further impact details are located in respective Technical Reports.*

Resource Type[34]	Resource	Unit	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Preferred Alternative
			No-Build, 6-5-6	6-8-6 North	6-8-6 South	8-8-8 North	8-8-8 South	8-10-8 North	8-10-8 South	
Natural Resources	Critical Area (100-ft) Buffer	acres	0	1.2	1.0	1.2	1.0	1.2	1.0	1.0
	Submerged Aquatic Vegetation (2019-2023)	acres	0	0.3	0	0.3	0	0.4	0	0
	Public Shellfishery Areas	acres	0	0.5	0.6	0.5	0.6	0.5	0.6	0.4
	Oyster Sanctuaries	acres	0	0	0	0	0	0	0	0
	Natural Oyster Bars	acres	0	0.8	0.9	0.8	0.9	0.8	0.9	0.6
	Essential Fish Habitat	acres	0	4.0	4.0	4.0	4.0	4.2	4.3	2.4
	Waterfowl Staging and Concentration Areas	Acres	0	0.1	0	0.1	0	0.1	0	0
	FIDS Habitat	acres	0	0.2	0.2	0.2	0.2	0.1	0.1	0.2
	SSPRA Habitat	#	0	0	0	0	0	0	0	0
		acres	0	4.3	4.5	4.3	4.5	4.2	4.6	3.5
	Forest Areas	acres	0	2.3	1.4	2.3	1.4	1.1	0.9	1.4
Noise	Noise Sensitive Areas	#	0	0	0	0	0	0	0	0
Other Resources/ Preservation Areas	Number of Section 4(f) Properties	#	0	0	0	0	0	0	0	0
	Section 4(f) Properties	acres	0	1.9	1.2	1.9	1.2	2.0	1.3	1.8
	Number of Section 6(f) Properties	#	0	0	0	0	0	0	0	0.6
	Conservation Easements	acres	0	0.7	0.6	0.7	0.6	0.7	0.6	0
	Habitat Connectivity Network	acres	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Local Protected Land	acres	0	1.2	0.6	1.2	0.6	1.3	0.7	0.6
	Environmental Trust Easements	acres	0	0	0	0	0	0	0	0
Cost Estimate		2025 $	$0.0	$1.3 Billion	$1.2 Billion	$1.3 Billion	$1.2 Billion	$1.3 Billion	$1.2 Billion	$1.2 Billion

[1] *Impacts do not include the Chesapeake Bay proper.*
[2] *Includes impacts from new bridge construction and old bridge pier removal.*