# Chapter 11: Natural Resources

## A. INTRODUCTION

This chapter describes existing natural resource conditions within the study area for the Proposed Project. The natural resources analysis considered topography, geology, and soils; floodplains and wetlands/waters of the U.S.; terrestrial resources; aquatic resources; Chesapeake Bay Critical Area; coastal zone management; and unique and sensitive areas. This chapter also identifies potential adverse impacts on these resources from the Proposed Project, and discusses potential avoidance, minimization, and mitigation alternatives to offset these potential impacts. As discussed in Chapter 2, "Project Alternatives," this Environmental Assessment (EA) evaluates two Build Alternatives: Alternative 9A and Alternative 9B. Alternative 9A was selected as the Preferred Alternative.

## B. REGULATORY CONTEXT AND METHODOLOGY

Regulatory context is summarized in **Table 11-1** and described in more detail in **Appendix E**, "Natural Environmental Technical Report (NETR)." Methodology is described below.

### TOPOGRAPHY, GEOLOGY, AND SOILS

Maps published by the United States Geological Survey (USGS) and the Maryland Geological Survey (MGS) were used to obtain information on the topography and geology of the study area. Information on soil types within the study area was obtained from the USDA NRCS in the form of County Online Soil Surveys.

### FLOODPLAINS AND WETLANDS/WATERS OF THE U.S.

Floodplains were identified within the study area using *Flood Insurance Rate Maps* (FIRM) produced by FEMA. Two sets of floodplain maps were available for Harford County, the effective FEMA floodplain and a preliminary FEMA floodplain that provides proposed updates to the current effective floodplain maps. Both were assessed. Acreages of the 100-year and 500-year floodplain within the corridor were calculated using a geographic information system (GIS) overlay of the FIRM map limits.

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) and the Maryland Department of Natural Resources (DNR) Wetlands Inventory GIS layers were initially used to investigate the potential presence of wetlands within the study area. Where the DNR wetlands and NWI wetlands overlapped, the combined outer limits of each layer were used to create the wetland polygon. NRCS hydric soil layer was also used to note the potential location of wetlands within the study area. Estimated wetland limits within the study area were drawn using a combination of an inventory level field assessment in April 2014 and August 2014, agency field review in March 2015, mapped wetlands, and hydric soils limits. In October 2015, a wetland delineation was conducted within the proposed limits of disturbance for the alternatives

retained for detailed study (Alternative 9A and Alternative 9B). Wetlands were identified in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region, Version 2.0* (USACE 2010). The wetland delineation was conducted within the existing the National Railroad Passenger Corporation (Amtrak) ROW. All identified wetlands and waterways were flagged in the field and the flags surveyed. Stream resources within the 1,000-foot study area were identified and classified using the National Hydrography Dataset (NHD) from USGS, Harford and Cecil County hydrology GIS layers, FEMA FIRMs, and from the 2015 delineation.

**Table 11-1**
**Regulatory Context Summary Table**

| Technical Area | Regulatory Context |
|---|---|
| Topography, Geology, and Soils | Maryland Department of Environment Erosion and Sediment Control Regulations (COMAR 26.17.02) |
| | Farmland Policy Protection Act (FPPA) of 1981 |
| Floodplains and Wetlands/Waters of the U.S. | Executive Order 11988 |
| | Executive Order 13690 on "Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input" |
| | National Flood Insurance Program |
| | Section 404 of the Clean Water Act and Maryland Wetlands Regulations |
| Terrestrial Resources | Maryland Reforestation Law & Maryland Forest Conservation Act |
| | Nongame Endangered Species Conservation Act |
| | Forest Interior Dwelling Species (FIDS) (COMAR 27.01.09.04C(2)(b)(iv) |
| Aquatic Resources | Clean Water Act (33 USC § 1251-1387) |
| | Safe Drinking Water Act (42 USC § 330f-300j) |
| | Section 7 of the Endangered Species Act (ESA) |
| | Executive Order 13508 on Chesapeake Bay Protection and Restoration |
| | National Pollutant Discharge Elimination System (NPDES) (Annotated Code of Maryland, Environment Article, Environment Article, Title 9, Subtitle 3, and implementing regulations in COMAR 26.08.04) |
| Chesapeake Bay Critical Area | Chesapeake Bay Critical Area Protection Act |
| Coastal Zone Management | Section 307 of the Federal Coastal Zone Management Act of 1972 (CZMA) |
| | The Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) |
| Unique and Sensitive Areas | Natural Heritage Areas (COMAR 08.03.08) |
| | Scenic and Wild Rivers System Act of 1968 |
| | Maryland's Green Infrastructure Assessment |
| | Forest Conservation Act Easements |
| | Federal Lands |

## TERRESTRIAL RESOURCES

Forest boundaries were identified using the most recent publically available aerial imagery and vegetation GIS layers from both counties. Forest resources were assessed on a broad scale using the Vegetation Map of Maryland (Brush et al. 1976). Forest interior habitat was identified using guidelines from A Guide to the Conservation of Forest Interior Dwelling Birds in the Critical Area (Jones et al. 2000) and is explained in detail within the NETR in **Appendix E**, Section C. FIDS habitat areas were mapped within the project study area. Forest resources were characterized, including the size class and dominant species of trees, understory conditions, and degree of disturbance.

Information on terrestrial wildlife was obtained using data available through DNR Wildlife and Heritage Service (WHS) online resources, the 2nd Atlas of the Breeding Birds of Maryland and District of Columbia (Ellison 2010), and preliminary data of the Maryland Amphibian and Reptile Atlas (MARA) project (MARA Database Online Resource 2010). Wildlife observed during the field inventory were recorded and listed in tables within the NETR in **Appendix E**, Section C.

To assess potential terrestrial rare, threatened, or endangered (RTE) species, project review letters, were sent to the DNR-WHS, DNR Integrated Policy Review Unit, and the USFWS. Mapped DNR Sensitive Species Project Review Areas (SSPRA) were also reviewed to determine areas supporting or providing habitat buffers for RTE species within the study area. The lists of current and historic RTE species of Harford and Cecil Counties (DNR 2010) were also reviewed to determine which species could potentially occur within the study area.

## AQUATIC RESOURCES

- Published literature, including information obtained from governmental and non-governmental agencies, such as DNR, Maryland Department of Planning, and MDE.
- Data mapping tools provided by state agencies, including tools for watershed boundaries and health; designated use classes for surface waters; water quality assessments; and stream health data including fish and benthic sampling results.
- DNR's response to a request for information on fisheries data, including rare, threatened, or endangered species in the study area.

## CHESAPEAKE BAY CRITICAL AREA

### *METHODOLOGY*

The Critical Area is defined as all land within 1,000 feet of Maryland's tidal waters and tidal wetlands. It also includes the waters of the Chesapeake Bay, the Atlantic Coastal Bays, their tidal tributaries and the lands underneath these tidal areas. The 1,000 foot Critical Area located within the study area limits have been determined using statewide mapping developed and maintained by DNR as well as written coordination with the CAC. Impacts to the Critical Area were calculated using the limit of disturbance (LOD) for Alternative 9A and Alternative 9B (i.e., project alternative footprint).

### COASTAL ZONE MANAGEMENT

The "Guide to Maryland's CZMP and Federal Consistency Process" issued by MDE was reviewed to determine the federal consistency requirements established by the federal CZMA and how those requirements are administered through the Maryland CZMP.

### UNIQUE AND SENSITIVE AREAS

NHAs, Green Infrastructure, and Wild and Scenic Rivers within the study area were determined through a review of existing literature and coordination with DNR.

## C. AFFECTED ENVIRONMENT

### TOPOGRAPHY, GEOLOGY, AND SOILS

*TOPOGRAPHY*

The topography at the study area ranges from less than 20 feet above sea level to greater than 100 feet. The topography in the Atlantic Coastal Plain physiographic province (south of the study area) is fairly flat. The topography in the Piedmont physiographic province is generally rolling hills, rising to over 400 feet north of the study area.

*GEOLOGY*

Harford and Cecil Counties lie within the Fall Line separating two physiographic provinces, the Piedmont and the Atlantic Coastal Plain. The study area is primarily located within the Atlantic Coastal Plain, with a small portion located within the Piedmont Province. The Atlantic Coastal Plain Province is underlain by a wedge of unconsolidated sediments including gravel, sand, silt, and clay whereas the Piedmont is composed of hard, crystalline igneous and metamorphic rocks. These geological formations are depicted in Figure E-1 in **Appendix E**. In addition to the existing geology, mining occurs near the study area. There is a ready source of sand and gravel at the Havre de Grace Quarry (Vulcan Havre de Grace Quarry), approximately 7,800 feet northwest of the bridge.

*SOILS*

According to the USDA Web Soil Survey, there are 31 soil series and 47 mapping units within the study area (see **Table 11-2**).

The Drainage Class identifies the natural drainage conditions of the soil (e.g., very poorly drained, poorly drained). Study area soils range from poorly drained (Leonardtown silt loam and Othello silt loam) to well drained soils (Elsinboro loam, Matapeake silt loam, Nassawango silt loam, and Sassafras and Croom). However, the majority of soil types in the Cecil County portion of the study area are Urban soil. Urban soils are mapped in areas where either the native soil has been removed or covered with fill. The urban map unit consists of land that has been so altered or disturbed by urban works and structure that classifying the soil is no longer feasible. Soil mapping units are depicted in Figure E-2 in **Appendix E**.

Prime Farmland Soils are defined by NRCS as "having the soil quality, growing season and moisture supply needed to economically produce sustained high yields of crops" (NRCS 2011). Soils of Statewide Importance are defined by NRCS as "having early Prime Farmland quality and that economically produce high yields of crops when treated and managed according to

acceptable Methodology" (NRCS 2011). Figure E-2 in **Appendix E** illustrates Prime Farmland Soils and Soils of Statewide Importance within the study area. However, as shown in the figure, most of this land is part of the existing railroad ROW, and, therefore, is not used for agriculture.

**Table 11-2**
**Soil Characteristics**

| Map Unit | Description | Drainage Class (Dominant) | Hydric Classification | Farmland Classification | Erosion Class |
|---|---|---|---|---|---|
| AqA | Aquasco silt loam | Somewhat poorly drained | Partially hydric | Statewide importance | Not highly erodible |
| BeA | Beltsville silt loam | Moderately well drained | Partially hydric | Prime farmland | Not highly erodible |
| EsA | Elsinboro loam | Well Drained | Not hydric | Prime farmland | Not highly erodible - potentially highly |
| Lr | Leonardtown silt loam | Poorly drained | All hydric | Not prime | Not highly erodible |
| MkB | Matapeake silt loam | Well drained | Not hydric | Statewide importance | Not highly erodible |
| MlA | Mattapex silt loam | Moderately well drained | Partially hydric | Prime farmland | Not highly erodible |
| NsA | Nassawango silt loam | Well Drained | Partially hydric | Prime farmland | Not highly erodible |
| Ot | Othello silt loam | Poorly drained | All hydric | Statewide importance | Not highly erodible |
| SME | Sassafras and Croom soils, (*15 - 25% slopes*) | Well drained | Partially hydric | Not prime | Highly erodible |

**FLOODPLAINS AND WETLANDS/WATERS OF THE U.S.**

*FLOODPLAINS*

Floodplains have been mapped within the study area along: the Susquehanna River, an unnamed tributary to Swan Creek, an unnamed tributary to Gashey's Creek, Gashey's Creek, an unnamed tributary to Lily Run, Lily Run, Mill Creek, and Principio Creek (see Figure E-3 in **Appendix E**). Floodplains along the Susquehanna River are primarily used for waterfront commercial properties, parkland and other developed properties. Floodplains within the Harford County portion of the study area are dominated by urban development with some isolated open space. Within the Cecil County portion of the study area, Mill Creek and Principio Creek floodplains largely consist of forest cover. According to the effective FEMA floodplain maps, the majority of the 1,560-acre study area is outside the 100- and 500-year floodplain.

Where floodplains exist within the 1,560-acre study area, there are approximately 320 acres of FEMA-designated 100-year floodplains. This includes approximately 160 acres within the Susquehanna River. For Harford County, the total amount of effective 100-year floodplain within the study area is 220 acres. For Cecil County, the total amount of effective 100-year floodplain within the study area is 100 acres. The total effective 500-year floodplain within the study area is approximately 345 acres, including 222 acres in Harford County and 123 acres in Cecil County. Harford County has proposed revised floodplain limits. This preliminary floodplain mapping would result in a slight decrease in the 100-year and 500-year floodplain area within the study area to 203 acres and 209 acres, respectively.

FEMA floodplain mapping indicates that within the study area, two of the waterways, an unnamed tributary to Lily Run and Lily Run, also have a regulated floodway within the overall floodplain. FEMA defines a floodway as "the channel of a…watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height." These floodways were designated through detailed hydrologic studies conducted by FEMA and are regulated by FEMA, MDE, and localities through the permitting process to ensure that development in the floodplain does not raise the base elevation of a designated floodway by more than a maximum of 1 foot or a smaller increment as determined by MDE (see **Appendix E**, Section B).

*WETLANDS/WATERS OF THE U.S.*

Across the entire study area, 22 waters of the U.S., including wetlands, were identified. All waters of the U.S., including wetlands are depicted in Figure E-4 in **Appendix E**. The majority of the identified systems included nontidal forested wetlands. These systems included a few emergent/open water wetland stormwater management ponds or drainage swales and a forested wetland ditch along the Amtrak railroad tracks. Two identified forested wetlands and one emergent wetland appeared to be hydrologically isolated. Two systems were identified as tidal emergent, scrub shrub, or forested wetlands, one along the Susquehanna River and the other along the perimeter of Furnace Bay.

In Harford County, 12 potential nontidal wetlands were identified within the study area (**Table 11-3**). These include natural palustrine forested (PFO)/scrub shrub (PSS)/emergent (PEM) wetlands and manmade palustrine emergent/open water (POW and PUBH) wetlands. (Note that a description of each wetland at stream classification included in **Table 11-1** can be found in **Appendix E**, Section B, **Table E-3**). Eight nontidal intermittent or perennial streams also cross the Amtrak ROW within Harford County.

In Cecil County, two tidal wetland systems and six potential nontidal wetland systems were identified within the project study area (see **Table 11-3**). Mill Creek is the only perennial stream that crosses the study area in Cecil County. There are also three intermittent streams that flow parallel to the tracks on the south side and one ephemeral channel that drains into Wetland 9. Ephemeral channels contain a defined, natural bed and bank, and convey surface water to relatively permanent waters following precipitation or snow-melt events.

The total area of the potential wetlands identified within the Harford County portion of the study area is 77.3 acres of PFO/PSS/PUBHx and 2.2 acres of PEM/POW/PUBHx. The total area of potential wetlands identified within the Cecil County portion of the study area is 2.3 acres of estuarine intertidal with scrub shrub (E2SS), 8.3 acres of estuarine intertidal with an unconsolidated bottom (E2US), 4.9 acres of PFO, 2.9 acres of PEM, and 0.1 acre of POW. A brief description of each wetland and waters of the U.S. system is provided in **Appendix E**, Section B.

**Table 11-3**
**Mapped and Delineated Wetlands and Waters of the U.S.**

| System Number | Waters of the U.S. Classification[1] | Wetland Type | Approximate Area of Wetland (Acre) | Approximate Length of Stream (Linear Feet) |
|---|---|---|---|---|
| **Harford County** | | | | |
| 1 | PFO1A/PFO1C/PSS1A | Nontidal | 53.7 | - |
| | R2UB1 (Unnamed tributary to Gashey's Creek) | | - | 2,800 |
| 2 | PEM1/POWHx | Nontidal | 0.2 | - |
| | R2UB1(Two unnamed tributaries to Swan Creek) | | - | 2,500 |
| 3 | PFO1A/C | Nontidal | 7.8 | - |
| | R3UB1 (Gashey's Creek) | | - | 2,275 |
| | R2UB3 (Unnamed tributary to Gashey's Creek) | | - | 2,297 |
| 4 | PEM1/POWHx | Nontidal | 1.0 | - |
| 5 | PFO1C | Nontidal | 5.4 | - |
| | R2UB1/2 (Unnamed tributary to Lily Run) | | - | 1,953 |
| 6 | PFO1A/C | Nontidal | 4.9 | - |
| | PEM1C | | 0.2 | - |
| | PUBHx | | 0.6 | - |
| | R3UB1 (Unnamed tributary to Lily Run) | | - | 2,659 |
| | R4SB3/5 (Unnamed tributary to Lily Run) | | - | 4,546 |
| 7 | PFO1A | Nontidal | 1.1 | - |
| 8 | PFO1A/PUBHx | Nontidal | 3.3 | - |
| 14 | Susquehanna River (R1UBV/R1OWV) | Tidal | - | 2,000 |
| 17 | PEM1C | Nontidal | 0.05 | - |
| | R2UB1/2 (Lily Run) | | - | 2,893 |
| 18 | PEM1C | Nontidal | 0.04 | - |
| 19 | PFO1C | Nontidal | 0.2 | - |
| | PEM1C | | 0.1 | - |
| | R4SB3/4 (Unnamed tributary to Lily Run) | | - | 725 |
| | R2UB1 (Unnamed tributary to Lily Run) | | - | 228 |
| 20 | PFO1C | Nontidal | 0.9 | - |
| 21 | R4SB3 | Nontidal | - | 4,197 |
| **Cecil County** | | | | |
| 9 | PFO1R | Tidal | 0.9 | - |
| | PEM1N | | 0.4 | - |
| | PEM1/5N | | 0.8 | - |
| | Ephemeral | Nontidal | - | 128 |
| 10 | PFO1E | Nontidal | 0.9 | - |
| | R3UB1 (Mill Creek) | | - | 2,495 |
| 11 | PFO1S | Tidal | 2.5 | - |
| | E2SS1P6 | | 2.3 | - |
| | E2USN6 (Including Furnace Bay) | | 8.3 | - |

**Table 11-3 (cont'd)**
**Mapped and Delineated Wetlands and Waters of the U.S.**

| System Number | Waters of the U.S. Classification[1] | Wetland Type | Approximate Area of Wetland (Acre) | Approximate Length of Stream (Linear Feet) |
|---|---|---|---|---|
| **Cecil County (cont'd)** | | | | |
| 12 | PFO1C<br>R4SB4 (unnamed tributary to Susquehanna River | Nontidal | 0.4<br>- | -<br>2,500 |
| 13 | PFO1C<br>PEM1C<br>R4SB3 (unnamed tributary to Mill Creek) | Nontidal | 0.2<br>0.3<br>- | -<br>-<br>1,100 |
| 15 | PEM1C | Nontidal | 1.1 | - |
| 16 | POW<br>R4SB3 (unnamed tributary to Furnace Creek) | Nontidal | 0.1<br>- | -<br>1,500 |
| 22 | PEM1C | Nontidal | 0.3 | - |

## TERRESTRIAL RESOURCES

Terrestrial resources within the study area include forest resources; wildlife; and threatened, endangered, or special concern terrestrial species.

### *FOREST RESOURCES*

According to Brush et al. (1976), the majority of the study area is mapped within the Tulip Poplar Association, with a narrow area of the Sycamore-Green Ash-Box Elder-Silver Maple Association mapped within the Mill Creek floodplain in Cecil County. The Tulip Poplar Association is dominated by tulip trees (tulip poplar), red maple, white oak, and flowering dogwood. The Sycamore-Green Ash-Box Elder-Silver Maple Association is dominated by these species and red maple and white oak. The field assessment corroborated the mapped associations except in smaller areas of forested wetlands located within the mapped Tulip Poplar Association. Within these areas, the dominant trees were red maple and sweet-gum trees with scattered tuliptree, pin oak, and sycamore. Mapped forest associations are depicted in Figure E-5 in **Appendix E**.

A majority of the forest resources within the study area consist of smaller patches of deciduous forest that lie between the Amtrak ROW and residential or commercial properties. Therefore, these forests are not likely of high quality. One of the exceptions is a large, forested area in the southern portion of the study area in Harford County. This area is associated with unnamed tributaries to Swan Creek and Gashey's Creek and the largest wetland crossed by the Proposed Project, which contains a Wetland of Special State Concern (WSSC). The interior of this forested area may also be considered regulated FIDS habitat, as it is a part of a large (>500 acres) contiguous forest that lies within the Critical Area.

Specimen trees with a diameter of 30 inches or greater were not common, but did occur mostly as isolated trees on developed properties, such as on the grounds of Rodgers Tavern.

*WILDLIFE*

The majority of the study area is characterized by urban, suburban, commercial, and agricultural land uses with few natural habitat areas remaining. Forests in the study area are generally fragmented by development and/or past and present agricultural use. Terrestrial habitat within the study area consists mostly of smaller patches of low quality deciduous forest that lie between the Amtrak ROW and residential or commercial properties. However, there are also several deciduous forests present within the study area along stream corridors. The remainder of the terrestrial habitat in the study area consists of commercial/residential properties with scattered trees and landscaping, undeveloped meadows, agricultural fields, and residential yards. Aquatic wildlife habitat within the study area consists of the Susquehanna River, Furnace Bay, numerous wetlands, and several perennial and intermittent streams.

Preliminary data from the MARA indicate that 30 species of reptiles and amphibians have been documented within portions of the Aberdeen and Havre de Grace USGS quadrangles that are crossed by the study area. The *2nd Atlas of the Breeding Birds of Maryland and the District of Columbia* (Ellison 2010) indicates that 120 species of breeding birds have been documented within portions of the Aberdeen and Havre de Grace USGS quadrangles crossed by the study area. Similar statewide distributional data are lacking for mammals. However, the study area provides habitat for numerous mammals that are adapted to urban/suburban environments, as well as more natural areas.

The smaller, disturbed forest habitats within the study area would be expected to support disturbance tolerant wildlife and edge adapted species. These habitats could support herpetofauna species such as eastern toads, common five-lined skink, eastern redbacked salamander, northern black racer, eastern ratsnake, eastern garter snake, and the eastern box turtle, among other species. Mammals such as mice, voles, the eastern mole, bats, squirrels, foxes, raccoon, woodchuck, and white tailed deer, among other species, likely inhabit terrestrial areas within the study area. More urban environments such as Havre de Grace may also support species such as the Norway rat and the black rat. Bird species likely to occur within the smaller, more disturbed forests with abundant edge habitat would be common species such as red-bellied woodpecker, downy woodpecker, eastern wood-pewee, American crow, blue jay, Carolina chickadee, tufted titmouse, white-breasted nuthatch, Carolina wren, American robin, and northern cardinal. With the exception of the eastern wood-pewee, all of these bird species were observed during the inventory level field assessment in early April 2014.

One large, contiguous forest habitat is located within the study area and occurs southeast of the Amtrak ROW at the southwestern end of the study area. This forest may support forest interior birds known as FIDS. A list of the 25 FIDS potentially occurring within the Critical Area are provided in **Appendix E**, Section C. According to the *2nd Atlas of the Breeding Birds of Maryland and the District of Columbia* (Ellison 2010), 20 of the 25 FIDS have been documented within breeding bird atlas blocks near the study area. It is likely that at least some of these species would be found within the forest interior habitat mapped within the study area.

Wetlands and vernal pools within the study area could support herpetofauna species, such as the eastern cricket frog, spring peeper, American bullfrog, northern green frog, pickerel frog, wood frog, painted turtle, snapping turtle, northern watersnake, and spotted salamander, among other species. The spring peeper was observed during the early spring inventory level field assessment. Smaller streams could support the northern two-lined salamander and the long-tailed salamander. Larger waterbodies within the study area, such as the Susquehanna River, are also habitat for species such as the northern map turtle, red-bellied cooter, American beaver, muskrat,

and the northern river otter. The northern map turtle is a state-endangered aquatic turtle discussed in the Aquatic Resources section below. Bird species using forested wetlands would include those listed above, including some FIDS. Within tidal marsh and riverine habitats along the Susquehanna River, birds, such as geese, ducks, egrets, herons, rails, and red-winged blackbird would be expected. In addition, many species of waterfowl, gulls and terns, and raptors, such as the osprey and bald eagle, forage in and rest on the Susquehanna River during different seasons.

*THREATENED, ENDANGERED, OR SPECIAL CONCERN TERRESTRIAL SPECIES*

*Listed Species*

On April 2, 2015, USFWS listed the northern long-eared bat (NLEB) as threatened under the Endangered Species Act (ESA). The NLEB spends winter months hibernating in caves and mines (hibernacula) that have constant temperatures, high humidity, and no air currents. During the summer months, NLEB roost underneath bark, in cavities or in crevices of trees. Breeding begins in late summer or early fall. A response from USFWS dated January 15, 2016 indicated that the NLEB is a threatened species that has the potential to occur within the boundary of the Proposed Project, but is not likely to be adversely affected by the Proposed Project.

The Project Team solicited information on RTE species from DNR. DNR responded by identifying a known site within the Furnace Bay wetlands at the eastern end of the study area that supports a population of state-listed endangered water horsetail and vetchling, two aquatic plant species. DNR also identified a WSSC located within the Swan Creek drainage just south of the Amtrak ROW at the western end of the study area and a historic waterfowl concentration and staging area within the Susquehanna River. No other state-listed species were documented by the DNR as potentially occurring within the study area. Copies of all correspondence are included in **Appendix E**, Attachment E. Coordination is ongoing.

*Waterfowl Concentration Areas & Colonial Waterbird Colonies*

The Critical Area law has identified types of natural resources that should be protected from excessive development along the Chesapeake Bay and its tidal tributaries. These habitat protection areas include significant plant and wildlife habitat, including colonial water bird nesting areas and aquatic areas of historic waterfowl concentration. The intent of the CBCA law is to protect these sensitive areas from water-dependent development activities, such as docks, piers, bulkheads, etc.

According to the Maryland Environmental Resources and Land Information Network (MERLIN) online mapping tool, two waterfowl areas occur within the study area, one in the Susquehanna River crossed by the existing Susquehanna River Rail Bridge and the other within Furnace Bay at the extreme eastern end of the study area. These are historic waterfowl staging areas and wintering sites for waterfowl, such as diving ducks, swans, and geese that forage on fish and shellfish near the mouth of the Susquehanna River and within Furnace Bay. Prior to the 1960s, the expansive submerged aquatic vegetation (SAV) beds at the mouth of the Susquehanna River supported hundreds of thousands of these waterfowl (USFWS 2013). The rich SAV growth began declining in the 1960s as increased development in the watershed above the Conowingo Dam led to poorer water quality and quantity. Remaining SAV beds were destroyed by Hurricane Agnes in 1972. Since then, SAV have generally rebounded, providing increasing habitat for wintering waterfowl. The boundary of the waterfowl area within the Susquehanna

River lies primarily within Cecil County, from the US 40 Bridge to the mouth of the river. The Furnace Bay waterfowl area lies outside of the Proposed Project's limits of disturbance.

Colonial water bird colonies are nesting colonies for colonial water bird species, such as herons and egrets. No colonial water bird nesting areas occur within the study area. The closest colonial water bird nesting site occurs along the Cecil County shoreline of the Susquehanna River near the Conowingo Dam.

## AQUATIC RESOURCES

The study area for aquatic resources comprises the Lower Susquehanna River from the head of tide north of Port Deposit to the confluence with the Upper Bay, and the Upper Bay down to the Elk River at Turkey Point to include the shallow Susquehanna Flats area where much of the larger grained sediment discharged by the Susquehanna River is deposited (STAC 2000). The study area also includes the following streams: an unnamed tributary to Swan Creek, an unnamed tributary to Gashey's Creek, Gashey's Creek, an unnamed tributary to Lily Run, Lily Run, Mill Creek, and Principio Creek.

### *HYDROLOGY*

The Susquehanna River Rail Bridge crosses the Lower Susquehanna River[1], just north of its confluence with the Chesapeake Bay, the largest estuary in the United States. Estuaries are partially enclosed bodies of water where fresh water from rivers and streams mix with salt water from the ocean. The Susquehanna River supplies most of the freshwater (about 60 percent) to the Bay (Cerco et al. 2013). Flow within the Lower Susquehanna River is affected by natural flow of the river and operation of the Safe Harbor Corporation's Safe Harbor Dam located upriver from the Conowingo Dam.

The Chesapeake Bay is partially mixed. Freshwater from the tributaries flows downstream toward the Atlantic Ocean and saltier water from the Atlantic Ocean flows upstream along the bottom. Salinity and tidal gradients exist throughout the Bay, with higher salinities and greater tidal fluctuations occurring closer to the mouth. The Lower Susquehanna is tidal up to the northern end of Robert Island north of Port Deposit, where Deer Creek discharges to the river on the western bank (Gomez and Sullivan Engineers, P.C. 2011). Within the study area, the tide ranges from 0.2 feet at Mean Low Water (MLW) to 2.1 feet at MHW at Havre de Grace. The Susquehanna River empties into the head of Chesapeake Bay between Concord Point and Perry Point.

Riverbed depths within the Susquehanna River near the project study area were determined by a review of the NOAA Nautical Chart: Head of the Chesapeake Bay (NOAA Chart 12274). Where the Susquehanna River discharges to the Upper Bay, water depths are up to approximately 42 feet at MLLW (mean lower low water) and decrease rapidly to the shallow depths of the Susquehanna Flats area of the Upper Bay. Near the existing bridge on the Lower Susquehanna River, depths at MLLW in the deeper channel range from about 19 feet on the west bank of the deeper channel to about 51 feet at MLLW on the east bank where the Susquehanna River flows to the east of Garrett Island. Shallow waters on either bank range in depth from about three feet to five feet at MLLW.

[1] The Lower Susquehanna River is an approximately 10-mile length of the river in Cecil and Harford Counties, Maryland, that extends from Conowingo Dam to the Upper Chesapeake Bay

A review of Maryland's Tier II Waters within the study area identified Mill Creek 1 and Principio Creek 3 as the only Tier II Catchments, or high quality waters, under the COMAR Antidegradation Policy.

*GROUNDWATER*

The groundwater system within the project study area is controlled by the thickness of the residual weathered bedrock (saprolite) and the degree of fracturing in the bedrock. The flow water table water-bearing zone generally mimics the land surface contours. The flow system is recharged by precipitation that infiltrates the saprolite and percolates to the water table unit. Groundwater is utilized in Cecil County by public and private water systems and private on-lot wells. The latter includes industrial, commercial, institutional, agricultural enterprises, and individual domestic wells. The depth of the weathering and topography are such that there appears to be little potential for a well of more than 25 gallons per minute (gpm) within the vicinity of the study area. In Harford County, the City of Havre de Grace owns and operates a surface water treatment plant for which the source is the Susquehanna River. Havre de Grace maintains its own water distribution system. Only a small portion of residents utilize private groundwater wells since the reported low well yields (average reported well yields of 10 to 15 gpm with higher yields of about 50 gpm in draws and valleys) are not sufficient for consideration as a major groundwater source.

Designation of wellhead protection areas (WHPA's) has been established under the Safe Drinking Water Act and is implemented through the Maryland Department of the Environment (MDE). A WHPA is a designated area, either surface or subsurface, that is regulated to prevent contamination of a well or well-field supplying a public water system. Several Source Water Assessment Program reports have been conducted within Cecil and Harford counties in order to identify and delineate areas that contribute to the water source and identify potential sources of contamination.

*WATER QUALITY*

Water quality of the Chesapeake Bay is generally poor, though it varies among the segments of the Bay. High nutrient concentrations (i.e., nitrogen and phosphorus) promote algal blooms that die and sink to the bottom of the Bay and consume oxygen, leading to zones of low oxygen (hypoxic) where fish and shellfish cannot survive. High concentrations of suspended sediment and algal blooms limit the penetration of light into the water important to the growth and survival of SAV and other aquatic biota. Because of these high nutrient and suspended sediment concentrations, the waters of the mainstem and tidal tributaries of the Chesapeake Bay are considered impaired for aquatic life resources (USEPA 2010). This impairment has persisted despite extensive restoration efforts implemented within the Bay over the last 25 years, prompting the USEPA to establish the Chesapeake Bay Total Maximum Daily Load (TMDL) on December 29, 2010. The Chesapeake Bay TMDL, as required by the Clean Water Act, establishes a comprehensive "pollution diet" for the Bay with respect to nitrogen, phosphorus, and sediment to improve water quality in the Chesapeake Bay watershed.

The MDE classifies the Lower Susquehanna River and Upper Chesapeake Bay within the study area as Use Class II-P for tidal freshwater estuaries. Individual designated uses within the Use Class II-P grouping for the study area include: growth and propagation of fish, other aquatic life and wildlife, water contact sports, leisure activities involving direct contact with surface water, fishing, agricultural and industrial water supply, seasonal migratory fish spawning and nursery

use, seasonal shallow-water SAV use, open-water fish and shellfish use, and public water supply. Tidal tributary reaches of the Lower Susquehanna River within the aquatic resources study area are classified as Use II streams, with sub-designations within the segment for migratory fish spawning and nursery use, shallow water submerged aquatic vegetation, and open water fish and shellfish use.[2]

The 8-digit Lower Susquehanna River Watershed is listed on the 2012 303(d) list as impaired for total nitrogen, total phosphorus, and polychlorinated biphenyls (PCBs) in fish tissue (MDE 2012). The 8-digit Conowingo Dam/Susquehanna River Watershed was listed on the 2010 303(d) list as impaired by nutrients and sediment, both originally designated in 1996. Since then, MDE and USEPA have both supported the removal of these listings. Therefore, there are currently no TMDL impairments for the Conowingo Dam/Susquehanna River Watershed. The Upper Chesapeake Bay is listed as impaired for total nitrogen and total phosphorus. USEPA also considers Total Suspended Solids (TSS) to be an "unlisted impairment" for this region of the Bay, meaning that a TMDL is required for the parameter, but it is not listed as an official impairment in the current 303(d) list.

The project study area crosses an unnamed tributary to Swan Creek, an unnamed tributary to Gashey's Creek, Gashey's Creek, an unnamed tributary to Lily Run, and Lily Run on the western shore of the Susquehanna, and Mill Creek and Principio Creek on the eastern shore. All of these tributaries, except Principio Creek, are nontidal and classified as Use I streams, for water contact recreation and protection of aquatic life. Principio Creek is tidal within the rail corridor, and its tributaries near the site are classified as Use III streams (natural trout waters). Biological monitoring has been conducted by the Maryland Biological Stream Survey or volunteer groups on several streams within the study area. Excluding Principio Creek, biological monitoring has generally characterized fish and benthic macroinvertebrate communities within the study area as "Fair" or "Poor" based on Index of Biotic Integrity (IBI) scoring. The fish and benthic macroinvertebrate communities in Principio Creek were rated as "Good" by the IBI. Detailed information on recent biomonitoring can be found in **Appendix E**, Section D.

The Chesapeake Bay scientific and management community, which includes a number of public and private institutions, produces an annual assessment (or report card) each spring of the Bay's ecosystem health. The overall Bay Health score in 2012 for all regions of the Bay combined was 47 percent, or a C, which was improved from a D+ in 2011.

DNR conducts regular water quality monitoring of tidal tributaries and the mainstem of the Chesapeake Bay. Water temperature, DO, chlorophyll-*a*, total nitrogen, total phosphorus, and TSS were monitored for one DNR sampling station on the Lower Susquehanna River and two Chesapeake Bay mainstem sampling locations within the study area. While seasonal and annual fluctuations were observed, DO and total nitrogen were generally above criteria at all three stations. Excess nutrients, especially nitrogen and phosphorus, can lead to eutrophication and excess growth of plant matter. This results in an initial increase in DO levels followed by a sharp decline. When these plants decompose, the decomposition process depletes the water of

[2] According to DNR (October 22, 2014 correspondence), several very small tributaries to the Susquehanna River on the Cecil County side have been classified as Use Class III and have been documented to support wild trout, either consistently or occasionally. Two new Use Class III designations include Happy Valley Branch and its tributaries and an unnamed tributary to the Susquehanna River crossing Frenchtown Road in Cecil County. These tributaries discharge to the portion of the Lower Susquehanna River within the aquatic resources study area but are not crossed by the rail corridor.

available oxygen, which can lead to hypoxic (low DO) or anoxic (lack of DO) conditions and result in a loss of aquatic life. Detailed information on water quality monitoring can be found in **Appendix E**, Section D.

*SEDIMENT QUALITY & CONTAMINANTS*

The Lower Susquehanna River bottom within the study area comprises boulders and imbedded rock covered with silt that is deposited in this section due to the drop in current associated with the widening and deepening of the river in this section (NAI and Gomez and Sullivan 2011a). Sediment grain size characteristics demonstrate a distinct gradient from fine to coarse grained particles from north to south in the deeper portions of the Bay mainstem; in the tributaries, sediments tend to be muddier upstream and coarser near the mouths of the rivers (Hartwell and Hameedi 2007). The rate of sediment deposition throughout much of the Bay is less than about 0.06 inches/year. In the Upper Bay, however, rates of sediment accumulation are influenced by the large sediment loads supplied by the Susquehanna River.

Contaminants enter the Bay via atmospheric deposition, dissolved and particulate runoff from the watershed, or direct discharge, and sediments tend to accumulate most toxic contaminants (Hartwell and Hameedi 2007). Higher concentrations of contaminants (e.g., PCBs, PAHs, DDT, pesticides, and metals) are observed in depositional areas in the Susquehanna Flats and other areas where sedimentation rates are high and sediments are fine. In a 2006 sediment quality study, there was no toxicity contributing to mortality or reduced rates of reproduction for benthic organisms in samples taken in the Lower Susquehanna River (MDE 2008).

*AQUATIC BIOTA*

*Phytoplankton & Zooplankton*

Phytoplankton are microscopic plants whose movements within the system are largely governed by prevailing tides and currents. From 2010-2012, phytoplankton samples in the Upper Bay were dominated by *Diatoma*, *Melosira*, *Cyanobium*, *Kirchneriella, Cyclotella* spp*, Synechococcus* spp., and unidentified flagellates (DNR 2014a). Zooplankton are an integral component of aquatic food webs. They are primary grazers on phytoplankton and detritus material, and are themselves used by organisms of higher trophic levels as food. Cladocerans, cyclopoid Copepods, and calanoid Copepods are the most abundant zooplankton within the freshwater portions of the Bay.

*Benthic Macroinvertebrates*

Tidal-fresh and transitional habitats tend to be the most productive regions in estuarine systems. In the Lower Susquehanna River Basin, dominant benthic macroinvertebrate species typically include mayflies, non-biting midges, blackflies, and caddisflies (Millard et al. 1999). Polychaete and oligochaete worms are the dominant macroinvertebrates in terms of abundance and number of taxa within the Susquehanna Flats portion of the study area, followed by clams, snails, and amphipods (Hartwell and Hameedi 2007; Holland et al. 1989). Freshwater mussel species may occur in the study area; new field data are being developed, and further coordination with DNR would determine which species occur in the area.

*SAV*

SAV, also referred to as bay grasses, are submerged plants that grow in the shallow waters of the Chesapeake Bay and its tributaries. SAV is of critical importance to the health of the estuary, by providing food and shelter for waterfowl, fish, shellfish and invertebrates; by adding oxygen to the water; and by their capacity to trap sediments, absorb nutrients, and reduce erosion (USEPA 2004). More than 20 species of bay grasses grow in the Bay and its tributaries, with more diversity in less saline areas. Eurasian watermilfoil, wild celery, hydrilla, coontail, water stargrass and brittle waternymph are the SAV most commonly found within the Susquehanna Flats (Orth et al. 2010 in URS and Gomez and Sullivan 2012). Eurasian watermilfoil and hydrilla were the two SAV species found within the Susquehanna River in the northern portion of the study area around Robert, Wood, and Spencer Islands (URS and Gomez and Sullivan 2012). Over a five-year period (2009 to 2013), the location of the SAV beds in the Lower Susquehanna River portion of the study area have remained relatively consistent (see Figure E-11 in **Appendix E**). Dense beds present in 2009 and 2010 were negatively affected by Hurricane Irene in 2011. However, throughout the Chesapeake Bay region SAV increased 21 percent between 2014 and 2015 (VIMS 2016)

*Oyster Beds*

The region of the Chesapeake Bay near the mouth of the Susquehanna River, and the Upper Chesapeake Bay in general, does not contain suitable habitat for eastern oysters. Both the current and historic northern ranges for eastern oysters are well downstream of the study area. Salinity, DO, and depth conditions in the Upper Bay are not suitable for oysters in wet, dry, or normal hydrological years (USACE 2012). There are no oyster beds present within the study area.

*Fish*

The tidal fluctuations, presence of SAV beds, range of water depths and variety of bottom habitats within the Lower Susquehanna and Upper Chesapeake Bay create spatially and temporally dynamic abiotic conditions, which influence the species composition and relative abundance of fishes within the study area (Nordlie 2006; Lefcheck et al. 2014). While the relative abundance of different fish species has fluctuated over time, the most abundant species within the study area are generally gizzard shad, American shad, blueback herring, American eel, white perch, channel catfish, banded killifish, sunfish, largemouth bass, and yellow perch. A number of anadromous species have been documented as spawning near and/or migrating through the study area, including: yellow perch (semi-anadromous), white perch, herring, and shad. Game fish known to occur in the mainstem of the Susquehanna River include striped bass, walleye, largemouth bass, smallmouth bass, and catfish species (Steffy 2013).

Comely shiner, a state-threatened species, is also known to occur in the Lower Susquehanna River but was not specifically referenced as a species of concern on the Proposed Project by the DNR-WHS. Special attention has been given to the management of American eel in recent years due to their ecological and economic importance and their declining population numbers due to fish blockages. Since the construction of the Conowingo Dam in the 1920s, the Lower Susquehanna River has not supported large runs of Atlantic sturgeon or shortnose sturgeon. Recent observations of these federally endangered species in the Susquehanna River are similarly scant and limited to just a few individuals in as many years (NMFS 1998; NAI and Gomez and Sullivan 2011b).

The nontidal and tidal tributaries to the Susquehanna River support a number of fish species not found in the Susquehanna mainstem, including: blacknose dace, creek chub, common shiner, rosyside dace, white sucker, cutlip minnow, swallowtail shiner, northern hogsucker, river chub, margined madtom, and satinfin shiner. Additionally, rainbow trout were found within Principio Creek. Rainbow trout, a non-native, but intolerant of polllution, gamefish, is often indicative of high quality streams.

*Aquatic Invasive Species*

Some of the aquatic invasive species currently known to occur in the Lower Susquehanna River Basin include zebra mussels, quagga mussels, Asian clam, purple loosestrife, water chestnut, rusty crayfish, and flathead catfish.

*THREATENED, ENDANGERED, OR SPECIAL CONCERN AQUATIC SPECIES/SECTION 7 CONSULTATION*

*Federally Listed Species*

An on-line project review with the USFWS indicated that there are no federally listed species within the study area, but critical habitat is present for the federally endangered Maryland darter, which has not been found in the study area since 1965 (DNR 2016). The shortnose sturgeon, Atlantic sturgeon, Kemp's ridley sea turtle, green sea turtle, and leatherback turtle were identified by NMFS as endangered species that may occur within the project area. Threatened species that may be found within the study area include Atlantic sturgeon (Gulf of Maine Distinct Population Segment) and the loggerhead sea turtle. In June 2016, the entirety of the action area was proposed for designation as critical habitat for the Chesapeake Bay Distinct Population Segment (DPS) of the Atlantic sturgeon.

The southern portion of the study area in the vicinity of Turkey Point is designated as providing essential fish habitat (EFH) for adult and juvenile stages of windowpane flounder (Chang et al. 1999). No other EFH has been designated for the study area. The study area is also an important migration area for diadromous fish species such as American shad, alewife, blueback herring, striped bass, hickory shad, gizzard shad, and American eel.

Shortnose sturgeon is a federally and state-listed endangered species found along the Atlantic coast of North America in estuaries and large rivers, including the Susquehanna (Chesapeake Bay). It is considered "amphidromous" – that is, like anadromous species it spawns in freshwater but regularly enters saltwater. Shortnose sturgeon may occur in the study area year round, but are most likely to occur there between January and April based on previous observations (NOAA 2007). In preparation for spawning, shortnose sturgeon in many rivers migrate in the fall to overwintering areas located in the furthest upstream areas of rivers and in close proximity to spawning grounds (Crance 1986; Kynard et al. 2012 Life History and Behaviour of Sturgeon). Spawning occurs the following spring, usually during April and May. The Susquehanna River may contain suitable spawning habitat and adult shortnose sturgeon have been documented in the river in February, April, and June, consistent with spawning time periods. However, it is unknown if adequate spawning or nursery habitat is present below the Conowingo Dam, which is the first barrier to upstream passage (NMFS 2014).

Atlantic sturgeon is a federally listed endangered[3] species that also occurs along the Atlantic coast of North America in estuaries and large rivers, including the Susquehanna (Chesapeake Bay). Similar to the shortnose sturgeon, the Atlantic sturgeon is also typically anadromous, sharing much of its range within rivers with the shortnose sturgeon. Although Atlantic sturgeon are expected to occur at least intermittently in the study area, it is not found there in exceptionally high abundance (USFWS 2007 Atlantic sturgeon reward program). Atlantic sturgeon may occur in the study area year round as juveniles and sub-adults (NOAA 2007). The Chesapeake Bay DPS spawns in the James River in Virginia (NMFS 2014). There is not a spawning population in the Susquehanna River due to the presence of the Conowingo Dam (SRAFRC 2010); therefore, Atlantic sturgeon eggs, larvae, and early juveniles are not expected to occur in the study area.

Several species of sea turtles are known to be present in the Chesapeake Bay and off the Atlantic coast of Maryland. Leatherback sea turtles are present off the Maryland coast but are predominantly pelagic (open ocean) and not expected to occur in the study area. Loggerhead, Kemp's ridley, and green sea turtles are present in the Chesapeake Bay area mainly during late spring, summer, and early fall when water temperatures are relatively warm. Sea turtles are expected to be present in the Chesapeake Bay between April 1 and November 30.

*State Listed Species*

DNR identified American eel as an important fishery within the study area, as well as noting the presence of shortnose and Atlantic sturgeon. There is also potential for threatened or endangered mussel species to be found within the study area, which will require further coordination during later phases of project design. The logperch is a state-listed threatened species in Maryland. Adult logperch may occur year-round upstream of the study area between the Conowingo Dam and the Interstate 95 bridge. The state-listed endangered Northern Map Turtle is also documented in the project study area both within and along the banks of the Susquehanna River. The shores of the Susquehanna River are used by the Map Turtle for habitat, nesting, and foraging and the turtles hibernate on the river bottom in winter.

## CHESAPEAKE BAY CRITICAL AREA

The Critical Area is defined by the CAC for the Chesapeake and Atlantic Coastal Bays as *all land within 1,000 feet of the mean high water line of tidal waters or the landward edge of tidal wetlands and all waters of, and lands under, the Chesapeake Bay and its tributaries*. In addition, state regulations and local Critical Area ordinances require the establishment and maintenance of a minimum 100-foot buffer adjacent to all tidal waters, tidal wetlands, and tributary streams. In some cases, the Buffer is expanded beyond 100 feet in areas where there are adjacent sensitive resources such as steep slopes or soils with development constraints.

DNR classifies all land within the Critical Area based on the predominant land use and intensity of development present. These classifications include:

- Intensely Developed Areas (IDA)—developed areas where residential, commercial, institutional, and industrial land uses predominate.

[3] On February 6, 2012, certain DPS were designated as federally endangered. Atlantic sturgeon from the Chesapeake Bay and New York Bight Distinct Population Segment may occur in the study area.

- Limited Development Areas (LDA)—developed areas that include residential and some light commercial uses, as well as natural areas, wetlands, forests, and developed woodlands.
- Resource Conservation Areas (RCA)—nature-dominated areas and may include wetlands, surface water, and open space.

Approximately 208 acres of the study area is located within the Critical Area. Acreages of each Critical Area land use designation within the study area boundary are listed in **Table 11-4**. The study area is located within designated RCA and IDA Chesapeake Bay Critical Area. The study area is primarily designated as IDA around the Susquehanna River within the Corporate Limits of the City of Havre de Grace and the Town of Perryville. The study area also encompasses smaller portions of RCA designated Critical Area in Harford County near Gashey's Creek and Swan Creek and in Cecil County near the eastern terminus of the study area at Principio Creek (see Figure E-12 in **Appendix E**).

**Table 11-4**
**Critical Area within the Study Area**

| Study Area Location | Land Use Designation | CA Acreage within Study Area |
|---|---|---|
| Harford County | RCA | 35.19 |
| City of Havre de Grace/ Susquehanna River Area | IDA | 50.15 |
| Town of Perryville/ Susquehanna River Area | IDA | 61.04 |
| Cecil County | RCA | 61.40 |
| **Total 1,000 Foot Critical Area Located Within the Study Area** | | **207.78** |

The 100-foot Critical Area Buffer is located within the Corporate Limits of Havre de Grace and Perryville, as well as the RCA designated portions of the Critical Area located within Harford and Cecil Counties.

## COASTAL ZONE MANAGEMENT

The Maryland coastal zone is composed of the land, water and subaqueous land between the territorial limits of Maryland in the Chesapeake Bay, Atlantic Coastal Bays, and the Atlantic Ocean, as well as the towns, cities and counties that contain and help govern the thousands of miles of Maryland shoreline. The Maryland coastal zone extends from three miles out in the Atlantic Ocean to the inland boundaries of the 16 counties (including Harford and Cecil Counties) and Baltimore City that border the Atlantic Ocean, Chesapeake Bay, and the Potomac River. The entire study area is located within Maryland's Coastal Zone.

## UNIQUE AND SENSITIVE AREAS

Unique and Sensitive Areas describes all lands of unique natural resource value, including protected lands (Natural Heritage Areas, Forest Conservation Easements, Federal Lands) and waters (Scenic Rivers), and lands providing ecosystem connectivity (Green Infrastructure).

### *NATURAL HERITAGE AREAS*

According to COMAR 08.03.08, there are no NHAs within or near the study area.

*GREEN INFRASTRUCTURE*

Green infrastructure is the strategically planned and managed networks of natural lands, working landscapes, and other open spaces that conserve ecosystem functions and provide associated benefits to human populations. The DNR, using satellite imagery, road and stream locations, and biological data, has identified a green infrastructure network for the state of Maryland. The green infrastructure network is comprised of core areas, hubs, and corridors. Core areas are well-functioning natural ecosystems that provide high-quality habitat for native plants and animals. Hubs are slightly fragmented aggregations of core areas, plus contiguous natural cover. Hubs are intended to be large enough to support populations of native species, and serve as sources for emigration into the surrounding landscape, as well as providing other ecosystem services like clean water, flood control, carbon sequestration, and recreation opportunities. Corridors link core areas together, allowing wildlife movement and seed and pollen transfer between them, and thereby promoting genetic exchange.

Gaps are another component of the green infrastructure network. Gaps are areas within the Green Infrastructure that do not currently have natural vegetation, such as agricultural, barren, or lawn areas. Re-vegetation of these areas with natural land cover would strengthen the integrity of hubs and corridors, decrease negative edge effects, ease wildlife movement, and decrease opportunities for invasive plants.

Based on the DNR Green Infrastructure Atlas of Harford and Cecil Counties, a large continuous hub of green infrastructure is located near Gashey's Creek stream valley in Harford County and Principio Creek stream valley in Cecil County. These run north and south perpendicular to the study area.

*WILD AND SCENIC RIVERS*

There are no state wild and scenic rivers or their tributaries located within the study area. In addition, there are no nationally listed wild or scenic rivers located within the study area.

*FOREST CONSERVATION ACT EASEMENTS*

According to MERLIN, one forest conservation easement, Frenchman Land Company, occurs within the study area in Cecil County. The 0.86 acre easement lies along the north side of the existing railroad ROW just east of Firestone Road. The easement comprises a thin strip of deciduous forest that lies between the railroad ROW and a developed parcel.

*FEDERAL LANDS*

Federally designated National Wildlife Refuge lands occur on Garrett Island within the Susquehanna River just north of the study area. Garrett Island was established as a National Wildlife Refuge by legislation in 2005 (Lutz 2009). The approximately 198-acre island is the only rocky island in the Chesapeake Bay and forms a link between the Bay and the River. The island is part of the Chesapeake Marshlands National Wildlife Refuge complex under the jurisdiction of the Blackwater National Wildlife Refuge.

## D. NO ACTION ALTERNATIVE

The No Action Alternative assumes the Susquehanna River Rail Bridge remains in service as-is. The No Action Alternative is used as a baseline scenario against which potential project impacts

will be measured. No significant effects are anticipated from the No Action Alternative for any of the natural resources assessed for this EA. Changes to soils, river bathymetry, erosion and sedimentation may change due to siltation and other natural processes. Existing floodplains, wetlands/waters of the U.S., terrestrial resources, Chesapeake Bay Critical Area, Coastal Zone Management, and unique and sensitive areas are expected remain as described in Affected Environment above. Water quality and the condition of aquatic communities in the Chesapeake Bay watershed are expected to continue to gradually improve as a result of many ongoing large- and small-scale public and private initiatives to restore and protect the bay. Otherwise, aquatic resources within the study area would be expected to remain much the same as at present in the future without the Proposed Project. No significant in-water construction projects are currently planned or ongoing nearby. Hydrology and other abiotic conditions within the Susquehanna River would not change under the No Action Alternative, and the same assemblages of aquatic organisms would be expected to occur.

# E. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

## TOPOGRAPHY, GEOLOGY, AND SOILS

Minimal impacts and/or changes to topography and geology are anticipated in the study area, and the anticipated changes are similar for both Alternative 9A and Alternative 9B. Local topography would be altered by excavation and grading that would be required for bridge and rail approach construction. The majority of the slopes within the vicinity of the Build Alternatives are classified as 0 to 15 percent slopes. Highly erodible soils and/or steep slopes associated with the Sassafrass and Croom Soils in Cecil County or Elsinboro loam in Harford County would not be impacted by either of the Build Alternatives.

Both Build Alternatives would affect other soils through earthmoving and soil storage and through potential erosion and subsequent sedimentation during the construction phase. Removal of existing vegetation, primarily at the termini of both Alternative 9A and Alternative 9B, would result in increased exposure of soils to weather and runoff potential. Sites where surface water currently causes erosion, particularly along the Susquehanna River shorelines, would have a greater potential for erosion and sedimentation.

Both Alternatives 9A and Alternative 9B would affect Prime Farmland Soils and Soils of Statewide Importance (see **Table 11-5**). However, as previously noted, the majority of these soil types are located within the existing ROW, which means that they are not subject to FPPA since they are in an existing ROW purchased on or before August 4, 1984. For the Prime Farmland and/or Soils of Statewide Importance located outside of the ROW, Alternative 9A would affect 1.37 acres of Prime Farmland and 0.62 acre of Soils of Statewide Importance.

**Table 11-5**
**Effects to Prime Farmland Soils & Soils of Statewide Importance**

| | **Prime Farmland Soils (Acres)** | | **Soils of Statewide Importance (Acres)** | |
|---|---|---|---|---|
| | ***Alternative 9A*** | ***Alternative 9B*** | ***Alternative 9A*** | ***Alternative 9B*** |
| Harford County | 1.37 | 0.18 | 0.58 | 0 |
| Cecil County | 0 | 0 | 0.04 | 0.04 |
| ***Total*** | **1.37** | **0.18** | **0.62** | **0.04** |

However, on February 8, 2016, the NRCS, using the Farmland Conversion Impact Rating Form (NRCS-CPA-106) for corridor type projects pursuant to FPPA, determined that the Proposed Project is not subject to the provisions of the Policy Act and therefore exempt. No further coordination is required.

**FLOODPLAINS AND WETLANDS/WATERS OF THE U.S.**

*FLOODPLAINS*

Both Build Alternatives would occur within regulated floodplains. As noted, Harford County has a preliminary FEMA floodplain map that is proposed to replace the effective FEMA floodplain map. Portions of each Build Alternative occurring within the Harford County effective and preliminary 100-year and 500-year floodplains, as well as potential permanent impacts to the Cecil County effective 100- and 500-year floodplains, are included in **Table 11-6**. These values represent project footprint encroachments within the floodplain only and do not reflect actual fill volumes. Alternative 9A would have slightly higher permanent floodplain impacts than Alternative 9B, as result of its broader footprint at the Lily Run crossing. The majority of floodplain encroachments would be from transverse crossings for each of the alternatives (encroachment that crosses the valley width of floodplains).

**Table 11-6**
**Potential Effects on Natural Resources from the Susquehanna River Rail Bridge Project**

| Alignment Alternatives | | | |
|---|---|---|---|
| **Resource Type** | **Resource Category** | **Alternative 9A** | **Alternative 9B** |
| Effective FEMA Floodplain (acres) | 100-Year | 2.72 | 2.15 |
| | 500-Year | 4.83 | 4.24 |
| Preliminary FEMA Floodplain* (acres) | 100-Year | 3.09 | 2.63 |
| | 500-Year | 3.16 | 2.69 |
| Wetlands (acres) | Tidal | 0.06 | 0.06 |
| | Nontidal | 0.83 | 0.71 |
| Streams (linear feet) | Relatively Permanent Waterways | 3,190 | 2,943 |
| | Ephemeral | 19 | 19 |
| Wetland Buffers (acres) | Tidal | 0.27 | 0.27 |
| | Nontidal | 2.16 | 1.72 |
| Forest Resources (acres) | ---- | 2.92 | 2.08 |
| Chesapeake Bay Critical Area (acres) | ---- | 6.4 | 6.1 |
| Susquehanna Riverbed / Aquatic Biota (acres) | Permanent Impacts | 0.37 | 0.37 |
| | Construction (Temporary Impacts, including finger piers) | 0.23 | 0.23 |
| Submerged Aquatic Vegetation – SAV (acres) | Permanent Impacts | 0.61 | 0.61 |
| **Note:** * *Preliminary floodplain available for Harford County only* | | | |

Based on the current design of the two Build Alternatives and current guidelines, an increase in the base flood elevation (greater than one foot) in the two regulated floodways is not anticipated. However, the Proposed Project will require fill in both of these floodways. The new crossings of

the Susquehanna River will occur with the bridge piers aligned with the river to minimize any change in the flow characteristics. More detailed hydrologic and hydraulic studies will be undertaken later in design, allowing for more precise floodplain impacts and scour analyses at that time. In addition, as the Proposed Project moves into the design phase, regulatory guidance issued regarding Executive Order 13690 and/or revisions to Executive Order 11988 will be reviewed and incorporated into the overall design of the Proposed Project (e.g., design standards and specifications for culvert design and bridge and approach heights), as applicable.

*WETLANDS/WATERS OF THE U.S.*

The two Build Alternatives will have relatively minor effects on wetlands and somewhat greater effects on streams. Overall, the proposed new alignments will occur within and immediately adjacent to the existing rail alignment where wetlands and streams that are potentially affected by the Proposed Project have been historically altered to a considerable degree for the construction and maintenance of the existing rail alignment. Potential effects to tidal and nontidal wetland buffers take into consideration the existing land use within the buffers. For example, areas of existing impervious surfaces, such as pavement or buildings, were not included in the buffer impact totals. Permanent impacts to wetlands, wetland buffers, and streams for each of the Build Alternatives are summarized in **Table 11-6**. Wetland impacts by system and cover type are shown in more detail in **Appendix E**, **Table E-5**).

Alternative 9A would result in permanent direct impacts to tidal and nontidal wetland resources along the Amtrak ROW. Permanent nontidal wetland impacts in Cecil County would occur within a wetland that lies between the existing railroad tracks and the access road to the Perryville Maintenance Facility, just east of the Perryville Station. The only tidal wetland in the study area would also be slightly affected by the construction of the west bridge over the Susquehanna River. In Harford County, permanent nontidal wetland impacts would occur on the north side of the ROW east and west of Lewis Lane, and on the south side of the ROW east of Lewis Lane.

Alternative 9A would also cross four perennial nontidal streams and three intermittent nontidal streams, resulting in minor permanent impacts to these waterways. The total permanent stream impact includes 251 linear feet of impact to replace existing culverts and 2,939 linear feet of impact for new crossings. This also includes approximately 613 linear feet of intermittent stream that currently flows within a maintained ditch along the base of the existing track fill slope in an area where no track bed widening is being proposed. An additional 19 linear feet of ephemeral channel will also be affected on the Cecil County portion adjacent to the tidal wetland along the Susquehanna River. The crossing impacts to Lily Run and an unnamed tributary of Lily Run in Harford County and Mill Creek in Cecil County would result from the extension of culverts to accommodate the new tracks. For the Mill Creek crossing, the existing stone masonry arch culvert will be extended to the south by attaching a culvert extension. A similar culvert extension design is proposed for the south side of the existing stone masonry culvert of the Lily Run crossing. Smaller concrete culverts would need to be extended for the unnamed tributary to Lily Run. The intermittent stream that drains west along the existing tracks may be shifted slightly north to accommodate a shift in the track bed, if needed. The intermittent stream on the south side of the existing tracks that flows east from east of Lewis Lane would likely need to be placed in a culvert, as new ROW will be needed from Havre de Grace Middle School/High School to accommodate the track shift in that location, thus likely precluding a shift in the stream channel farther to the south.

Alternative 9B follows the same alignment as Alternative 9A in Cecil County, but has a slightly reduced footprint relative to Alternative 9A within Harford County, resulting from slightly lower design speeds. As a result, overall permanent wetland and stream impacts are slightly less for Alternative 9B. Permanent wetland buffer impacts are also slightly lower overall for Alternative 9B. Alternative 9B would cross the same streams that Alternative 9A crosses, but total permanent stream impacts would be slightly less, resulting from a narrower crossing of Lily Run and the unnamed tributary of Lily Run.

The girder approach/arch main span bridge design over the Susquehanna River would include 37 in-water piers, with a pier diameter of 5.67 feet for all piers except for the piers on either side of the navigation channel that will be 6.67 feet in diameter. Eight of the piers, five along the Cecil County shoreline and three along the Harford County shoreline, will be encased in permanent cofferdams. The remaining piers will be encased in permanent caissons. Permanent pier impacts to the riverbed of the Susquehanna River would be 0.37 acre for both alternatives (see **Table 11-6**). Potential impacts to SAV within the Susquehanna River are discussed in the "Aquatic Resources" section.

In addition to the permanent impacts discussed above, temporary wetland impacts could occur during construction. Temporary impacts could result from construction staging operations and access needs. However, these impacts would likely be minimal and such areas would be restored upon completion of construction. Any temporary stream crossings would also be removed. Construction of bridge piers for the crossing of the Susquehanna River would likely be conducted from barges in the river. Temporary finger piers are proposed on the Cecil County side of the river, both upstream and downstream of the bridge crossings, for material access by barge. These temporary piers would result in potential impacts to a tidal emergent wetland located just upstream of the existing bridge and to SAV located upstream and downstream of the proposed bridges (see discussion under "Aquatic Resources"). The temporary tidal wetland impact from the upstream finger pier would be approximately 1,743 square feet or 0.04 acre.

## TERRESTRIAL RESOURCES

### *FOREST RESOURCES*

The two Build Alternatives will have permanent impacts to forest resources, primarily to narrow forest strips immediately adjacent to the existing tracks. The largest, contiguous forest resources occur at the far western end of the project study area. The Build Alternatives both terminate over a mile east of this forested area, thereby avoiding any impact to these resources.

Alternative 9A would have the larger permanent forest impacts of the two Build Alternatives. Permanent impacts would occur to forested habitat between the existing tracks and the Havre de Grace Middle School/High School. This forest is relatively narrow and disturbed. Preliminary permanent forest impacts from Alternative 9A would total 2.92 acres (see **Table 11-6**). Alternative 9B would also result in permanent impacts to the same forested habitat adjacent to Havre de Grace Middle School/High School. However, the footprint for Alternative 9B is narrower than that of Alternative 9A, resulting in a potential permanent impact of approximately 2.08 acres.

Before a sediment and erosion control permit is issued for a project, the Maryland Forest Conservation Act requires that a Forest Stand Delineation (FSD) and a Forest Conservation Plan (FCP) be submitted and approved by the DNR, Forestry Division. A more detailed forest

assessment, including preparation of a FSD and FCP, would need to be completed for the Proposed Project during final design and permitting.

Construction related short-term impacts could result in additional tree clearing for staging and access for either alternative. Staging and construction access should be avoided on the north side of the ROW between North Juniata Street and Lewis Lane, where larger forest tracts occur along Lily Run and unnamed tributaries of Lily Run. In Cecil County, a large forest tract occurs south of the existing railroad tracks between a power substation and Firestone Road. Short-term impacts to this forest during construction are anticipated to be avoided, as an existing access road lies between the forest and the existing tracks, except for a short distance immediately east of the power substation.

*WILDLIFE*

Few wildlife impacts are anticipated from either of the two Build Alternatives, as both alternatives will be constructed immediately adjacent to and within the same alignment as the existing tracks. As noted in "Forest Resources," permanent impacts to forest will occur only adjacent to the Havre de Grace Middle School/High School. This forest is relatively thin and disturbed and likely only supports common resident species of wildlife, primarily birds and a few species of small mammals. However, mammals and birds would be displaced by the clearing of forest habitat. The habitat may also support a few common species of amphibians and reptiles that could also be minimally affected or displaced. During construction in this area, birds and mammals may be displaced by the clearing of trees and brush. Smaller amphibians and reptiles may be crushed by equipment during construction, while more motile species will be displaced.

*THREATENED, ENDANGERED, OR SPECIAL CONCERN TERRESTRIAL SPECIES*

In a letter dated January 15, 2016 (see **Appendix E**, Attachment E), USFWS indicated that because the permanent impacts to forests would be relatively small and the absence of documented NLEB within the area, the Proposed Project is "not likely to adversely affect" the species. The USFWS correspondence further indicated that for these reasons, there would be no time of year restrictions on forest clearing related to the NLEB. The letter also stated that other than transient species, no other federally proposed or listed threatened or endangered species are known to occur within the project area.

Neither of the Build Alternatives will affect areas known to support terrestrial state-listed threatened or endangered species or areas that are designated as a WSSC. The WSSC, and associated state listed species, lies over a mile west of the termination of Alternative 9A and Alternative 9B. Likewise, the state listed species found within the Furnace Bay wetlands lie over a mile and a half east of the termination of both alternatives. As very little natural habitat lies within the limits of disturbance for the two Build Alternatives, it is unlikely that state or federally listed terrestrial species would occur within the project area.

The Proposed Project will cross a known historic waterfowl staging area within the Susquehanna River along the Cecil County side. Waterfowl will not be permanently affected by either build alternative, but may be temporarily displaced from the active construction area.

No construction related short-term impacts to terrestrial federally or state-listed endangered or threatened species are anticipated. Temporary displacements of waterfowl within the Susquehanna River are likely during the construction phase of the Proposed Project.

## AQUATIC RESOURCES

### *HYDROLOGY*

During operation of the Proposed Project under Alternative 9A, the piers supporting the new west and east bridges would not be expected to significantly change river hydrology in the project site relative to the existing condition. For the girder approach/arch main span bridge design, there would be a net decrease of 4,074 square feet of structure volume below the water surface after removal of the existing bridge and the remnant piers. In addition, the majority of the west and east bridge piers would be aligned, or nearly aligned with each other and parallel with the direction of the river's incoming and outgoing tidal flow. Replacement of the existing bridge with the proposed west and east bridges would likely cause a small shift in the current spatial distribution of areas receiving scour and sediment deposition. In-water structures of the new bridges under Alternative 9B would be identical to those of Alternative 9A; any differences between the two alternatives in other ways would be inconsequential with regard to potential operational effects on hydrology.

### *GROUNDWATER*

The Proposed Project would be constructed mostly within, or immediately adjacent to, the existing ROW and would not introduce a new source of potential pollutants. In addition, treatment of surface water runoff from project construction and permanent stormwater best management practices (BMPs) will further reduce these negligible project-related impacts on groundwater.

### *WATER QUALITY*

Construction of Alternative 9A or Alternative 9B would require in-water work with the potential to resuspend bottom sediment, resulting in minimal, temporary, and localized effects on water quality of the Susquehanna River in the vicinity of the project site. These activities include construction of temporary finger piers, construction of west and east replacement bridge piers, and demolition of the existing bridge and remnant piers. Aside from minor potential changes in sedimentation and scouring, there would be no differences between the operation of the new bridges under Alternative 9A and the operation of the existing bridge that would have the potential to influence water quality. Operational differences between Alternative 9A and Alternative 9B would be inconsequential with regard to potential operational effects on water quality. Construction-phase staging areas and haul roads, if needed, could also disturb the ground, potentially causing erosion and sedimentation. However, with the minimization techniques discussed below, long-term and short-term construction-related impacts to water quality from the Proposed Project are expected to be minimal. Potential short-term and long-term impacts to water quality will be minimized through strict adherence to an effective Erosion and Sediment Control Plan and implementation of stormwater BMPs that meet the conditions of the Maryland Stormwater Act of 2007.

### *SEDIMENT QUALITY & CONTAMINANTS*

Sediment containment techniques, such as turbidity curtains and other approved BMPs, will be used during construction to minimize sediment releases from the Proposed Project. However, under Alternative 9A and Alternative 9B, some minor resuspension of sediment and changes in sedimentation properties within the Proposed Project area may occur. Sediment types within the

study area are primarily sand and gravely sand, which are not easily resuspended and would quickly settle. Construction of the proposed temporary finger piers would eliminate the need for dredging that would otherwise be required for construction barges to access the project site, and would thereby avoid the more substantial disturbance to river sediments that would be caused by dredging. Operational differences between Alternative 9B and Alternative 9A would be inconsequential with regard to potential operational effects on sediment quality and contaminants. Operational effects would be minor and temporary under both alternatives.

*AQUATIC BIOTA*

As discussed above in "Water Quality," under Alternative 9A and Alternative 9B, operation of the replacement bridges in place of the existing bridge would not have effects on water quality or other habitat characteristics that would alter the biological community present within the project area. Impacts to aquatic biota are anticipated to primarily be construction related. Minimal bottom disturbance and sediment resuspension may occur with the drilling of large-diameter piles for the replacement bridges and the driving of small-diameter piles for the temporary finger piers; however, these disturbances will be temporary and localized and are not expected to substantially affect aquatic biota.

Although the replacement bridges under Alternative 9A and Alternative 9B would result in a net increase of 21,095 square yards of shading**,** both bridges would have a large height to width ratio (0.8 [44 feet high by 52 feet wide at their widest point]) that would slightly exceed the level below which shading impacts to aquatic organisms (including SAV) are generally considered to occur (0.7; Struck et al. 2004). Shading from the relatively narrow temporary finger piers would also not have the potential to result in significant adverse effects to benthic organisms, but would result in permanent adverse effects to SAV (see below).

For both Alternative 9A and Alternative 9B, approximately 0.37 acre of the Susquehanna Riverbed would be permanently affected and 0.23 acre would be temporary affected from construction activities. Construction of the replacement bridges under Alternative 9A and Alternative 9B would result in the temporary loss of approximately 680 square feet of benthic habitat within the footprint of the piles supporting the temporary finger piers. The temporary loss of benthic habitat for temporary cofferdam construction for the bridge piers would total approximately 7,926 square feet (0.18 acre) for the girder approach/arch main span bridge design. Temporary impact to the riverbed for existing and remnant pier demolition using either blasting techniques (inside temporary sheet piles) or cutting using a wire saw would total approximately 1.4 acres. However, following demolition of the existing bridge and remnant piers this area of river bottom will return to benthic habitat, thereby more than offsetting losses from the construction of the replacement bridges. As such, construction of Alternative 9A and Alternative 9B would result in a potential net gain of populations of benthic organisms and their predators higher in the food web.

The low-speed vibratory drilling method that would be used to install the five- to six-foot diameter piles for the replacement bridge piers would not generate impulse noise underwater, and, therefore, would not have significant adverse noise impacts to fish. The smaller, 18 to 24 inch piles that would support the temporary finger piers would be installed by impact hammering, but would not be expected to cause physical impacts to fish because noise levels generated during the driving of small piles typically do not exceed 200 dB re 1 $\mu Pa_{peak}$ at a distance of 10 meters from the pile (Caltrans 2009). Following best practices for pile installation (NOAA 2008), noise from the driving of the finger pier piles would be minimized by first

allowing piles to sink into the sediment under their own weight before impact hammering the remainder of the pile. In addition, impact hammering would begin with a series of light taps of gradually increasing strength, which is an effective method to avoid sudden disturbances to fish and provide them with an opportunity to move away from the site of the activity (FHWA 2003). The most likely response of fish to the underwater sound produced during pile driving for the finger piers would be temporary avoidance of the area. Fish would also potentially avoid the area of activity during the drilling of the large-diameter piles for the replacement bridges piers. Should pile installation cause any fish to temporarily avoid the portion of the Susquehanna River in the vicinity of the activity, the extent of the area that would be affected at any one time would be negligible relative to the amount of suitable habitat that would remain available nearby, and no significant adverse effects to these individuals would be expected to occur.

As noted above, demolition of the existing bridge piers and remnant piers would be largely achieved through the use of mechanical means and methods (e.g., barge cranes, wire saws), which will have negligible impacts on aquatic biota. Blasting is not anticipated; however, removal of the existing and remnant bridge piers may require the use of blasting techniques as per the contractor's means and methods. Any blasting would be conducted in such a manner as to minimize adverse effects on fish.

*SAV*

SAV is regulated at the federal and state levels (see **Appendix E**, Section D). Alternative 9A and Alternative 9B would each have the same number of bridge piers within the Susquehanna River. Both alternatives include four bridge piers that would intercept SAV resources in slightly different amounts and locations. Permanent cofferdam bridge pier design is proposed immediately adjacent to the two shorelines. The permanent impacts to SAV for the girder approach / arch main span bridge design would total approximately 3,357 square feet (0.08 acre) under both Alternative 9A and Alternative 9B. Indirect SAV shading impacts of the new bridge are also possible; however, the new bridges will be slightly higher than the existing bridge, providing the potential for sufficient light to support SAV beneath the bridge.

Impacts to SAV may also occur during the construction of the bridges. Dredging is not currently proposed to provide access for bridge pier construction in this location. However, if dredging is required, this would uproot SAV species and temporarily displace sediments necessary for SAV growth. The suspended sediments could block sunlight necessary for SAV growth and cover SAV beds. To avoid the need for dredging, finger piers are proposed in shallow water to allow for deep water construction access. These finger piers would remain for at least three years during construction build-out of the two rail bridges. Because of the low profile of the finger piers and their long-term use during bridge construction, permanent impacts to SAV would be expected to occur from finger pier piles as well as shading effects of the finger pier footprint. Therefore, though the finger piers would ultimately be considered a temporary construction element, owing to the length of time the piers would be in place, they would likely result in permanent SAV impacts totaling approximately 0.48 acre. Other SAV impacts could occur from the installation of temporary cofferdams in shallow water. The impact to SAV from cofferdam installation during construction would be approximately 2,298 square feet (0.05 acre) for the girder approach / arch main span bridge design. These structures would be removed once piers are completed; however, the cofferdams will likely be in place for longer than six months, causing SAV impacts to be considered permanent rather than temporary. Additional disturbance of SAV by sediments from the installation of cofferdams could also affect SAV as described above for potential dredging operations.

For both Alternative 9A and Alternative 9B, the total permanent SAV impact from bridge construction would total approximately 0.61 acre, based on the permanent impacts to SAV for the girder approach / arch main span bridge design, finger piers, and cofferdam installation.

*THREATENED, ENDANGERED, OR SPECIAL CONCERN AQUATIC SPECIES/SECTION 7 CONSULTATION*

As discussed above, under "Aquatic Biota," operation of the replacement bridges under Alternative 9A and Alternative 9B would not be expected to result in significant changes to water quality or other aquatic habitat parameters that would affect aquatic organisms. As such, the Proposed Project would not have significant adverse impacts to any Atlantic sturgeon, shortnose sturgeon, sea turtles, freshwater mussels, logperch, or map turtles potentially occurring in the project area.

Construction of Alternative 9A or Alternative 9B is anticipated to have negligible direct or indirect effects on Atlantic and shortnose sturgeon potentially occurring in the Susquehanna River. By drilling rather than driving the large-diameter piles for the replacement bridges' piers, underwater noise levels would be minimal and well below both the physical and behavioral effect thresholds that have been established by the Fisheries Hydroacoustic Working Group and adopted by NMFS for evaluations of underwater noise impacts to sturgeon and other fish species. Impact pile driving for the finger piers would be attenuated by the use of wooden cushion blocks to levels where they are likely to be discountable according to the NMFS assessment protocol. Potential impacts of demolition activities to remove existing bridge piers would be minimized by implementing the protective measures discussed above. In particular, any blasting activities would be scheduled to occur within a work window that corresponds to the time period of the year when sturgeon are least likely to occur in the vicinity of the project area.

Construction of Alternative 9A or Alternative 9B would not have significant adverse impacts to sea turtles at the individual or population level. Kemp's ridley, green, and loggerhead sea turtles have the potential to occur within the project area, while the leatherback sea turtle is a more pelagic species that is not expected to occur within the Susquehanna River. By drilling rather than driving large-diameter piles for the replacement bridges' piers, and by driving only small-diameter piles to support the finger piers, underwater noise levels during construction of Alternative 9A or Alternative 9B would not be expected to have harmful effects on any sea turtles potentially occurring nearby. As described for sturgeon, the potential impacts of demolition activities required to remove existing bridge piers would be minimized by implementing the protective measures discussed above and any blasting activities would be scheduled to occur within a work window corresponding to the period of the year when sea turtles are least likely to occur in the vicinity of the project area. The work barges, delivery barges, and crew vessels for this project are expected to have drafts of less than 6 to 8 feet in most cases and, therefore, provide vessel clearance above the river bottom of at least 12 feet. Because both Atlantic and shortnose sturgeons are demersal (bottom-dwelling) species and spend the majority of the time within a few feet of the bottom while foraging, the risk of vessel interaction with sturgeon is small.

As there is a potential for freshwater mussel species to be found within the study area, further coordination will be necessary on the potential mussel presence and BMPs for their protection. This will include using construction and demolition methods to reduce impacts to freshwater mussel species.

The logperch is a freshwater fish that occurs within the non-tidal portion of the Susquehanna River, above the Conowingo Dam. Logperch would not be expected to occur within the project area, where conditions are brackish during flood tides. In addition, construction of Alternative 9A or Alternative 9B would not have significant adverse effects on water quality or other habitat conditions for fish, and drilling of the large-diameter piles would avoid potentially harmful underwater construction noise levels. Protective measures would be identified in coordination with the U.S. Fish and Wildlife Service and implemented during any blasting activities to minimize the potential impacts to logperch, should they occur. As such, construction of Alternative 9A or Alternative 9B and demolition of the existing bridge and remnant bridge piers would not have the potential to cause adverse impacts to the logperch.

DNR-WHS may require restrictions on construction projects in order to protect map turtles, including, but not limited to; conducting nesting surveys during the nesting season to identify the presence/absence of nests within the project area, in-stream time-of-year restrictions, and/or removal of turtles from the work zone using trained scuba divers. Map turtles are known to occur within the project area and could potentially be affected by construction and demolition. Further coordination with DNR-WHS will occur as the Proposed Project progresses, and the above-referenced avoidance and minimization measures will be implemented as appropriate.

### CHESAPEAKE BAY CRITICAL AREA

Permanent impacts to the Critical Area resulting from the Proposed Project are expected to result from earth disturbance, removal of vegetation, placement of fill, and increased impervious area. The anticipated Critical Area impacts resulting from Alternative 9A are 6.4 acres and for Alternative 9B are 6.1 acres. All impacts to Critical Area are limited to the Corporate Limits of Havre de Grace and Perryville; no impacts to RCA designated Critical Area are anticipated.

The CAC for the Chesapeake and Atlantic Coastal Bays was contacted about the Proposed Project. In a response letter, the CAC requested continued coordination as the Proposed Project becomes more defined to determine whether a full CAC review is required. Copies of all agency correspondence can be found in **Appendix E**, Attachment E. Coordination with the CAC will continue during the design phase of the Proposed Project to ensure compliance with all Critical Area criteria, mitigation requirements, and regulations.

### COASTAL ZONE MANAGEMENT

Because the Proposed Project is subject to the provisions of Section 307 of CZMA, the Coastal Zone consistency decision is coordinated through the Coastal Zone Consistency Division of the MDE. Applicants for federal licenses/permits (including U.S. Army Corps of Engineers' Section 10 and Section 404 activities) must certify that their proposed action will be conducted in a manner consistent with Maryland's CZMP. MDE is responsible for coordinating the review with appropriate state agencies, consolidating the state's comments, and forwarding the state's response and decision to the USACE. Examples of state approvals and other state agency actions related to the federal consistency decision and the overall review process are provided in **Appendix E**, Attachment B.

Pursuant to Section 307 of the CZMA, Coastal Zone consistency review will commence after the submittal of the MDE Joint Permit Application (JPA). The MDE permit authorization, received at subsequent phases of the Proposed Project, will constitute the federal consistency decision.

### UNIQUE AND SENSITIVE AREAS

As there are no NHAs or Wild and Scenic Rivers within the study area, no impacts are anticipated. Although Green Infrastructure hubs and corridors occur within the study area, neither Alternative 9A or Alternative 9B will affect Green Infrastructure resources. One forest conservation easement occurs within the limits of the study area, but lies outside the limits of disturbance for either Alternative 9A or Alternative 9B. No impacts to the conservation easement are anticipated. The federally protected Garrett Island lies outside the study area limits to the north, and will not be impacted by the Proposed Project.

## F. MINIMIZATION AND MITIGATION OF IMPACTS

### TOPOGRAPHY, GEOLOGY, AND SOILS

For both Alternative 9A and Alternative 9B, several methods could be implemented to decrease erosion effects, including structural, vegetative and operational methods during construction. These control measures may include:

- Seeding, sodding, and stabilizing slopes as soon as possible to minimize the exposed area during construction,
- Stabilizing ditches at the tops of cuts and at the bottoms of fill slopes before excavation and formation of embankments,
- Using sediment traps, silt fences, slope drains, water holding areas, and other control measures, and
- Using diversion dikes, mulches, netting, energy dissipaters, and other physical erosion controls on slopes where vegetation cannot be supported.

A grading plan and erosion and sediment (E&S) control plan will be prepared and implemented in accordance with MDE regulations. The grading and E&S control plans will minimize the potential for impacts to water quality from erosion and sedimentation that would occur before, during, and after construction. Furthermore, temporary and permanent controls will be reviewed and approved by MDE prior to initiation of construction. Additionally, the Proposed Project must obtain a Notice of Intent under the 2014 National Pollution Discharge Elimination System (NPDES) General Permit for Stormwater Associated with Construction Activity designed to control pollution runoff, including sediment, during construction.

### FLOODPLAINS AND WETLANDS/WATERS OF THE U.S.

*FLOODPLAINS*

Efforts to minimize permanent impacts to 100- and 500-year floodplains are ongoing, and will continue throughout the project planning and design process. Longitudinal crossings have been avoided where possible to reduce the potential for greater floodplain fill and resulting reductions in flood conveyance and floodplain storage. Any construction within the 100-year floodplain would require a Waterway Construction Permit from MDE. To ensure that floodwater impacts resulting from rail construction are minimized, drainage structures are required to maintain the current flow regime and prevent associated flooding. This is being investigated for the proposed Lily Run crossing where a new bottomless culvert may be installed to increase the hydraulic capacity, resulting in desirable flood relief for the area of Havre de Grace upstream of the rail

project. Other minimization and mitigation efforts that may be investigated in later planning and design phases for impacted 100- and 500-year floodplains could also include:

- Bridge spans over the 100- and 500-year floodplain,
- Reducing encroachments by using 2:1 minimum slopes for rail berms, and
- Building retaining walls where practicable.

As part of the MDE Waterways Construction Permit application process, hydrologic and hydraulic studies will be performed for the selected alternative to determine the effects of the proposed track bed fill on floodplain elevations during the design and permitting phase.

*WETLANDS/WATERS OF THE U.S.*

Unavoidable impacts to wetlands and other waters of the U.S. will require federal and state permit authorizations. These permits and associated agencies include:

- Section 404 Individual Permit from the USACE for the discharge of dredged or fill materials into waters of the U.S. (greater than 2,000 linear feet), including wetlands (greater than 1 acre)
- Section 10 permit from the USACE for construction of bridge structures over the navigable waters of the Susquehanna River
- Section 9 (Rivers and Harbors Act) permit from the U.S. Coast Guard (USCG) for construction of a new bridge over a navigable waterway
- Section 401 Water Quality Certification from MDE in conjunction with the Section 404 permit
- Nontidal Wetland and Waterways permit from MDE for impacts to nontidal wetlands and streams, including a 25-foot buffer surrounding the wetland
- Waterway Construction Permit from MDE for work in streams and floodplains
- Tidal Wetland License issued by the Board of Public Works for impacts to tidal wetlands and waters associated with the Susquehanna River

The two Build Alternatives would have direct permanent impacts to both nontidal and tidal wetland resources and their corresponding buffers (see **Table 11-3**). Both alternatives would also have permanent impacts to streams from culvert extensions, possible relocations, and piping, and would have permanent impacts to the riverbed of the Susquehanna River from bridge pier installation. Impacts to Waters of the U.S., including wetlands, from the Build Alternatives would total less than an acre of wetlands and more than 3,000 linear feet of streams. After all practicable measures have been taken to avoid and minimize impacts to aquatic resources, unavoidable impacts will require mitigation in the form of creation, enhancement, or preservation to replace the loss of wetland, stream, and/or other aquatic resource (e.g., SAV) functions.

The two Build Alternatives retained for detailed study were selected in part because of their reduced impacts to wetlands/waterways and other natural resources. These alternatives lie closer to the existing track ROW than other alternatives studied, and generally involve replacement of the existing track with the new eastbound and westbound tracks. The Project Team has incorporated avoidance and minimization measures with respect to wetland impacts, in part by optimizing the use of the existing rail ROW. The Project Team will continue to explore minimization measures during final design. Construction of the culvert extensions, or

replacements as needed, will include the minimum extent necessary to provide support for the additional rail tracks. Also, these necessary extensions or replacements will use bottomless culverts to provide for a more natural stream bed through the culvert.

Compensatory mitigation must be evaluated in accordance with state and federal regulations and guidance. Compensatory mitigation focuses on the replacement of the functions provided by an aquatic resource or wetland, in addition to the acreage affected. Traditionally, mitigation requirements under Section 404 and COMAR are determined by the ratio of wetland acres replaced to wetland acres lost, based on the following ratios:

- Nontidal emergent wetlands are often mitigated on a 1:1 replacement ratio;
- Nontidal forested and scrub-shrub wetlands are mitigated on a 2:1 ratio;
- Tidal emergent wetlands are replaced at a 2:1 ratio; and
- Tidal forested and scrub-shrub wetlands are mitigated on a 2:1 ratio.

**Table 11-7** summarizes the wetland and stream impacts and potential required mitigation for each of the two Build Alternatives.

Few on-site mitigation options are likely available to compensate for unavoidable nontidal wetland impacts given the linear nature of the Amtrak ROW. Even so, opportunities will be investigated during project design. If Alternative 9A is selected, wetland creation may also be possible within the expanded ROW adjacent to Havre de Grace Middle School. For the tidal wetland impacts along the Cecil County shoreline, mitigation could occur in the form of control of existing, invasive common reed and establishment of native, tidal wetland species. The area of degraded tidal wetland is approximately two acres, more than sufficient size to accommodate the higher enhancement ratio of at least 4:1. Other potential onsite mitigation options will also be investigated as the Proposed Project advances through later design phases. If further on-site mitigation is not an option, compensation could be sought through the purchase of credits at an approved mitigation bank or through permittee sponsored mitigation at an approved offsite location.

**Table 11-7**
**Wetland and Stream Impacts and Estimated Minimum Required Mitigation**

| Resource | Alternative 9A | | | Alternative 9B | | |
|---|---|---|---|---|---|---|
| | Impact (Ac/Lf) | Replacement Ratio | Mitigation (Ac/Lf) | Impact (Ac/Lf) | Replacement Ratio | Mitigation (Ac/Lf) |
| Nontidal Forest (ac) | 0.25 | 2:1 | 0.5 | 0.17 | 2:1 | 0.34 |
| Nontidal Emergent (ac) | 0.58 | 1:1 | 0.58 | 0.54 | 1:1 | 0.54 |
| Tidal Forest (ac) | 0.05 | 2:1 | 0.1 | 0.05 | 2:1 | 0.1 |
| Tidal Emergent (ac) | 0.01 | 2:1 | 0.02 | 0.01 | 2:1 | 0.02 |
| Intermittent and Perennial Streams (lf) | 3,190 | 1:1 | 3,190 | 2,943 | 1:1 | 2,943 |

The agencies also typically require compensatory stream mitigation projects to replace stream functions when feasible. In addition to stream channel improvements, mitigation measures for waterway impacts consider the size, stream order, and location of the stream to determine appropriate stream mitigation. Other mitigation measures, such as removal of fish blockages,

riparian buffer enhancements, in-stream habitat improvements, and water quality improvements, may also be used at the agencies' discretion.

Based on the currently identified permanent stream impacts, the Proposed Project would be expected to provide stream restoration totaling at least 3,190 linear feet for Alternative 9A and 2,943 linear feet for Alternative 9B (see **Table 11-7**). However, of these stream impacts, over 2,500 linear feet of impact is to previously disturbed headwater streams running parallel to the existing track that had been relocated during construction of the original rail track. These stream reaches are currently linear ditches with mostly rock ballast or sand substrates and little habitat structure. To mitigate for these permanent stream impacts resulting from track widening, the reaches would be relocated to the new track toe of slope. As part of this relocation, opportunities for in-stream habitat and water quality improvements will be investigated. Further mitigation options will be determined as the Proposed Project moves forward in design.

To address the potential need for off-site mitigation, a preliminary desk-top level mitigation site search was conducted within the Lower Susquehanna River and Swan Creek watersheds, as project impacts will occur within those two watersheds. All nontidal wetland impacts will occur within the Lower Susquehanna River watershed so the site search for nontidal wetlands was conducted only within that watershed. Site search criteria included non-forested sites located within topographic depressions or floodplains with areas of mapped hydric soils providing at least an acre of created wetland. The site search also targeted potential tidal wetland creation or restoration sites and hardened shoreline areas where more natural shoreline protection measures might allow for creation or enhancement of aquatic habitat. For stream mitigation, riparian areas within the Lower Susquehanna River and Swan Creek watersheds were investigated for their restoration potential, including stream channel stabilization, fish blockage removal, in-stream habitat improvements, riparian buffer enhancements, and water quality improvements. After potential wetland and stream mitigation sites were selected during the desk-top level site search, a windshield survey of publicly accessible sites was conducted to confirm landscape position and land use within the potential site.

Based on the windshield surveys, a total of eight potential nontidal wetland creation sites were carried forward. For potential stream restoration sites, one site was extended and the overall number of potential stream sites to carry forward was reduced to 17. Sites were eliminated for various reasons, including changed site conditions, steep topography, presence of utilities, etc. Additionally, an offsite potential tidal wetland enhancement area was identified along the Susquehanna River in Harford County. During the subsequent final design and permitting phase, these potential sites will be explored in more detail, and property access notification letters will be sent seeking permission to conduct more detailed on-site investigations. More detailed information on the site search process and full mitigation site descriptions are located in **Appendix E**, Attachment D.

Any mitigation measures employed due to unavoidable project impacts to waters of the U.S., including wetlands, will follow the Federal Compensatory Mitigation Rule (33 Code of Federal Regulations [CFR] Parts 325 and 40 CFR Part 230), and Maryland state compensatory mitigation guidelines, as well as other practicable recommendations from federal and state resource agencies. Mitigation options under both the Federal Rule and state mitigation guidelines could include mitigation banking credits, in-lieu fees, or permittee-responsible mitigation using a watershed approach in that order of preference.

## FOREST RESOURCES

Avoidance of a larger forest tract at the western end of the study area was accomplished by reducing the scope of the Proposed Project to tie back into the existing tracks prior the start of the large forest tract. Incorporation of tree protection measures during the development of the FCP will be coordinated, reviewed, and approved by DNR.

Where unavoidable permanent forest impacts occur, Amtrak will offset those impacts by planting trees in cleared areas (reforestation) and/or in areas not previously forested (afforestation). During the final design and permitting stage, Amtrak will develop and implement a DNR-approved FCP that prescribes the reforestation and afforestation acreage, mitigation site selection process, planting requirements and specifications, and monitoring plan.

Goals of the FCP are to: protect all priority forests, specimen trees, and sensitive areas on-site where possible; minimize impacts to other on-site vegetated areas to the greatest extent practicable; and define mitigation areas for unavoidable impacts to forest resources and specimen trees. Priority forests are those that include wetlands, streams, 100-year floodplains, endangered species, and specimen trees.

Forest mitigation must comply with Forest Conservation Act requirements for linear transportation projects. Based on afforestation and reforestation rules under this law, preliminary calculations of required mitigation for effects including forested and non-forested areas would total approximately 5.0 acres of tree planting for Alternative 9A and 3.4 acres of tree planting for Alternative 9B. This meets the requirements of the *State Forest Conservation Technical Manual* as defined in the Forests Section, Section III.

## AQUATIC RESOURCES

The Project Team minimized aquatic impacts through refined engineering design and reducing the number of in-water piers required for the proposed bridges. Further minimization of aquatic impacts is mandated by MDE sediment and erosion control regulations in the form of time of year in-stream work restrictions for the protection of fish spawning or migration. These stream closure periods prohibit in-stream work from March 1 through June 15 for Use I streams and from June 1 through September 30 and December 16 through March 14 for Use II streams.

Sediment containment techniques, such as turbidity curtains and other approved best practices, will be used during construction to minimize sediment releases that could harm SAV. In addition, MDE sediment and erosion control regulations require time of year work restrictions within designated SAV beds. The closure period for work within designated SAV areas is from April 1 through October 15.

Mitigation for unavoidable permanent impacts to SAV will follow the Federal Compensatory Mitigation Rule (33 CFR Parts 325 and 40 CFR Part 230), and other state compensatory mitigation guidelines, as well as other recommendations from federal and state resource agencies. The typical in-kind compensation ratio for SAV impacts is 3:1. For the estimated permanent impacts to SAV from the two selected alternatives, replacement of at least 1.83 acres would be required. Mitigation options under both the Federal Rule and state mitigation guidelines could include mitigation banking credits, in-lieu fees, or permittee-responsible mitigation using a watershed approach in that order of preference. A preliminary site search was conducted to identify potential mitigation sites to offset wetland, stream, and SAV. Details of the mitigation site search are included in **Appendix E**, Attachment D. The NMFS has indicated that mitigation of SAV impacts should include replanting the beds disturbed during construction

following project completion. This will be investigated along with other out-of-kind mitigation alternatives as the Proposed Project advances to later design phases. The final decision to replace function, acreage, or both may be adjusted at the discretion of the USACE or MDE, depending on the practicability of the proposed mitigation.

### CHESAPEAKE BAY CRITICAL AREA

Minimization efforts to avoid the Critical Area were incorporated as part of the early design for the Proposed Project. Also, whenever possible, the Critical Area has been further avoided by the proposed Alternatives. Further minimization and mitigation measures for unavoidable impacts to the Critical Area could include:

- Erosion and sediment control measures would be provided and strictly enforced to minimize impacts.
- Replacement lands of equal or greater natural resource and economic value.
- Additional appropriate mitigation measures, such as landscaping (where applicable with respect to the resource), would be developed through coordination with the appropriate parties.

Additional discussions are anticipated to occur regarding the Proposed Project's potential impacts to the Critical Area and mitigation measures that could lessen potential impacts.

### COASTAL ZONE MANAGEMENT

Although minimization/mitigation are not typically identified specifically for Coastal Zone Management, appropriate avoidance, minimization, and mitigation of impacts to wetlands, waterways, and floodplains will be addressed as part of the permit application/authorization process with MDE and the USACE, and will be considered the Coastal Zone Management consistency review.

### UNIQUE AND SENSITIVE AREAS

With no impacts anticipated to NHAs or Wild and Scenic Rivers, avoidance and minimization measures for these resources are not appropriate for the Proposed Project. Impacts to Green Infrastructure hubs have been minimized by placing the Proposed Project within and adjacent to the existing rail alignment. In addition, the proposed new alignments tie into the existing alignment as close to the river bridge as possible to avoid impacts to a large forested area that serves as a hub. Any reforestation requirements due to tree and forest loss could consider locations that would promote Green Infrastructure efforts, such as buffer enhancement, forest connectivity (FIDS habitat development), and reforestation near, or adjacent to, existing hubs and corridors.

## G. REFERENCES

See **Appendix E**. ✶