Susquehanna River Rail Bridge Project

Appendix E

Natural Environmental Technical Report (NETR)

March 2017

Maryland Department of Transportation
AMTRAK

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I. ENVIRONMENTAL OVERVIEW AND IMPACT ASSESSMENT

The following report has been developed to assess the potential effects on natural resources from the Susquehanna River Rail Bridge Project (Proposed Project). The Maryland Department of Transportation (MDOT), project sponsor, is proposing to improve the Susquehanna River Rail Bridge between the City of Havre de Grace, Harford County, Maryland and the Town of Perryville, Cecil County, Maryland in order to provide continued rail connectivity along the Northeast Corridor (NEC). The U.S. Secretary of Transportation selected the MDOT for an award of $22 million through a cooperative agreement between the Federal Railroad Administration (FRA) and MDOT for the preliminary engineering and National Environmental Policy Act of 1969 (NEPA) phases of the Proposed Project. The FRA is the lead federal agency and the National Railroad Passenger Corporation (Amtrak), as bridge owner and operator, is providing conceptual and preliminary engineering designs and is acting in coordination with MDOT and FRA.

The Susquehanna River Rail Bridge is located at Milepost 60 along the NEC. The Proposed Project would span approximately six miles, between the “Oak” Interlocking at Milepost 63.5 south of the City of Havre de Grace and the “Prince” Interlocking at Milepost 57.3 north of the Town of Perryville. The 110-year-old bridge is a critical link along one of the U.S. Department of Transportation’s (USDOT) designated high-speed rail corridors. The NEC is the busiest passenger rail line in the United States. The bridge is used by Amtrak, the Maryland Area Regional Commuter (MARC), and Norfolk Southern Railway (NS) to carry intercity, commuter, and freight trains across the Susquehanna River.

This document evaluates the potential effects on natural resources from Alternative 9A and Alternative 9B. Both Alternative 9A and Alternative 9B would construct:

- a new two-track bridge accommodating train speeds of up to 90 miles per hour (mph) to the west of the existing bridge, and
- a second new two-track bridge along the existing alignment.

The second new bridge would accommodate speeds of up to 160 mph for Alternative 9A and up to 150 mph for Alternative 9B. The bridge to the west of the existing bridge would be constructed first, including the river spans, approach structures, railroad systems, and embankment. The use of conventional ballasted track is anticipated for the fixed bridge portion of the Proposed Project. Under normal operations, this bridge would be used primarily by MARC commuter rail and NS freight rail service.

Once the new bridge to the west is completed, the existing bridge would be taken out of service, demolished, and replaced. A new high-speed passenger bridge would be built in the center of the right-of-way of the existing bridge alignment. This bridge would reduce the curve in Havre de Grace and allow for either 160 mph speeds for Alternative 9A or 150 mph speeds for Alternative 9B. Due to the flat curvature of Alternative 9A, it would require additional property acquisition outside of the current Amtrak-owned right-of-way (ROW). Since the west bridge will be built first, freight, MARC and Amtrak operations will be maintained throughout construction of both bridges. The south wye track (connecting the NS Port Road to the NEC in Perryville) would be realigned to accommodate the revised configuration of Perry Interlocking. It is assumed that a new undergrade bridge over Broad Street would be required to support the realignment of the south wye track. Although Alternative 9A and Alternative 9B are based on a four-track scenario, they could accommodate a three-track scenario with an option of a future fourth-track expansion.

Separate from alignment Alternative 9A and Alternative 9B, the Project Team evaluated four bridge type alternatives: girder approach / arch main span bridge design; delta frame approach / arch main span bridge design; truss approach / truss main span bridge design; and the girder approach / truss main span bridge design. Additional information regarding the evaluated bridge types can be found in ***Appendix A-2, Bridge Design Selection.*** All impact analyses and assessments included in this document are based on the girder approach / arch main span bridge design.

A. TOPOGRAPHY, GEOLOGY, AND SOILS

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Maryland Department of Environment Erosion and Sediment Control Regulations (COMAR 26.17.02)
Maryland's Erosion Control Law and regulations specify the general provisions for program implementation; procedures for delegation of enforcement authority; requirements for erosion and sediment control ordinances; exemptions from plan approval requirements; requirements for training and certification programs; criteria for plan submittal, review, and approval; and procedures for inspection and enforcement. The Maryland Department of the Environment (MDE) has established minimum criteria for effective erosion and sediment control practices. The *2011 Standards and Specifications for Soil Erosion and Sediment Control* serve as the official guide for erosion and sediment control principles, methodology, and practices (MDE 2014).

Farmland Policy Protection Act (FPPA) of 1981
The Farmland Protection Policy Act (FPPA) of 1981, 7 U.S.C. 4201, was enacted to minimize the loss of prime farmland and unique farmlands from Federal actions that convert these lands to nonagricultural land uses. Actions that result in the conversion of prime or unique farmland not already committed to urban development or water storage are reviewed for compliance with the FPPA. Compliance is coordinated with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).

Methodology

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.

2. AFFECTED ENVIRONMENT

a. Topography

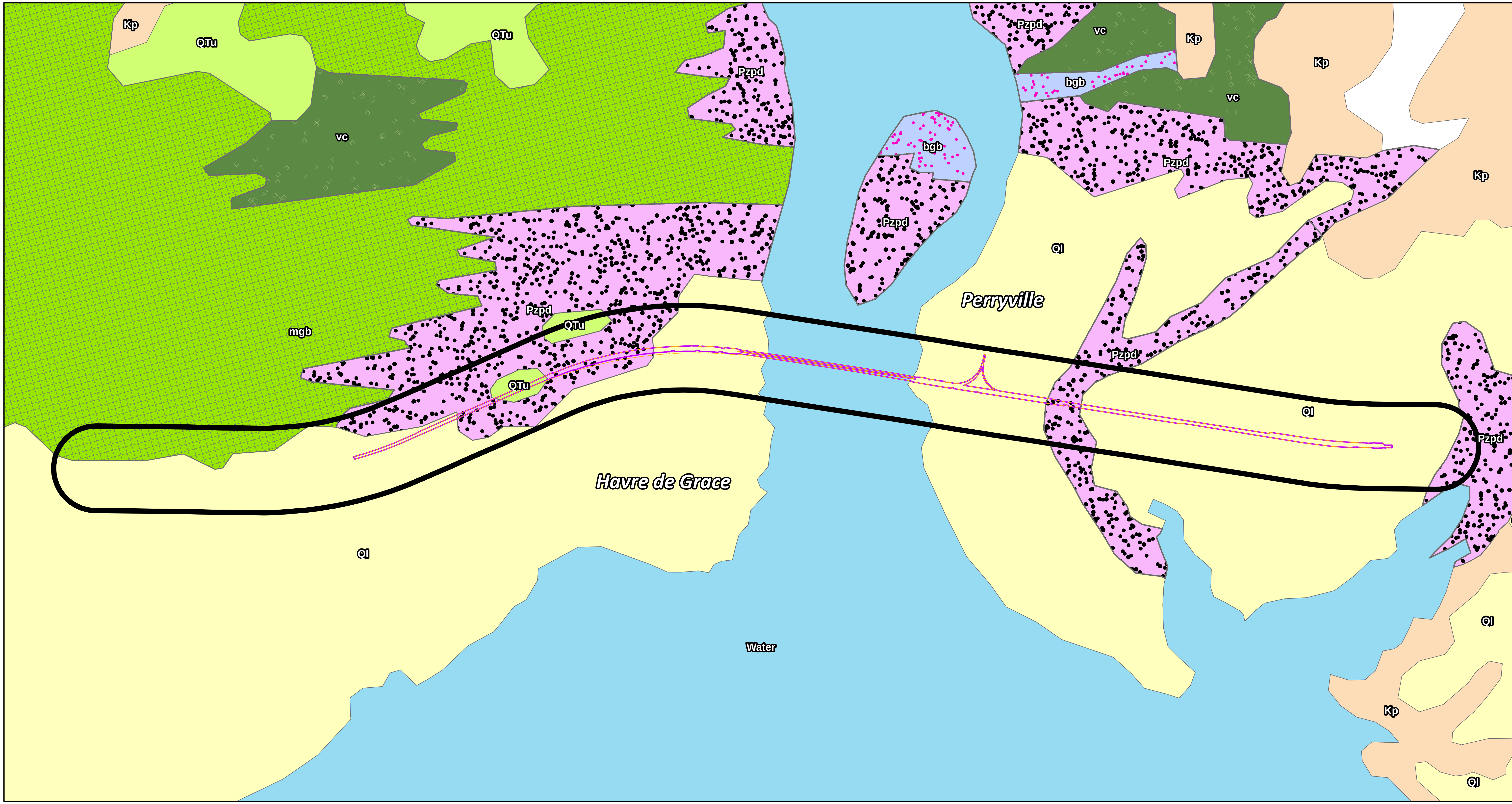
The topography at the study area ranges from less than 20 feet above sea level to over 100 feet. The topography in the Atlantic Coastal Plain physiographic province (south of the study area) is fairly flat. The topography in the Piedmont physiographic province is generally rolling hills, rising to over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

b. Geology

The Maryland Geologic Survey defines a physiographic province as a geographic area in which the geology (including lithology and structure) and climate history have resulted in landforms that are distinctly different from adjacent areas. Harford and Cecil Counties lie within the Fall Line separating two physiographic provinces, the Piedmont and the Atlantic Coastal Plain. 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. The study area is primarily located within the Atlantic Coastal Plain, with a small portion located within the Piedmont Province.

The study area contains two Quaternary-age deposits, the Coastal Plain deposits and upland deposits. The Coastal Plain deposits are fluvial and are characterized by thin (less than 98 feet thick) sequences of sand, gravel, and silty clay that overlies Piedmont bedrock or upper Coastal Plain marine deposits.

According to the Geological Survey of Maryland (1968), the majority of sediments associated with Coastal Plain deposits present in the study area are lowland (QI) composed of gravel, sand, silt, and clay (***Figure E-1***). Medium- to coarse-grained sand and gravel up to boulder size are common near the base of the deposits. The thickness ranges from 0 to 150 feet. These deposits have been classified by others as the Talbot and Kent Island Formations.



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Potomac Group (kp)
- Port Deposit Gneiss (Pzpd)
- Upland Deposits - Western Shore (QTu)
- Lowland Deposits (Ql)
- Water
- Baltimore Gabbro Complex (bgb)
- Metagabbro and Amphilobite (mgb)
- Volcanic Complex of Cecil County (vc)

Data Sources

Geology:
U.S. Geological Survey, 2005

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Figure E-1

Study Area Geology Map

The second Quaternary deposits are the Upland Deposits (Qtu). The Upland Deposits contain gravel and sand, which is commonly orange-brown and locally limonite-cemented. The Upland Deposits contain minor silt and red, white, or gray clay. There is a lower gravel member and an upper loam member with varying thickness of 0 to 50 feet.

There are four small portions of the study area that contain rocks from the Piedmont Province. Most of the bedrock deposits are composed of Port Deposit Gneiss (Pzpd). The Port Deposit Gneiss is a moderately to strongly deformed intrusive complex composed of gneissic biotite quartz diorite, hornblende-biotite quartz diorite, and biotite granodiorite. All these rocks are foliated and some are strongly sheared. There is one small area composed of metamorphosed gabbro and amphibolite deposits (mgb).There is a ready source of sand and gravel at the Havre de Grace Quarry (Vulcan Havre de Grace Quarry) located approximately 7,800 feet northwest of the bridge.

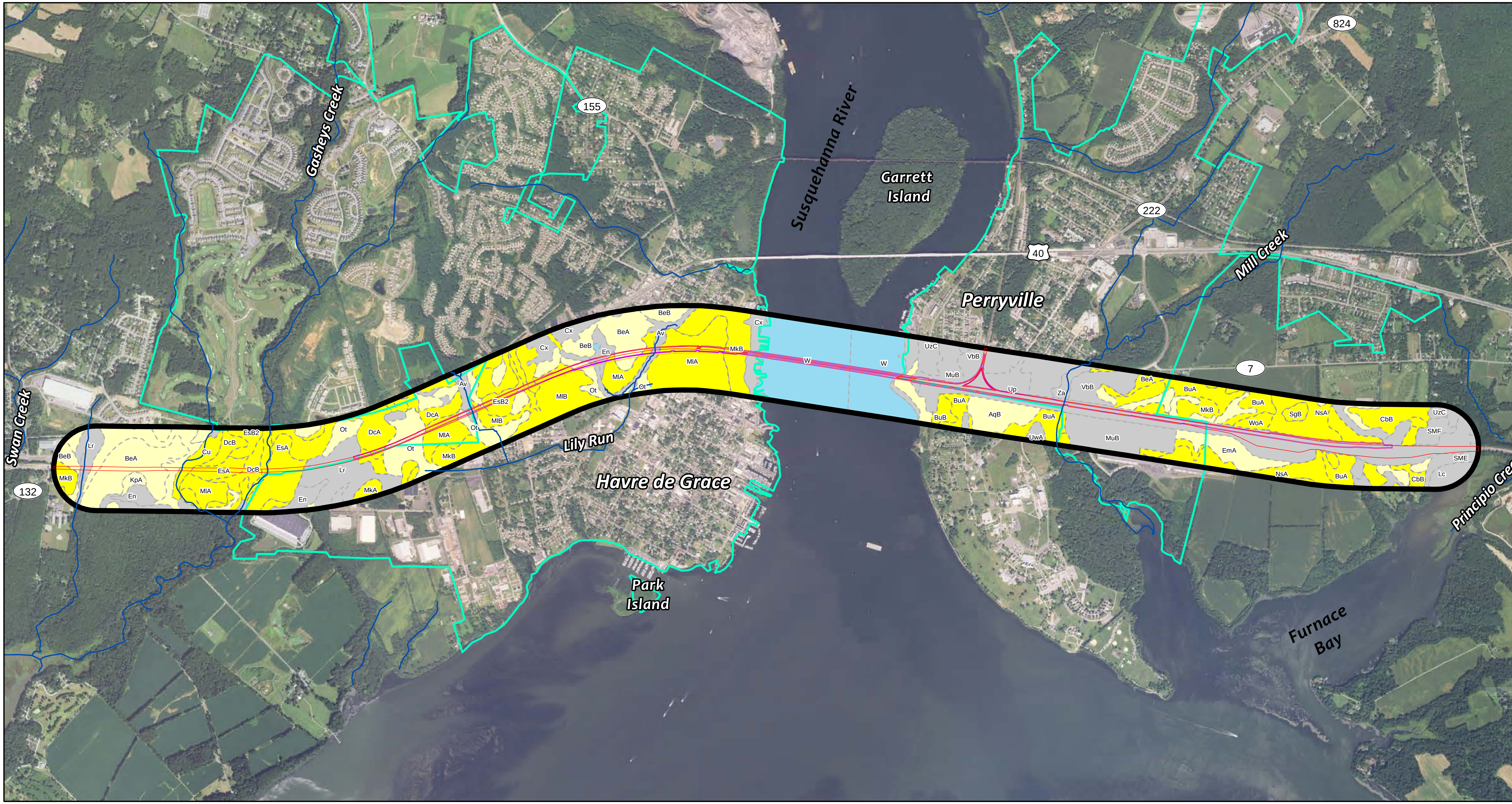
c. Soils

According to the USDA Web Soil Survey, there are 31 soil series and 47 mapping units within the study area. A table listing the characteristics of the most significant percentages of mapped soil types is shown below (***Table E-1***) and illustrated on ***Figure E-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). Hydric classification indicates if a soil type meets the hydric criteria which USDA defines as soil formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. This definition includes soils that developed under anaerobic conditions in the upper part but no longer experience these conditions due to hydrologic alteration such as those hydric soils that have been artificially drained or protected (e.g., ditches or levees). Two soil mapping units in the study area, Elsinboro loam and Matapeake silt loam, are considered not hydric; the majority of other soils units have some degree of hydric classification.

Table E-1
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



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- Disturbed Area
- 1,000 ft Study Area
- Municipal Boundary
- Prime Farmland Soils
- Soils of Statewide Importance
- Not prime farmland
- Water
- Streams

Data Sources

Soils:
NCRS Soil Survey, Harford County, 2010
NCRS Soil Survey, Cecil County, 2009

Imagery:
2015 National Agriculture
Imagery Program (NAIP)

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Figure E-2

Study Area Soils Map

The Erosion Class indicates the erodibility of a soil type. Only two soils that are classified as highly erodible are located within the study area: Sassafras and Croom soils (Cecil County) and Elsinboro loam (Harford County).

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.

d. Prime Farmland Soils/Soils of Statewide Importance

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 2010). 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*** 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.

3. NO ACTION ALTERNATIVE

No effects to topography or geology in the study area are anticipated with the No Action Alternative. Changes to soils, erosion and sedimentation may change due to siltation and other natural processes. The No Action Alternative is used as a baseline scenario against which potential impacts of the Proposed Project will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

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 impact 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 Alternative 9A and Alternative 9B would impact Prime Farmland Soils and Soils of Statewide Importance (***Table E-2***). However, as previously noted, the majority of these soil types are located within the existing ROW. Impacts to Prime Farmland Soils and Soils of Statewide Importance are not subject to FPPA coordination when the land is "is within or committed to urban development or water storage, or land that occurs in an existing ROW purchased on or before August 4, 1984." Therefore, impacts were quantified to soils outside of ROW and designated as Prime Farmland and/or Soils of Statewide Importance. Alternative 9A would have a larger impact to Prime Farmland (1.37 acres) and Soils of Statewide Importance (0.62 acre). Alternative 9B would impact a smaller amount of Prime Farmland and Soils of Statewide Importance (0.18 acre and 0.04 acre, respectively). However, on February 8, 2016, the NRCS determined that the Proposed Project is not subject to the provisions of the Policy Act and therefore exempt. No further coordination is required.

Please refer to ***Attachment A*** for the Farmland Conversion Impact Rating Form (NRCS-CPA-106) for corridor type projects submitted to NRCS, pursuant to FPPA.

Table E-2
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**

5. MINIMIZATION AND MITIGATION OF IMPACTS

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 (see Sections D and H). 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.

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

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Executive Order 11988

Several federal regulations govern the act of fill and construction in floodplains to ensure that proper consideration is given to the avoidance, minimization, and mitigation of adverse floodplain effects. These regulations include Executive Order 11988, U.S. Department of Transportation Order 5650.2, entitled the “Floodplain Management and Protection” and the National Flood Insurance Act of 1968. MDE is responsible for coordination of all state floodplain programs, and floodplains are also governed by local Flood Insurance Programs administered by localities and supervised by the Federal Emergency Management Agency (FEMA).

Executive Order 13690 on “Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input”

On January 30, 2015, Executive Order 13690 “Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input” was issued. The new Executive Order amends the existing Executive Order 11988 on Floodplain Management and adopts a higher flood standard for future federal investments in projects affecting floodplains, which will be required to meet the level of resilience established in the Federal Flood Risk

Management Standard. According to FEMA, the Standard establishes the flood level to which new and rebuilt federally funded structures or facilities must be resilient. Agencies will be given the flexibility to select one of three approaches for establishing the flood elevation and hazard area they use in siting, design, and construction:

- Utilizing best available, actionable data and methods that integrate current and future changes in flooding based on climate science;
- Two or three feet of elevation, depending on the criticality of the building, above the 100-year, or 1%-annual-chance, flood elevation; or
- 500-year, or 0.2%-annual-chance, flood elevation.

National Flood Insurance Program

All Maryland counties and 92 municipalities participate in the National Flood Insurance Program (NFIP). Local governments must adopt ordinances to manage development within 100-year floodplains to prevent increased flooding and minimize future flood damage. NFIP requires counties and towns to issue permits for all development in the 100-year floodplain. Development is broadly defined to include any man-made change to land, including grading, filling, dredging, extraction, storage, subdivision of land, and the construction or improvement of structures. If state and federal permits are required, development may not begin until all necessary permits are issued. Proposed development must not increase flooding or create a dangerous situation during flooding, especially on another person's property. If a structure is involved, it must be constructed to minimize damage during flooding.

Section 404 of the Clean Water Act and Maryland Wetlands Regulations

Section 404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers (USACE) to issue permits regulating the discharge of dredged or fill material into the Waters of the United States (WUS), including wetlands. Discharges require a permit from USACE based on regulatory guidelines developed in conjunction with the U.S. Environmental Protection Agency (USEPA), and will only be permitted if: the project avoided impacts to wetlands and waterways, where practicable; minimized potential impacts, and mitigated any remaining unavoidable impacts. Additionally, the state of Maryland regulates nontidal wetland resources via the Maryland Non-tidal Wetlands Protection Act and tidal wetlands via the Tidal Wetlands Act. Impacts to WUS, including wetlands, deemed unavoidable will also require nontidal wetland permits issued by MDE and a tidal wetland license issued by the Board of Public Works under these Acts.

Methodology

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 have been included in this technical report. 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). This approach requires interpretation of indicators representing wetland hydrology, vegetation, and soils. Soils were sampled using three-inch diameter Dutch augers, and Munsell Color charts were used to characterize soil color (Munsell 1975). Wetland Determination Data Forms (USACE 2010) were completed during the field work in order to describe wetland characteristics and provide a rationale for delineation of the wetland boundary. Copies of each of the field marked datasheets are included in ***Attachment C***. The wetland delineation was conducted within the existing Amtrak ROW and in areas except where the proposed alternatives extend beyond the existing ROW. All identified wetlands and waterways were flagged with pink wetland delineation tape and surveyed using a Trimble Global Positioning System (GPS). Stream resources within the 1,000-foot study area were identified using the National Hydrography Dataset (NHD) from USGS, Harford and Cecil County hydrology GIS layers, and FEMA FIRMs. Classification of these streams was based upon the 2014 inventory level field assessment and the 2015 wetland and waters delineation.

2. AFFECTED ENVIRONMENT

a. 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. According to the effective FEMA floodplain maps, approximately 320 acres of FEMA designated 100-year floodplains occur within the 1,560-acre study area. 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. According to the preliminary FEMA floodplain maps for Harford County, the 100-year floodplain area in Harford County would be reduced to 203 acres and the 500-year floodplain area reduced to 209 acres if this mapping is finalized in its current form.

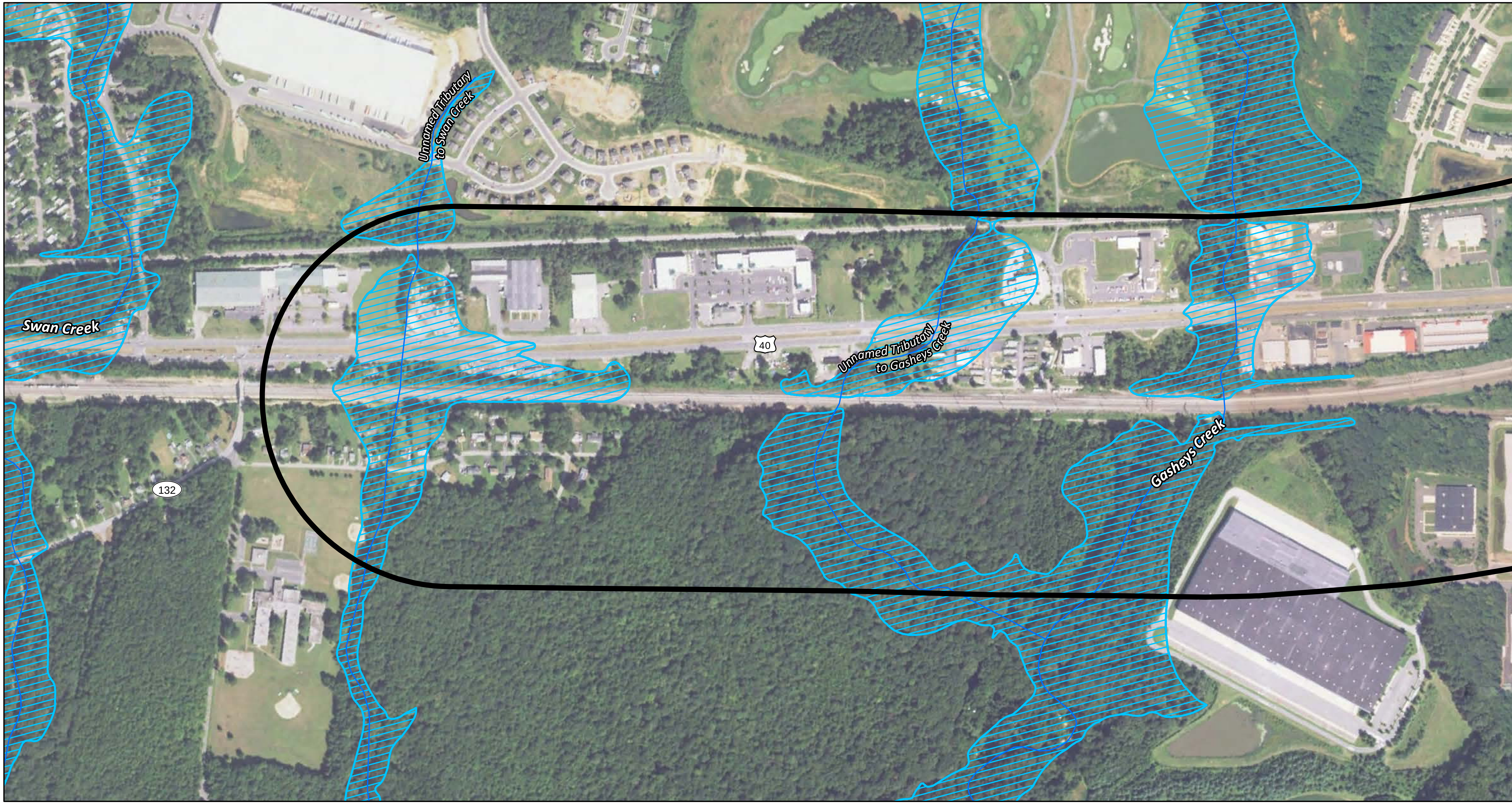
The preliminary FEMA floodplain mapping indicates that within the study area, two of these waterways, an unnamed tributary to Lily Run and Lily Run, also have a regulated floodway within the overall floodplain. A floodway is "the channel of a…watercourse and the adjacent land areas that must be reserved 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.

Floodplains along the Susquehanna River primarily consist of 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 FEMA, the majority of the study area is outside the 100- and 500-year floodplain. The 100- and 500-year FEMA designated floodplains located within the study area are illustrated on ***Figure E-3***.

b. Wetlands/Waters of the U.S.

Across the entire study area, 22 waters of the U.S., including wetlands, were identified. The majority of the identified systems included nontidal forested wetlands within the floodplain of lower and upper perennial streams that drain to the Chesapeake Bay, Susquehanna River, or Furnace Bay. These systems included a few emergent/open water wetland stormwater management (SWM) ponds or drainage swales and a forested wetland ditch along the Amtrak railroad tracks,



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- 100-Year Floodplain
- 500-Year Floodplain

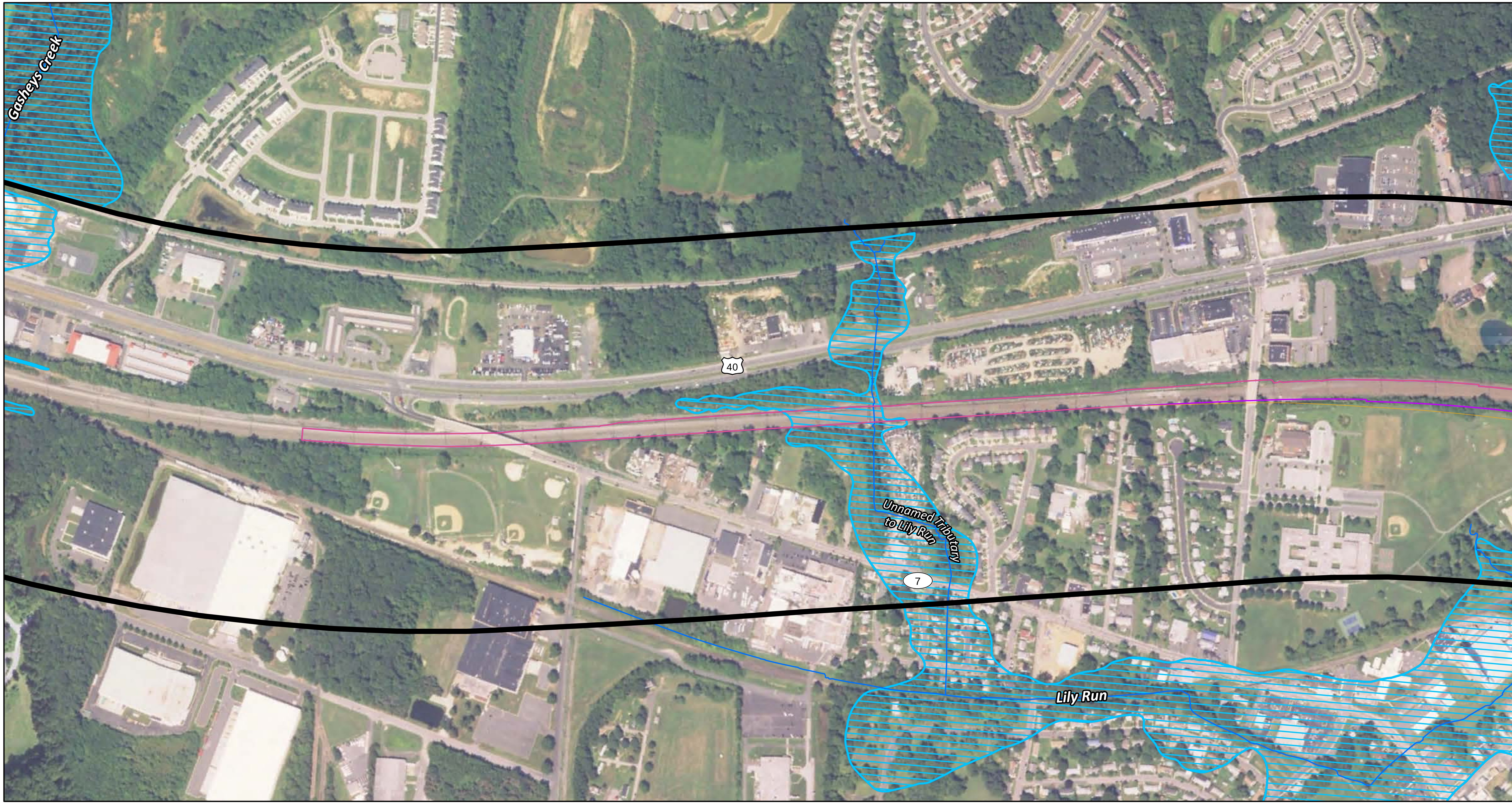
Data Sources

Streams:
MDE, 2012
100 and 500 Year Floodplain:
National Flood Hazard Layer, FEMA, 2013
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-3
Floodplain Mapping



Legend

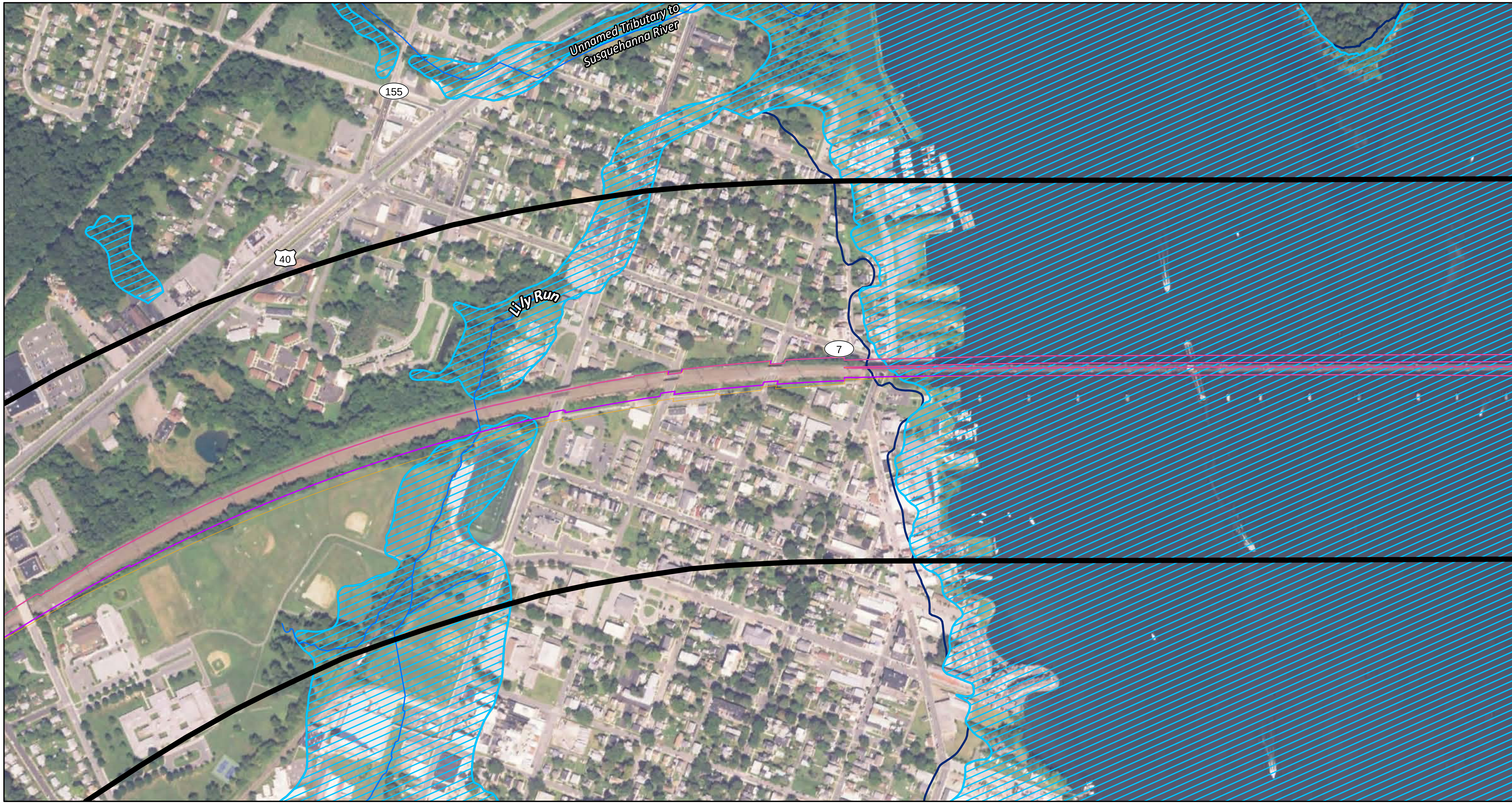
LOD 9A Calculation Area
LOD 9B Calculation Area
1,000 ft Study Area
Streams
100-Year Floodplain
500-Year Floodplain

Data Sources
Streams:
MDE, 2012
100 and 500 Year Floodplain:
National Flood Hazard Layer, FEMA, 2013
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-3
Floodplain Mapping



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- 100-Year Floodplain
- 500-Year Floodplain

Data Sources

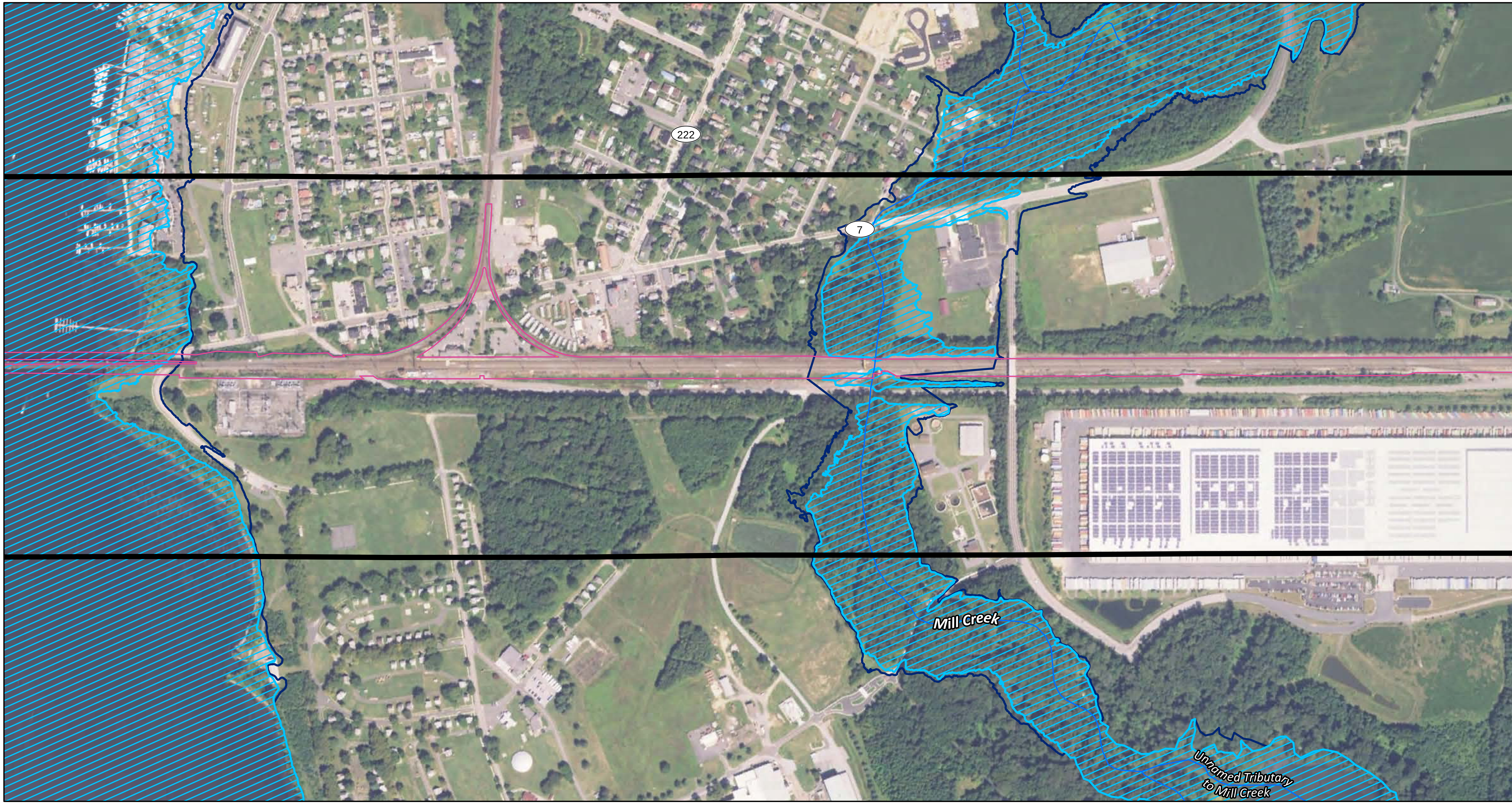
Streams:
MDE, 2012
100 and 500 Year Floodplain:
National Flood Hazard Layer, FEMA, 2013
Imagery:
2015 National Agriculture Imagery Program (NAIP)

N

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-3
Floodplain Mapping



Legend

LOD 9A Calculation Area
LOD 9B Calculation Area
1,000 ft Study Area
Streams
100-Year Floodplain
500-Year Floodplain

Data Sources

Streams:
MDE, 2012
100 and 500 Year Floodplain:
National Flood Hazard Layer, FEMA, 2013
Imagery:
2015 National Agriculture Imagery Program (NAIP)

N

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-3
Floodplain Mapping

Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- 100-Year Floodplain
- 500-Year Floodplain

Data Sources

Streams:
MDE, 2012
100 and 500 Year Floodplain:
National Flood Hazard Layer, FEMA, 2013
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-3
Floodplain Mapping

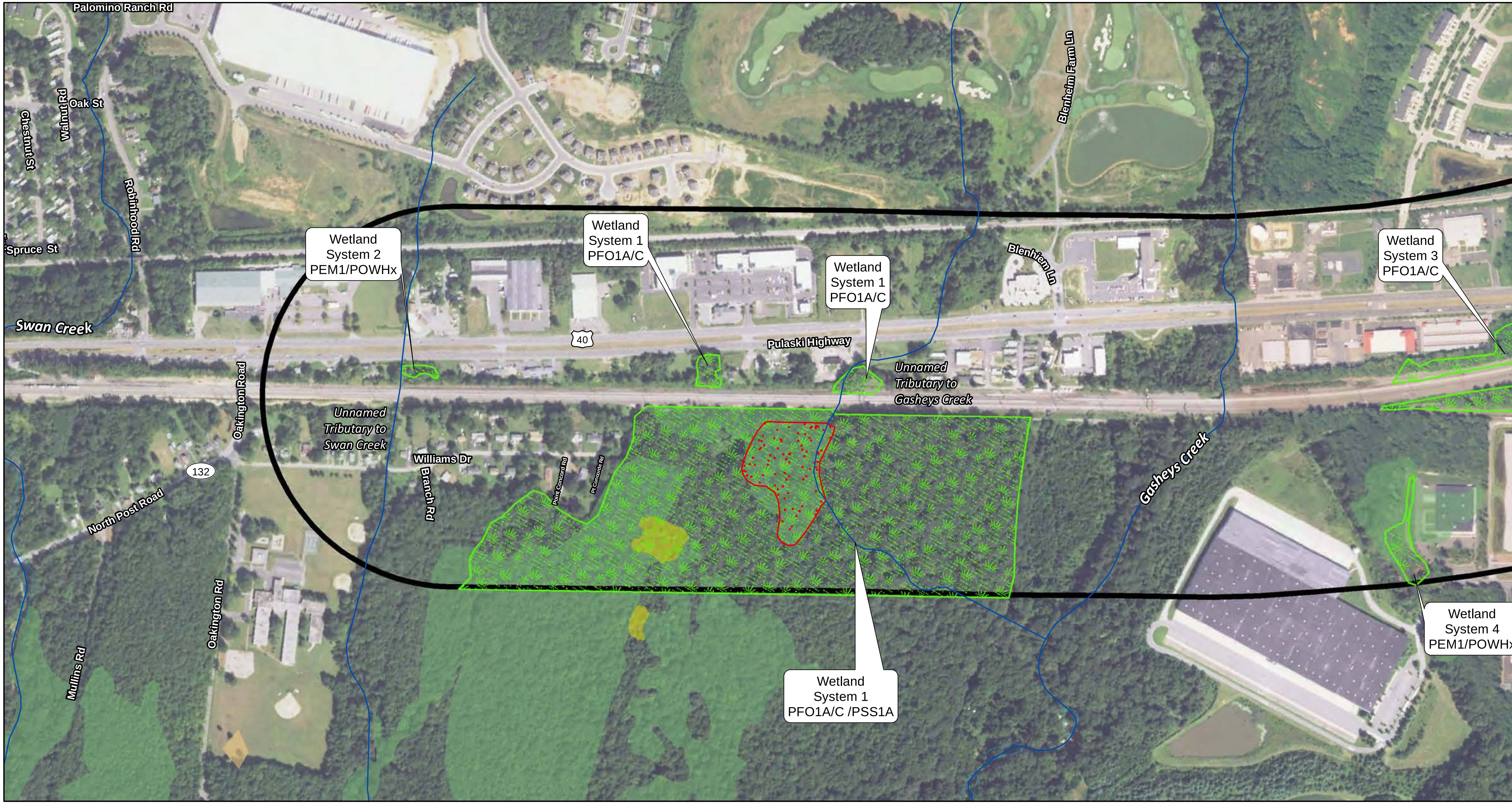
which drain directly to streams or forested wetlands along the streams. Two identified forested wetlands and one emergent wetland appeared to be hydrologically isolated. Two systems were identified as tidal emergent or forested wetlands, one along the Susquehanna River and the other along the perimeter of Furnace Bay. ***Table E-3*** provides a brief summary of the type and size of each wetland system identified within the Proposed Project study area.

Wetlands are important natural resources, providing numerous values and functions to society, including fish and wildlife habitat, flood protection, erosion control and water quality preservation (MDE 2007). Since most of the wetlands in the study area are near the headwaters of their small watersheds and abut or lie adjacent to tributaries to the Susquehanna River, they are likely important in providing flood protection, production export, and water quality functions. Production Export is a wetland function that evaluates how effective a wetland is at producing food or other useful products for humans or other living organisms. This can include timber for wood products or decomposed organics that provide food for aquatic organisms. Water quality functions include short and long-term trapping of nutrients, sediments, and pollutant-laden water before it enters the tributaries and the Susquehanna River. Additionally, these wetlands would be expected to provide habitat for wildlife. The estuarine system in the eastern portion of the study area also likely provides flood protection to upland areas from tidal surges. The following is a brief description of wetlands and waters of the U.S., separated by county.

Harford County

In Harford County, twelve (12) potential nontidal wetlands were identified within the study area (***Figure E-4***). These include natural palustrine forested (PFO)/scrub shrub (PSS)/emergent (PEM) wetlands and manmade palustrine emergent/open water (POW and PUBH) wetlands. Eight (8) nontidal intermittent or perennial streams and one tidal river also cross the Amtrak ROW within Harford County, including:

- an unnamed tributary to Swan Creek;
- two unnamed tributaries to Gashey’s Creek;
- Gashey’s Creek mainstem;
- three unnamed tributaries to Lily Run;
- Lily Run; and
- the mainstem of the Susquehanna River (tidal).



Legend

LOD 9A Calculation Area
LOD 9B Calculation Area
1,000 ft Study Area
Streams
Wetlands of Special State Concern
Inventory Level Assessment Streams*
Inventory Level Assessment Wetlands*

DNR & NWI Wetlands

Esturarine Intertidal Scrub-Shrub
Esturarine Intertidal Unconsolidated Shore
Palustrine Emergent
Palustrine Forested
Palustrine Scrub-Shrub
Riverine

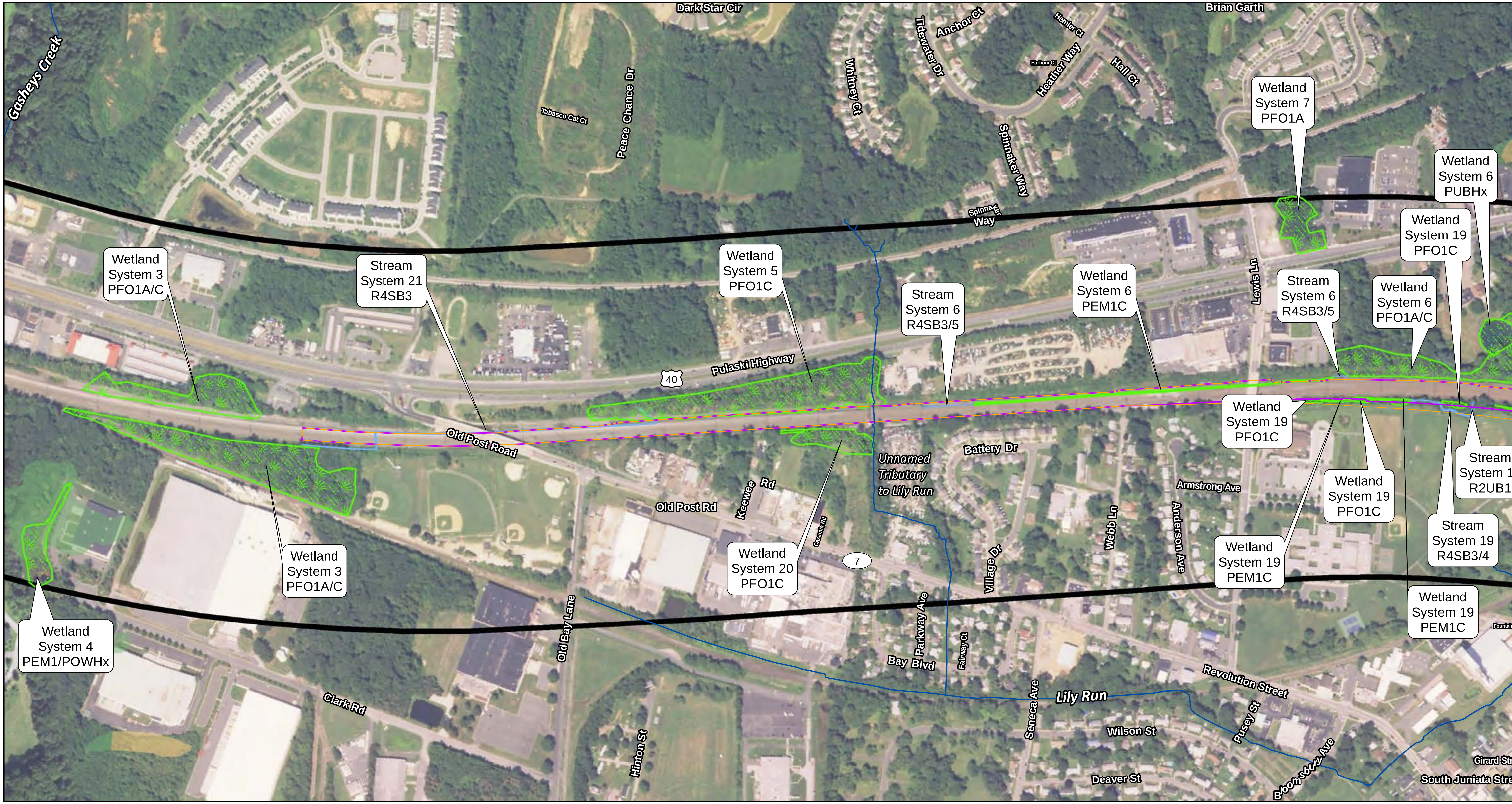
Data Sources

Streams:
MDE, 2012
DNR Wetlands:
MD DNR, 1993
National Wetland Inventory:
National Wetland Inventory, 2011
Imagery:
2015 National Agriculture
Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-4
Waters of the U.S.,
Including Wetlands Map



Legend

DNR & NWI Wetlands

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Wetlands of Special State Concern
- Inventory Level Assessment Streams*
- Inventory Level Assessment Wetlands*
- Esturarine Intertidal Scrub-Shrub
- Esturarine Intertidal Unconsolidated Shore
- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub-Shrub
- Riverine

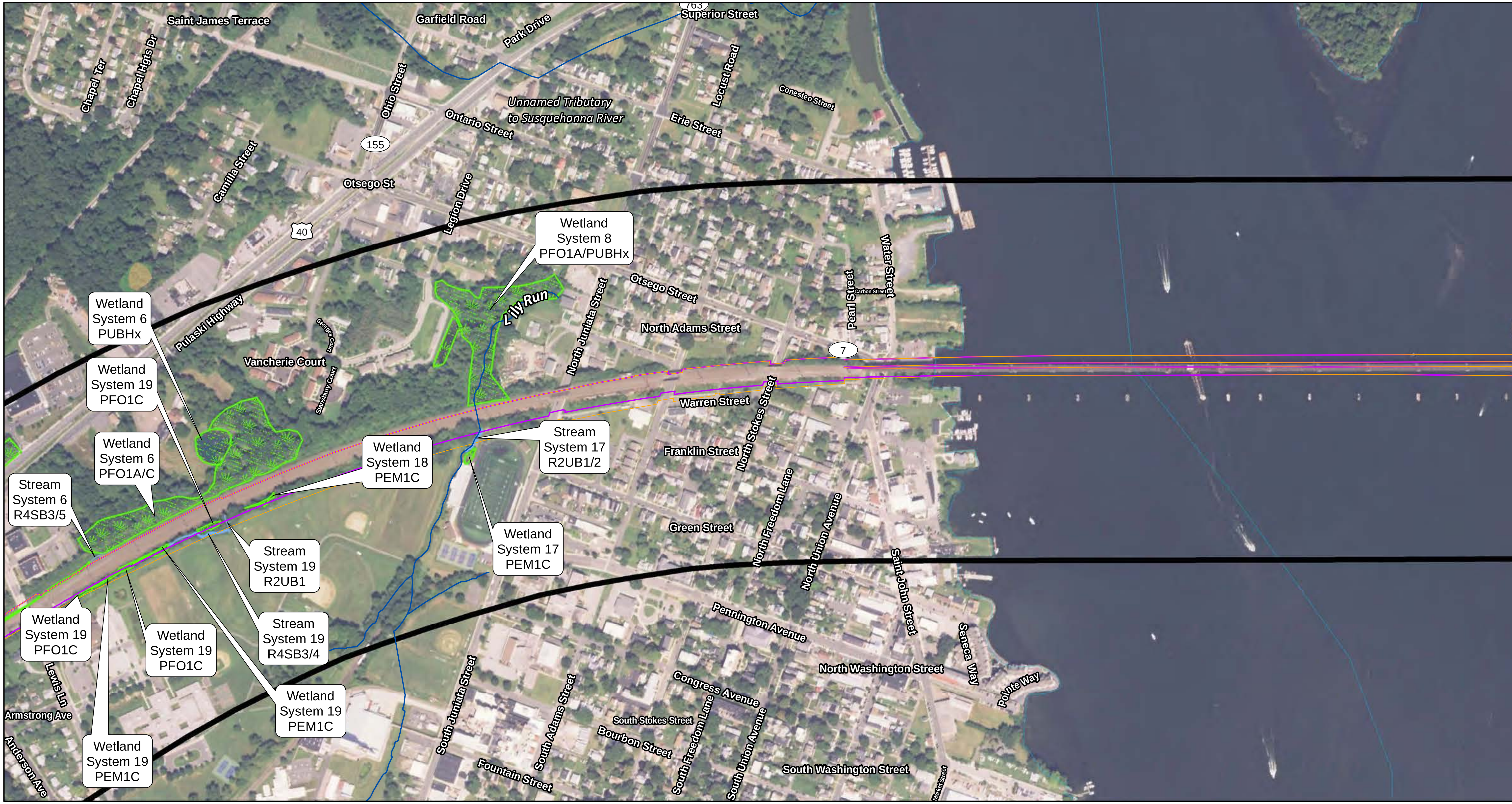
Data Sources

Streams:
MDE, 2012
DNR Wetlands:
MD DNR, 1993
National Wetland Inventory:
National Wetland Inventory, 2011
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-4
Waters of the U.S., Including Wetlands Map



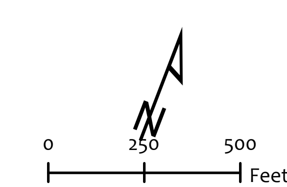
Legend

DNR & NWI Wetlands

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Wetlands of Special State Concern
- Inventory Level Assessment Streams*
- Inventory Level Assessment Wetlands*
- Esturarine Intertidal Scrub-Shrub
- Esturarine Intertidal Unconsolidated Shore
- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub-Shrub
- Riverine

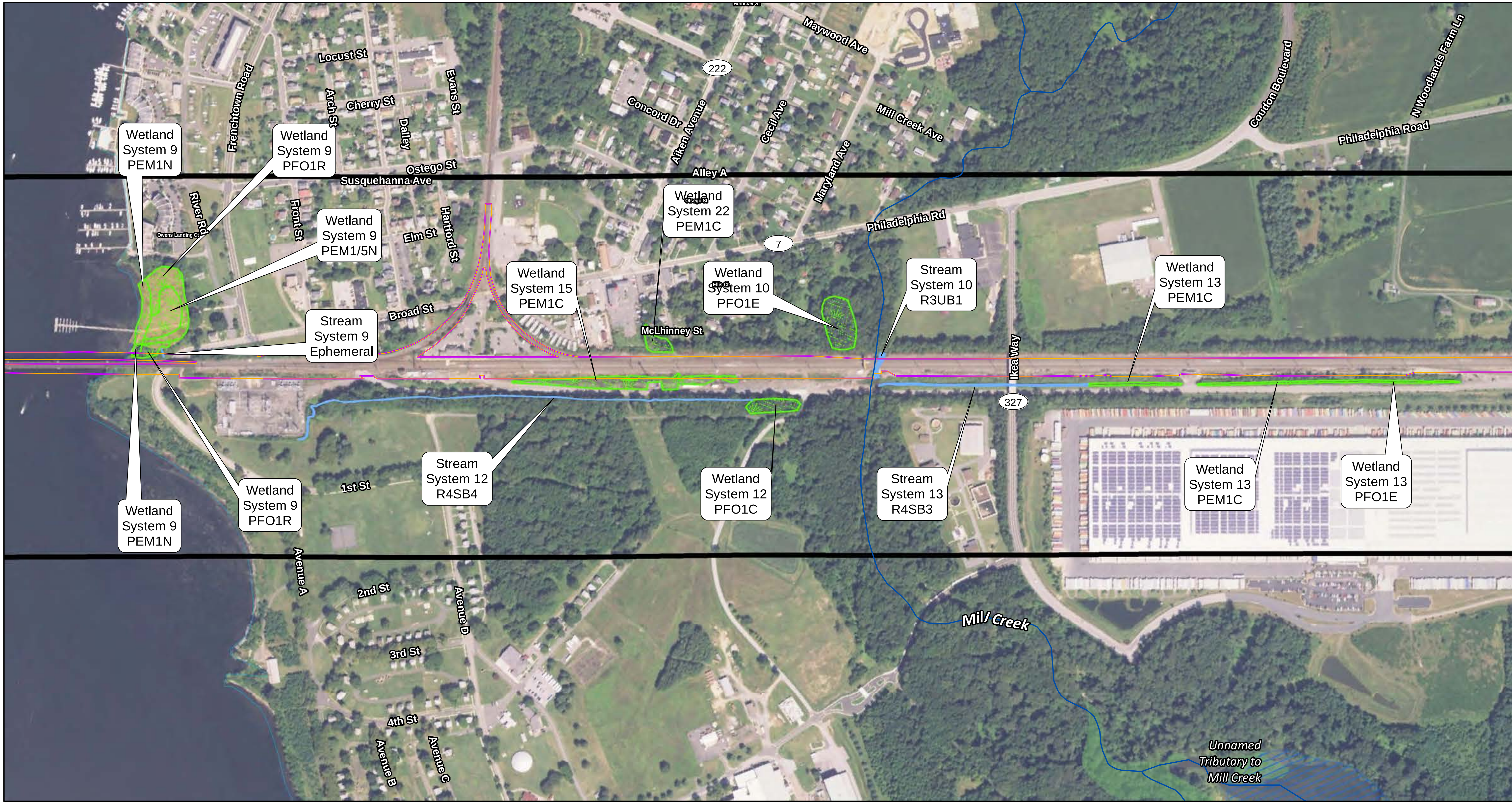
Data Sources

Streams:
MDE, 2012
DNR Wetlands:
MD DNR, 1993
National Wetland Inventory:
National Wetland Inventory, 2011
Imagery:
2015 National Agriculture Imagery Program (NAIP)



Susquehanna River Rail Bridge Project

Figure E-4
Waters of the U.S., Including Wetlands Map



Legend

LOD 9A Calculation Area
LOD 9B Calculation Area
1,000 ft Study Area
Streams
Wetlands of Special State Concern
Inventory Level Assessment Streams*
Inventory Level Assessment Wetlands*

DNR & NWI Wetlands

Esturarine Intertidal Scrub-Shrub
Esturarine Intertidal Unconsolidated Shore
Palustrine Emergent
Palustrine Forested
Palustrine Scrub-Shrub
Riverine

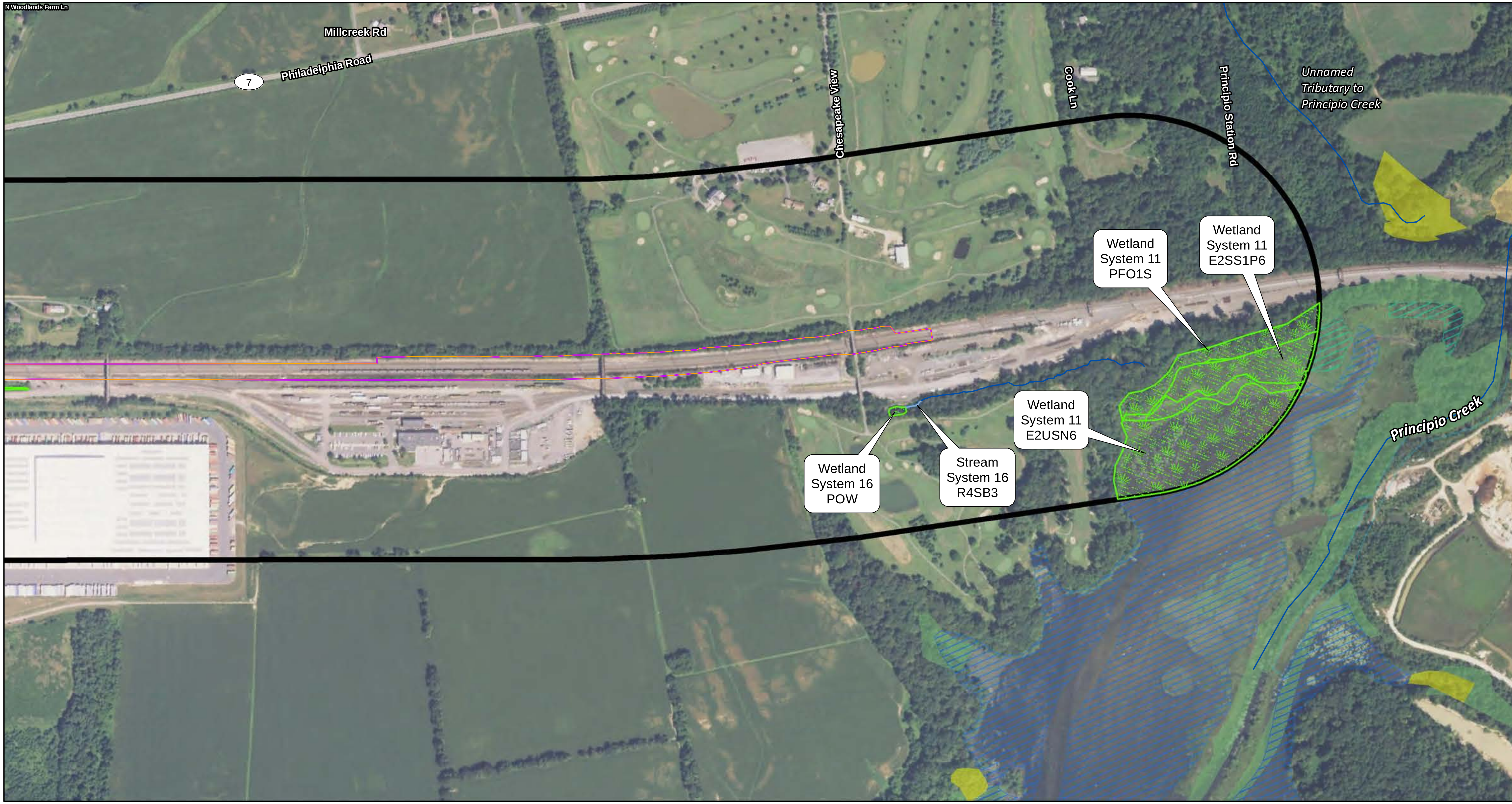
Data Sources

Streams:
MDE, 2012
DNR Wetlands:
MD DNR, 1993
National Wetland Inventory:
National Wetland Inventory, 2011
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-4
Waters of the U.S., Including Wetlands Map



Legend

DNR & NWI Wetlands

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Wetlands of Special State Concern
- Inventory Level Assessment Streams*
- Inventory Level Assessment Wetlands*
- Esturarine Intertidal Scrub-Shrub
- Esturarine Intertidal Unconsolidated Shore
- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub-Shrub
- Riverine

Data Sources

Streams:
MDE, 2012
DNR Wetlands:
MD DNR, 1993
National Wetland Inventory:
National Wetland Inventory, 2011
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-4
Waters of the U.S., Including Wetlands Map

Table E-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 R2UB1 (Unnamed tributary to Gashey's Creek)	Nontidal	53.7 -	- 2,800
2	PEM1/POWHx R2UB1(Two unnamed tributaries to Swan Creek)	Nontidal	0.2 -	- 2,500
3	PFO1A/C R3UB1 (Gashey's Creek) R2UB3 (Unnamed tributary to Gashey's Creek)	Nontidal	7.8 - -	- 2,275 2,297
4	PEM1/POWHx	Nontidal	1.0	-
5	PFO1C R2UB1/2 (Unnamed tributary to Lily Run)	Nontidal	5.4 -	- 1,953
6	PFO1A/C PEM1C PUBHx R3UB1 (Unnamed tributary to Lily Run) R4SB3/5 (Unnamed tributary to Lily Run)	Nontidal	4.9 0.2 0.6 - -	- - - 2,659 4,546
7	PFO1A	Nontidal	1.1	-
8	PFO1A/PUBHx	Nontidal	3.3	-
14	Susquehanna River (R1UBV/R1OWV)	Tidal	-	2,000
17	PEM1C R2UB1/2 (Lily Run)	Nontidal	0.05 -	- 2,893
18	PEM1C	Nontidal	0.04	-
19	PFO1C PEM1C R4SB3/4 (Unnamed tributary to Lily Run) R2UB1 (Unnamed tributary to Lily Run)	Nontidal	0.2 0.1 - -	- - 725 228
20	PFO1C	Nontidal	0.9	-
21	R4SB3	Nontidal	-	4,197

Table E-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				
9	PFO1R PEM1N PEM1/5N Ephemeral	Tidal Nontidal	0.9 0.4 0.8 -	- - - 128
10	PFO1E R3UB1 (Mill Creek)	Nontidal	0.9 -	- 2,495
11	PFO1S E2SS1P6 E2USN6 (Including Furnace Bay)	Tidal	2.5 2.3 8.3	- - -
12	PFO1C R4SB4 (unnamed tributary to Susquehanna River	Nontidal	0.4 -	- 2,500
13	PFO1C PEM1C R4SB3 (unnamed tributary to Mill Creek)	Nontidal	0.2 0.3 -	- - 1,100
15	PEM1C	Nontidal	1.1	-
16	POW R4SB3 (unnamed tributary to Furnace Creek)	Nontidal	0.1 -	- 1,500
22	PEM1C	Nontidal	0.3	-

[1]PFO1A = Palustrine Forest, Broad-leaved Deciduous Vegetation, Temporarily Flooded
PFO1C = Palustrine Forest, Broad-leaved Deciduous Vegetation, Seasonally Flooded
PFO1E = Palustrine Forest, Broad-leaved Deciduous Vegetation, Seasonally Saturated
PFO1R = Palustrine Forest, Broad-leaved Deciduous Vegetation, Seasonal Tidal
PFO1S = Palustrine Forest, Broad-leaved Deciduous Vegetation, Temporary Tidal
PSS1A = Palustrine Scrub Shrub, Broad-leaved Deciduous Vegetation, Temporarily Flooded
PEM1H = Palustrine Emergent, Persistent Vegetation, Permanently Flooded
PEM1C = Palustrine Emergent, Persistent Vegetation, Seasonally Flooded
PEM1N = Palustrine Emergent, Persistent Vegetation, Regularly Flooded
PUBHx = Palustrine Unconsolidated Bottom, Permanently Flooded, Excavated
E2SS1P6 = Estuarine Intertidal, Scrub Shrub, Broad-leaved Deciduous Vegetation, Irregularly Tidal, Oligohaline
E2USN6 = Estuarine Intertidal, Unconsolidated Shoreline, Regularly Flooded, Oligohaline
R2UB1 = Riverine lower perennial, unconsolidated bottom, cobble/gravel
R2UB1/2 = Riverine lower perennial, unconsolidated bottom, cobble/gravel/sand
R3UB3 = Riverine upper perennial, unconsolidated bottom, mud
R3UB1 = Riverine upper perennial, unconsolidated bottom, cobble/gravel
R4SB3 = Riverine intermittent, stream bed, cobble/gravel
R4SB3/4 = Riverine intermittent, stream bed, cobble/gravel/sand
R4SB3/5 = Riverine intermittent, stream bed, cobble/gravel/mud
R1UB/OWV = Riverine tidal, unconsolidated bottom/open water, permanent tidal

Wetland 1 – This wetland was assessed at the inventory level. The large palustrine forested/scrub shrub wetland lies mostly south of the NEC, south and east of Williams Drive (***Figure E-4***). This system is associated with the headwaters of unnamed tributaries to Swan Creek and Gashey's Creek. The USFWS/DNR mapped portions of this wetland system are classified as palustrine forested with a temporarily to seasonally flooded water regime (PFO1A/C) and palustrine scrub shrub with a temporarily flooded water regime (PSS1A). The portion of the forested wetland immediately adjacent to Williams Drive was dominated by red maple (*Acer rubrum*), sweet-gum (*Liquidambar styraciflua*), pin oak (*Quercus palustris*), sycamore (*Platanus occidentalis*), and tulip tree (*Liriodendron tulipifera*). Understory vegetation included spicebush (*Lindera benzoin*), rambler rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), poison ivy (*Toxicodendron radicans*), and grape (*Vitis* sp.). Surface water and saturation was visible within portions of this wetland system. A Code of Maryland Regulations (COMAR) designated Wetland of Special State Concern (WSSC) is also located within this system just south of the Amtrak ROW along an unnamed tributary to Gashey's Creek (***Figure E-4***). Based on best professional judgment, this wetland complex provides numerous functions and is of high ecological and societal value. Functions provided by the system include flood flow alteration, nutrient removal/retention/transformation, sediment/toxicant/pathogen retention, production export, wildlife habitat, and endangered species habitat. An unnamed, perennial tributary to Gashey's Creek crosses the ROW west of the Gashey's Creek crossing. It is classified as R2UB1.

Wetland 2 – This wetland was assessed at the inventory level. The wetland is a small, excavated, emergent, and open water pond located just south of US 40 and just east of an unnamed tributary to Swan Creek. Based on the field assessment, the wetland is classified as palustrine emergent/open water with a permanently flooded water regime (PEM1/POWHx). Vegetated portions of the wetland contained broad-leaf cat-tail (*Typha latifolia*). Functions provided by the wetland include sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and wildlife habitat. The system includes two unnamed, perennial tributary streams that drain south to Swan Creek. The streams are classified as R2UB1.

Wetland 3 – This wetland was assessed at the inventory level. The system includes forested wetlands that occur north and south of the Amtrak ROW just west of Stancil Field. This system is associated with an unnamed tributary to Gashey's Creek, and based on the field assessment, is classified as PFO1A/C. Dominant canopy trees included red maple, sweet-gum, pin oak, and sycamore. Understory vegetation included rambler rose, Japanese honeysuckle, and crow garlic (*Allium vineale*). No surface hydrologic indicators were evident from the field assessment; however, it is possible that near-surface groundwater was present and not visible from the inventory level assessment. Functions provided by this wetland include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/ transformation, production export, and wildlife habitat. This system includes the crossing of Gashey's Creek and an unnamed tributary to Gashey's Creek that lies north of the ROW and east of Gashey's Creek. Gashey's Creek is classified as R3UB1, while the unnamed tributary is classified as R2UB3.

Wetland 4 – This wetland was assessed at the inventory level. The wetland is an excavated SWM system adjacent to an industrial development located south of the Amtrak ROW and west of Old Bay Lane. The wetland is classified as PEM1/POWHx. The vegetated portions of the wetland contained broad-leaf cat-tail, lamp rush (*Juncus effusus*), and scattered black willow (*Salix nigra*) saplings. The pond was full of water during the field assessment. Functions provided by the wetland include sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and wildlife habitat.

Wetland 5 – This wetland was assessed at the inventory level. The wetland occurs as a linear strip located between US 40 and the Amtrak ROW. It begins just east of where MD 7 intersects US 40 and extends east to an unnamed tributary to the Susquehanna River. Based on the field assessment, the wetland is classified as PFO1C. Dominant canopy trees observed included red maple, sweet-gum, and green ash (*Fraxinus pennsylvanica*). Understory vegetation included southern arrow-wood (*Viburnum dentatum*), rambler rose, Japanese honeysuckle, grape, and an unknown species of grass that was emerging within the depressional areas with saturation or shallow inundation. Functions provided by the wetland likely include minor flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/ transformation, production export, and wildlife habitat. The system includes an unnamed tributary stream that drains south across the ROW to Lily Run. The stream is classified as R2UB1/2.

Wetland 6 – This wetland/stream complex was assessed at both the inventory level and through delineation. The system abuts the Amtrak ROW on the north side and generally lies east of Lewis Lane. The forested wetland and perennial stream portion of this wetland was assessed at the inventory level. An intermittent stream and emergent wetland along the intermittent stream were delineated in October 2015. The system includes PFO1A/C and PUBHx adjacent to an unnamed tributary to Lily Run. Dominant canopy trees within the forested wetland included red maple, sweet-gum, and tulip tree. Understory vegetation included northern spicebush, rambler rose, Japanese honeysuckle, and poison ivy. There were no visible signs of hydrology observed during the inventory level assessment, but the system lies within a depression in the floodplain of the stream. The perennial stream lies north of the ROW; however, the intermittent stream channel drains east along the toe of the railroad embankment, beginning approximately 1,600 feet west of Lewis Lane. The stream discharges into the perennial stream within the PFO portion of the wetland. PEM1C lies within the intermittent channel and extends approximately 1,400 feet west of Lewis Lane. Dominant plants within the PEM wetland include broad-leaf cat-tail, rice cutgrass (*Leersia oryzoides*), and rough barnyard grass (*Echinochloa muricata*). Likely functions provided by the system include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal, retention/transformation, production export, and wildlife habitat.

Wetland 7 – This wetland was assessed at the inventory level. The potential wetland lies within the floodplain of the same unnamed tributary stream as Wetland 6, but lies north of US 40. Based on the inventory level field assessment, the wetland is classified as PFO1A. Dominant canopy trees included red maple and sweet-gum. Visible understory vegetation included rambler rose, Japanese honeysuckle, crow garlic, grape, and Asiatic bittersweet (*Celastrus orbiculatus*). Pockets of saturation were visible in micro depressions within the floodplain. Likely functions provided by this wetland include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal, retention/transformation, production export, and wildlife habitat.

Wetland 8 – This wetland was assessed at the inventory level. It is located along an unnamed tributary to the Susquehanna River on the north side of the Amtrak right-of-way between Juniata Street North and Ohio Street. The system includes PFO1A within the floodplain of the stream and PUBHx. During the inventory level field assessment, visibility of the floodplain was difficult, but the stream appeared to be six to eight feet below the elevation of the floodplain. Dominant canopy trees included red maple, silver maple (*Acer saccharinum*), and sweet-gum. The understory included northern spicebush, rambler rose, Japanese honeysuckle, English ivy (*Hedera helix*), and grape. As a result of the dense vegetation, there were no visible signs of hydrology present. The pond was mostly open water with a narrow broad-leaf cat-tail fringe. Likely functions provided by the system include flood flow alteration, sediment/toxicant/ pathogen retention, nutrient removal, retention/transformation, production export, and wildlife habitat.

Wetland 17 – This wetland was delineated in October 2015. The system is located within the eastern floodplain of Lily Run, just west of the athletic track at Havre de Grace Middle School, and south of the Amtrak ROW. The system is classified PEM1C. The wetland appeared to be hydrologically supported by surface runoff from a culvert that discharges water from the athletic fields to the floodplain. At the time of the delineation in October 2015, soils were saturated throughout the wetland area. A few planted and natural trees were situated at the perimeter of the wetland, including bald cypress (*Taxodium distichum*) and black willow. However, the majority of the wetland was comprised of herbaceous plants, including rice cutgrass and planted harlequin blueflag (*Iris versicolor*). Likely functions provided by the system include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/ transformation, and minor wildlife habitat. The system includes Lily Run, which is a second order stream that flows north through the ROW to a culvert that carries the flow to the Susquehanna River. The stream is classified as R2UB1/2.

Wetland 18 – This wetland was delineated in October 2015. The wetland is located within the Amtrak ROW, south of the railroad tracks west of the Lily Run crossing. It lies within a swale at the toe of the railroad embankment. The system is classified as PEM1C. The wetland appeared to be hydrologically supported by a perched, seasonal water table. During the October 2015 delineation, the hydrologic indicator was met by oxidized rhizospheres along living roots, active crayfish burrows, drainage patterns, and Facultative (FAC)-neutral test.[1] Dominant vegetation within the swale was common reed (*Phragmites australis*). Likely functions provided by the system include sediment/toxicant/pathogen retention and nutrient removal/retention/transformation.

Wetland 19 – This wetland was delineated in October 2015. The wetland lies within the Amtrak ROW south of the tracks and east of Lewis Lane. The system is comprised of swales along the toe of the railroad fill slope and floodplain wetlands adjacent to unnamed tributaries of Lily Run. The wetlands are classified as PFO1C and PEM1C. The forested wetland within the floodplain of an intermittent stream was hydrologically supported by near-surface groundwater, while PEM within a swale upslope of the stream had only secondary hydrologic indicators, including crayfish burrows, surface soil cracks, drainage patterns, and FAC-neutral test. Vegetation within PFO was dominated in the canopy by red maple, in the shrub layer by black elder (*Sambucus nigra*), in the herbaceous layer by common reed and rice cutgrass, and in the vine layer by fox grape (*Vitis labrusca*). PEM was dominated by rough barnyard grass (*Echinochloa muricata*) and fall panic grass (*Panicum dichotomiflorum*). Likely functions provided by the system include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and minor wildlife habitat.

Wetland 20 – This wetland was assessed at the inventory level. The system lies on the south side of the railroad tracks opposite Wetland 5. It is classified as PFO1C. Wetland hydrology included shallow inundation and surface soil saturation. Dominant canopy vegetation included red maple and sweet-gum. Common understory vegetation included white grass (*Leersia virginica*), Japanese stilt grass (*Microstegium vimineum*), and, in more open areas, reed canary grass (*Phalaris arundinacea*). Likely functions provided by the system include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and minor wildlife habitat.

Waters of the U.S. 21 – This relatively permanent waterway was delineated in October 2015. Relatively Permanent Waters is a category of Waters of the US as defined by the USACE and resulting from the 2006 Supreme Court case (Rapanos) to clarify Clean Water Act protections. The stream flows onto the ROW from Wetland 5 north of the railroad tracks, and extends west along the toe of slope of the tracks for approximately 1,400 feet to a culvert. It flows through the culvert, under the tracks, and continues west along the tracks out of the limits of disturbance to Gashey's Creek. The intermittent stream is classified as R4SB3. There is very little in-stream habitat available, as the channel is mostly a shallow run within the Amtrak ROW. However, small fish and frogs were observed within the stream.

Streams - With the exception of Gashey's Creek and the Susquehanna River, all perennial streams were identified as lower perennial and had a cobble/gravel, sand, or mud substrate. These stream channels ranged in width from three to 40 (Gashey's Creek) feet, and the streams were down-cut between four and 12 feet below the elevation of the floodplain. The easternmost tributary to Gashey's Creek, between US 40 and the Amtrak ROW, had a mud bottom substrate and was less down-cut than the other lower perennial streams. Bank height was less than two feet. The intermittent streams that flowed

[1] The FAC-neutral test is performed by compiling a list of dominant plant species across all strata in the community, and dropping from the list any species with a Facultative indicator status (i.e., FAC). The FAC-neutral test is met if more than 50 percent of the remaining dominant species are rated Facultative Wetland (FACW) and/or Obligate (OBL). This indicator can be used in communities that contain no FAC dominants. If there are an equal number of dominants that are OBL and FACW verses Facultative Upland (FACU) and Upland (UPL), or if all dominants are FAC, non-dominant species should be considered (USACE 2011).

along the base of the railroad tracks were very shallow and were manipulated to maintain flow. Where these streams flow through the more developed areas or along the tracks, habitat complexity is relatively low, as the channels have been straightened to accommodate placement within culverts or bridges. For the streams draining to Swan Creek, habitat complexity is likely higher within the undeveloped forested sections. The Susquehanna River at the Amtrak crossing is classified as riverine tidal and is about 3,400 feet wide.

Cecil County

In Cecil County, two tidal wetland systems and six potential nontidal wetland systems were identified within the Proposed Project study area (***Figure E-4***). 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.

Wetland 9 – This tidal wetland system lies along the east side of the Susquehanna River in Perryville just north of the Amtrak ROW. According to the USFWS/DNR wetland mapping, the system is classified as palustrine scrub shrub and estuarine intertidal emergent with a seasonal tidal water regime and a mesohaline salinity range. Based on the wetland delineation in October 2015, the emergent wetland appears to be PEM1N and PEM1/5N. The forested portion of the wetland occurs on the periphery of the tidal emergent wetland and is dominated by black willow, ash-leaf maple (*Acer negundo*), and silver maple trees. This area was classified as PFO1R. The emergent portion of the wetland is dominated by common reed, Canadian clearweed (*Pilea pumila*), and marsh primrose-willow (*Ludwigia palustris*), and floating primrose-willow (*Ludwigia peploides*). Considerable trash has accumulated within the wetland, lowering its overall quality. Likely functions provided by the system include sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production export, and sediment/shoreline stabilization. A two-foot wide ephemeral channel drains runoff from an adjacent substation to the tidal wetland.

Wetland 10 – This potential wetland is located within the floodplain of Mill Creek just upstream of the Amtrak right-of-way (ROW) and was assessed at the inventory level. The area was not mapped as wetland by the USFWS or DNR, but during the inventory level assessment, a portion of the floodplain at the toe of the east facing slope contained standing water and skunk cabbage (*Symplocarpus foetidus*), an OBL wetland plant. Canopy vegetation included red maple, sweet-gum, and sycamore. Based on these visible characteristics, this wetland portion is classified as PFO1E. The remainder of the floodplain was comprised of a mix of wetland and upland vegetation and no visible signs of hydrology. Likely functions provided by the relatively small wetland include groundwater recharge/discharge, flood flow alteration, sediment/toxicant/pathogen retention, and nutrient removal/retention/transformation. Mill Creek is classified as lower perennial with a cobble/gravel bottom substrate. The stream channel width is about 15 feet and the channel depth averages about three feet. Habitat complexity between MD 7 and Amtrak appeared good, with numerous riffle/pool complexes and in-stream habitat.

Wetland 11 – This wetland was assessed at the inventory level. According to the NWI wetland mapping, a fringe of palustrine forested seasonally tidal wetland (PFO1S) borders the large estuarine system associated with Furnace Bay. A portion of the estuarine system is classified as scrub shrub wetland (E2SS1P6). The remainder of the system is classified as unconsolidated shoreline (E2USN6). Likely functions provided by wetlands along the periphery of Furnace Bay include sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production export, and sediment/shoreline stabilization.

Wetland 12 – This wetland was assessed at the inventory level. The depressional wetland system is located between Avenue G and the Amtrak paved access road south of the railroad tracks, and just west of Mill Creek. The wetland is classified as PFO1C. Dominant trees within the wetland include red maple, sweet-gum, and pin oak. Rambler rose was the dominant understory plant. Standing water was present within the depression and stained leaves were also observed. An intermittent stream channel drains excess water from this depression through a shallow channel that runs parallel to the Maintenance-of-Way access road on the south side. The two-foot-wide by a 0.5-feet-deep channel is classified as R4SB4. It extends west to the Amtrak substation. Shallow flow was observed during the field assessment. Likely functions provided by the system include sediment/toxicant/pathogen retention, nutrient removal/retention/ transformation, and possibly production export.

Wetland 13 – This wetland and stream system was assessed at the inventory level. The system is an incised ditch that occurs along the south side of the railroad tracks, between the tracks and the access road to the Amtrak Maintenance-of-Way facility. It extends approximately 3,000 feet and discharges into Mill Creek. From the confluence with Mill Creek to approximately 1,100 feet east, the system was determined to be an intermittent stream only. This stream was classified as R4SB3. The stream channel was about five feet wide and one foot deep with several inches of flowing water at the time of the field assessment. Fish were observed in the stream. Upslope of the intermittent stream, the channel was comprised of emergent and forested wetlands. The westernmost 950 feet or so of the wetland is classified as palustrine emergent with persistent vegetation and a seasonally flooded water regime (PEM1C). This portion of the wetland had been recently managed by the removal of woody vegetation from the side slopes. Emergent vegetation within the wetland was predominately comprised of unknown grasses. The easternmost approximately 900 feet of the wetland is classified as PFO1C. The bottom of the ditch lies six to eight feet below the ground elevation, and likely receives some groundwater input at least early in the growing season. It also serves to divert surface runoff to Mill Creek. Damp to shallowly inundated soils were present during the site visit. Dominant woody vegetation included red maple and sweet-gum. Likely functions provided by the system include groundwater recharge/discharge, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and production export.

Wetland 15 – This wetland was delineated in October 2015. The system is associated with a drainage ditch east of the Perryville Station that runs along the south side of the railroad tracks and north of Broad Street. The wetland is classified as PEM1C. The system drains west along the toe of the railroad embankment to a culvert beneath Broad Street. It was unclear where the water drains downstream of Broad Street, as it appeared to pool within a riprap lined swale. Hydrology of this system appears to be shallow groundwater, as a water table was present within 10 inches of the soil surface. The vegetated portion on the north side of Broad Street contained common reed, broad-leaf cat-tail, wand panic grass (*Panicum virgatum*), and rice cutgrass. Shallow surface water or saturation to the surface was present throughout the system at the time of the wetland delineation in October 2015. Mucky modified mineral soils meeting the redox dark surface wetland indicator were observed during the October 2015 delineation. Likely functions provided by the system include sediment/toxicant/pathogen retention and nutrient removal/retention/transformation.

Wetland 16 – This wetland was assessed at the inventory level. The system is composed of an excavated impoundment with an intermittent stream that drains excess water from the impoundment to Principio Creek. The system starts adjacent to the Prince Interlocking on the south side of the gravel access road, just east of the cart path crossing for the Furnace Bay Golf Course. The pond is classified as POW. At the time of the field assessment the pond was filled to capacity and water was observed flowing through the intermittent channel at the eastern end. The pond did not appear to contain a vegetated wetland fringe. The intermittent channel is classified as R4SB3. The channel varied in size from three feet wide and a half foot deep at the upstream end and eight feet wide and three feet deep at the downstream end. Functions likely provided by the system include sediment/toxicant/pathogen retention.

Wetland 22 – This wetland was assessed in the inventory level assessment. The wetland is located within a drainage ditch along the north side of the Amtrak ROW at the end of McLhinney Street. The wetland drains northwest to a culvert. Saturated soils were present within the swale. Common vegetation included red maple and sweet-gum. Functions likely provided by the system include sediment/toxicant/pathogen retention, and flood flow alteration.

Summary

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.

3. NO ACTION ALTERNATIVE

Without the Proposed Project, existing floodplains and wetlands/waters of the U.S. will remain as described in Affected Environment above. The No Action Alternative is used as a baseline scenario against which potential impacts of the Proposed Project will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

a. Floodplains

Both Build Alternatives will occur within regulated floodplains. As noted above, 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 effective and preliminary 100-year and 500-year floodplains are included in ***Table E-4***. These values represent Proposed Project footprint encroachments within the floodplain only and do not reflect actual fill volumes. Project alternatives are not configured in such a manner that major longitudinal floodplain encroachments (encroachment that parallels the stream channel) would occur. The majority of floodplain encroachments would be from transverse crossings for each of the alternatives (encroachment that crosses the valley width of floodplains).

Any construction within the 100-year floodplain would require a Waterway Construction Permit from the MDE. 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 floodways is not anticipated. However, the Proposed Project will require additional fill in both of these floodways. The new crossings of the Susquehanna River will occur in the same location as the existing crossing and on the upstream side of the existing crossing, with the bridge piers aligned with the stream to minimize any change in the flow characteristics. The new bridge may have a slightly higher water velocity owing to the closer spacing of more bridge piers. The closer spacing of the bridge piers of 30 to 90 feet over 3,200 feet of the river will only result in a very slight change in velocity and therefore would not produce a significant impact to the hydrologic properties of the river upstream or downstream. More detailed hydrologic and hydraulic studies will be undertaken later in design, allowing for more precise floodplain impacts and scour analyses at that time.

Table E-4
Floodplain Encroachments and Impacts to Waters of the U.S., Including Wetlands

Resource Type	Resource Category	Alternative 9A	Alternative 9B
Effective FEMA Floodplains (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

Susquehanna Riverbed (acres)	Girder Approach/Arch Main Span Bridge	0.37	0.37

**Preliminary FEMA floodplain information available for Harford County only*

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, bridge and approach heights, etc.), as applicable.

b. 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 rail existing 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.

Alternative 9A

Alternative 9A would result in direct impacts to tidal and nontidal wetland resources along the Amtrak ROW (***Table E-4***). Nontidal wetland impacts in Cecil County would occur within Wetland 15 that lies between the existing railroad tracks and the access road to the Perryville Maintenance Facility, just east of the Perryville Station (***Table E-5***). The only tidal wetland in the study area, Wetland 9, would also be slightly impacted (0.06 acre) by the construction of the west bridge over the Susquehanna River. In Harford County, nontidal wetland impacts would occur within Wetlands 5 and 6 on the north side of the ROW east and west of Lewis Lane and within Wetlands 18 and 19 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 impacts to these waterways (***Table E-5***). The total 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 impacted on the Cecil County portion adjacent to the tidal wetland along the Susquehanna River. The crossing impacts to Lily Run and two unnamed tributaries 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 two unnamed tributaries to Lily Run. The intermittent stream that drains west along the existing tracks from Wetland 5 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.

Table E-5
Wetlands and Waters of the U.S. Effects by System and Habitat Classification

System Number	Waters of the U.S. Classification	Wetland Type	Potential Wetland (Ac) and Stream (Lf) Impacts	
			Alternative 9A	Alternative 9B
5	PFO1C	Nontidal	0.06	0.06
6	PEM1C R4SB3/5 (Unnamed tributary to Lily Run)	Nontidal	0.28 1,717	0.28 1,717
9	PFO1R PEM1N Ephemeral	Tidal Nontidal	0.06 0.01 19	0.06 0.01 19
10	R3UB1	Nontidal	83	83
14	Susquehanna River (R1UBV/R1OWV)	Tidal	0.37	0.37
15	PEM1C	Nontidal	0.20	0.20
17	R2UB1/2 (Lily Run)	Nontidal	84	11
18	PEM1C	Nontidal	0.04	0.03
19	PFO1C PEM1C R4SB3/4 (Unnamed tributary to Lily Run) R2UB1 (Unnamed tributary to Lily Run)	Nontidal	0.19 0.06 286 84	0.11 0.03 169 28
21	R4SB3	Nontidal	936	935

The girder approach / arch main span bridge design would include 37 in-water piers (with a pier diameter of 5.67 feet for all piers except 13 and 14 at 6.67 feet). 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 are included in ***Table E-4***. Potential impacts to submerged aquatic vegetation (SAV) within the Susquehanna River are discussed in **Section D**, "Aquatic Resources."

Alternative 9B

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 wetland and stream impacts are slightly less for Alternative 9B (***Table E-5***). Wetland buffer impacts are also slightly lower overall for Alternative 9B (***Table E-5***). Alternative 9B would cross the same streams as Alternative 9A, but total stream impacts would be slightly less (***Table E-5***) resulting from a narrower crossing of Lily Run and unnamed tributaries of Lily Run. Bridge pier impacts within the Susquehanna River would be the same for Alternative 9B as for Alternative 9A.

5. MINIMIZATION AND MITIGATION OF IMPACTS

a. Floodplains

Efforts to minimize impacts to 100-year and 500-year floodplains are ongoing, and will continue throughout the Proposed 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 due to rail construction are minimized, drainage structures are required to maintain the current flow regime and prevent associated flooding (COMAR 26.17.04). 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-year and 500-year floodplains could also include:

- Bridge spans over the 100-year 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.

b. Wetlands/Waters of the U.S.

Unavoidable impacts to wetlands and other waters of the U.S. will require federal and state permit authorizations. A Section 404 permit from the USACE is required for the discharge of dredged or fill materials into waters of the U.S., including wetlands. The Proposed Project will require a Section 404 Individual Permit, as it will result in greater than 2,000 linear feet of stream impact. A USACE Section 10 permit will also be required for construction of bridge structures over the navigable waters of the Susquehanna River. A U.S. Coast Guard (USCG) permit under Section 9 of the Rivers and Harbors Act will also be required for construction of a new bridge over a navigable waterway. Impacts to waters of the U.S., including wetlands also require a Section 401 Water Quality Certification from MDE. In addition, MDE requires a Nontidal Wetland and Waterways permit for impacts to nontidal wetlands and streams, including a 25-foot buffer surrounding the wetland; a Waterway Construction Permit for work in streams and floodplains; and a Tidal Wetland License issued by the Board of Public Works for impacts to tidal wetlands and waters associated with the Susquehanna River.

The two alternatives retained for detailed study were selected in part because of their reduced impacts to wetlands/waterways and other natural resources, as compared to the conceptual alternatives considered. These alternatives lie closer to the existing track ROW and generally involve replacement of the existing track with the new eastbound and westbound tracks. These two alternatives would have some direct impacts on both nontidal and tidal wetland resources and their corresponding buffers. Both alternatives would also have 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.

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 measure during final design (e.g., considering steeper slopes and/or additional retaining walls). 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.

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 may 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.

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. Emergent wetlands are often mitigated on a 1:1 replacement basis, while forested and scrub-shrub wetlands are mitigated on a 2:1 basis. Tidal wetland compensation follows similar ratios, except emergent tidal wetlands are also replaced at a 2:1 ratio. However, these ratios can provide only a preliminary estimate of required mitigation, as functional replacement is the guiding mitigation principal, and ratios may be adjusted at the discretion of the USACE or MDE depending on the practicability and functional effectiveness of the proposed mitigation. 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, and water quality improvements, may also be used at the agencies' discretion. ***Table E-6*** summarizes the wetland and stream impacts and estimated minimum mitigation required to offset those impacts.

Table E-6
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 (acre)	0.25	2:1	0.5	0.17	2:1	0.34
Nontidal Emergent (acre)	0.58	1:1	0.58	0.54	1:1	0.54
Tidal Forest (acre)	0.05	2:1	0.1	0.05	2:1	0.1
Tidal Emergent (acre)	0.01	2:1	0.02	0.01	2:1	0.02
Intermittent and Perennial Streams (linear feet)	3,190	1:1	3,190	2,943	1:1	2,943

Few onsite 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 Proposed Project design, including within nontidal Wetland 13 in Cecil County that will not be impacted, but is a disturbed ditch wetland that may be enhanced. 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 in size, 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 onsite 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.

Based on the currently identified 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. 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 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 level desktop mitigation site search was conducted within the Lower Susquehanna River and Swan Creek watersheds, as Proposed 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.

The results of the preliminary desktop site search identified 27 potential nontidal wetland creation sites totaling approximately 123 acres; 10 in Harford County (43 acres) and 17 in Cecil County (80 acres). Twenty-six (26) stream restoration sites were identified, including nine (9) in the Swan Creek watershed and 17 in the Lower Susquehanna River watershed. Fifteen (15) of the sites had potential fish blockage removal opportunities and two (2) sites also had wetland creation potential. A map of the potential wetland and stream mitigation sites and a summary of the site search process are described in more detail in ***Attachment D***. For those potential mitigation sites visible from publicly accessible locations, a windshield survey was completed in March 2016 to confirm landscape position and existing conditions within the potential site. Based on the windshield surveys, one new potential wetland creation site was added, but the number of potential nontidal wetland creation sites to carry forward was reduced to eight. For potential stream restoration sites, one site was extended and the overall number of potential stream sites to carry forward was reduced to 17. Information on potential wetland and stream sites recommended for more detailed on-site investigations are shown in ***Tables E-7*** and ***E-8***, respectively. 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.

Any mitigation measures employed due to unavoidable Proposed 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.

Table E-7
Potential Nontidal Wetland Mitigation Sites: Post Windshield Site Search

SITE ID	COUNTY	CURRENT LAND USE	APPROXIMATE SIZE (AC)	HYDRIC SOILS (Y/N)	STATUS/COMMENTS
W-14	Cecil	Agricultural Field	5	N	Low lying ag field abuts emergent marsh with thin strip of young trees (willow, sweetgum, planted leyland cypress); 3-4' cut could yield about 5 Ac wetland.
W-15	Cecil	Agricultural Field	2	Y	Low lying field lies adjacent to Coudon Creek and potentially created wetland on Perryville Elementary School property. Site not accessible, but might be worth further investigation.
W-17	Harford	Scrubby / Mowed Field	4	Y	Site mostly existing shrubby wetland. Small (<0.5Ac), low lying field adjacent to common reed wetland with creation potential and enhancement of common reed. Lies adjacent to Proposed Project.
W-22	Harford	Pasture	7	N	Site not completely visible from road, but part of a large abandoned agricultural area with many small streams/ditches draining through; some portions likely existing wetlands. Site appears relatively flat, but according to contours, has over 10 feet of elevation change. Potential stream restoration opportunities. More investigations warranted.
W-23	Harford	Pasture	5	N	Part of large abandoned agricultural area on the south side of a gravel driveway from Site 22. Land form appears relatively flat, but contours suggest as much as a 20' elevation difference within the site. Existing wetland mapped adjacent to site. Potential stream restoration opportunities. More investigations warranted.
W-25	Harford	Agricultural Field	2	Y	Relatively flat field adjacent to forested floodplain of small stream. Wet patches observed in field; portion of field mapped hydric soils. Possibly suitable to create 2 Ac wetlands.
W-27	Cecil	Agricultural Field	1	N	Small (1 Ac.), gently sloping area mapped as hydric soil adjacent to forested floodplain along stream.
W-28	Cecil	Maintained ROW	1.5	Y	Linear uplands within transmission ROW would require less than 3' of cut. Within transmission ROW so only PSS possible; may restrict access to towers. No more than 2 Ac of creation.

Table E-8
Potential Stream Mitigation Sites: Post Windshield Site Search

SITE ID	COUNTY	WATER-SHED	APPROX. LENGTH (LF)	FISH BLOCK-AGES (Y/N)	RIPARIAN ZONE	STATUS/COMMENTS
S-2	Harford	Lower Susquehanna River	607	Yes	Partially forested, partially maintained	No obvious blockages; some minor erosion on bends; right bank with scattered planted trees and lawn, more plantings possible, but no restoration.
S-4	Harford	Swan Creek	863	No	Forested between agricultural fields	Not accessible, but scored low for water quality by MBSS. Potential instream habitat improvements.
S-6	Cecil	Lower Susquehanna River	545	Yes	Forested	Site not visible, but potentially contains an old culverted road crossing that could be a fish blockage.
S-8	Cecil	Lower Susquehanna River	830	Yes	Forested, residential property	Fish blockage on upstream side of primary channel culvert at Jackson Station Rd where vertical wooden slats have been installed. Secondary channel culvert beneath Jackson Station Rd mostly filled with sediment. No other stream habitat improvements necessary.
S-9	Harford	Swan Creek	1,482	Yes	Forested, abuts residential properties	Impoundment not visible, but likely functions as fish blockage.
S-10	Cecil	Lower Susquehanna River	474	Yes	Forested/ scrub-shrub	Not visible, as site lies within large, fenced Bainbridge Development Corp property.
S-12	Harford	Lower Susquehanna River	755	Yes	Forest/ scrub-shrub	No visible, but several small streams flow through large abandoned farm site; most of streams without forest cover.
S-13	Harford	Lower Susquehanna River	2,168	Yes	Partially forested, residential properties	Between Superior and Erie Sts, recent clearing of vegetation on right bank, left bank mowed lawn with large planted trees. Between Erie St and US 40 gabion baskets on right bank with minor fish blockage.

Table E-8 (cont'd)
Potential Stream Mitigation Sites: Post Windshield Site Search

SITE ID	COUNTY	WATER-SHED	APPROX. LENGTH (LF)	FISH BLOCK-AGES (Y/N)	RIPARIAN ZONE	STATUS/COMMENTS
S-14	Harford	Swan Creek	266	Yes	Forested	Concrete apron on downstream side of Chapel Road culvert that acts as fish blockage. Large debris jam 200' farther downstream.
S-15	Harford	Swan Creek	1,314	No	Forested	At Hopewell Road crossing, stream appears stable with forested banks. MBSS site upstream of Hopewll Road with poor habitat index, possible instream improvements.
S-19	Cecil	Lower Susquehanna River	464	Yes	Forested	Reach not fully visible from road; instream habitat improvements possible.
S-20	Cecil	Lower Susquehanna River	1,550	Yes	Forested	Most of reach not visible from Frenchtown Rd; reach just upstream with high gradient and boulder substrate. Possible instream habitat improvements elsewhere within the reach.
S-22	Harford	Swan Creek	718	No	Partially forested	Not visible, but left bank not forested; possible planting and/or instream habitat enhancements.
S-23	Cecil	Lower Susquehanna River	595	No	Forested and agricultural fields	Not visible from driveway; flows through agricultural area with thin forest buffer.
S-24	Harford	Swan Creek	1,480	No	Forested/ scrub-shrub	Flows through old field managed for wild turkey by National Wild Turkey Federation. Stream banks 3' high with minor erosion. Most of reach not accessible.
S-26	Harford	Lower Susquehanna River	2,384	No	Maintained school property	Portions of Lily Run through school property lacking forest cover. Other portions of reach are currently piped. If Amtrak takes school ROW for new track, could investigate opening piped sections and doing other instream habitat improvements and tree plantings.

No matter what form of compensatory mitigation is adopted, the mitigation plan must follow the same 12 fundamental components that are required for permit issuance. These components include:

- Objectives
- Site selection criteria
- Site protection instruments (e.g., conservation easements)
- Baseline information (for impact and compensation sites)
- Credit determination methodology
- Mitigation work plan
- Maintenance plan
- Ecological performance standards
- Monitoring requirements
- Long-term management plan
- Adaptive management plan
- Financial assurances

C. TERRESTRIAL RESOURCES

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Maryland Reforestation Law & Maryland Forest Conservation Act

The Maryland Reforestation Law establishes a program to produce a no-net-loss impact to wooded acres resulting from State funded transportation projects. The Maryland Forest Conservation Act regulates any activity requiring an application for a subdivision, grading permit, or sediment erosion control permit on areas 40,000 square feet or greater.

Nongame Endangered Species Conservation Act

The Nongame Endangered Species Conservation Act regulates activities that impact the habitats of plants and animals listed on the Maryland Threatened and Endangered Species list. Any constructing agency (federal, state, local or private) is required to cooperate and consult with DNR regarding: the presence of listed species within a project area; field verification of habitat and/or populations of listed species, and avoidance and minimization efforts as appropriate.

Forest Interior Dwelling Species (FIDS) (COMAR 27.01.09.04C(2) (b)(iv)

FIDS are regulated as a protected resource within the Chesapeake Bay Critical Area (Critical Area). Regulated FIDS habitat includes documented FIDS breeding areas within existing riparian forests that are at least 300 feet in width and that occur adjacent to streams, wetlands, or the Bay shoreline, and other forest areas used as breeding areas by forest interior dwelling birds (for example, relatively mature forested areas within the Critical Area of 100 acres or more, or forest connected with these areas).

Methodology

Forest boundaries were identified using the most recent publically available aerial imagery and vegetation GIS layers from both counties. For the desktop review, 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). Based on this guidance, FIDS habitat exists where riparian forests average a minimum of 300 feet in total width and occur in blocks of at least 50 acres. FIDS habitat is also present where forests occur in blocks of at least 50 contiguous acres with 10 or more acres of forest interior (defined as the area of the forest minus a 300-foot wide edge). Areas meeting these definitions were mapped within the Proposed

Project study area. For the inventory level assessment, 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 below in tables of potential and observed species within the study area.

To assess potential terrestrial rare, threatened, or endangered (RTE) species, Proposed Project review letters, dated January 13, 2014, 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.

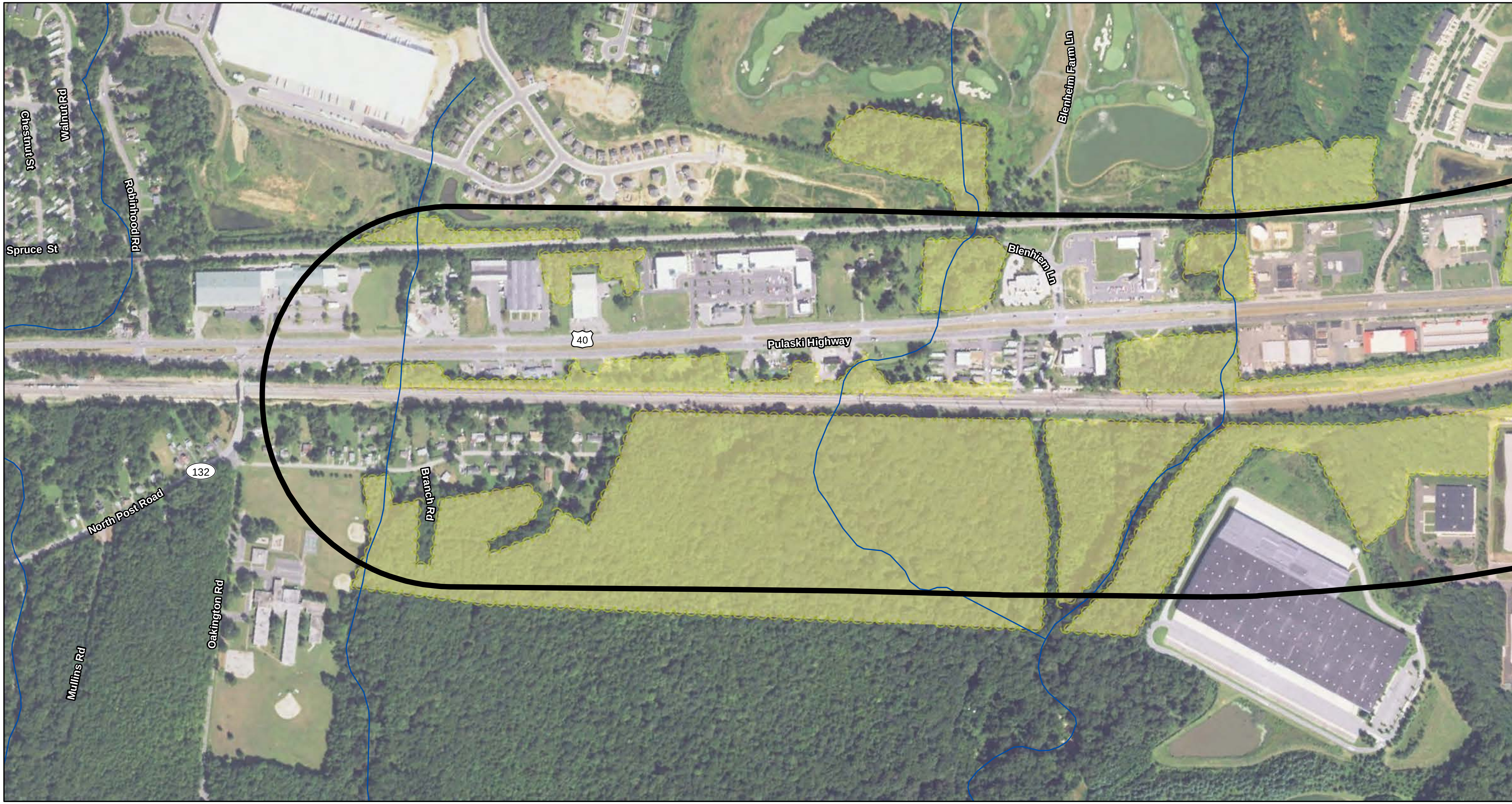
2. AFFECTED ENVIRONMENT

a. Forest Resources

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 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.

All forests in Harford County are classified within the Tulip Poplar Association according to Brush et al. 1976 (***Figure E-5***). Characteristic species in this forest association include, tulip tree, red maple, flowering dogwood (*Cornus florida*), Virginia creeper *(Parthenocissus quinquefolia*), black gum *(Nyssa sylvatica*), and white oak *(Quercus alba*). The results of the inventory level field assessment were generally consistent with the mapped association according to Brush et al. The primary differences occurred within forested wetland areas. As noted in the "Wetlands and Waters of the U.S." section, forested wetlands were dominated by red maple and sweet-gum trees with scattered tulip tree, pin oak, and sycamore. Upland forest stands within the Harford County portion of the study area occur within relatively small, isolated patches, often along streams, and are characterized by varying degrees of disturbance. Other upland forest stands were linear strips of trees that border roadways, property boundaries, and the railroad ROW. The majority of these stands were early to mid-successional in seral stage, and contained canopy species, including tuliptree, white oak, red maple, sweet-gum, ash *(Fraxinus* sp.), American beech *(Fagus grandifolia*), and black locust *(Robinia pseudoacacia*). The average size of canopy trees was generally greater than four inches for red maple and sweet-gum and larger than eight inches for tuliptree. The understory was generally dense with either shrubs or vines or a combination of both. Common species included rambler rose, bush honeysuckle *(Lonicera* sp.), Japanese honeysuckle, and grape. One mature forest stand was identified on the south side of the Amtrak ROW between two industrial warehouse buildings west of Old Bay Lane. This stand was comprised of mature oaks (primarily white oak) and tuliptree in the 10 to 20-inch diameter size range. Slightly smaller red maple and sweet-gum were also common in the canopy. The understory was sparse, with scattered American beech and American hornbeam *(Carpinus caroliniana*).

Cecil County has fewer forest resources within the study area than Harford County (***Figure E-5***). Most of the forests in the study area have also been classified by Brush et al. within the Tulip Poplar Association. However, the floodplain of Mill Creek has been classified by Brush et al. within the Sycamore-Green Ash-Box Elder-Silver Maple Association.



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Sycamore, Green Ash, Ash-leaf Maple, Silver Maple Forest Association
- Tulip Poplar Forest Association

Data Sources

Streams:
MDE, 2012
Forest Assocation:
Vegetation Map of Maryland (Brush et al. 1976)
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-5

Forest Resources Map

Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Sycamore, Green Ash, Ash-leaf Maple, Silver Maple Forest Association
- Tulip Poplar Forest Association

Data Sources

Streams:
MDE, 2012
Forest Assoication:
Vegetation Map of Maryland (Brush et al. 1976)
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-5
Forest Resources Map
Page 2 of 5

Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Sycamore, Green Ash, Ash-leaf Maple, Silver Maple Forest Association
- Tulip Poplar Forest Association

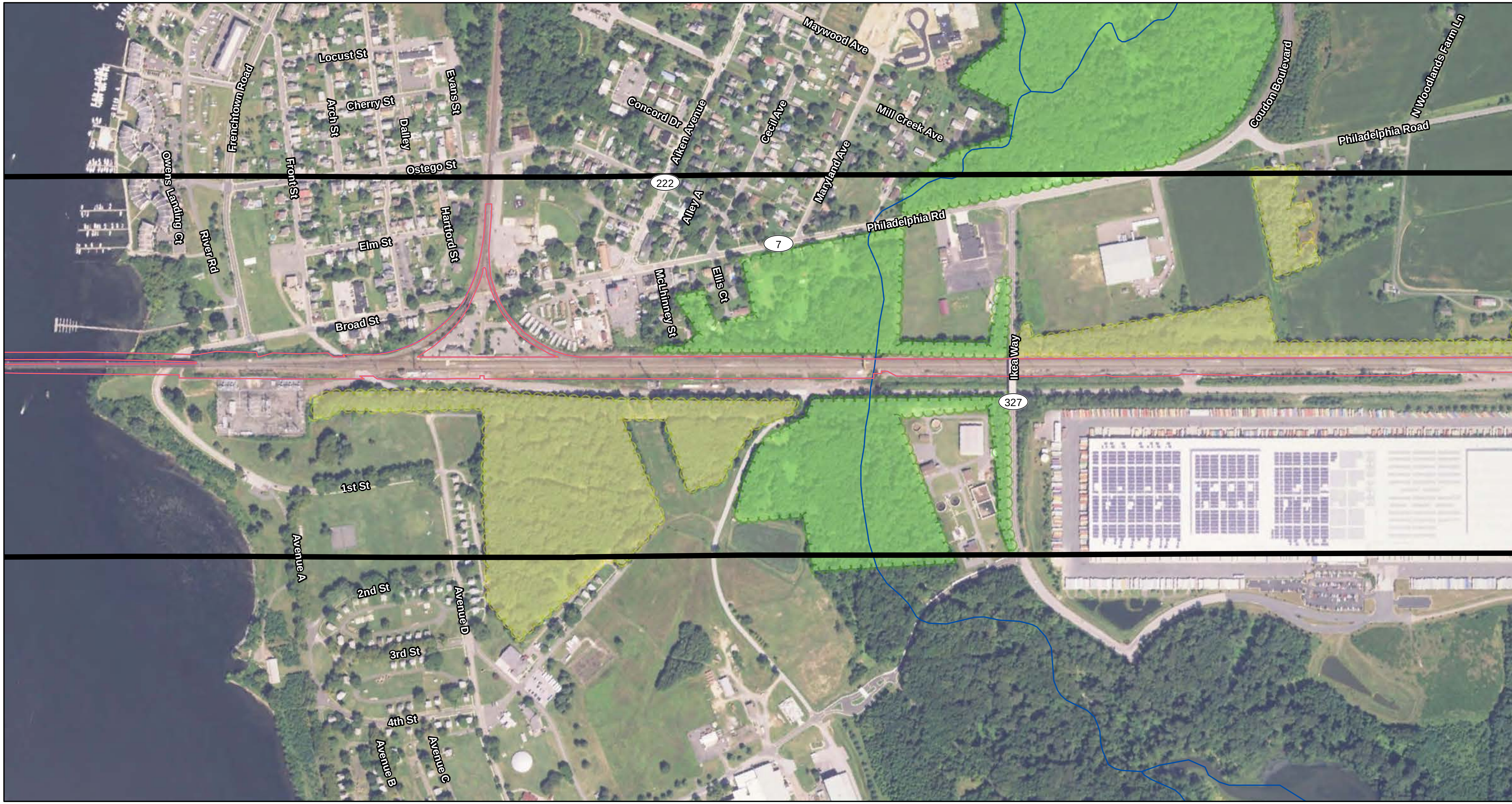
Data Sources

Streams:
MDE, 2012
Forest Assocation:
Vegetation Map of Maryland (Brush et al. 1976)
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-5
Forest Resources Map
Page 3 of 5



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Sycamore, Green Ash, Ash-leaf Maple, Silver Maple Forest Association
- Tulip Poplar Forest Association

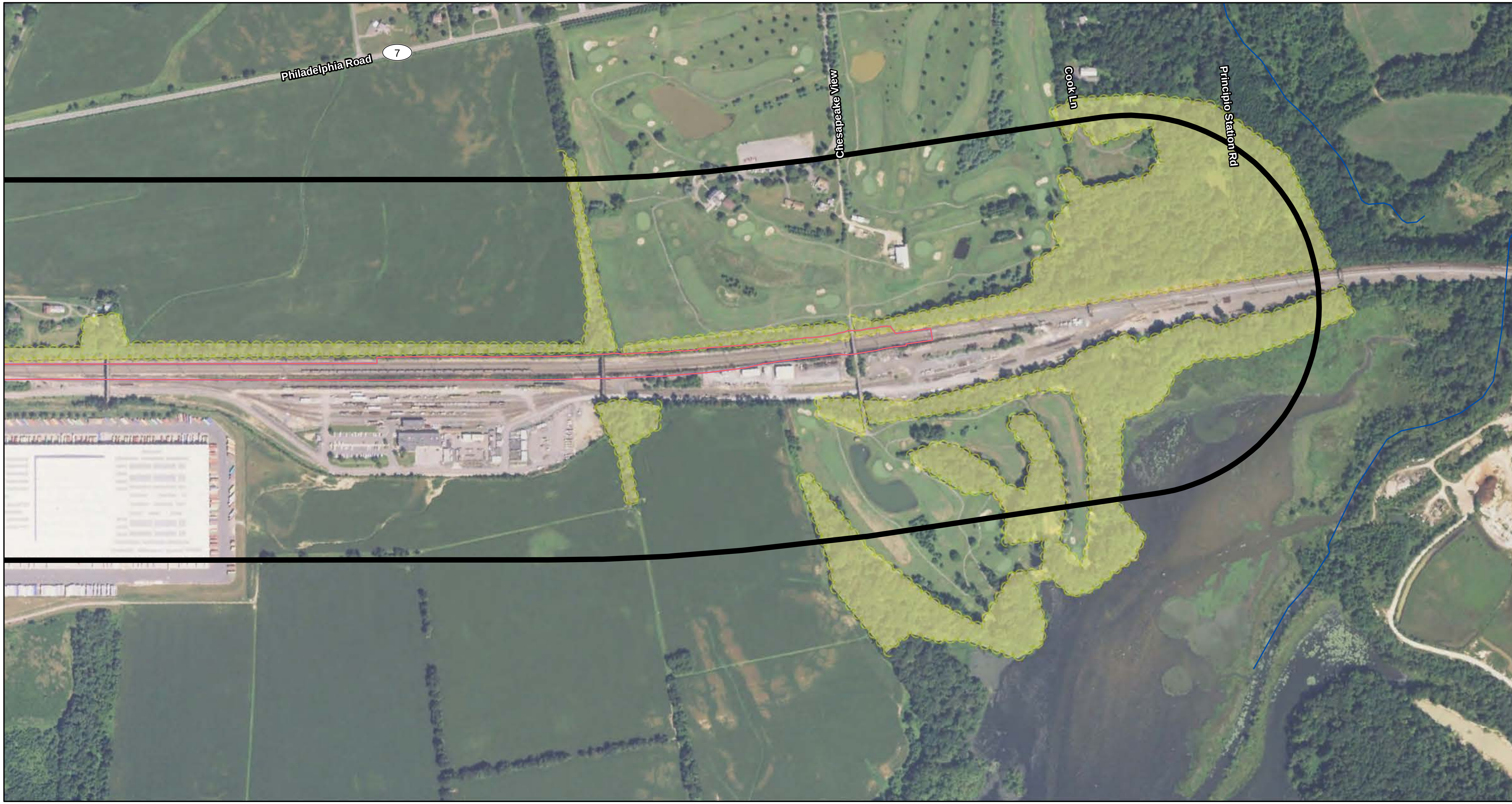
Data Sources

Streams:
MDE, 2012
Forest Assoication:
Vegetation Map of Maryland (Brush et al. 1976)
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-5
Forest Resources Map
Page 4 of 5



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Sycamore, Green Ash, Ash-leaf Maple, Silver Maple Forest Association
- Tulip Poplar Forest Association

Data Sources

Streams:
MDE, 2012
Forest Assoication:
Vegetation Map of Maryland (Brush et al. 1976)
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-5
Forest Resources Map
Page 5 of 5

Characteristic species in this forest association include sycamore, green ash, box elder (*Acer negundo*), silver maple, red maple, Virginia creeper, white oak, flowering dogwood, and grape. Results of the inventory level field assessment in Cecil County were generally consistent with the mapped forest associations according to Brush et al. Most of the forested areas in Cecil County are smaller rows of deciduous trees bordering the Amtrak ROW and roads within the study area. The canopy species composition of these generally small, disturbed upland stands includes tuliptree, red maple, and sweet-gum. The understory is characterized by dense vines and shrubs, including rambler rose, Japanese honeysuckle, Asiatic bittersweet, and grape. The forest stand associated with Mill Creek was characterized by relatively mature upland and wetland cover types. Common canopy trees included tuliptree, sweet-gum, and sycamore in the 10 to 30-inch diameter size class and red maple in the four to ten-inch diameter size class. Common understory species included black cherry (*Prunus serotina*), American beech, American holly (*Ilex opaca*), rambler rose, bush honeysuckle, and Japanese honeysuckle. At the extreme eastern end of the study area, forest stands lie on the north and south sides of the Amtrak ROW just east of the Furnace Bay Golf Course.

While a formal specimen tree survey has not been conducted, trees with diameters of 30 inches or greater were observed as individual trees along the shoreline of the Susquehanna River just south of the Amtrak ROW adjacent to Avenue A. On the grounds of the Rodgers Tavern, two trees appeared to be greater than 30 inches in diameter, including a sycamore and willow oak (*Quercus phellos*). Within the floodplain of Mill Creek between MD 7 and the Amtrak ROW, several trees (sweet-gum, sycamore) appeared to have diameters equal to or greater than 30 inches.

b. 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 ***Table E-9*** lists Herpetofauna documented near the study area.

Table E-9
Herpetofauna Documented Near the Study Area

Scientific Name	Common Name	Scientific Name	Common Name
AMPHIBIANS		**REPTILES**	
Acris crepitans	Eastern cricket frog	*Chelydra serpentine*	Eastern snapping turtle
Ambystoma maculatum	Spotted salamander	*Chrysemys picta*	Painted turtle
Anaxyrus fowleri	Fowler’s toad	*Clemmys guttata*	Spotted turtle
Eurycea bislineata	Northern two-lined salamander	*Coluber constrictor constrictor*	Northern black racer
Eurycea longicauda longicauda	Long-tailed salamander	*Diadophis punctatus*	Ring-necked snake
Hyla versicolor	Gray treefrog	*Kinosternon subrubrum subrubrum*	Eastern mud turtle

Table E-9 (cont'd)
Herpetofauna Documented Near the Study Area

Scientific Name	Common Name	Scientific Name	Common Name
AMPHIBIANS		**REPTILES**	
Lithobates clamitans melanota	Northern green frog	*Nerodia sipedon sipedon*	Northern watersnake
Lithobates palustris	Pickerel frog	*Plestiodon fasciatus*	Common five-lined skink
Plethodon cinereus	Eastern redbacked salamander	*Lampropeltis traingulum Triangulum*	Eastern milksnake
Pseudacris crucifer	Spring peeper*	*Pantherophis alleghaniensis*	Eastern ratsnake
Pseudemys rubriventris	Northern red-bellied cooter	*Storeria dekayi dekayi*	Northern brownsnake
Rana catesbeiana	American bullfrog	*Thamnophis sirtalis sirtalis*	Eastern gartersnake
		Trachemys scripta elegans	Red-eared slider
		Virginia valeriae valeriae	Eastern smooth earthsnake

Source: Maryland Amphibian and Reptile Atlas 2010-2014, Natural History Society of Maryland, Interim results used with permission)
* Observed during the inventory level field assessment.

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 (***Table E-10***).

Table E-10
Breeding birds documented near the study area

Scientific Name	Common Name	Scientific Name	Common Name
Accipiter cooperii	Cooper's hawk*	*Melanerpes carolinus*	Red-bellied woodpecker*
Actitis macularius	Spotted sandpiper	*Melanerpes erythrocephalus*	Red-headed woodpecker
Agelaius phoeniceus	Red-winged blackbird*	*Meleagris gallopavo*	Wild turkey
Aix sponsa	Wood duck*	*Melospiza melodia*	Song sparrow*
Anas discors	Blue-winged teal	*Mimus polyglottos*	Northern mockingbird*
Anas platyrhynchos	Mallard*	*Mniotilta varia*	Black-and-white warbler
Anas rubripes	American blackdDuck	*Molothrus ater*	Brown-headed cowbird*
Antrostomus carolinensis	Chuck-will's-widow	*Myiarchus crinitus*	Great crested flycatcher
Antrostomus vociferous	Whip-poor-will	*Nyctanassa violacea*	Yellow-crowned night-heron
Archilochus colubris	Ruby-throated hummingbird	*Nycticorax nycticorax*	Black-crowned night-heron
Ardea alba	Great egret	*Pandion haliaetus*	Osprey*
Ardea herodias	Great blue heron*	*Parkesia motacilla*	Louisiana waterthrush
Baeolophus bicolor	Tufted titmouse*	*Passer domesticus*	House sparrow*

Table E-10 (cont'd)
Breeding birds documented near the study area

Scientific Name	Common Name	Scientific Name	Common Name
Bombycilla cedrorum	Cedar waxwing	*Passerculus sandwichensis*	Savannah sparrow
Botaurus lentiginosus	American bittern	*Passerina caerulea*	Blue Grosbeak
Branta canadensis	Canada goose*	*Passerina cyanea*	Indigo bunting
Bubo virginianus	Great horned owl	*Phalacrocorax auritus*	Double-crested cormorant*
Buteo jamaicensis	Red-tailed hawk	*Phasianus colchicus*	Ring-necked pheasant
Buteo lineatus	Red-shouldered hawk	*Picoides pubescens*	Downy woodpecker*
Butorides virescens	Green heron	*Pipilo erythrophthalmus*	Eastern towhee*
Cardinalis cardinalis	Northern cardinal*	*Piranga olivacea*	Scarlet tanager
Cathartes aura	Turkey vulture*	*Podilymbus podiceps*	Pied-billed grebe
Catharus fuscescens	Veery	*Poecile carolinensis*	Carolina chickadee*
Chaetura pelagica	Chimney swift	*Polioptila caerulea*	Blue-gray gnatcatcher
Charadrius vociferous	Killdeer*	*Porzana carolina*	Sora
Circus cyaneus	Northern harrier	*Progne subis*	Purple martin
Cistothorus palustris	Marsh wren	*Protonotaria citrea*	Prothonotary warbler
Coccyzus americanus	Yellow-billed cuckoo	*Quiscalus quiscula*	Common grackle*
Colaptes auratus	Northern flicker*	*Rallus elegans*	King rail
Colinus virginianus	Northern bobwhite	*Riparia riparia*	Bank swallow
Columba livia	Rock pigeon*	*Sayornis phoebe*	Eastern phoebe*
Contopus virens	Eastern wood-pewee	*Scolopax minor*	American woodcock
Coragyps atratus	Black vulture*	*Seiurus aurocapilla*	Ovenbird
Corvus brachyrhynchos	American crow*	*Setophaga americana*	Northern parula
Corvus ossifragus	Fish crow*	*Setophaga citrina*	Hooded warbler
Cyanocitta cristata	Blue jay*	*Setophaga discolor*	Prairie warbler
Cygnus olor	Mute swan	*Setophaga petechia*	Yellow warbler
Dryocopus pileatus	Pileated woodpecker	*Setophaga ruticilla*	American redstart
Empidonax virescens	Acadian flycatcher	*Sitta carolinensis*	White-breasted nuthatch*
Eremophila alpestris	Horned lark	*Spinus tristis*	American goldfinch*
Falco peregriuns	Peregrine falcon	*Spizella passerina*	Chipping sparrow*
Geothlypis formosa	Kentucky warbler	*Stelgidopteryx serripennis*	Northern rough-winged swallow*
Geothlypis trichas	Common yellowthroat	*Setophaga pinus*	Pine warbler
Haemorphous mexicanus	House finch*	*Sternula antillarum*	Least tern
Haliaeetus leucocephalus	Bald eagle	*Strix varia*	Barred owl
Helmitheros vermivorum	Worm-eating warbler	*Sturnella magna*	Eastern meadowlark
Hylocichla mustelina	Wood thrush	*Sturnus vulgaris*	European starling*
Icteria virens	Yellow-breasted chat	*Tachycineta bicolor*	Tree swallow*
Icterus galbula	Baltimore oriole	*Thryothorus ludovicianus*	Carolina wren*
Icterus spurius	Orchard oriole	*Toxostoma rufum*	Brown Thrasher
Ixobrychus exilis	Least bittern	*Troglodytes aedon*	House wren
Larus argentatus	Herring gull*	*Turdus migratorius*	American robin*
Larus delawarensis	Ring-billed gull*	*Tyrannus tyrannus*	Eastern kingbird
Larus marinus	Great Black-backed gull*	*Vireo gilvus*	Warbling vireo
Lophodytes cucullatus	Hooded merganser	*Vireo griseus*	White-eyed Vvireo

Table E-10 (cont'd)
Breeding birds documented near the study area

Scientific Name	Common Name	Scientific Name	Common Name
Megaceryle alcyon	Belted kingfisher	*Vireo olivaceus*	Red-eyed vireo
Megascops asio	Eastern screech-owl	*Zenaida macroura*	Mourning dove*

Source: 2nd Atlas of the Breeding Birds of Maryland and the District of Columbia
*Observed during the inventory level field assessment.

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. ***Table E-11*** includes a list of mammal species that could potentially inhabit the study area (DNR-WHS website accessed November 20, 2014).

Table E-11
Mammals potentially occurring near the study area

Scientific Name	Common Name	Scientific Name	Common Name
Blarina brevicauda	Northern short-tailed shrew	*Nycticeius humeralis*	Evening bat
Canis latrans	Coyote	*Odocoileus virginianus*	White-tailed deer*
Castor canadensis	American beaver*	*Ondatra zibethicus*	Muskrat
Condylura cristata parva	Southeastern star-nosed mole	*Oryzomys palustris*	Marsh rice rat
Cryptotis parva	Least shrew	*Peromyscus leucopus*	White-footed deer mouse
Didelphis virginiana	Virginia opossum	*Peromyscus maniculatus*	Deer mouse
Eptesicus fuscus	Big brown bat	*Pipistrellus subflavus*	Eastern pipistrelle
Glaucomys volans	Southern flying squirrel	*Procyon lotor*	Raccoon*
Lasionycteris noctivagans	Silver-haired bat	*Rattus norvegicus*	Norway rat
Lasiurus borealis	Eastern red bat	*Rattus rattus*	Black rat
Lasiurus cinereus	Hoary bat	*Reithrodontomys humulis*	Eastern harvest mouse
Lutra canadensis	Northern river otter	*Scalopus aquaticus*	Eastern mole
Marmota monax	Woodchuck*	*Sciurus carolinensis*	Eastern gray squirrel*
Mephitis mephitis	Striped skunk	*Sciurus niger*	Eastern fox squirrel
Microtus pennsylvanicus	Meadow vole	*Sorex hoyi winnemana*	Southern pygmy shrew
Microtus pinetorum	Woodland vole	*Sylvilagus floridanus*	Eastern cottontail*
Mus musculus	House mouse	*Synaptomys cooperi*	Southern bog lemming
Mustela vison	Mink	*Tamiasciurus hudsonicus*	Red squirrel
Myocastor coypus	Nutria	*Urocyon cinereoargenteus*	Gray fox
Myotis lucifugus	Little brown myotis	*Vulpes vulpes*	Red fox
Myotis septentrionalis	Northern long-eared bat[1]	*Zapus hudsonius*	Meadow jumping mouse
Napaeozapus insignis	Woodland jumping mouse		

*Observed (directly or indirectly – tracks) during the inventory level field assessment.
[1] Federally Endangered

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 (*Anaxyrus* spp.), common five-lined skink (*Plestiodon fasciatus*), eastern redbacked salamander (*Plethodon cinereus*), northern black racer, (*Coluber constrictor constrictor*), eastern ratsnake (*Pantherophis alleghaniensis*), eastern garter snake (*Thamnophis* *sirtalis sirtalis*), and the eastern box turtle (*Terrapene carolina carolina*), among other species. Mammals such as mice (*Peromyscus* spp.), voles (*Microtus* spp.), the eastern mole (*Scalopus aquaticus*), bats (*Myotis* spp.), squirrels (*Sciurus* spp. and *Tamiasciurus hudsonicus*), foxes (*Urocyon cinereoargenteus* and *Vulpes vulpes*), raccoon (*Procyon lotor*), woodchuck (*Marmota monax*), and white tailed deer (*Odocoileus virginianus*), 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 (*Rattus norvegicus*) and the black rat (*Rattus rattus*). Bird species likely to occur within the smaller, more disturbed forests with abundant edge habitat would be common species such as red-bellied woodpecker (*Melanerpes carolinus*), downy woodpecker (*Picoides pubescens*), eastern wood-pewee (*Contopus virens*), American crow (*Corvus brachyrhynchos*), blue jay (*Cyanocitta cristata*), Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), white-breasted nuthatch (*Sitta carolinensis*), Carolina wren (*Thryothorus ludovicianus*), American robin (*Turdus migratorius*), and northern cardinal (*Cardinalis cardinalis*). 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 (See ***Table E-10***).

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 a specialized group of birds of FIDS. ***Table E-12*** lists the FIDS potentially occurring within the Critical Area. According to the breeding birds listed in ***Table E-12***, 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.

Table E-12
List of Maryland's FIDS

Scientific Name	Common Name
Buteo lineatus	Red-shouldered hawk[1]
Buteo platypterus	Broad-winged hawk[1]
Strix varia	Barred owl[1]
Caprimulgus vociferous	Whip-poor-will
Picoides villosus	Hairy woodpecker
Dryocopus pileatus	Pileated woodpecker
Empidonax virescens	Acadian flycatcher
Certhia Americana	Brown creeper[1]
Catharus fuscescens	Veery
Hylocichla mustelina	Wood thrush
Vireo flavifrons	Yellow-throated vireo
Vireo olivaceus	Red-eyed vireo
Setophaga americana	Northern parula
Setophaga virens waynei	Black-throated green warbler[1]
Setophaga cerulea	Cerulean warbler[1]
Mniotilta varia	Black-and-white warbler[1]
Setophaga ruticilla	American redstart[1]
Protonotaria citrea	Prothonotary warbler
Helmitheros vermivorum	Worm-eating warbler[1]
Limnothlypis swainsonii	Swainson's warbler[1,2]
Seiurus aurocapillus	Ovenbird
Parkesia motacilla	Louisiana waterthrush[1]
Setophaga citrina	Hooded warbler[1]
Geothlypis formosa	Kentucky warbler[1]
Piranga olivacea	Scarlet tanager

[1]Highly area-sensitive species most vulnerable to forest loss, fragmentation, and overall habitat degradation.

[2]State-listed as Endangered.

Wetlands and vernal pools within the study area could support herpetofauna species such as the eastern cricket frog (*Acris crepitans*), spring peeper (*Pseudacris crucifer*), American bullfrog (*Rana catesbeiana*), northern green frog (*Lithobates clamitans melanota*), pickerel frog (*L. palustris*), wood frog (*L. sylvaticus*), painted turtle (*Chrysemys picta*), snapping turtle (*Chelydra serpentina*), northern watersnake (*Nerodia sipedon sipedon*), and spotted salamander (*Ambystoma maculatum*), among other species. The spring peeper was observed during the early spring inventory level field assessment (See ***Table E-9***). Smaller streams could support the northern two-lined salamander (*Eurycea bislineata*) and the long-tailed salamander (*E. longicauda longicauda*). Larger waterbodies within the study area, such as the Susquehanna River, are also habitat for species such as the northern map turtle (*Graptemys geographica*), red-bellied cooter (*Pseudemys rubriventris*), American beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and the northern river otter (*Lutra canadensis*). The northern map turtle is a state-endangered aquatic turtle discussed in Section D. 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 (*Agelaius phoeniceus*) would be expected. In addition, many species of waterfowl, gulls and terns, and raptors, such as the osprey (*Pandion haliaetus*) and bald eagle (*Haliaeetus leucocephalus*), forage in and rest on the Susquehanna River during different seasons.

c. Threatened, Endangered, or Special Concern Terrestrial Species

Listed Species

On April 2, 2015, USFWS listed the northern long-eared bat (NLEB) (*Myotis septentrionalis*) 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.

In response to a December 13, 2013 letter requesting information on RTE species in the Proposed Project study area, DNR issued a letter dated March 20, 2014 and an updated response in September 1, 2015 (Refer to ***Attachment E***) that identified potential RTE species or species of statewide importance that could occur within the study area. The letter identified the presence of a WSSC located within the Swan Creek drainage just south of the Amtrak ROW at the western end of the study area. The presence within the study area of historic waterfowl concentration and staging areas within the Susquehanna River was also referenced in the March 2014 DNR letter (see below). At the eastern end of the study area, DNR identified the presence of a known site within the Furnace Bay wetlands that supports a population of state-listed endangered water horsetail (*Equisetum fluviatile*) and vetchling (*Lathyrus palustris*). Both plant species are found in aquatic habitats. No other state-listed species were documented by the DNR as potentially occurring within the study area. A response letter was submitted to DNR on April 7, 2016 regarding all potentially occurring resources within the study area (***Attachment E)***. On May 9, 2016, DNR issued a subsequent letter elaborating on the aforementioned resources and listing additional concerns with the state-listed endangered northern map turtle (Graptemys geographica) and Forest Interior Dwelling Bird Species (FIDS). A follow-up response letter was submitted to DNR on June 14, 2016 providing additional information on further coordination on these resources and documenting that the listed plant species are outside of the project limit of disturbance and will receive additional protection by the project strictly adhering to best management practices for sediment and erosion control.

Waterfowl Concentrations & 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 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 begun to rebound, 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 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.

3. NO ACTION ALTERNATIVE

Without the Proposed Project, terrestrial resources are expected to remain the same as described in Affected Environment. The No Action Alternative is used as a baseline scenario against which potential Proposed Project impacts will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

a. Forest Resources

Forest resources are protected in Maryland under the Maryland Forest Conservation Act for any activity requiring application for a subdivision, grading permit, or sediment and erosion control plan that will disturb at least 40,000 square feet of area. 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.

The two Build Alternatives will have minor 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 Proposed Project study area. The Build Alternatives all terminate over a mile east of this forested area thus avoiding any impact to these resources.

Alternative 9A

Alternative 9A would have the greatest forest impacts of the two Build Alternatives. 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. Forest impacts from Alternative 9A would total approximately 2.92 acres.

Alternative 9B

Alternative 9B would also impact the same forested habitat adjacent to Havre de Grace Middle School/High School. However, the Proposed Project footprint for Alternative 9B is narrower than that of Alternative 9A, resulting in a potential impact of approximately 2.08 acres.

b. Wildlife

Few wildlife impacts are anticipated from construction of the 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,” 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 residential 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 impacted or displaced.

c. Threatened, Endangered, or Special Concern Terrestrial Species

NLEB roost during the summer months in forested areas; therefore, Alternative 9A has a higher potential for impacts to NLEB habitat. However, the majority of forest impact occurs in relatively narrow and disturbed areas immediately adjacent to the existing tracks/ROW. In a letter dated January 15, 2016 (Refer to ***Attachment E***), the USFWS indicated that because of the relatively small forest impacts and the absence of documented NLEB within the area, the Proposed Project is “not likely to adversely affect” the species. The letter 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 Proposed Project area.

Neither of the Build Alternatives will impact 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 more than a mile west of the termination of Alternative 9A and Alternative 9B. Two state-endangered plants, water horsetail (*Equisetum fluviatile*) and vetchling (*Lathyrus palustris*), are aquatic plants that lie within tidal marsh wetlands of Furnace Bay directly south of the eastern end of the project area. While these plants would not be directly impacted by the Proposed Project, DNR has recommended that, to avoid indirect impacts to the plants, the project strictly adhere to best management practices for sediment and erosion control. 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 Proposed Project area.

An historic waterfowl staging area occurs within the Proposed Project footprint of the two Build Alternatives in the Susquehanna River along the Cecil County side. This area is known to support winter concentrations of ducks and geese that forage on fish, invertebrates, and submerged aquatic vegetation. Waterfowl will not be permanently impacted by either bridge alternative, but may be temporarily displaced from the active construction area. DNR has indicated that further coordination will be required, as the project progresses into later phases of design, regarding any potential disturbances along the shoreline and adjacent open waters, and appropriate protection measures.

5. MINIMIZATION AND MITIGATION OF IMPACTS

a. Forest Resources

Both Alternative 9A and Alternative 9B lie immediately adjacent to the existing track alignment, resulting in only minor forest impacts on the south side of the existing alignment near Havre de Grace Middle School/High School. This forest is relatively narrow and disturbed. Avoidance of a much larger forest tract farther to the west 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 FCP will be coordinated, reviewed, and approved by DNR.

Where unavoidable 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: maintain forest at or above the break-even point, protecting 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.

D. AQUATIC RESOURCES

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Clean Water Act (33 USC §§ 1251-1387)

The objective of the Clean Water Act, also known as the Federal Water Pollution Control Act, is to restore and maintain the chemical, physical, and biological integrity of the waters of the United States. It regulates point sources of water pollution, such as discharges of municipal sewage, industrial wastewater, and stormwater runoff; the discharge of dredged or fill material into navigable waters and other waters; and non-point source pollution (e.g., runoff from streets, construction sites, etc.) that enter water bodies from sources other than the end of a pipe. Applicants for discharges to navigable waters in Maryland must obtain a Water Quality Certification from MDE.

Safe Drinking Water Act (42 USC §§ 330f-300j)

The Safe Drinking Water Act Amendments of 1986 requires each state to develop Wellhead Protection Programs. The EPA approved Maryland's Wellhead Protection Program in June of 1991. Maryland's program provides technical assistance, information, and funding to local governments, to help them protect their water supplies. Wellhead Protection is a strategy designed to protect public drinking water supplies by managing the land surface around a well where activities might affect the quality of the water.

Section 7 of the Endangered Species Act

Section 7 of the ESA protects listed species, assists with species recovery, and protects lands that provide critical habitat for federally-listed endangered and threatened species. Section 7 requires that federal agencies consult with the National Marine Fisheries Service (NMFS) for marine and anadromous species, or the USFWS for freshwater species and wildlife, on any federal action that has the potential to affect listed species or critical habitats.

Executive Order 13508 on Chesapeake Bay Protection and Restoration

The purpose of the Executive Order, signed on May 12, 2009, is to "protect and restore the health, heritage, natural resources, and social and economic value of the nation's largest estuarine ecosystem and the natural sustainability of its watershed." Under the Executive Order, multiple federal agencies were required to make recommendations concerning water quality, agricultural conservation practices, SWM practices, impacts of climate change, public access, and environmental research. These recommendations were integrated into a coordinated strategy for restoration and protection, which was presented on May 12, 2010. The strategy launches major environmental initiatives, establishes two-year milestones for water quality and other action items, and sets specific and measurable restoration and water quality goals with the help and partnership of local communities.

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).

State Environment Article, Title 9, Subtitle 3 authorizes the MDE to develop comprehensive programs and plans for the prevention, control, and abatement of pollution of the waters of the State and to issue, modify, or revoke orders and permits that prohibit discharges of pollutants into Maryland waters, in accordance with Section 402 of the federal Clean Water Act. The MDE regulates discharges to Maryland State waters under COMAR 26.08.04. Activities requiring a NPDES permit include point source discharges of wastewater, discharge of stormwater runoff, thermal discharges, and construction activities that disturb one or more acres.

Methodology

Existing conditions for aquatic resources were summarized using the following:

- 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; river bathymetry; 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.

2. AFFECTED ENVIRONMENT

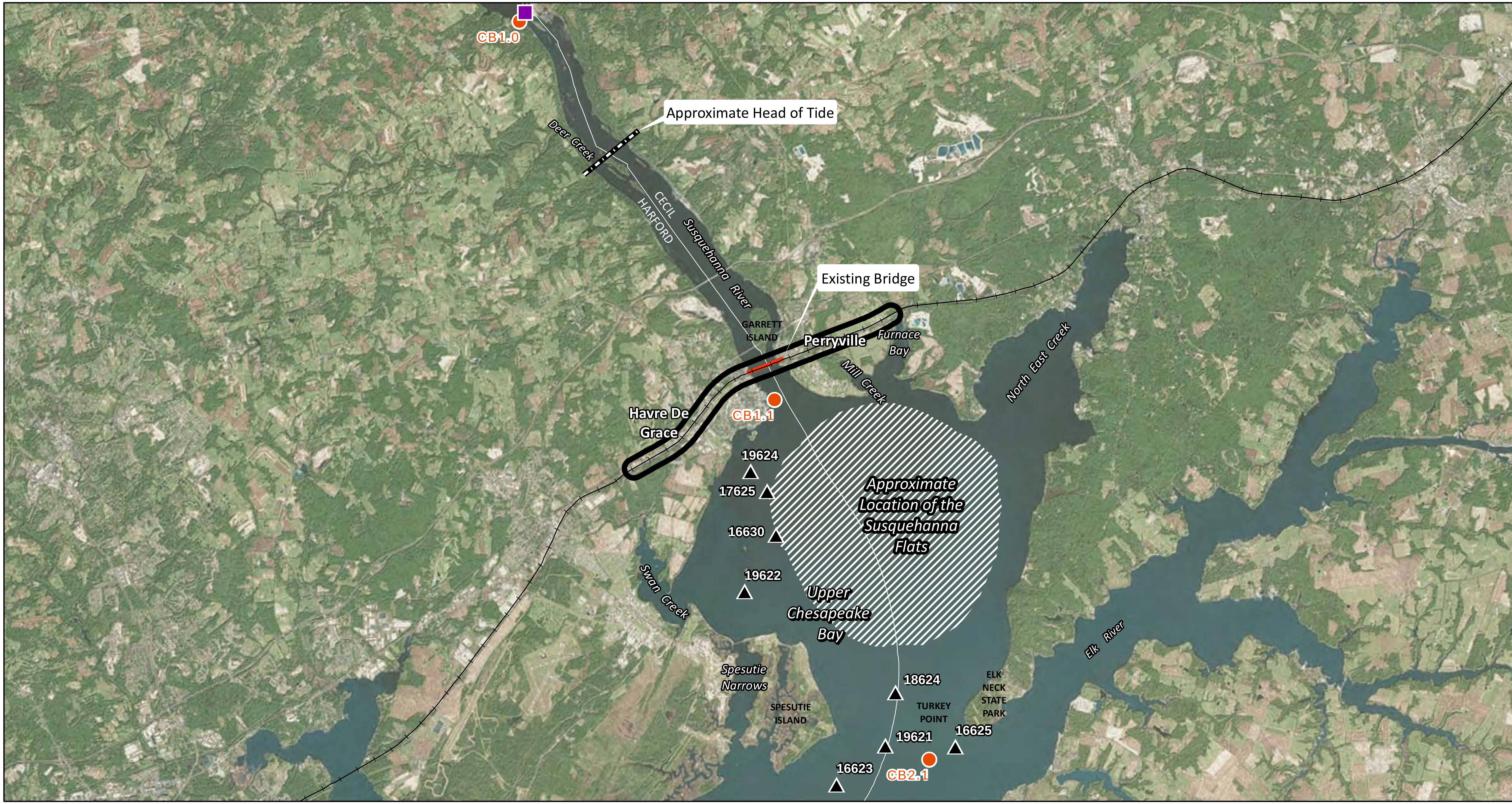
The study area for aquatic resources comprises the Lower Susquehanna River from the head of tide north of Port Deposit to the confluence with the Upper Bay, and the Upper Bay down to the Elk River at Turkey Point to include the shallow Susquehanna Flats area where much of the larger grained sediment discharged by the Susquehanna River is deposited (***Figure E-6***) (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.

a. Hydrology

The Susquehanna River Rail Bridge crosses the Lower Susquehanna River[2], just north of its confluence with the Chesapeake Bay (***Figure E-6***), 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 main portion of the Chesapeake Bay extends approximately 186 miles from the Atlantic Ocean up to the Susquehanna River, varying in width from about 3.4 miles near Aberdeen, Maryland, to 35 miles near the mouth of the Potomac River (USEPA 2010).

The Susquehanna River supplies most of the freshwater (about 60 percent) to the Bay, with the remainder primarily supplied by the Potomac, Rappahannock, York, and James Rivers (Cerco et al. 2013). Much of the freshwater inputs to the Bay occur during winter and spring, with occasional large discharges in late summer during tropical storm events

[2] 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



Legend

- ▲ Chesapeake Bay Program Benthic Monitoring Stations
- ■ USGS Gage
- ● Chesapeake Bay Program Water Quality Stations
- Existing Bridge
- 1,000 ft Study Area
- Rail line

Data Sources

Monitoring Locations:
USGS, Chesapeake Bay Program
County Boundaries:
Maryland Department of Planning, 2006

N

0 1 2 Miles

Susquehanna River Rail Bridge Project

Figure E-6
Aquatic Monitoring Stations within the Vicinity of the Existing Susquehanna River Bridge

(Cerco and Noel 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 Conowingo Project has limited active storage available due to reservoir size and a relatively small allowable variation in headwater level. Additionally, the Conowingo Project must also maintain certain minimum flows downstream of the dam: 3,500 cubic feet per second (cfs) or natural river flow in March; 10,000 cfs or natural river flow, whichever is less in April; 7,500 cfs or natural river flow in May; 5,000 cfs or natural river flow, whichever is less from June 1 through September 14; 3,500 cfs or natural river flow, whichever is less from September 15 to November 30; and 3,500 cfs intermittent from December 1 through February 28 (NAI and Gomez and Sullivan 2011a). Mean Susquehanna River flow recorded at Conowingo (USGS gage 01578310) located just downstream of the Conowingo Dam was about 41,233 cfs for the period between January 1, 2008 and November 11, 2013. The average flow at Havre de Grace is 40,100 cfs (SRBC 2013). According to USGS, the mean river discharge is 65,700 cubic feet per second (cfs) averaged over 46 years of records at the Conowingo Dam, 9.9 miles upstream from the mouth. Minimum discharge was 10,700 cfs in 1993 and the maximum was 330,000 cfs in 1975 (USGS 2014).

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. Wind and other climatic events can disrupt this pattern (Cerco et al. 2013; USEPA 2004) and during storm events, with large discharges of freshwater all water depths within the Upper Bay flow south (STAC 2000). The mean tide range in the Bay decreases from about 2.5 feet at the mouth to less than 1.3 feet in the Upper Bay (Cerco et al. 2013). The Lower Susquehanna is tidal up to the northern end of Robert Island to the north of Port Deposit, where Deer Creek discharges to the river on the western bank (Gomez and Sullivan Engineers, P.C. 2011). Salinity within the Bay ranges from marine levels at the mouth to freshwater in the Upper Bay in the vicinity of the Susquehanna River (Cerco et al. 2013, Chesapeake Bay Program 2016).

Within the study area, the tide ranges from 0.2 feet at Mean Low Water (MLW) to 2.1 feet at Mean High Water (MHW) at Havre de Grace. The Susquehanna River is tidal at Havre de Grace with a mean semi-diurnal variation of 2.1 feet and approximately 2.5 feet during spring neap tides. The Susquehanna River empties into the head of Chesapeake Bay from northwestward. The entrance is between Concord Point and Perry Point, one mile east-northeastward.

Bathymetry of Susquehanna River

A review of the NOAA Nautical Chart: Head of the Chesapeake Bay (NOAA Chart 12274) was conducted to determine approximate bathymetry for the Susquehanna River within the vicinity of the study area. The Upper Bay in the Susquehanna Flats (shallow waters at the mouth of the Susquehanna River) region is shallow, ranging from about 0.5 feet to 10 feet at Mean Lower Low Water (MLLW). Deeper channels exist along the borders of this shallow region, ranging in depth from 16 to 35 feet at MLLW on the west side and from 15 to 30 feet at MLLW on the east side. At Turkey Point, south of the Susquehanna Flats, depths range from three feet at MLLW in the shallows near the banks to about 22 feet in the deeper channel (NOAA Chart 12274).

In the vicinity of 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. Where the Susquehanna River discharges to the Upper Bay, water depths are up to approximately 42 feet at MLLW, and decrease rapidly to the shallow depths of the Susquehanna Flats area of the Upper Bay (NOAA Chart 12274).

Maryland's Tier II High Quality Waters

Maryland's Antidegradation Policy under COMAR 26.08.02.04 was implemented due to required water quality standards under the Clean Water Act. The Antidegradation Policy requires the State of Maryland to identify Tier II Waters where water quality is better than the minimum requirements and where water quality should be maintained. The Proposed Project area is located along the southern edge of the Mill Creek 1 and Principio Creek 3 Tier II Catchments in Cecil County. The MDE regulates activities with potential discharges or impacts to water quality within Tier II catchments.

b. Groundwater

The groundwater system is controlled by the thickness of the residual weathered bedrock (saprolite) and the degree of fracturing in the bedrock. The saprolite is usually thickest on hilltops and slopes and thinnest in valleys. The saprolite is relatively porous and permeable, and acts as a source of recharge to the bedrock below. Where the saprolite is saturated, groundwater occupies the spaces between unconsolidated soil particles and rock fragments and is under unconfined conditions. The flow water table water-bearing zone generally mimics the land surface contours.

In contrast, groundwater in the bedrock is only in secondary porosity caused by stresses and weak spots. The number and size of the voids determine the secondary porosity of the bedrock; the degree to which the openings are interconnected determines its secondary permeability, and hence groundwater yield. Groundwater in bedrock is commonly under confined conditions due to the essentially impermeable bedrock on the sides of the voids. However, because there are no well-defined, continuous confining beds and because the degree of hydraulic connection between the saprolite and the secondary openings in the underlying bedrock is generally high, the entire groundwater flow system may be considered one complex unconfined aquifer.

The flow system is recharged by precipitation that infiltrates the saprolite and percolates to the water table unit. Frequently, this groundwater is of poor quality and low yield. The bedrock, on the other hand, has very low primary porosity and is less permeable than the saprolite. The number, size, and interconnection of the secondary openings differ with depth below land surface and with topographic setting. Secondary porosity and permeability decrease with depth owing to the increase in pressure and the decrease in weathering and solution. Also, secondary porosity and permeability are relatively low under hilltops and relatively high under draws and valleys.

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.

Wellhead Protection Areas

A wellhead protection area (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. Designation of WHPA has been established under the Safe Drinking Water Act and is implemented through the Maryland Department of the Environment (MDE). Existing and potential sources of contamination are identified for each WHPA which may include: underground storage tanks, sources of discharge to septic systems, agricultural operations, solid waste disposal facilities, and abandoned wells. Limited data is available regarding existing wellhead protection areas within the vicinity of the study area. However, several Source Water Assessment Program (SWAP) reports have been prepared for communities in both Harford and Cecil Counties. The intent of the SWAP reports are to document to delineate the area that contributes to the water source, identify potential sources of contamination and susceptibility of the water supply to contamination. SWAP reports completed within the vicinity of the study area include:

- Swan Harbor Dell Mobile Home Community, Harford County (2003)
- Havre De Grace, Harford County (2003)
- Chestnut Estates Mobile Home Park, Cecil County (2003)
- Perryville, Cecil County (2003)

c. Water Quality

Water quality of the Chesapeake Bay is poor—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 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 TMDL is required under the Clean Water Act and responds to consent decrees in Virginia and the District of Columbia from the late 1990s. It is also the principal component of a federal strategy to meet Executive Order 13508. It sets watershed limits of 185.9 million pounds of nitrogen, 12.5 million pounds of phosphorus, and 6.45 billion pounds of sediment per year. The pollution limits are further divided by jurisdiction and major river basin based on modeling, extensive monitoring data, peer-reviewed science, and close interaction with jurisdiction partners (USEPA 2010).

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.[3]

The Proposed 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. There are no Maryland Biological Stream Survey (MBSS) sites in the unnamed tributary to Swan Creek, but volunteer monitoring data shows the benthic Index of

[3] 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.

Biotic Integrity (IBI) is "Fair." Similarly, in the unnamed tributary to Gashey's Creek there are no MBSS sites, but volunteer monitoring data shows the benthic IBI is "Poor." According to MBSS data, fish and benthic IBIs for Gashey's Creek within the rail corridor are both defined as "Poor." Habitat quality including instream habitat, epifaunal substrate, and pool quality are Optimal, and velocity/depth diversity and riffle quality are Suboptimal. Within the unnamed tributary to Lily Run there are no MBSS sites, though volunteer monitoring shows the benthic IBI is "Poor" (labeled as Lillie [sic] Run in volunteer data). No MBSS or volunteer monitoring sites are located in Lily Run near the rail corridor. There are no MBSS sites in Mill Creek near the rail corridor on the eastern shore of the Susquehanna, but volunteer monitoring data shows that the benthic IBI is "Fair." Principio Creek is tidal within the rail corridor, and its tributaries near the site are classified as Use III streams (natural trout waters). Principio Creek has "Good" IBIs for both fish and benthic invertebrates; instream habitat, epifaunal substrate, velocity/depth diversity, pool quality, and riffle quality are all defined as Optimal according to MBSS data.

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). A draft TMDL for PCBs is currently under development to support the "fishing" designated use of the Lower Susquehanna River, which is protective of human health related to the consumption of fish (MDE 2013). The Lower Susquehanna River was listed in 1996 by MDE as impaired by cadmium. However, this impairment listing was removed in 2009 after further studies indicated that cadmium levels within the Lower Susquehanna River segment remained below water quality criteria.

The Susquehanna River is used as a public water supply source by the City of Havre de Grace and Town of Perryville. The City of Havre de Grace water treatment plant also supplies drinking water to Harford County. Municipal wastewater treatment plants (WWTP) discharging to the Lower Susquehanna and the Upper Bay include the Aberdeen Advanced WWTP (NPDES MD0021563), Aberdeen Proving Ground (NPDES MD0021237), the Havre de Grace WWTP (NPDES MD0021750), and the Perryville WWTP (NPDES MD0020613) (MDE 2010).

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. The nutrient impairment was further refined on Maryland's 2008 list to indicate that phosphorus was the specific nutrient for which the listing was made. After further studies, MDE's water quality analysis indicated that the impairments for both phosphorus and sediment should be removed. The USEPA agreed in letters dated May 18, 2012. 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 2010 Chesapeake Bay TMDL allocates a total nitrogen load of 1,466,462 lbs/yr, a total phosphorus load of 70,734 lbs/yr, and a TSS load of 70,310,967 lbs/yr for the portion of the Upper Bay within the study area (MDE 2010).

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 report card combines multiple water quality and habitat indicators into a single score for 15 regions of the Bay; scores are presented in numeric and narrative formats. Indicators include: chlorophyll-*a*, SAV, dissolved oxygen (DO), Benthic Index of Biological Integrity, water clarity, total nitrogen, total phosphorus, and Bay Health Index. Chlorophyll-*a* is used as a measure of phytoplankton biomass, excess levels of which can lead to reduced water clarity and DO levels. Aquatic grasses and Benthic Index of Biological Integrity give a picture of available habitat conditions. Water clarity, DO, total nitrogen, and total phosphorus are important water quality parameters that affect the quality of aquatic life. The Bay Health Index is an average of the other seven indicators. In 2015, the Upper Bay received scores of 58 percent for total nitrogen ("C"), 23 percent for water clarity ("D"), 35 percent for chlorophyll-*a* ("D"), 39 percent for aquatic grasses ("D"), 61 percent for benthic habitat ("B"), 70 percent for total phosphorus ("B"), and 88 percent for DO ("A"). The overall Bay Health score in 2015 for all regions of the Bay combined was 53 percent, or a C, which was improved from 50 in 2014.

DNR conducts regular water quality monitoring of tidal tributaries and the mainstem of the Chesapeake Bay. Sampling for various forms of the nutrient elements (e.g., nitrogen, phosphorus, carbon), the photosynthetic pigment chlorophyll *a*, silicon, suspended solids, and water clarity and/or turbidity, in addition to water temperature, conductivity, salinity, DO, and pH, began in June 1984. Sampling at each station was conducted biweekly during spring, summer, and fall months, and monthly during the winter. ***Table E-13*** summaries water quality monitoring data for water temperature, DO, and chlorophyll-*a*, three parameters important to survival of aquatic life, and parameters related to the Chesapeake Bay TMDL (Total Nitrogen [TN], Total Phosphorous [TP], and TSS) for one DNR sampling stations on the Lower Susquehanna River (CB1.0 at Conowingo Dam), two Chesapeake Bay mainstem sampling locations within the study area (CB1.1 at the mouth of the Susquehanna River, midchannel, and CB2.1 at Elk Neck State Park, just southeast of the Susquehanna Flats) (see ***Figure E-6***) for a five year period (August 5, 2008 through July 31, 2013). Sampling of surface and bottom waters was conducted at Stations CB1.1 and CB2.1. Only sampling of the surface was conducted at the Conowingo Dam station, CB1.0.

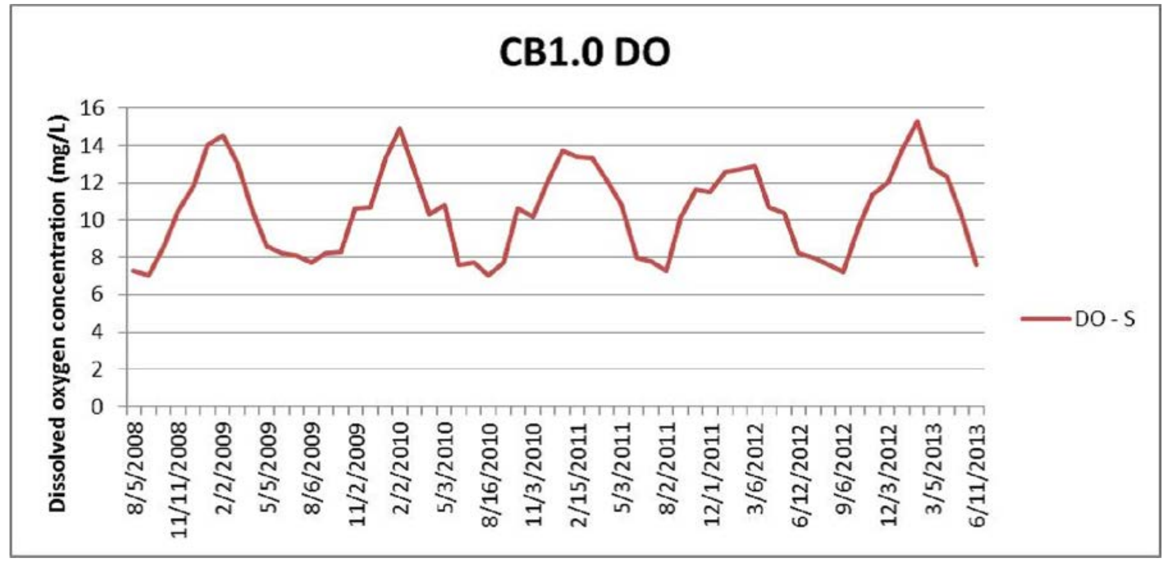
Figures E-7 through E-10 show the seasonal variation of DO, total suspended solids, and total nitrogen and phosphorous from 2008 through 2013. Measurements taken on September 7 and 8, 2011 were excluded from analysis; these data were collected immediately following flooding from Tropical Storm Lee and are not representative of typical conditions. DO concentrations were always above the criteria, were fairly similar at surface, mid, and bottom depths for the Upper Bay stations, peaked in late winter to early spring and were lowest during the summer, typically in August (***Figure E-7***).

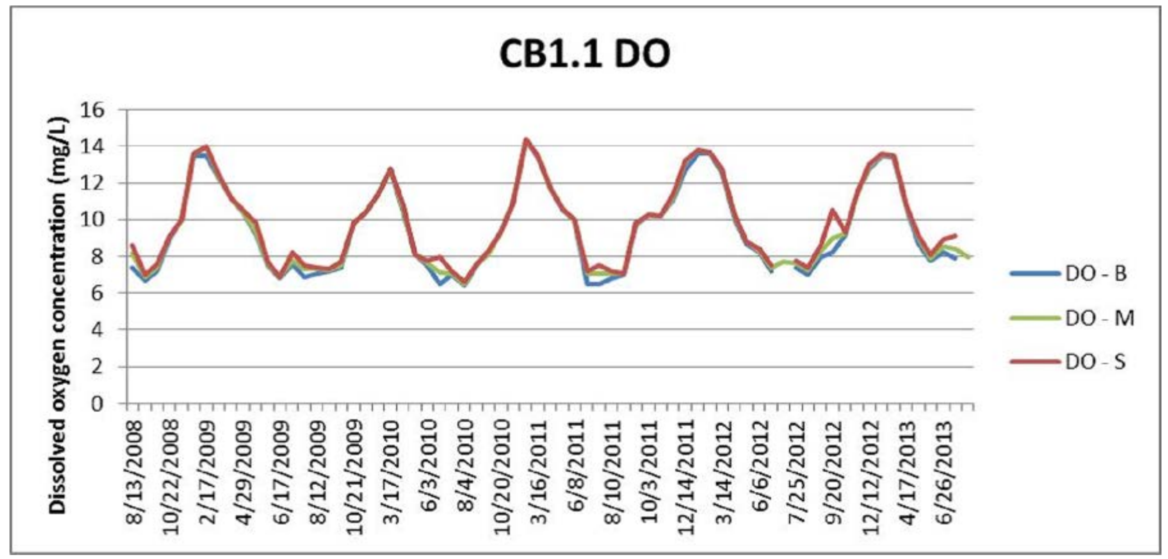
TSS (***Figure E-8***) concentrations at Conowingo Dam (CB1.0) fluctuated over the course of the time period, with the highest discharges typically in the spring and fall. The Upper Bay station at the mouth of the Susquehanna River (CB1.1) showed greater fluctuation in TSS concentration than the Conowingo Dam Station, but surface and bottom concentrations were fairly similar and peak concentrations generally occurred in the spring and fall. The Upper Bay station at the southern end of the study area, CB2.1, showed the greatest fluctuation, with substantially higher bottom than surface concentrations.

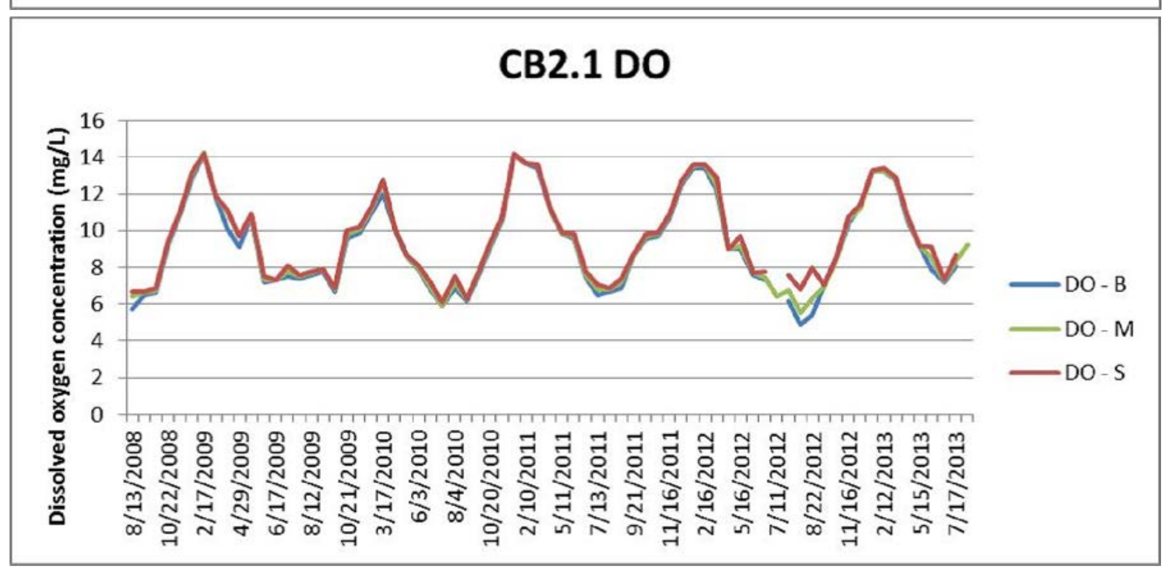
This station is located within the area of the Chesapeake Bay Estuarine Turbidity Maximum (ETM), generally located between Turkey Point and Tolchester, Maryland, which likely contributes to the higher TSS concentrations. ETM traps particles of intermediate settling speeds—larger particles from the Susquehanna River settle out in the Susquehanna Flats before reaching the ETM, smaller slow settling particles are carried through the ETM toward the Atlantic Ocean (STAC 2000).

Excess nutrients, especially nitrogen and phosphorus, can lead to eutrophication and excess growth of plant matter. When these plants decompose, the decomposition process depletes the water of available oxygen, which can lead to hypoxic (low DO) or anoxic (lack of DO) conditions and result in a loss of aquatic life. National criteria have not been established for total nitrogen or phosphorus; however, USEPA has recommended a desired goal of 0.1 mg/L for total phosphorus and 0.38 mg/L for total nitrogen (USEPA 2013).

Maryland has not set water quality standards for either nitrogen or phosphorus in either dissolved or particulate forms, but reduction of these nutrients has been a major focus of the Chesapeake Bay TMDL efforts. Surface and bottom values were fairly similar for both total nitrogen and total phosphorus at the Upper Bay stations, with peak concentrations usually occurring in the fall and early spring (***Figures E-9 and E-10***). The highest concentration of total nitrogen was 2.3 mg/L and occurred at Station CB1.0. The highest concentration of total phosphorus was 0.12 mg/L and occurred at Station CB2.1. Nutrient loads from the Susquehanna River are the major source of nutrients to the mainstem of the Bay, with the

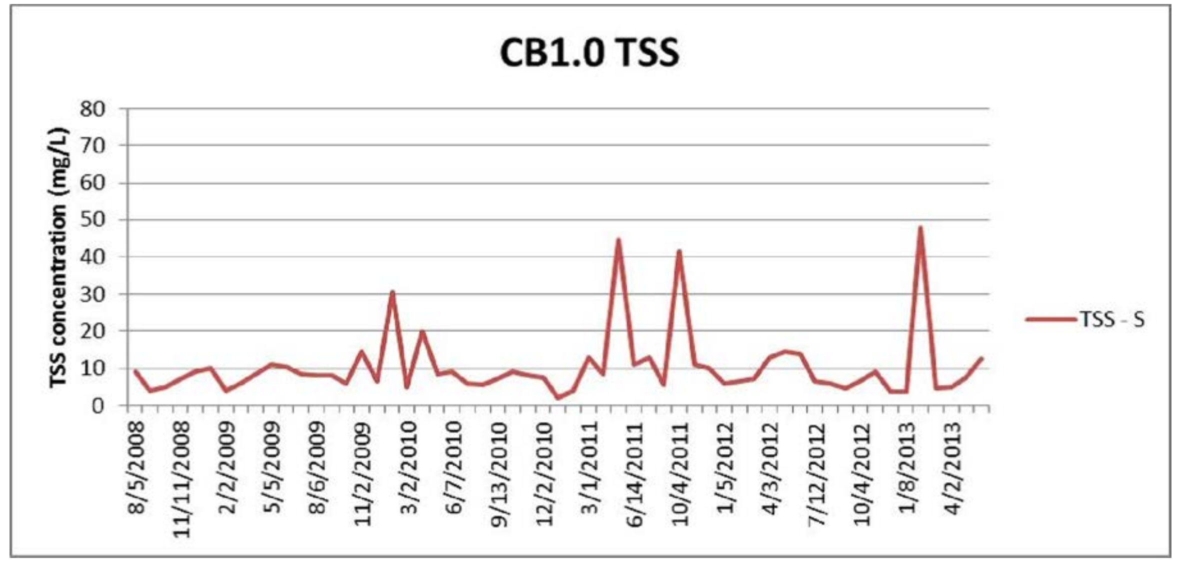


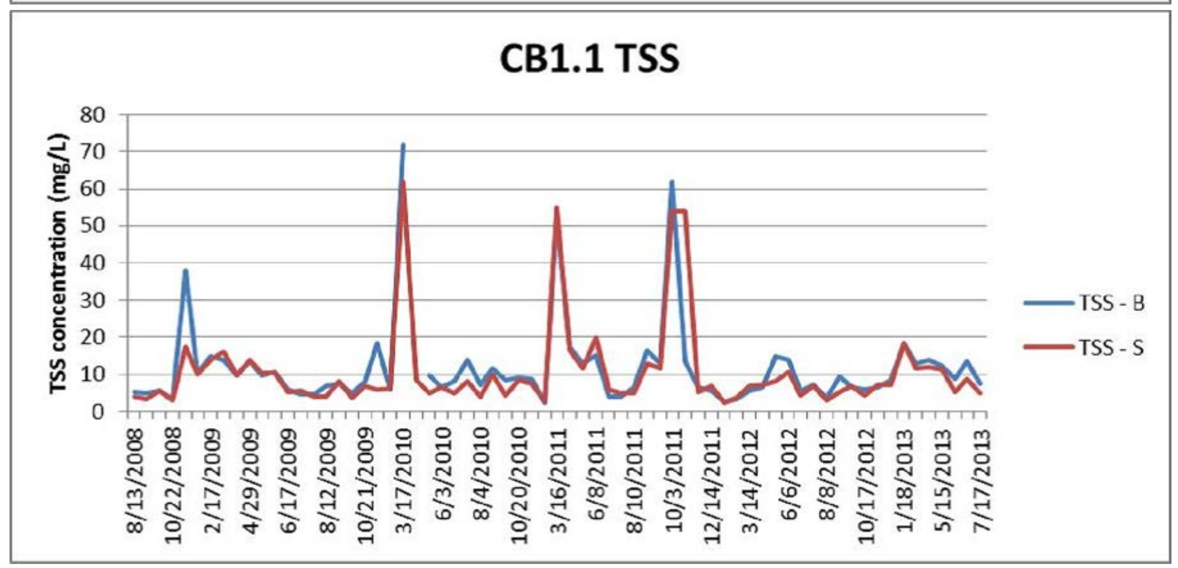


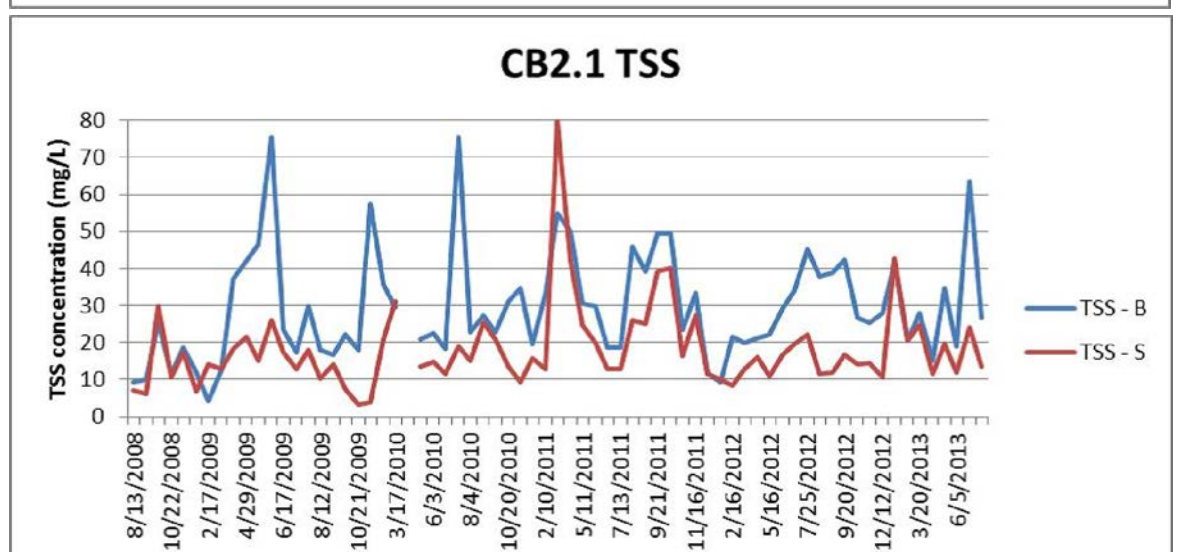


Susquehanna River
Rail Bridge Project

Figures E-7
Dissolved Oxygen
2008 through 2013

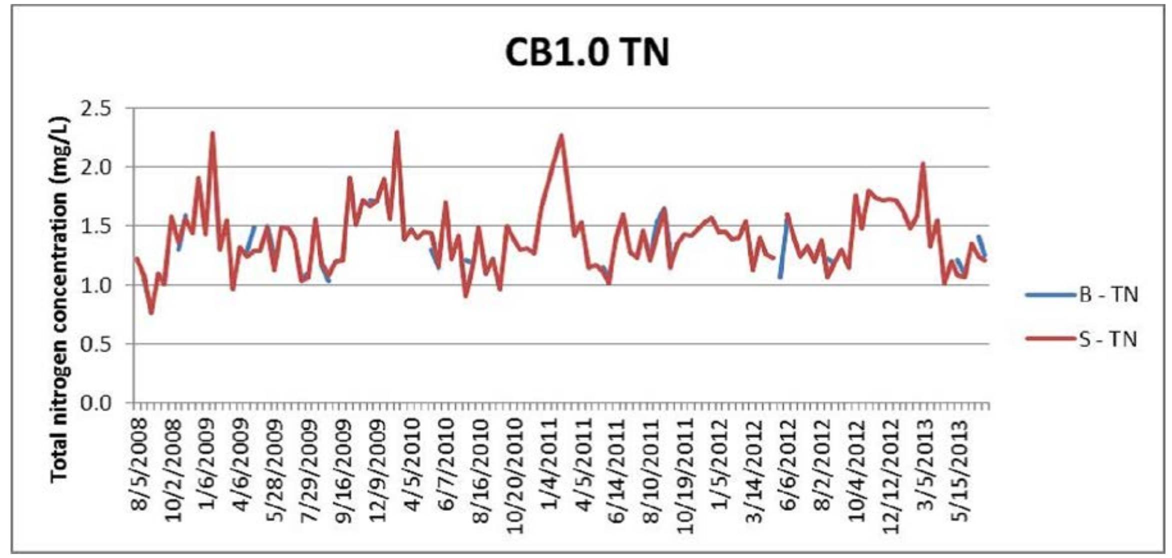


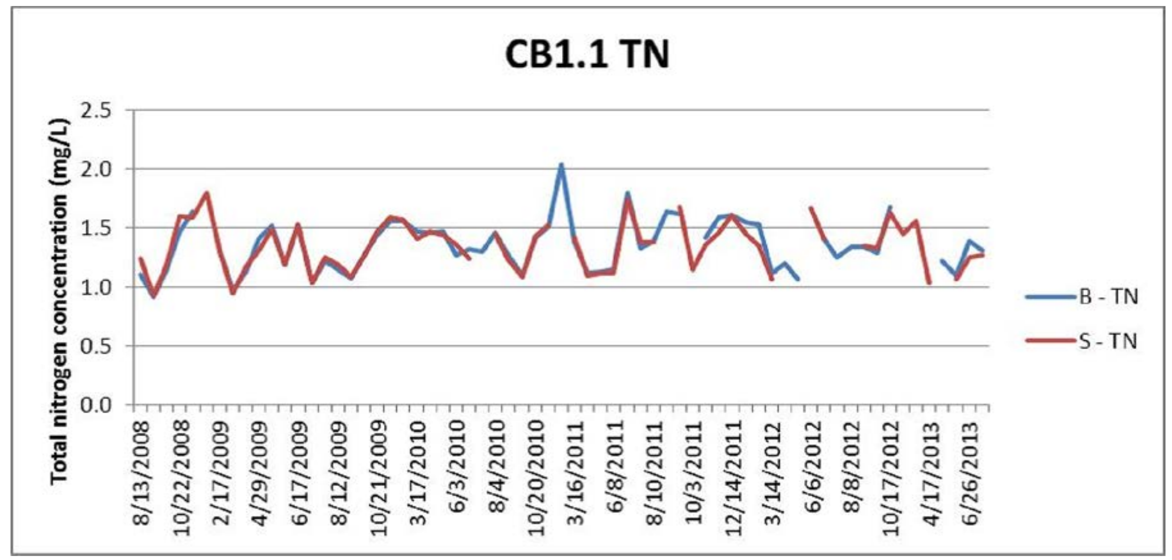


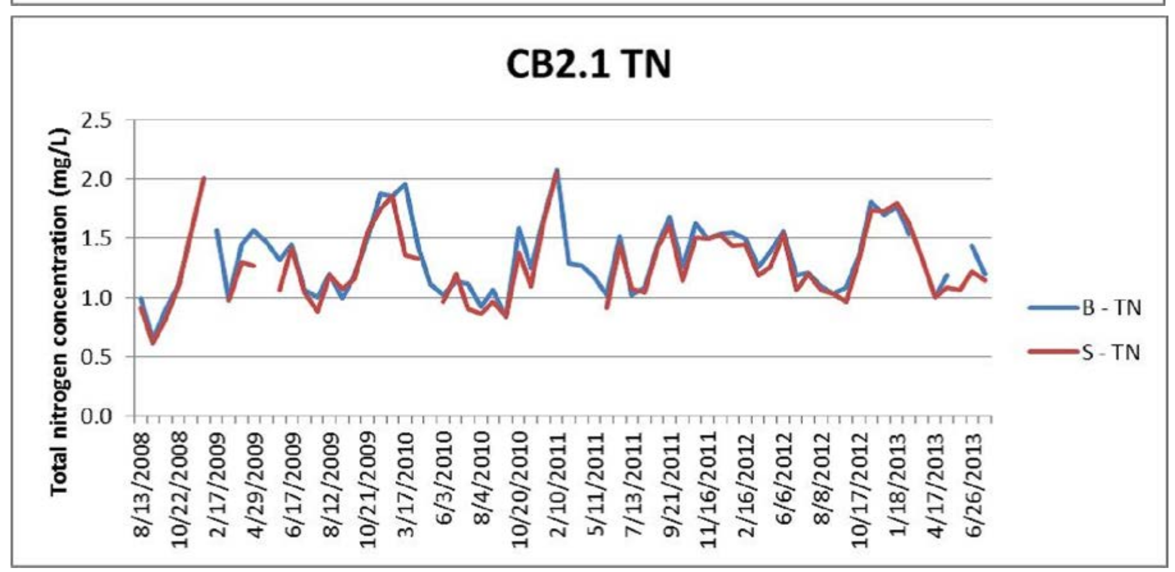


Susquehanna River Rail Bridge Project

Figures E-8
Total Suspended
Solid Concentrations
2008 through 2013



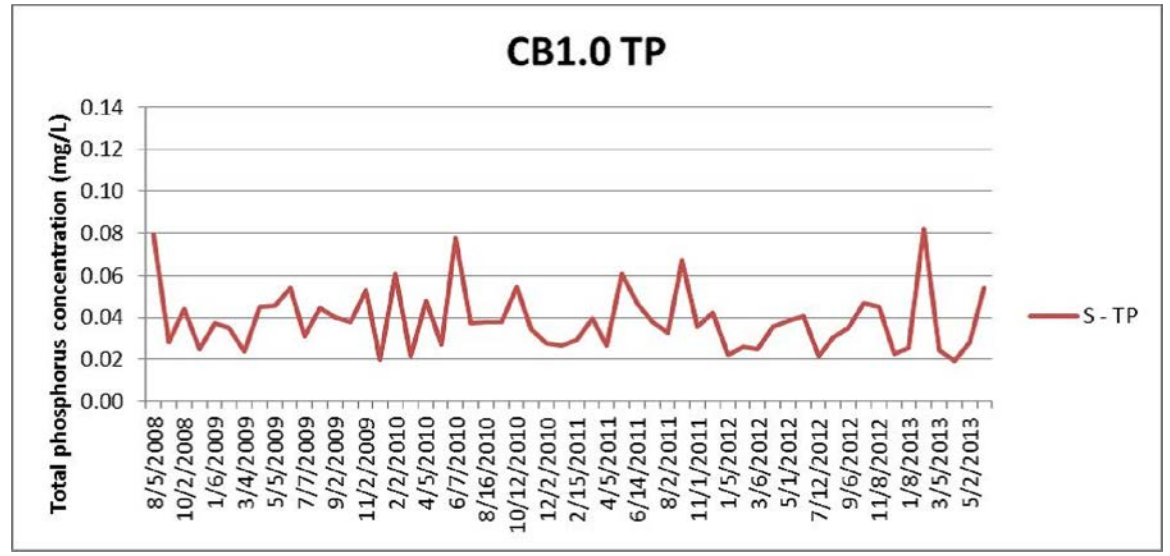


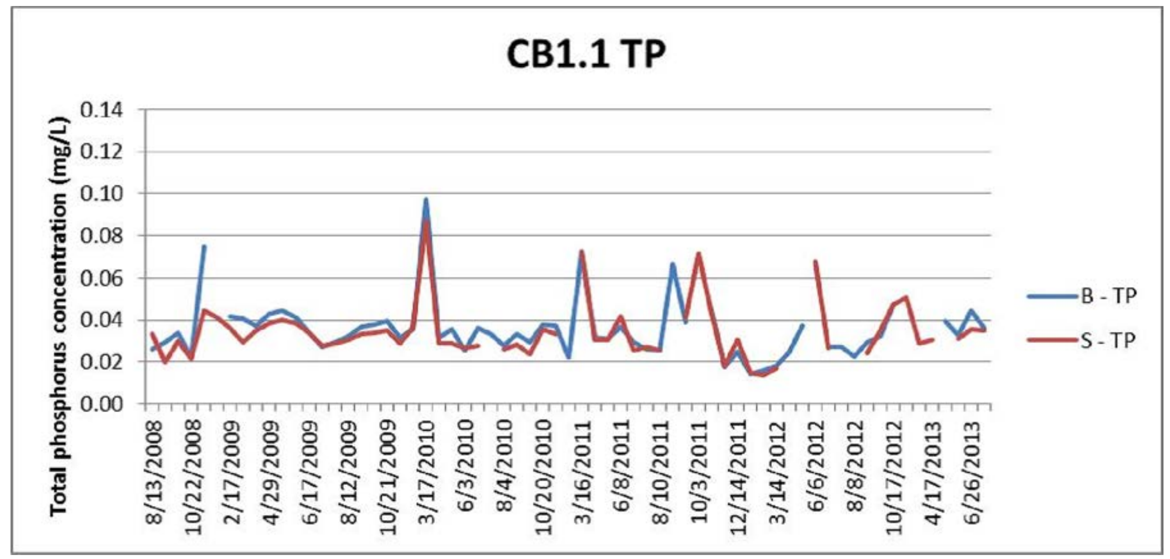


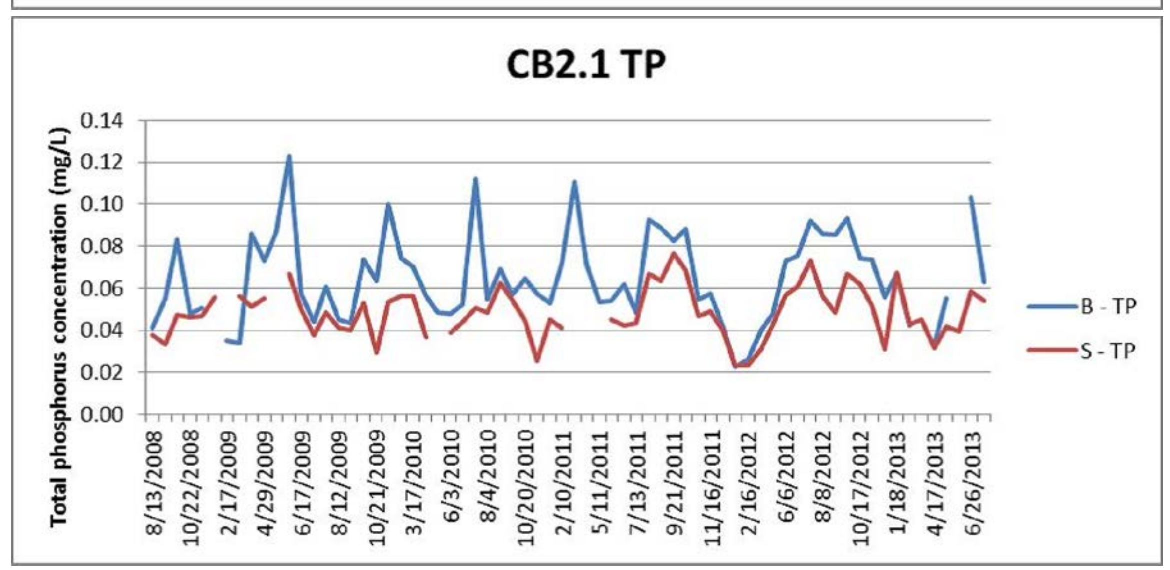
Susquehanna River Rail Bridge Project

Figures E-9

Total Nitrogen Concentration 2008 through 2013







Susquehanna River
Rail Bridge Project

Figures E-10
Total Phosphorous
Concentrations
2008 through 2013

largest contributions occurring during times of largest flows (Cerco and Noel 2013).

Table E-13
Water Quality Measurements for Stations in the Lower Susquehanna River and Upper Chesapeake Bay, August 2008 – July 2013

Parameter	Position in Water Column	Station CB1.0 (Conowingo Dam)				Station CB1.1 (Mouth of Susquehanna River)				Station CB2.1 (Chesapeake Bay at Elk Neck State Park)			
		Min	Max	Avg	Use Class II-P Criteria	Min	Max	Avg	Use Class II-P Criteria	Min	Max	Avg	Use Class II-P Criteria
Water temperature (°C)	Surface	0.7	31.4	15.0	NC	2	30.2	18.0	NC	0.1	29.7	17.2	NC
	Bottom	-	-	-		2	29.9	17.8		0.1	29.5	17.1	
Dissolved oxygen (mg/L)	Surface	7	15.3	10.5	5	6.6	14.4	9.7	5**	6.1	14.2	9.6	5**
	Mid	-	-	-		6.5	14.4	9.6		5.1	14.3	9.4	
	Bottom	-	-	-		6.4	14.3	9.5		4.9	14.2	9.3	
Chlorophyll-*a* (micrograms/L)	Surface	0.9	31.6	6.3	NC	0.9	27.3	8.5	NC	1.5	31.1	10.2	NC
	Bottom	-	-	-		0.8	27.8	7.3		1.5	28.8	11.8	
Total suspended solids (mg/L)	Surface	1.5	49	22.4	NC	2.4	62	10.7	NC	3.1	80	18.2	NC
	Bottom	-	-	-		2.4	72	11.8		4.3	75.5	29.5	
Total nitrogen (mg/L)	Surface	1.1	2.33	1.5	0.38***	0.9	1.8	1.3	0.38***	0.6	2.1	1.3	0.38***
	Bottom	-	-	-		0.9	2.0	1.3		0.6	2.1	1.3	
Total dissolved nitrogen (mg/L)	Surface	0.9	2.26	1.4	NC	0.8	1.7	1.2	NC	0.5	1.9	1.1	NC
	Bottom	-	-	-		0.8	2.0	1.2		0.5	1.7	1.1	
Total phosphorus (mg/L)	Surface	0.01	0.08	0.04	0.1***	0.01	0.09	0.03	0.1***	0.02	0.11	0.05	0.1***
	Bottom	-	-	-		0.01	0.10	0.04		0.02	0.12	0.07	
Total dissolved phosphorus (mg/L)	Surface	0.006	0.057	0.017	NC	0.005	0.039	0.013	NC	0.006	0.040	0.018	NC
	Bottom	-	-	-		0.004	0.035	0.012		0.006	0.044	0.021	

Notes: Avg = average NC – denotes no criteria for that parameter

* Measurements taken on September 7 and 8, 2011 were excluded from analysis; these data were collected immediately following flooding from Tropical Storm Lee and are not representative of typical conditions.

** Because multiple subcategories, each with their own criteria, apply to the CB1.1 and CB2.1 stations, the most protective criteria would be enforced. These stations are subject to additional DO criteria based on the use class subcategories. For Migratory Spawning & Nursery Use, DO must be greater than or equal to 5 mg/L as an instantaneous minimum and must have a 7-day average of at least 6 mg/L between February 1st and May 31st. For both Shallow Water SAV Use and Open Water Fish & Shellfish Use, DO must be at least 5.5 mg/L as a 30-day average, at least 4 mg/L as a 7-day average, and at least 3.2 mg/L as an instantaneous minimum.

*** In lieu of national criteria, which have not yet been established for total nitrogen or total phosphorus, USEPA has recommended a desired goal of 0.38 mg/L for TN and 0.1 mg/L for TP.

TN comprises all forms of nitrogen in a waterbody, including both dissolved and particulate forms. TDN comprises the forms of nitrogen that will pass through a filter, including ammonia, nitrate, and nitrite. TP comprises both soluble and insoluble forms of phosphorus in a sample, including orthophosphate, condensed phosphate, and organic phosphate. TDP is a measurement of organic and inorganic phosphorus that will pass through a filter.

Sources: Chesapeake Bay Program Water Quality Database

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). However, in the marginal shallow areas of the bay (depths less than 11 feet), mechanical energy tends to be higher and sediments are generally sand-sized (STAC 2000). The sediments in the Upper Bay comprise fine grain sediments of the Susquehanna Flats with between 0 and 20 percent silt and clay, and finer grained sediments toward the southern end of the study area with between 20 and 80 percent silt and clay (Hartwell and Hameedi 2007; STAC 2000).

The rate of sediment deposition throughout much of the bay is less than about 0.06 inches/year. Deeper channel regions show higher rates of accumulation, approaching about 0.2 inches/year in the middle and lower portions of the estuary. In the Upper Bay, however, rates of sediment accumulation are influenced by the large sediment loads supplied by the Susquehanna River. Between 1980 and 2000, the mean annual discharge of sediment from the Susquehanna River was 1.31 million metric tons per year (Mt/y), with a median annual discharge of 0.95 Mt/y (STAC 2000). Sediment accumulation in the Upper Bay reaches an average of about 2 to 3 inches/year, with significantly higher rates, up to 7 inches/year, in deeper maintained shipping channels (STAC 2000). In general, sediment accumulation rates in the upper Bay are 2 to 10 times higher than sedimentation rates in the middle and lower Bay, and sediment that accumulates in the Upper Bay tends to remain settled for longer than it would in other areas farther downstream (Hartwell and Hameedi 2007). Almost all of the sediment delivered by the Susquehanna River is deposited north of Baltimore, with higher rates of accumulation of finer materials in the deeper channels.

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). Depositional areas in the Susquehanna Flats region and the upper portions of the deep trough of the mainstem, two areas where sedimentation rates are high and sediments are fine grained, have higher concentrations of contaminants (e.g., Polycyclic Aromatic Hydrocarbons [PAHs], PCBs, dichlorodiphenyltrichloroethane [DDT], pesticides and metals) than the middle and lower Bay (Hartwell and Hameedi 2007). 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).

e. Aquatic Biota

Phytoplankton & Zooplankton

Phytoplankton are microscopic plants whose movements within the system are largely governed by prevailing tides and currents. Several species can reach larger sizes as chains or in colonial forms. Light penetration, turbidity and nutrient concentrations are important factors in determining phytoplankton productivity and biomass. Phytoplankton are most abundant within the Chesapeake Bay during spring, as a result of the high level of nutrients washed into the Bay from snow melt and rain. In 2012, *Cyclotella* spp, and *Synechococcus* spp., were the most abundant phytoplankton throughout much of the year, along with unidentified flagellates, particularly in the spring at Station CB2.1 located at the southern end of the study area. *Cyclotella*, *Diatoma*, *Melosira*, *Cyanobium*, *Kirchneriella*, and unidentified flagellates were the most abundant phytoplankton within the Upper Bay in 2010 and 2011 (DNR 2012).

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 (*Bosmina longirostris*, *Diaphanosoma leuchtenbergianus*, *Moina micrura*), cyclopoid Copepods (*Cyclops bicuspidatus*, *Mesocyclops edax*, *Cyclops vernalis*), and calanoid Copepods (*Eurytemora affinis*) are the most abundant zooplankton within the freshwater portions of the Chesapeake Bay. Cladocerans are the most numerically abundant in the warmer months and the calanoid copepod *Eurytemora affinis* is usually the most numerically abundant zooplankton in the winter months (DNR 2014b).

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 (Ephemerellidae), non-biting midges (*Cricotopus* spp. and *Orthocladius* spp.), blackflies (Simuliidae), and caddisflies (*Cheumatopsyche* spp.). The most common taxa found by the Maryland Biological Stream Survey was a burrowing mayfly, which occurred in 86 percent of samples taken throughout the basin, followed by non-biting midges at 78 percent (Millard et al. 1999). Other macroinvertebrates collected within the Lower Susquehanna River include the primitive flatworm (*Dugesia* spp.), and oligochaete worms (*Nais* spp.) (NAI and Gomez and Sullivan 2012). At the mouth of the Susquehanna River, benthic macroinvertebrates are found at extremely low numbers possibly due to low residence time resulting from high river flow (Versar and CES 1995). 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). Within the Susquehanna Flats, the most abundant benthic invertebrates sampled between 2009 and 2013 belonged to the Gammaridae and Tubificidae families. *Gammarus daiberi* was the most common species collected, comprising about 36 percent of the total (CBP 2014). 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.

Maryland Stream Waders data show that mayflies (32 percent) and midges (Chironomidae; 32 percent) are the most common macroinvertebrates in Mill Creek near its confluence with the Bay on the eastern shore of the Susquehanna. Blackflies and stoneflies (*Acroneuria* spp. and *Strophopteryx* spp.) were also found, each comprising about 5 percent of samples. Caddisflies (20.5 percent) were the most common macroinvertebrates found in MBSS samples from Principio Creek, followed by midges (*Orthocladius* spp. and *Hydrobaenus* spp.; 16.9 percent total) and stoneflies (9 percent total). Blackflies and mayflies were found in smaller numbers, comprising about 7.1 percent and 3.6 percent of samples, respectively. Benthic IBI data were not provided for Gashey's Creek, on the western shore of the Susquehanna.

Submerged Aquatic Vegetation (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, providing food and shelter for waterfowl, fish, shellfish and invertebrates, by addition oxygen to the water, and by their capacity to trap sediments, absorb nutrients, and reduce erosion (USEPA 2004). SAV have high light requirements and are adversely affected by suspended sediment, due to surface deposits of sediment on leaves and by the attenuation of light that occurs with increased turbidity. Suspended sediments have the greatest potential to adversely affect SAV during the growing period (March to November), and have less potential to adversely affect them outside this period when light requirements are low due to decreased metabolic rates (STAC 2000). More than 20 species of bay grasses grow in the Bay and its tributaries, with more diversity in less saline areas. Widgeon grass (*Ruppia maritima*), Eurasian watermilfoil (*Myriophyllum spicatum*), sago pondweed (*Stuckenia pectinata*), redhead grass (*Potamogeton perfoliatus*), Curly pondweed (*Potamogeton crispus*), Slender pondweed (*Potamogeton pusillus*), horned pondweed (*Zannichellia palustris*), wild celery (*Vallisneria americana*), common elodea (*Elodea canadensis*), coontail (*Ceratophyllum demersum*), hydrilla (*Hydrilla verticillata*), water stargrass (*Heteranthera dubia*), southern naiad (*Najas guadalupensis*), brittle waternymph (*Najas minor*), slender waternymph (*Najas gracillima*), and at least one other species of *Najas* sp. are the SAV species present within the Upper and Middle

Bay (VIMS 2013). 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).

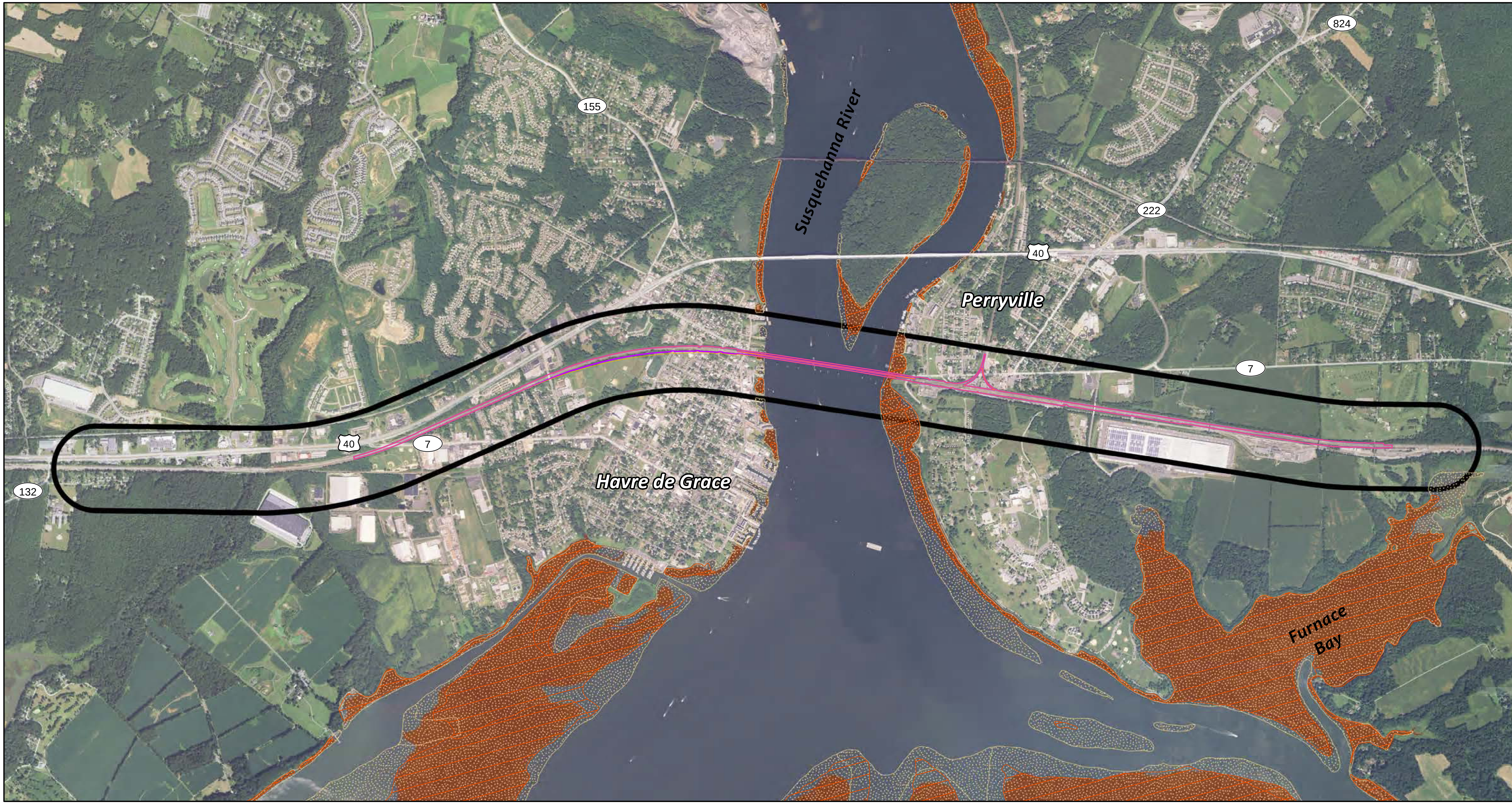
Presence and density of SAV vary from year to year and are mapped annually within the Chesapeake Bay (VIMS 2013). ***Figure E-11*** presents the distribution of SAV within the study area in 2009, 2012, and 2013. Over a five-year period (2009 to 2013), the location of the SAV beds in the Lower Susquehanna River portion of the study area have remained relatively consistent, except for a decrease in coverage in 2011 and 2012. Again with the exception of 2011 and 2012, SAV density within the beds has also remained consistent. Bed densities were generally dense (70 to 100 percent coverage) from 2009 through 2010, and decreased to very sparse (0 to 10 percent), sparse (10 to 40 percent) and moderate (40 to 70 percent) density classes in 2011 and 2012. Within the Upper Bay/Susquehanna Flats portion of the study area, SAV beds have shown a similar decrease in areal extent and density with the majority of the Susquehanna Flats bed remaining at dense cover where present. The changes in SAV beds in 2011 reflect the effects of Hurricane Irene in August and Tropical Storm Lee in September that resulted in high turbidity and deposition of large amounts of sediment in the system (VIMS 2013). Projected SAV coverage in 2014 is similar to that of 2013. However, the unconfirmed 2014 SAV results indicate that no SAV occurred under the existing Amtrak bridge on the Cecil County side and SAV occurred both upstream and downstream of the Amtrak bridge on the Harford County side.

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 (*Crassostrea virginica*). 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). A number of semi-anadromous and anadromous species have been documented as spawning near and/or migrating through the study area, including: yellow perch (*Perca flavescens*), white perch *(Morone americana*), blueback herring (*Alosa aestivalis)*, alewife (*Alosa pseudoharengus)*, and American shad *(Alosa sapidissima)*. Game fish known to occur in the mainstem of the Susquehanna River include striped bass (*Morone saxatilis*), walleye (*Sander vitreus)*, largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*) and catfish species (Siluriformes) (DNR 2014c). ***Table E-14*** lists the fish taxa known to occur within the study area.



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Submerged Aquatic Vegetation (2009)
- Submerged Aquatic Vegetation (2012)
- Submerged Aquatic Vegetation (2013)

Data Sources

Submerged Aquatic Vegetation:
Maryland Department of Natural Resources
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Figure E-11
Submerged Aquatic Vegetation

Table E-14
Fish of the Lower Susquehanna River and Susquehanna Flats

Common Name	Scientific Name	Common Name	Scientific Name
Alewife	*Alosa pseudoharengus*	Inland silverside	*Menidia beryllina*
American eel	*Anguilla rostrata*	Inshore lizardfish	*Synodus foetens*
American shad	*Alosa sapidissima*	Killifish	*Fundulus* spp.
Atlantic croaker	*Micropogonias undulatus*	Largemouth bass	*Micropterus salmoides*
Atlantic menhaden	*Brevoortia tyrannus*	Northern pipefish	*Syngnathus fuscus*
Atlantic silverside	*Menidia menidia*	Pumpkinseed	*Lepomis gibbosus*
Atlantic sturgeon	*Acipenser oxyrinchus*	Redear sunfish	*Lepomis microlophus*
Bay anchovy	*Anchoa mitchilli*	Shorthead redhorse	*Moxostoma macrolepidotum*
Black crappie	*Pomoxis nigromaculatus*	Shortnose sturgeon	*Acipenser brevirostrum*
Black drum	*Pogonias cromis*	Smallmouth bass	*Micropterus dolomieu*
Blueback herring	*Alosa aestivalis*	Spot	*Leiostomus xanthurus*
Bluefish	*Pomatomus saltatrix*	Spottail shiner	*Notropis hudsonius*
Bluegill	*Lepomis macrochirus*	Striped anchovy	*Anchoa hepsetus*
Bluespotted sunfish	*Enneacanthus gloriosus*	Striped bass	*Morone saxatilis*
Brown bullhead	*Ameiurus nebulosus*	Summer flounder	*Paralichthys dentatus*
Chain pickerel	*Esox niger*	Tessellated darter	*Etheostoma olmstedi*
Channel catfish	*Ictalurus punctatus*	Walleye	*Sander vitreus*
Common carp	*Cyprinus carpio*	White catfish	*Ictalurus catus*
Eastern silvery minnow	*Hybognathus regius*	White perch	*Morone americana*
Golden shiner	*Notemigonus crysoleucas*	Winter flounder	*Pseudopleuronectes americanus*
Hickory shad	*Alosa mediocris*	Yellow perch	*Perca flavescens*
Hogchoker	*Trinectes maculatus*		

Source: NOAA Maryland Environmental Sensitivity Index Maps 115 and 123 (NOAA 2007)

A large body of data on the fishes of the Lower Susquehanna River is available from decades of electrofishing, fish ladder, gill net, and creel surveys conducted in association with the operation of Conowingo Hydroelectric Project. While the relative abundance of different fish species has fluctuated over time, the most abundant species are generally gizzard shad (*Dorosoma cepedianum*), American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), American eel (*Anguilla rostrata*), white perch (*Morone americana*), channel catfish (*Ictalurus punctatus*), banded killifish (*Fundulus diaphanus*), sunfish (*Lepomis* spp.), largemouth bass (*Micropterus salmoides*), and yellow perch. Common carp (*Cyprinus carpio*), quillback (*Carpiodes cyprinus*), comely shiner (*Notropis amoenus*), walleye, smallmouth bass, alewife (*Alosa pseudoharengus*), sea lamprey (*Petromyzon marinus*), and striped bass also occur within this portion of the river (NAI and Gomez and Sullivan 2012a). Comely shiner is a state-threatened species, but was not specifically referenced as a species of concern on the Proposed Project by the DNR-WHS. Gizzard shad, a pollution tolerant species, has become increasingly abundant in the Lower Susquehanna River since the 1970's while other species, such as white crappie (*Pomoxis annularis*) and blueback herring, have declined (NAI and Gomez and Sullivan 2012a). The abundance of diadromous species (fish that migrate between fresh and salt waters, e.g., American shad, blueback herring, striped bass, alewife) reflects the importance of the Lower Susquehanna River, the Chesapeake Bay and other Bay tributaries as important spawning and nursery habitat.

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, although they are not protected under the Endangered Species Act. American eels migrate upstream through the Upper Chesapeake Bay region to smaller streams where they grow to adult sizes. They then migrate downstream on spawning runs as adults to the Sargasso Sea region of the Atlantic Ocean. Some eels may reside in the study area long-term (DNR 2014c).

Since the construction of the Conowingo Dam in the 1920s, the Lower Susquehanna River has not supported large runs of Atlantic sturgeon (*Acipenser oxyrinchus*) or shortnose sturgeon (*A. brevirostrum*). 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). Atlantic and shortnose sturgeon are discussed in further detail below, under “Threatened and Endangered Species.”

The nontidal and tidal tributaries to the Susquehanna River support a number of fish species found in brackish or freshwater habitats. American eel (50 percent of samples), blacknose dace (*Rhinichthys atratulus*; 20.5 percent), bluegill (*Lepomis macrochirus*; 15.9 percent), creek chub (*Semotilus atromaculatus*; 6.8 percent), green sunfish (*Lepomis cyanellus*; 4.5 percent), and tessellated darter (*Etheostoma olmstedi*; 2.3 percent) dominated MBSS samples collected in Gashey’s Creek. Common shiner (*Luxilus cornutus*; 28.2 percent), rosyside dace (*Clinostomus funduloides*; 14.1 percent), tessellated darter (13.3 percent), blacknose dace (12 percent), American eel (9 percent), and white sucker (*Catostomus commersonii*; 8.8 percent) dominated the MBSS samples collected in Principio Creek. Cutlip minnow (*Exoglossum maxillingua*), creek chub, swallowtail shiner (*Notropis procne*), northern hogsucker (*Hypentelium nigricans*), river chub (*Nocomis micropogon*), margined madtom (*Noturus insignis*), pumpkinseed (*Lepomis gibbosus*), satinfin shiner (*Cyprinella analostana*), redbreast sunfish (*Lepomis auritus*), and rainbow trout (*Oncorhynchus mykiss*) were found in smaller numbers within Principio Creek.

Invasive Species

Some of the aquatic invasive species currently known to occur in the Lower Susquehanna River Basin include zebra mussels (*Dreissena polymorpha*), quagga mussels (*Dreissena bugensis*), Asian clam (*Corbicula fluminea*), purple loosestrife (*Lythrum salicaria*), water chestnut (*Eleocharis dulcis*), rusty crayfish (*Orconectes rusticus*), and flathead catfish (*Pylodictis olivaris*). Zebra mussels had spread to the Lower Susquehanna River by 2008 (SRBC 2013).

f. Threatened, Endangered, or Special Concern Aquatic Species/Section 7 Consultation

Federally Listed Species

An on-line Proposed Project review with the U.S. Fish and Wildlife Service (USFWS) indicated that there are no federally listed species within the study area, but critical habitat is present for the federally-endangered Maryland darter (*Etheostoma sellare*). However, Maryland darter has not been found within the study area since 1965, and occurs only in Deer Creek (DNR 2016). The Project Team sent a letter requesting information on threatened and endangered species to NMFS on February 14, 2014. In a response dated March 5, 2014, NMFS identified the Atlantic sturgeon from the Gulf of Maine Distinct Population Segment (DPS) and the loggerhead sea turtle (*Caretta caretta*) as threatened species that may be found within the Chesapeake Bay and mouth of the Susquehanna River and shortnose sturgeon, Atlantic sturgeon (New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPS), Kemp’s ridley sea turtle (*Lepidochelys kempi*), green sea turtle (*Chelonia mydas*), and leatherback turtle (*Dermochelys coriacea*) as endangered species that may occur within that area. NMFS noted that “in Maryland waters of the Chesapeake Bay, sea turtles are most often documented in marine and estuarine waters and are not likely to be present in upper reaches of major tributaries because of salinity and prey availability requirements.” The study area is located in tidal fresh waters above the estuarine mixing zone where salinities in this area of the Susquehanna Flats and lower Susquehanna River are less than 0.5 parts per thousand year round (Chesapeake Bay Program, 2016). According to Endangered Species Maps provided as Section 7 guidance by NMFS (2016), none of the sea turtle species are expected to occur in the Chesapeake Bay north of Baltimore, which includes the study area in the lower Susquehanna River. While sea turtles are expected to be present in the Chesapeake Bay between April 1 and November 30, there are no confirmed sitings of live sea turtles north of Baltimore. The occasional reported strandings of dead turtles are believed to have been swept north by winds or currents (Aberdeen Proving Ground 1998).

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 (*Scophthalmus aquosus*) (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.

Section 7(a)(2) of the Endangered Species Act (ESA) requires federal agencies to consult on any action that may affect a federally listed endangered or threatened species. Initial stages of this process typically begin with a request to the National Marine Fisheries Service (NMFS) or U.S. Fish and Wildlife Service (USFWS) for information on listed species in the vicinity of the Proposed Project area. This stage may be followed by formal or informal consultation with NMFS or USFWS depending on the degree of potential impacts to listed species as determined by the federal sponsor. Alternatively, if the federal sponsor concludes that the Proposed Project will have “no effect” on listed species, consultation with NMFS or USFWS is not initiated. In the event that consultation is necessary, the federal sponsor evaluates the potential effects of the Proposed Project on listed species, makes a determination, and requests concurrence from NMFS or USFWS.

FRA, as the lead agency of the Proposed Project, initiated informal consultation with NMFS regarding federally listed species on May 10, 2016 (***Attachment E***). Coordination is ongoing. If NMFS concurs with FRA’s determination, Section 7 consultation will be concluded.

Shortnose Sturgeon

Shortnose sturgeon is a federally and state-listed endangered species. Shortnose sturgeon are found along the Atlantic coast of North America in estuaries and large rivers such as the Hudson, Delaware, and Susquehanna (Chesapeake Bay). It is considered "amphidromous" – that is, like anadromous species it spawns in freshwater but regularly enters saltwater. In general, adult shortnose sturgeon occur primarily in either brackish estuarine waters or, more rarely, higher salinity coastal waters, while juveniles tend to remain in the estuary. There are currently 19 riverine populations of shortnose sturgeon recognized by NMFS; however, there does not appear to be a spawning population in the Susquehanna River, only migrants from the Delaware River (Wirgin et al. 2009).

Shortnose sturgeon may occur in the study area year round (NOAA 2007), but are most likely to occur there between January and April based on previous observations (NOAA 2007). Between 1996 and 2008, the USFWS sturgeon reward program captured shortnose sturgeon in the vicinity of the southern portion of the study area in the upper Bay, between Kent Island and the mouth of the Susquehanna River (NMFS 2014). Although they have been reported in the study area, they are thought to be uncommon. For this reason, little is known about the abundance, local home range, or habitat use by shortnose sturgeon in the study area and in the Chesapeake Bay in general (Welsh et al. 2002). Historically, shortnose sturgeon have been observed in the Susquehanna River and in the Susquehanna Flats area of northern Chesapeake Bay just downstream of the river mouth (Dadswell et al. 1984; SRAFRC 2010). More recently, between 1992 and 2004, approximately twenty shortnose sturgeon were reported within the tidal portion of the Susquehanna River and on the Susquehanna Flats; however, there have been no reports of shortnose sturgeon in this area since 2004 (NMFS 1998; NAI and Gomez and Sullivan 2011b). Monitoring for acoustic-tagged sturgeon in the tidal Susquehanna River between March and November 2010 failed to detect any shortnose sturgeon (NAI and Gomez and Sullivan 2011b). Shortnose sturgeon are more likely to occur 9 to 22 miles downstream of the study area and closer to the freshwater-saltwater interface where primary productivity is high (Crance 1986; Sanford et al. 2001). Shortnose sturgeon tracking in another tributary of the

Chesapeake Bay indicated that the sturgeon were predominantly located over mud substrates and were in areas characterized by prolific SAV and algae blooms (NMFS 2014).

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. Because of the presence of dams on many historical spawning rivers, shortnose sturgeon have been observed to spawn in the area just downstream of dams (Kynard et al. 2012; NMFS 2014). The eight shortnose sturgeon reported prior to 2004 occurred in the tidal Susquehanna River just downstream of the Conowingo Dam during winter and spring (January to April). Because adult shortnose sturgeon are known to overwinter just downstream of the spawning grounds, the presence of these fish during the winter and early spring months suggests the presence of overwintering and/or spawning habitat in the river. Spawning habitat is commonly located in waters ranging from 3 to 16 feet deep, with relatively strong currents (1 to 4 feet per second (fps)) and daily mean temperatures of 44 to 58º F, and over substrates composed of coarse gravel or cobble (Crance 1986; NMFS 2014). Suitable spawning area between the Conowingo Dam and I-95 is relatively limited (approximately 19 percent of the available habitat; NAI and Gomez and Sullivan 2012b). Moreover, the availability of suitable larval and juvenile habitat in this area is even more limited (1.2 to 2.1 percent). Critical habitat has not been designated for shortnose sturgeon; therefore, the Proposed Project will not impact critical habitat for this species.

<u>*Atlantic Sturgeon*</u>

Atlantic sturgeon is a federally-listed threatened and endangered[4] species that occurs along the Atlantic coast of North America in estuaries and large rivers such as the Hudson, Delaware, and 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. Of the two species, Atlantic sturgeon can grow considerably larger, is more oceanic, and does not typically migrate as far upstream to spawn. Although Atlantic sturgeon are expected to occur at least intermittently in the study area, it has not been found there in exceptionally high abundance (USFWS 2007 Atlantic sturgeon reward program). In the Chesapeake Bay, Atlantic sturgeon are more commonly associated with deep-water areas (typically 16 to 164 feet) of the estuary and its tidal tributaries and have been most frequently reported from the mainstem of the estuary (USFWS 2007; NMFS 2014). Critical habitat has not been designated for Atlantic sturgeon; however NMFS issued a proposed critical habitat in June 2016 with a final designation scheduled for summer 2017. At that time, potential impacts for Atlantic sturgeon will be re-evaluated.

Atlantic sturgeon may occur in the study area year round as juveniles and sub-adults (NOAA 2007). Sub-adults are most likely to occur in the study area between spring and fall, spending the colder months in the Atlantic Ocean (Bain 1997). Individuals from any DPS may occur throughout the Chesapeake Bay, provided suitable habitat is present, and distribution is strongly associated with prey availability (NMFS 2014). Although they have been reported in the study area, these fish are thought to have migrated from the Delaware or Hudson River populations and occur relatively infrequently. For this reason, little is known about the abundance, local home range, or habitat use by Atlantic sturgeon in the study area. While Atlantic sturgeon were historically once abundant in the Susquehanna River and in the Susquehanna Flats area of northern Chesapeake Bay just downstream of the river mouth (SRAFRC 2010), only four Atlantic sturgeon have been collected in the Susquehanna Flats area during a 19-year monitoring program conducted by the USFWS; these sturgeon were collected between 1996 and 1999 (= NAI and Gomez and Sullivan 2011b). Collections were far more common in the mainstem of the estuary downstream of the Susquehanna River. Monitoring for acoustic-tagged sturgeon

[4] On April 6, 2012, Atlantic sturgeon was designated as federally threatened (Gulf of Maine Distinct Population Segment) or endangered (New York Bight, Chesapeake, Carolina, and South Atlantic DPS). Atlantic sturgeon from each of these DPSs may occur in the study area.

in the tidal Susquehanna River between March and November 2010 failed to detect any tagged Atlantic sturgeon (NAI and Gomez and Sullivan 2011b).

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. Adult sturgeon spend most of their time in the Atlantic Ocean, returning to the estuary in the spring and early summer to spawn. Older juveniles that have emigrated from the estuary (i.e., subadults) are thought to mimic the migratory patterns of the adults as they return to coastal rivers and bays during the spring and summer months, and probably use the estuary to forage.

Sea Turtles

Several species of sea turtles, including loggerhead, green, Kemp's ridley, and leatherback, 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 and not expected to occur in the study area. Loggerhead and Kemp's ridley are the two most common sea turtle species in the estuary (VIMS 2016, DGIF 2016) and are not expected to occur in the Chesapeake Bay north of Baltimore where salinities are typically less than 5 ppt (CBP 2016, NMFS 2016). Green sea turtles are less common and are present primarily during late summer and early fall (VIMS 2016). In general, sea turtles are present in the Chesapeake Bay between April 1 and November 30 when water temperatures are relatively warm. Satellite tracking studies of sea turtles has found that foraging sea turtles mainly occurred in areas where the water depth was between approximately 16 and 49 feet. This depth was interpreted not to be as much an upper physiological depth limit for turtles, as a natural limiting depth where light and food are most suitable for foraging turtles. In Maryland waters of the Chesapeake Bay, sea turtles are most often documented in marine and estuarine waters and are not likely to be present in upper reaches of major tributaries because of salinity tolerance and prey availability requirements. Given the tidal freshwater conditions (< 0.5 ppt) conditions on the Susquehanna Flats and lower Susquehanna River (CBP 2016), sea turtles are not expected to occur in the vicinity of the Proposed Project. This is consistent with Section 7 guidance (NMFS 2016) that indicates the northern extent of sea turtle distribution in the Chesapeake Bay is Baltimore, which is downstream of the study area.

Critical habitat has not been designated for sea turtles in the vicinity of the Proposed Project area; therefore, Proposed Project activities will not affect critical habitat for sea turtles.

State Listed Species

The Project Team also sent a letter to DNR's Integrated Policy Review Unit on February 14, 2014. In a response dated October 22, 2014, DNR identified American eel as an important fishery within the study area, as discussed previously, and the presence of shortnose and Atlantic sturgeon was noted within the study area. Both sturgeon are protected species, and are under specific management requirements and the subject of research and conservation efforts undertaken by NMFS, USFWS, and with cooperation from DNR. DNR also identified the presence of freshwater mussels within the study area, some of which are state-listed as threatened or endangered. As discussed previously, DNR Wildlife and Heritage Service is the state lead for state-listed freshwater mussel species. As there is a potential for these species to be found within the study area, further coordination will be necessary on the potential mussel presence and Best Management Practices for their protection in later phases of design.

Logperch

Logperch (*Percina caprodes*) is state-listed in Maryland as threatened and is considered imperiled or critically imperiled due to its rarity. This freshwater perch in the family Percidae is most commonly found in riverine habitats characterized by coarse sand and gravel substrates with or without aquatic vegetation. This species can be found in swift currents or slow-moving lotic habitats.

Adult logperch may occur year-round upstream of the study area between the Conowingo Dam and the Interstate 95 bridge. Spawning occurs in the spring and summer between March and July.

Northern Map Turtle

The state-listed endangered northern map turtle (*Graptemys geographica*) is documented in the Proposed Project study area both within and along the banks of the Susquehanna River. The shores of the Susquehanna River are used by the northern map turtle for habitat, nesting, and foraging and the turtles hibernate on the river bottom in winter. DNR has indicated that further coordination will be required as the project progresses into later phases of design to ensure that appropriate protection measures are in place to avoid negative effects on Norther Map Turtles during construction.

3. NO ACTION ALTERNATIVE

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, bathymetry, 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.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

a. 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 Proposed Project site relative to the existing condition. The number of bridge piers in the river would be 37 for the girder approach / arch main span bridge design. There are currently 16 in-water piers supporting the existing bridge and 13 remnant piers just downstream of the existing bridge that were left in place following demolition of the 1866 Philadelphia, Wilmington & Baltimore Railroad (PW&B) bridge. The spacing of the new bridge piers for the girder approach / arch main span bridge design ranges from 160-170 feet. The spacing of the existing bridge piers is 200-260 feet. 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. As such, sediment deposition, scour, and overall hydrology in this section of the river would not be expected to significantly change. Most of the river in the vicinity of the Proposed Project site is expected to be a mix of areas of dynamic scour, likely occurring around the downstream side of the existing bridge's piers, and dynamic drift (areas characterized by deposition in the lee of obstacles), likely occurring around their upstream side. However, the contrast may not be well pronounced because flow direction alternates with the tide. Replacement of the existing bridge with the proposed west and east bridges would likely cause a small shift in this current spatial distribution of areas with scour and sediment deposition. Also because the spacing of the new bridges' piers would be closer together than the existing bridge's piers, water velocity and scouring between the piers would potentially increase, but would be expected to be minimal and would not significantly alter the hydrological properties of the river within, upstream, or downstream of the Proposed Project site and would not alter the site bathymetry.

In-water structures of the new bridges under Alternative 9B would be identical to those of Alternative 9A, and any differences between the two alternatives in other ways would be inconsequential with regard to potential operational effects on hydrology.

b. 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. Contamination of groundwater resources occurs when man-made chemicals such as gasoline, oil, and road salts enter aquifers and render the water unsafe and unfit for human use. Some of the major sources of these contaminants include storage tanks, septic systems, hazardous waste sites, landfills, and the widespread use of salts and chemicals. The improved design of the new bridges complies with all federal, state and local safety regulations that improve the safety and reliability of the rail bridge, and which will reduce the chances of contaminant spills from derailments

The Proposed Project entails primarily aerial bridge work with extension of the existing trackbed berm along landward areas. Impacts to groundwater resources are anticipated to be negligible. In addition, treatment of surface water runoff from Proposed Project construction and stormwater best management practices (BMPs) will effectively reduce even further these negligible impacts on groundwater.

c. Water Quality

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. As discussed above, under “Hydrology,” some minor changes in sedimentation and scouring properties within the Proposed Project area would possibly occur shortly following the completion of the new bridges’ in-water support structures and the removal of the existing bridge, but no significant increases in turbidity or other water quality parameters would be expected to occur. Operational differences between Alternative 9A and Alternative 9B would be inconsequential with regard to potential operational effects on water quality. The improved design of the new bridges complies with all federal, state and local safety regulations that improve the safety and reliability of the rail bridge, and which will reduce the chances of contaminant spills from derailments.

d. Sediment Quality & Contaminants

Sediment containment techniques, such as turbidity curtains and other approved best management practices, will be used during construction to minimize sediment releases from the Proposed Project. However, under Alternative 9A, some minor resuspension of sediment and changes in sedimentation properties within the Proposed Project area have the potential to occur following the completion of the new bridges’ in-water support structures and the removal of the existing bridge. Any such redistribution of sediments within the area would be minor and temporary, and therefore, would not be expected to cause a significant release of any contaminants or otherwise impact sediment quality in the area. Operational differences between Alternative 9B and Alternative 9A would be inconsequential with regard to potential operational effects on sediment quality and contaminants. As such, operation of Alternative 9B would not be expected to have any significant or long-lasting effects on sediment quality and sediment-bound contaminants.

e. Aquatic Biota

Under Alternative 9A, 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 Proposed Project area. As discussed above, under “Water Quality,” areas of scouring and sedimentation would initially shift upon replacement of the existing bridge outside of its current alignment, but erosion and sedimentation processes would not change substantially, and overall bottom conditions for benthic organisms and their predators would not differ from the existing condition. The same assemblages of aquatic species would be expected to occur as at present. Although the replacement bridges under Alternative 9A 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 are generally considered to occur (0.7; Struck et al. 2004). The east and west bridges would be separated by open space varying from 16 to 25 feet wide through which light could pass, and because the sun changes positions throughout the day, no area of river around the proposed bridges would be shaded for prolonged periods of time. As such, no shading effects on aquatic biota would be expected to occur during operation of Alternative 9A.

As with Alternative 9A, the operation of the replacement bridges under Alternative 9B would not differ from the operation of the existing bridge in a way that would impact aquatic biota. The current community of aquatic organisms would not be altered by the operation of Alternative 9B, and because the dimensions of the replacement bridges would be the same under both alternatives, no impacts to aquatic biota from shading would be expected to occur.

SAV

SAV is regulated at the federal and state levels. At the federal level, SAV is regulated under Section 404 of the Clean Water Act (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Act (33 U.S.C. 403). In the Section 404(b)(1) Guidelines, SAV is referred to as vegetated shallows, which are defined under 40 CFR 230.43(a) as “permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation.” The definition also includes vegetated shallows that may occur in marine and estuarine systems as well as in freshwater lakes and rivers. SAV is regulated under this vegetated shallows definition as one of several categories of “Special Aquatic Sites,” each of which is a subset of Waters of the United States. SAV is also directly protected under the Coastal Zone Management Act (15 CFR 930.11) as a “resource,” and indirectly protected under the Environmental Protection Agency’s National Pollutant Discharge Elimination Program (NPDES; 40 CFR 122.26), which regulates point source discharge of pollutants into navigable waters. At the state level, SAV may be regulated under seven statutes of COMAR, including those related to Section 401 water quality certifications, NPDES permits, Surface Water Use Designations, and dredging.

Alternative 9A and Alternative 9B would each have the same number of bridge piers within the Susquehanna River depending upon bridge design. Both alternatives appear to include four bridge piers that would intercept SAV resources in slightly different amounts and locations. Based on the preliminary engineering drawings, two bridge piers for the new west bridge would fall within the mapped SAV area along the Cecil County shoreline. Following removal of the existing bridge, one pier for the new east bridge would also potentially impact a portion of the SAV bed just downstream of the existing bridge alignment. 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. As noted under the Aquatic Biota section, the lowest bridge height to width ratio is 0.8 along the Cecil County shoreline. On the Harford County shoreline, the ratio would be 1.22 (48.8 feet in height and 40 feet wide). The existing bridge is approximately 32 feet wide and the base of the catwalk and girder structure is approximately 25 feet high over the Susquehanna River at the approaches (the river segments of the track outside of the channel section) yielding a ratio of 0.8. This ratio is comparable to the proposed bridge designs at the Cecil County shoreline. These results suggest that SAV should continue to be able to grow beneath the replacement bridge, regardless of which alternative is selected.

Fish

As noted above, water velocities through the bridge structure may be slightly higher for the new bridge than for the existing bridge because of the closer spacing of more bridge piers. However, the replacement bridge will occur within the tidal portion of the river, with daily changes in flow direction and velocity. Also, the change in velocity is expected to be minimal since the decrease in the spacing of the bridge piers of 30 to 90 feet would occur over a span of 3,200 feet of the Susquehanna River. In addition, anadromous fish moving upriver to the dam and fish ladder are stimulated to do so by much faster flows than would be experienced at the bridge. Therefore, no effect on anadromous fish behavior through the Proposed Project area would be expected from the new bridge structures.

f. Threatened, Endangered, or Special Concern Aquatic Species/Section 7 Consultation

As discussed above, under "Aquatic Biota," operation of the replacement bridges under Alternative 9A 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 northern map turtles potentially occurring in the Proposed Project area. Potential effects to these resources from construction of the Proposed Project are discussed in Section H.

As with Alternative 9A, the operation of the replacement bridges under Alternative 9B would not differ from the operation of the existing bridge in a way that would impact aquatic biota, including Atlantic sturgeon, shortnose sturgeon, sea turtles, freshwater mussels, logperch, and northern map turtles. Operation of Alternative 9B would not have significant adverse impacts to any federally- or state-listed species. FRA will continue with the informal consultation process with NMFS regarding a selected/preferred alternative. As noted above, potential effects to these resources from construction of the bridge are discussed in Section H.

5. MINIMIZATION AND MITIGATION OF IMPACTS

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 will be achieved 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 February 15 through June 15 for tidal Use II streams. Additional restrictions for work in SAV areas in described below. As with most large bridge projects, certain activities may be allowable within time of year restriction periods and these will be determined through coordination with the responsible agencies.

SAV

Sediment containment techniques, such as turbidity curtains and other approved best management 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.

As noted under Section B.4.b above, mitigation for unavoidable 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. Successful in-kind compensation for SAV impacts has proven extremely difficult within the Chesapeake Bay area (Submerged Aquatic Vegetation Workgroup 1995), and out-of-kind compensation in the form of water quality or stream habitat improvements is typically accepted by the regulatory agencies. However, the NMFS has indicated that mitigation of SAV impacts should include replanting the beds disturbed during construction following removal of all temporary structures. The NMFS provided the following recommendations for mitigation after removal of the temporary finger piers:

- Allow the sediment to settle.
- Replant the area during the following growing season to restore existing conditions.
- Mitigate for the temporal loss of SAV habitat by planting additional SAV at a 3:1 ratio, preferably in locations where SAV has been successful in the past but has disappeared or has minimal density.
- Monitor the entire project site for five years to determine if there are additional SAV losses resulting from the proposed project that require mitigation and to determine the success of replanting. If SAV growth has not been documented by year three, a second round of planting may be necessary.

If sufficient SAV planting area cannot be found or SAV replanting efforts fail, the remainder of the mitigation requirement would need to be compensated out-of-kind. As noted under Section B.4.b above, 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. As discussed in Section B.5.b, a preliminary site search was conducted to identify potential mitigation sites to offset wetland, stream, and special aquatic sites (SAV). Details of the mitigation site search, including sites that could potentially be used to offset Proposed Project SAV impacts above those compensated through the replanting of the temporarily disturbed existing SAV bed, are included in (***Attachment D***). 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.

E. CHESAPEAKE BAY CRITICAL AREA

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Chesapeake Bay Critical Area Protection Act

In 1984, the Chesapeake Bay Critical Area Law was passed in response to a decline in the overall quality of the Chesapeake Bay. This law created a special planning area, known as the Critical Area and establishes the Chesapeake Bay Critical Area Commission (CAC). The intent of the Commission is to formulate protective criteria for the use and development of this planning area and to oversee the development of Critical Area land use programs by local jurisdictions.

Methodology

The 1,000 foot Critical Area located within the study area limits have been determined using statewide mapping developed and maintained by DNR (DNR 2001) 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., Proposed Project Build Alternatives footprint).

2. AFFECTED ENVIRONMENT

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. These 100-foot buffers provide a heavily vegetated filter strip adjacent to the shoreline for storm water infiltration and water quality improvements on projects that have direct and immediate impact on the Chesapeake Bay. The Critical Area Buffer is defined as "*the area of at least 100 feet located directly adjacent to the tidal waters, tidal wetlands, and tributary streams*" (DNR 2012). 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.
- 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.

The study area is located within designated RCA and IDA designated Chesapeake Bay Critical Area (***Figure E-12***). 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 within the vicinity of Gashey's Creek and Swan Creek and in Cecil County near the eastern terminus of the study area/Principio Creek. Approximately 207 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 E-15***.

Table E-15
Critical Areas 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**

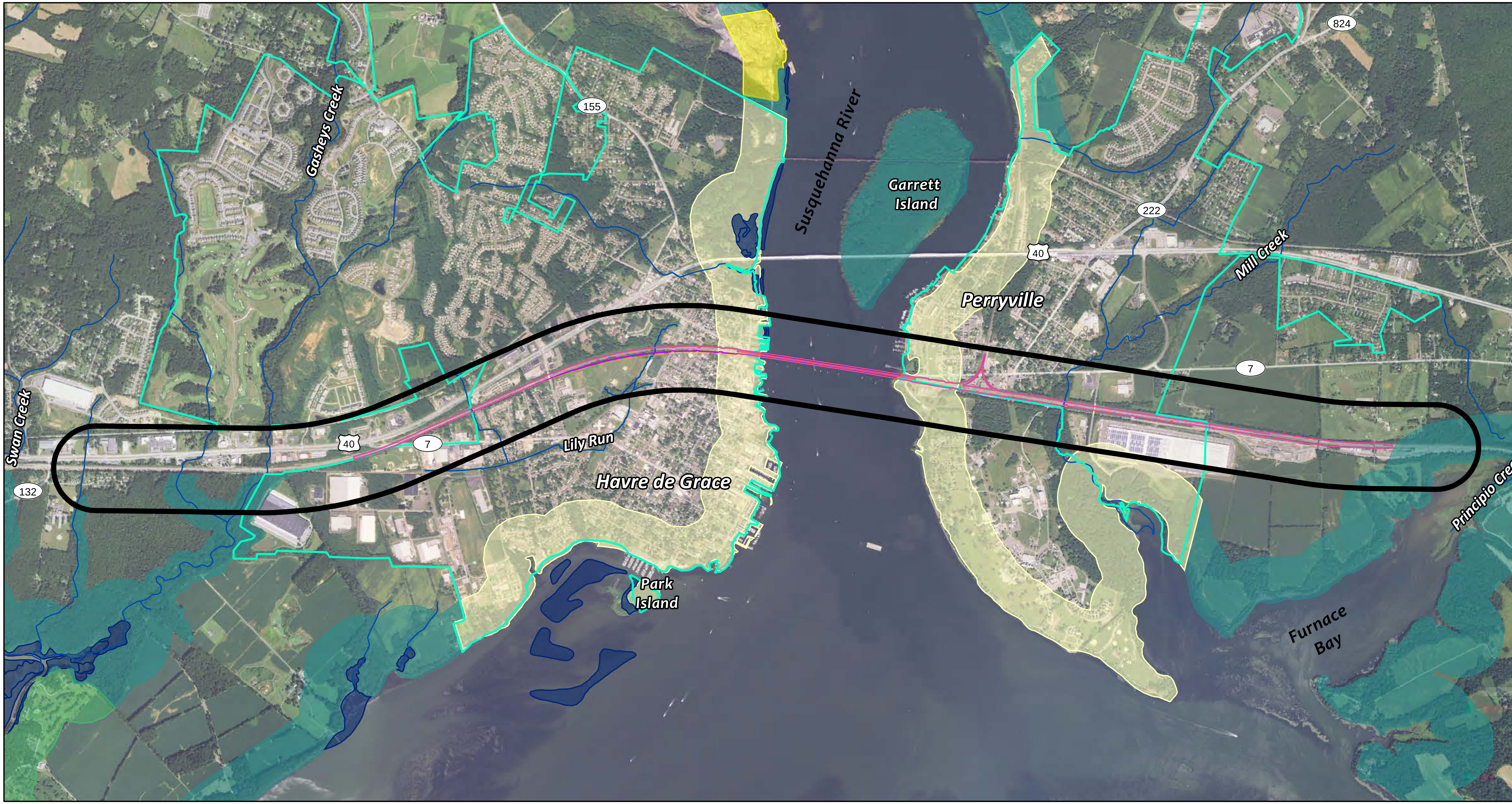
The 100-foot Critical Area Buffer is located within the Corporate Limits of Havre de Grace and Perryville as well as the RCA designated portions of Critical Area located within Harford and Cecil Counties.

3. NO ACTION ALTERNATIVE

The No Action Alternative assumes conditions will remain the same as in existing conditions. The No Action Alternative is used as a baseline scenario against which potential impacts from the Proposed Project will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

Impacts to the Critical Areas resulting from the Proposed Project are expected to result from earth disturbance, removal of vegetation, placement of fill, and increased impervious area. The anticipated impacts resulting from Alternative 9A are 6.4 acres and 6.1 acres for Alternative 9B. All impacts to Critical Area are limited to the Corporate Limits of Havre de Grace and Perryville; no impacts to RCA designated Critical Area is anticipated. Detailed analyses regarding Critical Area impacts, including 100-foot buffer impacts, will be completed during the design phase of the project.



Legend

1,000 ft Critical Area Boundary:

- Corporate Limits
- Intensly Developed Areas
- Limited Development Areas
- Resource Conservation Areas
- Wetland
- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Municipal Boundary

Data Sources

Streams:
MDE, 2012
Critical Area:
MD DNR, 2001
Imagery:
2015 National Agriculture Imagery Program (NAIP)

N

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Figure E-12

Critical Area Mapping

The Project Team sent a letter requesting information on February 14, 2014 to the CAC for the Chesapeake and Atlantic Coastal Bays. In a letter dated February 18, 2014, the CAC requested continued coordination as the Proposed Project becomes more defined to determine whether a full CAC review is required (***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.

5. MINIMIZATION AND MITIGATION OF IMPACTS

Minimization efforts to avoid Critical Areas were incorporated as part of the early design for the Proposed Project. Also, whenever possible, Critical Areas have been further avoided by the Build Alternatives. Mitigation measures for impacts to Critical Areas could include:

- Replacement lands of equal or greater natural resource and economic value.
- Erosion and sediment control measures would be provided and strictly enforced to minimize impacts.
- 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 project's potential impacts to Critical Areas and mitigation measures that could lessen potential impacts.

F. COASTAL ZONE MANAGEMENT

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Section 307 of the Federal Coastal Zone Management Act of 1972 (CZMA)

CZMA and NOAA regulations (15 CFR part 930) requires that federal actions which are reasonably likely to affect any land or water use, or natural resource of a state's coastal zone be conducted in a manner that is consistent with a state's federally approved Coastal Zone Management Program (CZMP).

The Coastal Zone Act Reauthorization Amendments of 1990 (CZARA)

CZARA amended the CZMA to clarify that federal consistency requirements apply when any federal activity, regardless of location, effects on any land or water use or natural resource of the coastal zone (also referred to as coastal uses or resources, or coastal effects) must be consistent with the enforceable policies of a coastal state's federally approved coastal management program, before they can occur. Effective January 8, 2001, NOAA revised the regulations implementing the federal consistency provisions of the CZMA. The revisions were necessary based on new provisions in the 1990 CZARA and the 1996 Coastal Zone Protection Act. Effects include both direct effects that result from the activity and occur at the same time and place as the activity, and indirect (cumulative and secondary) effects that result from the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

Methodology

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.

2. AFFECTED ENVIRONMENT

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.

3. NO ACTION ALTERNATIVE

Without the Proposed Project, it is assumed that Coastal Zone conditions will remain the same as in existing conditions. The No Action Alternative is used as a baseline scenario against which potential impacts from the Proposed Project will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

The proposed Susquehanna River Rail Bridge Project is subject to the provisions of Section 307 of CZMA, and therefore 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. ***Attachment B*** lists examples of state approvals and other state agency actions related to the federal consistency decision and the overall review process.

Pursuant to Section 307 of the CZMA, Coastal Zone consistency 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.

5. MINIMIZATION AND MITIGATION OF IMPACTS

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.

G. UNIQUE AND SENSITIVE AREAS

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Natural Heritage Areas (COMAR 08.03.08)

Natural Heritage Areas (NHAs) are composed of plant or animal communities within the Critical Area that are considered to be among the best statewide examples of their kind. In addition, all NHAs contain at least one species designated or proposed as endangered, threatened, or in need of conservation. According to COMAR 08.03.08, in order to qualify as a NHA a natural community shall: (1) Contain one or more threatened or endangered species or wildlife species in need of conservation; (2) Be a unique blend of geological, hydrological, climatological, or biological features; and (3) Be considered to be among the best Statewide examples of its kind.

Scenic and Wild Rivers System Act of 1968

According to DNR, a Scenic River is a "free-flowing river whose shoreline and related land are predominantly forested, agricultural, grassland, marshland, or swampland with a minimum development for at least two miles of the river length" [8-402(d)(2)]. A Wild River is a "free-flowing river whose shoreline and related land are undeveloped, inaccessible except by trail, or predominately primitive in a natural state for at least four miles of the river length" [8-402(d)(3)]. Rivers under this program are protected from development that would diminish the character of the resources.

Maryland's Green Infrastructure Assessment

The GreenPrint Program (2001) was established by the Maryland General Assembly in an effort to "preserve the most ecologically valuable natural lands in Maryland" (Maryland's Green Infrastructure Assessment 2003). Green infrastructure data, in coordination with County planners and the regulatory agencies, identifies areas of land that could be targeted for protection or restoration to help ensure habitat for Maryland's plants and wildlife, as well as to promote a healthier environment including improved outdoor recreation, clean drinking water, and erosion prevention.

Forest Conservation Act Easements

Under the Maryland Forest Conservation Act, referenced in Section C, lands set aside under a forest conservation and management agreement must be maintained in perpetuity in a conservation easement. These easements set restrictions on development of the land but the landowner retains ownership of the land.

Federal Lands

Beginning in 1903, Theodore Roosevelt established the first federal wildlife refuge, Pelican Island National Wildlife Refuge, along Florida's central Atlantic coast. The Mission of the National Wildlife Refuge System is to, "administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

Methodology

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

2. AFFECTED ENVIRONMENT

a. Natural Heritage Areas

According to COMAR 08.03.08, there are no NHAs in Harford County and two NHAs are designated within Cecil County: Grove Creek and Plum Creek. There are no NHAs within the study area.

b. 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 within the vicinity of 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 (***Figure E-5***).

c. State Scenic and Wild Rivers and Federal Wild and Scenic Rivers

There are no rivers or their tributaries designated by either the State Scenic and Wild Rivers Program or the Federal Wild and Scenic Rivers Program located within the study area.

d. Forest Conservation Act Easements

According to Maryland's Environmental Resource and Land Information Network (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.

e. Federal Lands

Federally designated National Wildlife Refuge lands occur on Garrett Island within the Susquehanna River approximately 1,428 feet north of the Proposed Project 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.

3. NO ACTION ALTERNATIVE

Without the Proposed Project, it is assumed that conditions will remain the same as in existing conditions. The No Action Alternative is used as a baseline scenario against which potential impacts from the Proposed Project will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

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 impact 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.

5. MINIMIZATION AND MITIGATION OF IMPACTS

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.

H. CONSTRUCTION EFFECTS

1. WETLANDS/WATERS OF THE U.S.

Temporary construction impacts to wetland and stream resources will occur from either build alternative. 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. The temporary tidal wetland impact from the upstream finger pier would be approximately 1,743 square feet or 0.04 acre.

Bridge piers may be constructed using either typical cofferdams in shallow water or float-in precast cofferdams in deeper water. These structures would be removed once piers are completed. The riverbed impact from use of these temporary cofferdam structures would be 0.2 acre for the girder approach / arch main span bridge design. Additional temporary riverbed impact would result from the pilings used in the construction of the finger piers and the sheet piles used to envelop the existing piers and remnant piers to be removed, should blasting be the removal technique of choice. The temporary riverbed impact from the finger piers would total approximately 680 square feet. 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.

2. TERRESTRIAL RESOURCES

Forest Resources

Construction related 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. 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

During construction, 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. Again, this is most likely to occur within the small forest patch adjacent to Havre de Grace Middle School/High School.

Threatened, Endangered, or Special Concern Wetland and Terrestrial Species

No construction related impacts to terrestrial federally or state-listed endangered or threatened species are anticipated. For example, a response from USFWS dated January 15, 2016 indicated that the northern long-eared bat 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.. Temporary displacements of waterfowl within the Susquehanna River are likely during the construction phase of the Proposed Project.

3. AQUATIC RESOURCES

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 Proposed Project site. These activities include the following:

- Construction of temporary finger piers: Finger piers would be used to connect to access roads for construction efficiency and optimum movement of equipment, as well as to avoid the need for dredging. These would remain for the majority of the construction period (3 to 5 years). Support for the finger piers would likely include small (18 to 24 inches) driven piles.
- Construction of west and east replacement bridge piers: The new girder approach / arch main span bridge would have a total of 37 in-water piers. The construction approach used for each pier pairing would depend on the location of the pier in relation to water depth. In deeper waters, drilled caissons (concrete-filled steel pipe piles) would be used for the pier construction and in shallower waters cofferdams would be utilized.
- Demolition of the existing bridge and remnant piers: Bottom disturbance during the construction of the in-water elements of Alternative 9A and Alternative 9B would have the potential to result in temporary sediment resuspension, and in turn, increased turbidity. However, any such effects would be highly localized and temporary, and would be expected to dissipate quickly, such that no significant or long-lasting changes in turbidity or other water quality parameters would occur. Pile drilling results in minimal river bottom disturbance relative to other large-diameter pile installation methods, and no dredging, sheet pile cells, or cofferdams would be required with the exception of the deep-water piers (Piers 3 and 4) that would potentially require a cofferdam during construction.

During demolition, the existing bridge would be dismantled by removing parts of the superstructure by barge or crane. The existing piers would be removed with an excavator and their support piles would either be cut two feet below the mud line with a wire saw or demolished by blasting inside a temporary cofferdam. Use of turbidity curtains and floating booms during the bridge removal activities would minimize the potential for resuspended sediment to result in significant adverse impacts to water or sediment quality.

Construction along the Proposed Project corridor could also potentially result in short-term water quality effects, such as: increased sedimentation, increased turbidity from in-stream work, and possible spills. Construction activities that could affect stormwater runoff include:

- Excavating to widen any “cut” sections and removing unsuitable (organic) material from “fill” sections
- Filling and placing ballasts to support the new track
- Relocating access roads
- Relocating or creating new trackside swales, and

- Implementing any substructure work required for the catenary foundations, or bridge or culvert installation.

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 (MDE 2007). The MDE-approved Erosion and Sediment Control Plan will reduce the risk of surface water contamination, and minimize the harmful effects of increased impervious surfaces on surface waters. Erosion and sediment control measures include sediment traps and basins, super silt fence, in-stream closure periods, and other construction BMPs designed in compliance with current regulations. In-stream work restrictions include the following:

- Tidal Use II Streams restrictions for fish spawning and migration from February 15 through June 15
- Designated SAV beds between April 1 and October 15.

All measures will be reviewed and approved by MDE as part of the permitting process during Final Design to ensure that the Proposed Project is in compliance with the most current regulations. Adherence to the Clean Water Act's TMDL provisions will be addressed through coordination with MDE and compliance with NPDES permit process for Proposed Project stormwater. Over the long-term, all SWM facilities would be monitored and maintained in accordance with NPDES permits to ensure that each facility continues to provide the intended level of quantity and/or quality control.

The extent and duration of in-water construction activity would not differ between Alternative 9A and Alternative 9B, and as such, for the reasons discussed above, construction of the replacement bridges under Alternative 9A or Alternative 9B would not have significant adverse impacts to water quality in the Susquehanna River.

Sediment Quality & Contaminants

As discussed above, under "Water Quality," in-water construction activities for Alternative 9A and Alternative 9B would have the potential to result in the resuspension of bottom sediment and sediment-bound contaminants within the work area. However, any sediment resuspension would be temporary, minimal, and highly localized, such that no significant or long-lasting adverse impacts would occur. Suspended sediment would be expected to dissipate quickly, and would not cause a significant liberation or redistribution of existing contaminants. 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 Proposed Project site, and would thereby avoid the more substantial disturbance to river sediments that would be caused by dredging.

Aquatic Biota

As discussed above, under "Water Quality," construction of the replacement bridges and demolition of the existing bridge under Alternative 9A and Alternative 9B would not affect water or sediment quality in the Susquehanna River, and therefore, would not impact habitat conditions for fish and other aquatic biota. In-water construction activities would be limited to the drilling of large-diameter piles for the replacement bridges and the driving of small-diameter piles for the temporary finger piers, which would cause minimal bottom disturbance. Any sediment suspension that would occur during pile installation and the demolition of the existing bridge would be temporary and localized, and would be expected to be well below physiological impact thresholds of adult and larval fish and benthic macroinvertebrates.

Shading from the temporary finger piers would also not have the potential to result in significant adverse impacts to aquatic biota given their narrow width. Two finger piers would be constructed on the Perryville side. The overwater length of the upstream pier would be approximately 495 feet, while the downstream pier would be approximately 260 feet, but each pier would be only approximately 38 feet wide**.** Shading effects from low-lying overwater structures such as docks and piers generally begin at points beyond 15 feet inward from a structure's outer edges (Able and Grouthues 2011, Able et al. 2013). Angled light sufficiently reaches these areas of bottom that are within 15 feet of the edge such that conditions for aquatic biota do not appear to be altered. At a width of only 38 feet, only a small area beneath the finger piers would be more than 15 feet inward from the closest edge, and therefore, no significant shading effects would be expected to occur. Because the finger piers would be removed upon completion of the replacement bridges, there would be no cumulative shading effect from the combination of the structures.

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. Benthic invertebrates unable to move away from these areas would be lost during pile installation. Following the completion of the replacement bridges, the finger piers would be removed, and the areas occupied by their piles would begin to accumulate sediment, return to benthic habitat, and become recolonized by benthic organisms. Demolition of the existing bridge and remnant piers would allow approximately 0.5 acre of river bottom to 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 5 to 6-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. Any underwater noise produced during the installation of these piles would be minimal and well below both the physical and behavioral effect thresholds of 206 dB re: 1 µPa SPL_{peak} and 150 dB re: 1 µPa SPL_{RMS}, respectively, which have been established by the Fisheries Hydroacoustic Working Group and adopted by NMFS. 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 µPa SPL_{peak} at a distance of 10 meters from the pile (Caltrans 2009). Following BMP's 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 self weight before impact hammering the remainder of the pile. The duration of impact pile driving is expected to be less than 5 to 10 minutes per pile, which would be minimized if a vibratory driver was first used to drive the pile to resistance. 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). During impact pile driving of unattenuated steel pipe piles for temporary finger piers, underwater noise levels associated with the potential onset of physiological injury to fish (i.e., 206 dB re: 1µPa SPLpeak) would extend up to 50 feet from the pile [1]. The use of a wooden cushion block during impact pile driving would provide approximately 11 to 26 dB of noise attenuation, which would reduce the extent of the ensonified (sound-filled) area to within less than 33 feet of the pile. Given the small extent of the 206 dB SPLpeak noise isopleth, effects to sturgeon in the action area are likely to be discountable. The potential impacts of underwater noise would be further minimized if the impact pile driving was conducted between July and December, when sturgeon are less likely to occur in the action area.

Underwater noise levels associated with the potential onset of behavioral effects to fish (i.e., 150 dB re: 1µPa SPLrms) would extend across the river during impact pile driving of unattenuated piles and approximately 1,800 feet (i.e., 50 percent of the river width within the action area) if a wooden cushion block was used to attenuate noise levels. These noise levels would only occur over a period of 1 to 2 hours per day. If an average of 6 piles were driven per day and 3 days of impact pile driving occurred each week, then impact pile driving would be completed within 2.5 months. The most likely response of sturgeon to the underwater sound produced during pile driving for the finger piers would be temporary avoidance of the area (AKRF and Popper 2012a,b). Behavioral avoidance by sturgeon would be temporary and limited to 1 to 2 hours during impact pile driving on any given day. Because the extent of the 150 dB SPLrms isopleth is greater than the extent of the 187 dB re: 1μPa2 s cSEL isopleth (i.e., the potential onset of physiological injury due to prolonged sound exposure), sturgeon would avoid the ensonified area and would not likely be exposed to noise levels exceeding the 187 dB cSEL threshold. 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.

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), as described in EA ***Chapter 17 Construction Effects***. Methods such as turbidity curtains, cofferdams, and deck shielding would be implemented as necessary to contain debris. Divers with wire saws would cut bridge piers two feet below the mudline and the pier would be removed using a barge crane. 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 the potential for fish mortalities. In the event that blasting is proposed, a number of protective measures would be implemented. Blasting would use blast mats and would be conducted within steel sheet pile cofferdams that would: 1) physically exclude fish and turtles from the immediate area of the Proposed Project, 2) minimize peak pressures experienced by aquatic organisms in the vicinity of demolition activities, and 3) reduce potential increases in suspended sediments. Monitoring for listed fish and turtles during blasting would occur and any observations of these species would be reported to NMFS or USFWS. Blasting would be scheduled to occur during a work window that will be defined during coordination with NMFS and will be protective of listed species in the Proposed Project area. Any potential impacts from blasting activities that may occur outside of this window would be minimized through the implementation of additional best management practices, including the preparation of a detailed blasting plan, implementation of noise attenuation measures, detonation of low-energy scare charges to repel fish and turtles just prior to blasting, and limitations to the charge size and detonation velocity of the explosives to minimize underwater pressure changes experienced by fish and turtles.

At this time, the number of project vessels operating within the action area at any given time and the number of operating hours for those vessels are not known. At a minimum, the project will utilize work barges, delivery barges and crew vessels (with personnel lifts). The drafts of these vessels are not likely to exceed 6 to 8 feet in most cases. Water depths within most of the action area range from 20 to 50 feet at mean lower low water. Therefore, the vessel clearance above the river bottom would be 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 and below 15 feet from the water's surface for Atlantic sturgeon (Balazik et al. 2012), the risk of vessel interaction with sturgeon is small.

SAV

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. Displaced sediment could also 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, due 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 impact SAV as described above for potential dredging operations.

For both Alternatives 9A and 9B, the total permanent SAV impact from bridge construction would total approximately 0.61 acre.

Threatened, Endangered, or Special Concern Aquatic Species

<u>*Atlantic and Shortnose Sturgeon*</u>

Atlantic and shortnose sturgeon have the potential to occur within the Proposed Project area, although they have not been documented in the lower Susquehanna River since 1999 and 2004, respectively. As discussed under "Water Quality", "Hydrology", and "Aquatic Biota," construction of Alternative 9A or Alternative 9B would not have significant adverse effects on water quality or other habitat conditions for fish, including both sturgeon species and would not be expected to significantly change river hydrology in the Proposed Project site relative to the existing condition. Sediment resuspension during bottom-disturbing construction and demolition activities would be temporary and localized, and in many cases would be minimized through the use of turbidity curtains and temporary cofferdams. Dredging is not planned for the Proposed Project and there would be a net gain in benthic habitat following the removal of the existing bridge piers, which would result in no net loss of benthic habitat where sturgeon might forage. Critical habitat has not been designated for either sturgeon species; therefore, Proposed Project activities will not affect critical habitat for Atlantic or shortnose sturgeon.

Underwater noise levels will be minimized by drilling shafts rather than impact pile driving the large-diameter piles for the replacement bridges' piers, and are expected to be below both the physiological (206 dB re: 1 μPa SPL_{peak}) and behavioral (150 dB re: 1 μPa SPL_{RMS}) 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. Noise generated by the driving of the small-diameter piles using low-energy impact hammers and cushion blocks for the temporary finger piers would likewise be expected to be below levels at which physical injury to sturgeon could occur. Any effects to sturgeon potentially occurring in the area during impact pile driving would be limited to temporary avoidance of the immediate area of activity. Potential noise impacts of demolition activities performed using mechanical means and methods to remove existing bridge piers are expected to be minimized by using relatively low noise, non-impact equipment including wire saws and cranes. Although blasting is not planned for demolition, the potential impacts of any blasting activities would be minimized by implementing the protective measures discussed above. Additionally, blasting would be scheduled to occur within a work window that corresponds to the time of the year when sturgeon are least likely to occur in the vicinity of the Proposed Project area. Moreover, the very short duration (i.e., several seconds) of elevated sound pressure levels during blasting greatly minimizes the potential impacts to fish that are not in the immediate vicinity of the activity. In the event that blasting is being considered, FRA will coordinate with NMFS to develop an agreed upon approach for minimizing the potential impacts to sturgeon.

For the reasons given above, the construction of Alternative 9A or Alternative 9B and demolition of the existing bridge may affect, but are not likely to adversely affect Atlantic or shortnose sturgeon that may occur in the Susquehanna River.

Sea Turtles

Loggerhead, Kemp's ridley, and green sea turtles occur in the Chesapeake Bay, while the leatherback sea turtle is a more pelagic species that is occurs less frequently in the Bay and is not expected to occur in the Susquehanna River. As noted in the Affected Environment section above, the other sea turtles most commonly occur in the marine and estuarine portions of the estuary and are not likely to be present in the major tributaries which would include the Susquehanna River. Sea turtles occur seasonally in the Chesapeake Bay between April and November and are not expected to be present between during the winter and early spring months. During the months that sea turtles are present in the Bay, they are not expected to occur in the vicinity of the Proposed Project in the Susquehanna River or on the Susquehanna Flats. As discussed under "Water Quality" and "Aquatic Biota," construction and demolition of Alternative 9A or Alternative 9B would not have significant adverse effects on water quality or other habitat conditions for aquatic organisms, including sea turtles. There is no critical habitat designated for any of the sea turtles in the Proposed Project area.

For these reasons, the construction of Alternative 9A or Alternative 9B and demolition of the existing bridge would have no effect on loggerhead, Kemp's ridley, green, or leatherback sea turtles that may occur in the Chesapeake Bay.

Freshwater Mussels

As there is a potential for freshwater mussels, some of which are state-listed as threatened or endangered, 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 construction and demolition methods utilized to reduce impacts to freshwater mussel species.

Logperch

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 Proposed 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. 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.

Northern MapTturtles

DNR-WHS may require restrictions on construction projects in order to protect northern map turtles, including, but not limited to: conducting nesting surveys during the nesting season to identify the presence/absence of nests within a project area, in-stream time-of-year restrictions, and/or removal of turtles from the work zone using trained scuba divers. northern map turtles are known to occur within the Proposed Project area and could potentially be impacted 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.

I. CONCLUSION

In summary, this report evaluates the potential effects from the Susquehanna River Rail Bridge on a variety of natural resources, including topography, geology, and soils; floodplains and wetlands; terrestrial resources; aquatic resources; Chesapeake Bay Critical Area; Coastal Zone Management; and Unique and Sensitive Areas. ***Table E-16*** summarizes the potential effects on natural resources from the Susquehanna River Rail Bridge Project. The Proposed Project would have no significant impacts to threatened, endangered, or special concern wetland and terrestrial species, hydrology, groundwater, water quality, sediment quality and contaminants, coastal zones, and unique and sensitive areas. With the incorporation of the mitigation measures described herein, the Proposed Project would not result in significant adverse impacts on floodplains, wetlands, forest resources, wildlife, aquatic biota, and critical areas.

Table E-16
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 Encroachment (acres)	100-Year	2.72	2.15
	500-Year	4.83	4.24
Preliminary FEMA Floodplain Encroachment* (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 from bridge piers and construction (e.g., includes temporary finger pier and cofferdam impacts owing to length of construction)	0.61	0.61

** Preliminary floodplain available for Harford County only*

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Attachment A

FPPA Form NRCS-CPA-106

USDA

United States Department of Agriculture

DATE: February 8, 2016

TO: Dan Reagle
Environmental Planning Division
Maryland Transit Administration
6 St. Paul Street, 9th Floor
Baltimore, MD 21202

Received
FEB 12 2016
Office of Planning

SUBJECT: Farmland Protection Policy Act
Susquehanna River Rail Bridge Project
Harford and Cecil Counties, Maryland

Dear Mr. Reagle:

The Natural Resources Conservation Service responsibility pertaining to the Farmland Protection Policy Act (FPPA) is to provide technical assistance for the Act by evaluating and completing Parts II, IV, and V of the Farmland Conversion Impact Rating Form, AD-1006. The purpose of the Act is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses.

We have determined that the Susquehanna River Rail Bridge Project, in Harford and Cecil Counties, is an activity that is not subject to provisions of the Policy Act and is therefore exempt from the Act. This is because the reconstruction of the bridge and rail system is on existing right-of-ways and these activities will not "permanently convert farmland".

We are enclosing the Rating Form NRCS-CPA-106 with "Site Exempt" written across the top of it.

If you require any additional information, please let us know.

Sincerely,

Dean Cowherd

Dean Cowherd
NRCS Assistant State Soil Scientist
443-482-2931

cc: Tim Clippinger, Forest Hill, MD
Phillip King, Dover, DE
Patricia Engler, Annapolis, MD
James Brewer, Easton, MD

Site Exempt

U.S. DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service

NRCS-CPA-106
(Rev. 1-91)

FARMLAND CONVERSION IMPACT RATING FOR CORRIDOR TYPE PROJECTS

PART I *(To be completed by Federal Agency)*	3. Date of Land Evaluation Request 1/15/16		4. Sheet 1 of 2
1. Name of Project **Susquehanna Rail Bridge Project**	5. Federal Agency Involved **Federal Rail Administration (FRA)**		
2. Type of Project **Rail Bridge Replacement**	6. County and State **Harford and Cecil Counties, Maryland**		
PART II *(To be completed by NRCS)*	1. Date Request Received by NRCS	2. Person Completing Form	
3. Does the corridor contain prime, unique statewide or local important farmland? (If no, the FPPA does not apply - Do not complete additional parts of this form). YES ☑ NO ☐		4. Acres Irrigated	Average Farm Size
5. Major Crop(s)	6. Farmable Land in Government Jurisdiction Acres: %	7. Amount of Farmland As Defined in FPPA Acres: %	
8. Name Of Land Evaluation System Used site exempt, see attached ltr.	9. Name of Local Site Assessment System	10. Date Land Evaluation Returned by NRCS 2/9/16	

PART III *(To be completed by Federal Agency)*	Maximum Points	Alternative Corridor For Segment Alternatives 9A and 9B: Corridor A	Corridor B	Corridor C	Corridor D
A. Total Acres To Be Converted Directly		1.99 ac.	0.22 ac.		
B. Total Acres To Be Converted Indirectly, Or To Receive Services		0	0		
C. Total Acres In Corridor		62.13 ac.	62.13 ac.		
PART IV *(To be completed by NRCS)* **Land Evaluation Information**					
A. Total Acres Prime And Unique Farmland					
B. Total Acres Statewide And Local Important Farmland					
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted					
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value					
PART V *(To be completed by NRCS)* ***Land Evaluation Information Criterion Relative value of Farmland to Be Serviced or Converted (Scale of 0 - 100 Points)***					
PART VI *(To be completed by Federal Agency)* ***Corridor Assessment Criteria (These criteria are explained in 7 CFR 658.5(c))***	**Maximum Points**				
1. Area in Nonurban Use	15	6	6		
2. Perimeter in Nonurban Use	10	3	3		
3. Percent Of Corridor Being Farmed	20	0	0		
4. Protection Provided By State And Local Government	20	0	0		
5. Size of Present Farm Unit Compared To Average	10	10	10		
6. Creation Of Nonfarmable Farmland	25	0	0		
7. Availablility Of Farm Support Services	5	5	5		
8. On-Farm Investments	20	10	10		
9. Effects Of Conversion On Farm Support Services	25	1	0		
10. Compatibility With Existing Agricultural Use	10	2	1		
TOTAL CORRIDOR ASSESSMENT POINTS	160	37	35	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland (From Part V)	100	0	0	0	0
Total Corridor Assessment (From Part VI above or a local site assessment)	160	37	35	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	37	35	0	0

1. Corridor Selected: TBD	2. Total Acres of Farmlands to be Converted by Project: 1.99 ac (Alt 9A)/0.22 ac (Alt 9B)	3. Date Of Selection:	4. Was A Local Site Assessment Used? YES ☐ NO ☑

5. Reason For Selection:

Signature of Person Completing this Part: Dean Cowherd

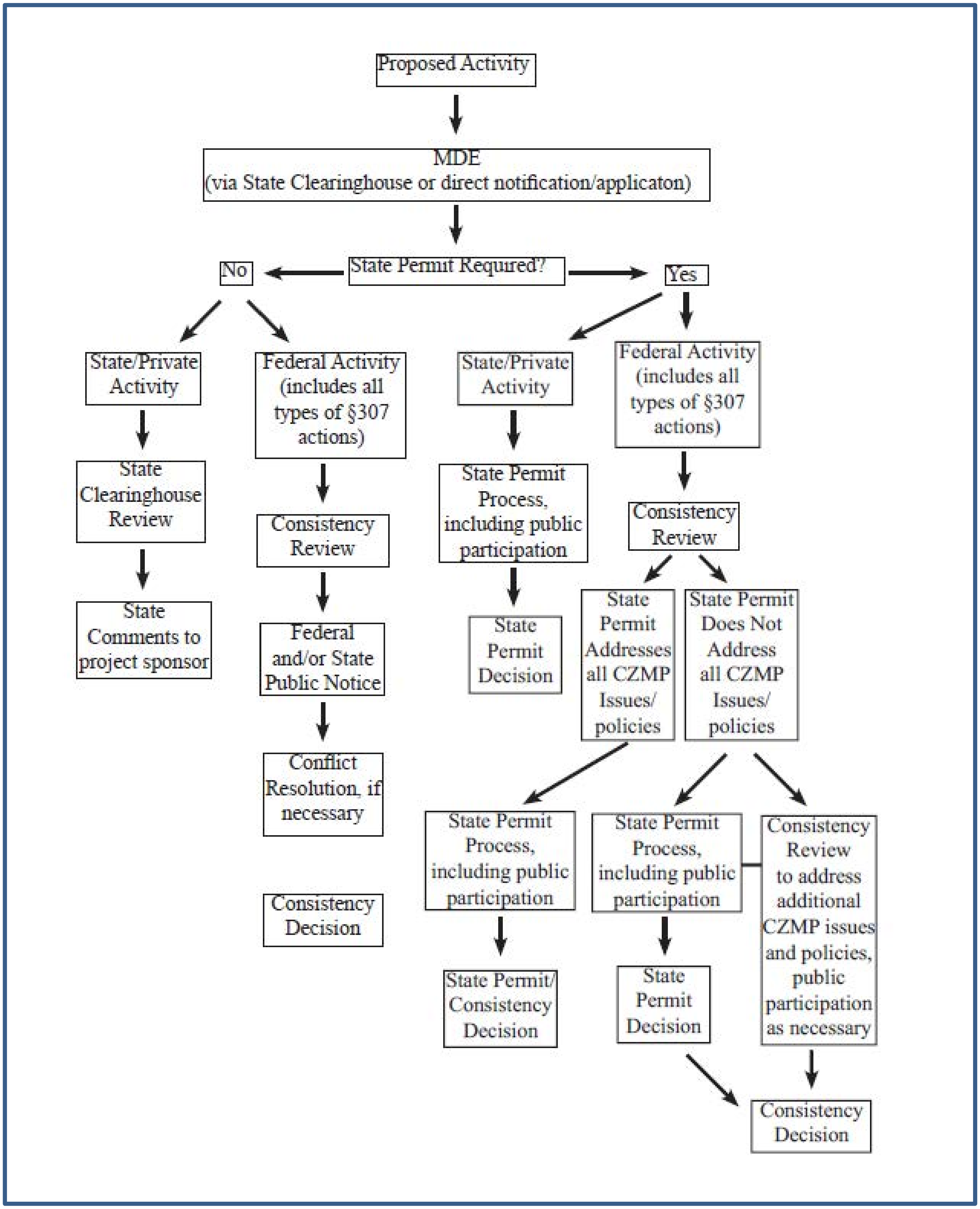
DATE 2/5/16

NOTE: Complete a form for each segment with more than one Alternate Corridor

Attachment B

Coastal Zone Management Consistency Flowchart

Attachment B: Overall Consistency Review Process



Source: Maryland Department of Environment (MDE)
A Guide to Maryland's Coastal Zone Management Program Federal Consistency Process (2004)

Attachment C

Wetland Delineation Data Forms

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehannah Amtrak City/County: Perryville, Cecil Sampling Date: 26 Oct 2015

Applicant/Owner: Amtrak State: MD Sampling Point: W15-1

Investigator(s): Emily Jellick & David Smith Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): LRR S Lat: 39° 33' 31.28" Long: 76° 04' 13.63" Datum: ______

Soil Map Unit Name: Urban Land NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______	Is the Sampled Area within a Wetland? Yes ✓ No ______	
Hydric Soil Present? Yes ✓ No ______		
Wetland Hydrology Present? Yes ✓ No ______		

Remarks:

Flags 1-48 Photo 3 looking Westerly along toe of railroad tracks.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ✓ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ✓ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ✓ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present? Yes ✓ No ______ Depth (inches): ______

Water Table Present? Yes ✓ No ______ Depth (inches): 4

Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Positive α,α dipyridyl test. Rain w/in previous 36 hrs. Dry conditions over previous month +.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W151

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
		= Total Cover	
50% of total cover:		20% of total cover:	
Sapling/Shrub Stratum (Plot size: 20' wide x 60' long)			
1. Liquidambar styraciflua	8	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	8	= Total Cover	
50% of total cover:	4	20% of total cover:	1.6
Herb Stratum (Plot size: 20' wide x 60' long)			
1. Leersia oryzoides	35	Y	OBL
2. Panicum virgatum	48	Y	FAC
3. Andropogon virginicus	3		FAC
4. Typha latifolia	5		OBL
5. Schedonorus arundinaceus	4		FAC
6. Schoenoplectus pungens	10		OBL
7.			
8.			
9.			
10.			
11.			
12.			
	105	= Total Cover	
50% of total cover:	52.5	20% of total cover:	21
Woody Vine Stratum (Plot size: 20' x 60')			
1. Lonicera japonica	5	Y	FACU
2.			
3.			
4.			
5.			
	5	= Total Cover	
50% of total cover:	2.5	20% of total cover:	1

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: W151

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR3/1	95	5YR4/6	5	C	M,PL	SiCl	muck presence, rootlets
5-10	10YR3/1	100					Sl	muck presence, coarse fragments
10	Rejected by gravel							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Amtrak Susquehannah City/County: Havre De Grace Harford Sampling Date: 10/27/15
Applicant/Owner: Amtrak State: MD Sampling Point: WL17-1
Investigator(s): D. Smith, E. Jellick Section, Township, Range: ___
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex Slope (%): 1%
Subregion (LRR or MLRA): LRRS Lat: 39°32'58.35" Long: 76°05'54.12" Datum: ___
Soil Map Unit Name: Alluvial Land NWI classification: ___
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	Is the Sampled Area within a Wetland?	Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___		
Wetland Hydrology Present?	Yes ✓ No ___		

Remarks: . pn # 1 (SW)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- X Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ___ No X	Depth (inches): ___	
Water Table Present?	Yes ___ No X	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ✓ No ___	Depth (inches): 0-8	Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Saturation due to confining layer. Positive αα-dipyridyl test.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL171

Tree Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	18	Y	OBL
2. Taxodium distichum	15	Y	OBL
3.			
4.			
5.			
6.			
7.			
8.			
	33 = Total Cover		
50% of total cover: 16.5	20% of total cover: 6.6		

Sapling/Shrub Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Herb Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Leersia oryzoides	65	Y	OBL
2. Iris versicolor	25	Y	OBL
3. Persicaria sagittata	15		OBL
4. Sagittaria latifolia	15		OBL
5. Phragmites australis	10		FACW
6. Pilea pumila	5		FACW
7. Impatiens capensis	5		FACW
8.			
9.			
10.			
11.			
12.			
	140 = Total Cover		
50% of total cover: 70	20% of total cover: 28		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WL17-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	100	—				SiL	many fine rootlets
2-8	5Y 3/1	95	10YR 4/4	5	C	M,PL	SiCL	coarse fragments
8-12	5Y 3/1	95	10YR 4/4	5	C	M	SC	coarse fragments

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5)
__ Organic Bodies (A6) **(LRR P, T, U)**
__ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
__ Muck Presence (A8) **(LRR U)**
__ 1 cm Muck (A9) **(LRR P, T)**
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Coast Prairie Redox (A16) **(MLRA 150A)**
__ Sandy Mucky Mineral (S1) **(LRR O, S)**
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Dark Surface (S7) **(LRR P, S, T, U)**
__ Polyvalue Below Surface (S8) **(LRR S, T, U)**
__ Thin Dark Surface (S9) **(LRR S, T, U)**
__ Loamy Mucky Mineral (F1) **(LRR O)**
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Marl (F10) **(LRR U)**
__ Depleted Ochric (F11) **(MLRA 151)**
__ Iron-Manganese Masses (F12) **(LRR O, P, T)**
__ Umbric Surface (F13) **(LRR P, T, U)**
__ Delta Ochric (F17) **(MLRA 151)**
__ Reduced Vertic (F18) **(MLRA 150A, 150B)**
__ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
__ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) **(LRR O)**
__ 2 cm Muck (A10) **(LRR S)**
__ Reduced Vertic (F18) **(outside MLRA 150A,B)**
__ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
__ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehanna Amtrak City/County: Havre de Grace/Harford Sampling Date: 27 Oct 2015

Applicant/Owner: Amtrak State: MD Sampling Point: WL18-1

Investigator(s): D. Smith, E. Jellick Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): LRR S Lat: 39°32'52.60" Long: 76°06'05.87" Datum: ______

Soil Map Unit Name: Elkton silt loam, Mattapex silt loam 0-2% slopes NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______ No ______	Is the Sampled Area within a Wetland?	Yes ______ No ______
Hydric Soil Present?	Yes ______ No ______		
Wetland Hydrology Present?	Yes ______ No ______		

Remarks:
Photo 4 looking NE at wet ditch. Ditch 5'-8' wide originating at culvert beneath railroad.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ✓ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ______ No ✓	Depth (inches): ______	
Water Table Present?	Yes ______ No ✓	Depth (inches): ______	
Saturation Present? (includes capillary fringe)	Yes ______ No ✓	Depth (inches): ______	Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No rain in 48 hours, dry previous 2 months,

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL18-1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
		= Total Cover	
50% of total cover:		20% of total cover:	

Herb Stratum (Plot size: 5X100)	Absolute % Cover	Dominant Species?	Indicator Status
1. Phragmites australis	95	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	95	= Total Cover	
50% of total cover:	47.5	20% of total cover:	19

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Vitis labrusca	15	Y	FAC
2. Lonicera japonica	20	Y	FACU
3.			
4.			
5.			
	35	= Total Cover	
50% of total cover:	17.5	20% of total cover:	7

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0[1]
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WL18-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR3/1	90	7.5YR4/4	10	C	M,PL	SiCl	many rootlets, organics
6-14	10YR2/1	20	7.5YR4/6	10	C	M	C	Disturbed
	10YR5/3	70						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.   [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) (LRR P, T, U)
- ___ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ___ Muck Presence (A8) (LRR U)
- ___ 1 cm Muck (A9) (LRR P, T)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (MLRA 150A)
- ___ Sandy Mucky Mineral (S1) (LRR O, S)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (LRR P, S, T, U)
- ___ Polyvalue Below Surface (S8) (LRR S, T, U)
- ___ Thin Dark Surface (S9) (LRR S, T, U)
- ___ Loamy Mucky Mineral (F1) (LRR O)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (LRR U)
- ___ Depleted Ochric (F11) (MLRA 151)
- ___ Iron-Manganese Masses (F12) (LRR O, P, T)
- ___ Umbric Surface (F13) (LRR P, T, U)
- ___ Delta Ochric (F17) (MLRA 151)
- ___ Reduced Vertic (F18) (MLRA 150A, 150B)
- ___ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR O)
- ___ 2 cm Muck (A10) (LRR S)
- ___ Reduced Vertic (F18) (outside MLRA 150A,B)
- ___ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehanna Amtrak City/County: Havre De Grace/Harford Sampling Date: 27 Oct 2015

Applicant/Owner: Amtrak State: MD Sampling Point: WL 19-1

Investigator(s): D. Smith, E. Jellick Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain terrace Local relief (concave, convex, none): Concave Slope (%): 3

Subregion (LRR or MLRA): LRR S Lat: 39°32'50.44" Long: 76°06'08.78" Datum: ______

Soil Map Unit Name: Othello silt loam, Alluvial Land NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______	Is the Sampled Area within a Wetland?	Yes ✓ No ______
Hydric Soil Present? Yes ✓ No ______		
Wetland Hydrology Present? Yes ✓ No ______		

Remarks:

Photo 9 looking SW at test plot. PFO1C

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ✓ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ______	No ✓	Depth (inches): ______
Water Table Present?	Yes ✓	No ______	Depth (inches): 10
Saturation Present? (includes capillary fringe)	Yes ✓	No ______	Depth (inches): 0-10

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No rain w/in 48 hours. Dry 2 months. Positive αα dipyridyl test.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WL19-1

Tree Stratum (Plot size: 20'X80')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	65	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	65 = Total Cover		
50% of total cover: 32.5	20% of total cover: 13		

Sapling/Shrub Stratum (Plot size: 20'X80')			
1. Acer rubrum	6		FAC
2. Lindera benzoin	5		FACW
3. Sambucus nigra	11	Y	FACW
4. Rubus argutus	16	Y	FAC
5. Rosa multiflora	4		FACU
6.			
7.			
8.			
	42 = Total Cover		
50% of total cover: 21	20% of total cover: 8.4		

Herb Stratum (Plot size: 20'x80')			
1. Poa palustris	10		FACW
2. Leersia virginica	18	Y	FACW
3. Phragmites australis	25	Y	FACW
4. Microstegium vimineum	5		FAC
5. Lonicera japonica	12		FACU
6. Cinna arundinacea	3		FACW
7. Toxicodendron radicans	5		FAC
8.			
9.			
10.			
11.			
12.			
	78 = Total Cover		
50% of total cover: 39	20% of total cover: 15.6		

Woody Vine Stratum (Plot size: 20'x80')			
1. Vitis labrusca	17	Y	FAC
2. Celastrus orbiculatus	8	Y	FACU
3. Toxicodendron radicans	5		FAC
4.			
5.			
	30 = Total Cover		
50% of total cover: 15	20% of total cover: 6		

Remarks: (If observed, list morphological adaptations below).

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.6 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- __ 3 - Prevalence Index is ≤3.0[1]
- __ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ____

SOIL

Sampling Point: WL 19-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR3/2	95	7.5YR4/4	5	C	PL	SiL	
1-9	10YR4/1	85	7.5YR4/6	15	C	M,PL	SiCL	
9-12	10YR5/4	80	7.5YR3/4	20	C	M	CL	
12-16	10YR5/2	80	7.5YR3/4	20	C	M	C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) (LRR P, T, U)
- ___ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ___ Muck Presence (A8) (LRR U)
- ___ 1 cm Muck (A9) (LRR P, T)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (MLRA 150A)
- ___ Sandy Mucky Mineral (S1) (LRR O, S)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (LRR P, S, T, U)
- ___ Polyvalue Below Surface (S8) (LRR S, T, U)
- ___ Thin Dark Surface (S9) (LRR S, T, U)
- ___ Loamy Mucky Mineral (F1) (LRR O)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (LRR U)
- ___ Depleted Ochric (F11) (MLRA 151)
- ___ Iron-Manganese Masses (F12) (LRR O, P, T)
- ___ Umbric Surface (F13) (LRR P, T, U)
- ___ Delta Ochric (F17) (MLRA 151)
- ___ Reduced Vertic (F18) (MLRA 150A, 150B)
- ___ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR O)
- ___ 2 cm Muck (A10) (LRR S)
- ___ Reduced Vertic (F18) (outside MLRA 150A,B)
- ___ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___________

Depth (inches): ___________

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehanna Amtrak City/County: Havre de Grace / Harford Sampling Date: 27 Oct 2015

Applicant/Owner: Amtrak State: MD Sampling Point: WL 19-2

Investigator(s): D. Smith, E. Jellick Section, Township, Range:

Landform (hillslope, terrace, etc.): Ditch/Swale Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): LRR S Lat: 39° 32' 45.44" Long: 76° 06' 14.21" Datum:

Soil Map Unit Name: Mattapex silt loam, 2-5% slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ___	Is the Sampled Area within a Wetland?	Yes ✓ No ___
Hydric Soil Present? Yes ✓ No ___		
Wetland Hydrology Present? Yes ✓ No ___		

Remarks:

Photo 10 looking NE at PEM1C

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ✓ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No rain in 48 hours +. Dry 2 months.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL19-2

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Herb Stratum (Plot size: 15x80')	Absolute % Cover	Dominant Species?	Indicator Status
1. Echinochloa muricata	42	Y	FACW
2. Panicum dichotomiflorum	20	Y	FACW
3. Typha angustifolia	10		OBL
4. Dichanthelium scoparium	5		FACW
5. Phragmites australis	12		FACW
6. Digitaria sanguinalis	5		FACU
7.			
8.			
9.			
10.			
11.			
12.			
	94 = Total Cover		
50% of total cover: 47	20% of total cover: 18.8		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0[1]
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WI 19-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR4/2	85	7.5YR3/4	15	C	M,PL	SiCl	
2-6	10YR5/4	75	7.5YR4/6	20	C	M	Sl	
			10YR4/2	5	D	M	Sl	
6-14	10YR5/6	85	7.5YR4/6	10	C	M	SC	
			10YR6/1	5	D	M	SC	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehanna Amtrak City/County: Havre de Grace/Harford Sampling Date: 27 Oct 2015
Applicant/Owner: Amtrak State: MD Sampling Point: W6-1
Investigator(s): D. Smith, E. Jellick Section, Township, Range: ______
Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave Slope (%): 5
Subregion (LRR or MLRA): LRR S Lat: 39°32'44.56" Long: 76° 06' 17.19" Datum: ______
Soil Map Unit Name: Mattapex silt loam, 2-5% slopes NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	Is the Sampled Area within a Wetland? Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:
Photo 11 looking E. Vegetated relatively permanent waterway.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)
- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ✓ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)
- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ✓ No ___	Depth (inches): 3	
Water Table Present?	Yes ✓ No ___	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓ No ___	Depth (inches): 0	Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Dry previous 2 months. No rain >48 hrs.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W6-1

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Sapling/Shrub Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Herb Stratum (Plot size: 10'x80')	Absolute % Cover	Dominant Species?	Indicator Status
1. Typha latifolia	20	Y	OBL
2. Echinochloa muricata	15	Y	FACW
3. Leersia oryzoides	15	Y	OBL
4. Persicaria hydropiperoides	4		OBL
5. Cyperus strigosus	3		FACW
6. Lonicera japonica	5		FACU
7.			
8.			
9.			
10.			
11.			
12.			
	62 = Total Cover		
50% of total cover: 31	20% of total cover: 12.4		

Woody Vine Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
50% of total cover: ____	20% of total cover: ____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: Wb-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10 YR 3/1	85	7.5YR3/4	15	C	PL	SL	many rootlets

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) (LRR P, T, U)
- ___ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ___ Muck Presence (A8) (LRR U)
- ___ 1 cm Muck (A9) (LRR P, T)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (MLRA 150A)
- ___ Sandy Mucky Mineral (S1) (LRR O, S)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (LRR P, S, T, U)
- ___ Polyvalue Below Surface (S8) (LRR S, T, U)
- ___ Thin Dark Surface (S9) (LRR S, T, U)
- ___ Loamy Mucky Mineral (F1) (LRR O)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (LRR U)
- ___ Depleted Ochric (F11) (MLRA 151)
- ___ Iron-Manganese Masses (F12) (LRR O, P, T)
- ___ Umbric Surface (F13) (LRR P, T, U)
- ___ Delta Ochric (F17) (MLRA 151)
- ___ Reduced Vertic (F18) (MLRA 150A, 150B)
- ___ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR O)
- ___ 2 cm Muck (A10) (LRR S)
- ___ Reduced Vertic (F18) (outside MLRA 150A,B)
- ___ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehannah Amtrak City/County: Perryville, Cecil Sampling Date: 26 Oct. 2015
Applicant/Owner: Amtrak State: MD Sampling Point: W9 - 1
Investigator(s): David Smith, Emily Jellick Section, Township, Range: ______
Landform (hillslope, terrace, etc.): tidal fringe Local relief (concave, convex, none): ______ Slope (%): 5%
Subregion (LRR or MLRA): LRR S Lat: 39° 33' 23.79" Long: 76° 04' 44.25" Datum: ______
Soil Map Unit Name: Butlertown silt loam, 5-10% slopes NWI classification: PEM1/SS1R
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland?	Yes ✓ No ______
Hydric Soil Present?	Yes ✓ No ______		
Wetland Hydrology Present?	Yes ✓ No ______		

Remarks:
class. PFO, flags 1-10 openended (2-10 are E2FO)

ph#6 (N)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ______ No ✓	Depth (inches): ______	
Water Table Present?	Yes ______ No ✓	Depth (inches): ______	
Saturation Present? (includes capillary fringe)	Yes ______ No ✓	Depth (inches): ______	Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Rain within 36 hours

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W9-1

Tree Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	40	Y	FAC
2. Acer saccharinum	30	Y	FAC
3. Fraxinus pennsylvanica	15		FACW
4.			
5.			
6.			
7.			
8.			
	85 = Total Cover		
50% of total cover: 42.5	20% of total cover: 17		

Sapling/Shrub Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	28	Y	FAC
2. Acer saccharinum	3		FAC
3. Ligustrum sinense	5		FAC
4.			
5.			
6.			
7.			
8.			
	36 = Total Cover		
50% of total cover: 18	20% of total cover: 6.2		

Herb Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Phragmites australis	30	Y	FACW
2. Pilea pumila	15	Y	FACW
3. Carex intumescens	5		FACW
4. Duchesnea indica	15	Y	FACU
5. Eupatorium serotinum	5		FAC
6. Vinca minor	15	Y	UPL
7. Microstegium vimineum	5		FAC
8. Boehmeria cylindrica	5		FACW
9. Leersia virginica	5		OBL
10. Mentha arvensis	7		FACW
11. Cinna arundinacea	10		FACW
12. Lonicera japonica	10		FACU
	127 = Total Cover		
50% of total cover: 63.5	20% of total cover: 25.4		

Woody Vine Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Parthenocissus quinquefolia	10	Y	FACU
2. Toxicodendron radicans	5	Y	FAC
3.			
4.			
5.			
	15 = Total Cover		
50% of total cover: 7.5	20% of total cover: 3		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ______	x 1 = ______
FACW species ______	x 2 = ______
FAC species ______	x 3 = ______
FACU species ______	x 4 = ______
UPL species ______	x 5 = ______
Column Totals: ______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: W9-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1	96	7.5YR 3/4	4	C	M PL	SiL	many rootlets dense roots - muck presence
2-14	10YR 3/1	85	7.5YR 4/6	15	C	M	SL	w/ organics

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Organic Bodies (A6) **(LRR P, T, U)**
___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
___ Muck Presence (A8) **(LRR U)**
___ 1 cm Muck (A9) **(LRR P, T)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Coast Prairie Redox (A16) **(MLRA 150A)**
___ Sandy Mucky Mineral (S1) **(LRR O, S)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) **(LRR P, S, T, U)**

___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
___ Thin Dark Surface (S9) **(LRR S, T, U)**
___ Loamy Mucky Mineral (F1) **(LRR O)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) **(LRR U)**
___ Depleted Ochric (F11) **(MLRA 151)**
___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
___ Umbric Surface (F13) **(LRR P, T, U)**
___ Delta Ochric (F17) **(MLRA 151)**
___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR O)**
___ 2 cm Muck (A10) **(LRR S)**
___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehanna Amtrak City/County: Perryville / Cecil Sampling Date: 26 Oct 2015
Applicant/Owner: Amtrak State: MD Sampling Point: W9-2
Investigator(s): D. Smith, E. Jellick Section, Township, Range: ____
Landform (hillslope, terrace, etc.): Tidal fringe Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR or MLRA): LRR-S Lat: 39° 33' 23.03" Long: 76° 04' 46.30" Datum: ____
Soil Map Unit Name: Water NWI classification: PEM1/SS1R
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	Is the Sampled Area within a Wetland? Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:
Photo 9 looking upriver (N). Habitat identified as PEMIN fringe.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)
- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1)
- ✓ Sediment Deposits (B2)
- ✓ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)
- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ___	No ✓	Depth (inches): ___	
Water Table Present?	Yes ✓	No ___	Depth (inches): 3	
Saturation Present? (includes capillary fringe)	Yes ✓	No ___	Depth (inches): 0	Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Rain within 36 hours. Area subject to twice daily tides. Sampled at low tide.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W9-2

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Herb Stratum (Plot size: 20x60')	Absolute % Cover	Dominant Species?	Indicator Status
1. Pilea pumila	25	Y	FACW
2. Carex intumescens	6		FACW
3. Murdannia Keisak	5		OBL
4. Hibiscus moscheutos	4		OBL
5. Persicaria hydropiperoides	3		OBL
6. Ludwigia peploides	12	Y	OBL
7. Hydrocotyl umbellata	5		OBL
8. Schoenoplectus tabernaemontani	3		OBL
9. Leersia oryzoides	10		OBL
10. Typha latifolia	8		OBL
11. Ludwigia palustris	15	Y	OBL
12. Lycopus uniflorus	11	Y	OBL
	= Total Cover		
~~50% of total cover:~~	~~20% of total cover:~~		

~~Woody Vine Stratum (Plot size:~~ ______)			
13 Mikania scandens	8		
14 Boehmeria cylindrica	4		
15 Lythrum salicaria	4		
4.			
5.			
	123 = Total Cover		
50% of total cover: 61.5	20% of total cover: 24.6		

Remarks: (If observed, list morphological adaptations below).

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

SOIL

Sampling Point: W9-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8								Peat
8-14	10YR3/1	100						Muck

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) (LRR P, T, U)
- ___ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ___ Muck Presence (A8) (LRR U)
- ___ 1 cm Muck (A9) (LRR P, T)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (MLRA 150A)
- ___ Sandy Mucky Mineral (S1) (LRR O, S)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (LRR P, S, T, U)
- ___ Polyvalue Below Surface (S8) (LRR S, T, U)
- ___ Thin Dark Surface (S9) (LRR S, T, U)
- ___ Loamy Mucky Mineral (F1) (LRR O)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (LRR U)
- ___ Depleted Ochric (F11) (MLRA 151)
- ___ Iron-Manganese Masses (F12) (LRR O, P, T)
- ___ Umbric Surface (F13) (LRR P, T, U)
- ___ Delta Ochric (F17) (MLRA 151)
- ___ Reduced Vertic (F18) (MLRA 150A, 150B)
- ___ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR O)
- ✓ 2 cm Muck (A10) (LRR S)
- ___ Reduced Vertic (F18) (outside MLRA 150A,B)
- ___ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

Area in tidal Fringe at low tide. Peat overlying muck.

Stream Features
Field Sheet

Date: 10/26/15 Project Site: Amtrak Susquehanna WUS # : 29

Observer(s) D. Smith, E. Sellick

Stream Flow:

Perennial: ______ Intermittent ______ Ephemeral cohem

Gradient: 5 Classification: ______

Channel Characteristics:

Natural ______ Artificial (man-made) ✓ Manipulated (man-altered) ______

Explain: Flows from corrugated metal pipe

Channel Has (check all that apply):

- [x] Bed and Banks
- [ ] OHWM
  - [x] clear, natural line impressed on the bank
  - [ ] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [ ] water staining
  - [x] the presence of litter and debris
  - [x] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [ ] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ______
- [ ] Discontinuous OHWM (explain): ______

Morphology:

Avg. Channel Width 2' Depth 6" Avg. Water Depth <1"

Habitat and Pollutants:

Substrate (predominant type (s)): Sand, silt, gravel

Habitat Complexity (characterize): Low, shallow channel flowing from culvert with little habitat complexity

Bank Erosion: Severe ______ Moderate ______ Minor X

Describe: Shallow channel, vegetated banks

Silt Deposition: low

Pollutants (observation / potential sources): Runoff from road

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species ______ Fish Spawn Areas ______

Other Environmentally-Sensitive Species ______ Aquatic/Wildlife Diversity ______

Explain Findings: none observed

Riparian Zone:

Development: Mid successional Grwd

Riparian vegetation: Forest ✓ Shrubs ______ Herbs ______

Dominant Species: FRPE, Acer saccharinum, ACNE, VIMI

Riparian Buffer Width: >100'

Approximate % Shading by Woody Species: 75%

Notes: Ph # 7 US, Ph#8 DS drains to tidal wetland

Mill Creek

Stream Features
Field Sheet

Date: 26 Oct. 2015 Project Site: Susquehanna Hat.[illegible] WUS # : 10

Observer(s) D. Smith, E. Tollick

Stream Flow:
Perennial: ✓ Intermittent ____ Ephemeral ____

Gradient: 1-2% Classification: R3UB1

Channel Characteristics:
Natural ____ Artificial (man-made) ____ Manipulated (man-altered) ✓

Explain: Channel diverted through stone arch bridge

Channel Has (check all that apply):

- [x] Bed and Banks
- [ ] OHWM
  - [x] clear, natural line impressed on the bank
  - [ ] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [x] sediment deposition
  - [ ] water staining
  - [x] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [x] the presence of wrack line
  - [ ] sediment sorting
  - [x] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ____
- [ ] Discontinuous OHWM (explain): ____

Morphology:
Avg. Channel Width 18' Depth 2.5' Avg. Water Depth 6"

Habitat and Pollutants:
Substrate (predominant type (s)): cobble/gravel

Habitat Complexity (characterize): Numerous riffle/run complexes up and Downstream of bridge, deeper pools present at bridge.

Bank Erosion: Severe ____ Moderate ____ Minor ✓

Describe: Minor bank cut on right bank below bridge

Silt Deposition: Minor

Pollutants (observation / potential sources): Runoff from railroad, adj. road

Stormwater Outfalls: None observed

Biological Habitat For (check all that apply):

Federally Listed species ________ Fish Spawn Areas ✓

Other Environmentally-Sensitive Species ________ Aquatic/Wildlife Diversity ✓

Explain Findings: Fish observed; habitat appears suitable for diverse macroinvertebrate community.

Riparian Zone:

Development: Railroad crosses Mill Creek.

Riparian vegetation: Forest ________ Shrubs ✓ Herbs ✓

Dominant Species: Juncus effusus, Microstegium vimineum, Leersia oryzoides, Dichanthelium clandestinum, Liquidambar styraciflua, Robinia pseudoacacia, Eupatorium serotinum

Riparian Buffer Width: Right Bank - 25', Left Bank - >100'

Approximate % Shading by Woody Species: 0%

Notes: Photo 1 looking US, Photo 2 looking DS

Stream Features
Field Sheet

Date: 10/27/15 Project Site: Amtrak Susquehanna WUS # : 17

Observer(s) D. Smith, E Jellick

Lily run

Stream Flow:

Perennial: RPW Intermittent ______ Ephemeral ______

Gradient: 1% Classification: R2UB1/2

Channel Characteristics:

Natural ______ Artificial (man-made) ______ Manipulated (man-altered) ✓

Explain: Flows through culvert under railroad

Channel Has (check all that apply):

- [x] Bed and Banks
- [x] OHWM
  - [x] clear, natural line impressed on the bank
  - [x] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [ ] water staining
  - [ ] the presence of litter and debris
  - [x] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [x] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ______
- [ ] Discontinuous OHWM (explain): ______

Morphology:

Avg. Channel Width 6' Depth 2.5' Avg. Water Depth 1'

Habitat and Pollutants:

Substrate (predominant type (s)): Sand, silt, gravel

Habitat Complexity (characterize): low, few undercut banks, majority of channel is standing pools/run, instream habitat - wood, leafpacks, etc lacking

Bank Erosion: Severe ______ Moderate ______ Minor X

Describe: Banks well vegetated

Silt Deposition: low

Pollutants (observation / potential sources): runoff from sports fields, train tracks

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species ______ Fish Spawn Areas ______

Other Environmentally-Sensitive Species ______ Aquatic/Wildlife Diversity X

Explain Findings: Fish and S. leopard frog observed

Riparian Zone:

Development: Forest, meadow, wetland

Riparian vegetation: Forest X Shrubs ______ Herbs ______

Dominant Species: PHAU, SACA sppningra, TORA, LOTA, ACNE

Riparian Buffer Width: LB ~50' RB >100

Approximate % Shading by Woody Species: 20%

Notes: Ph # 2 - DS, PH#3 - US stream flows through culvert past maintained ball fields, narrow strip of meadow on LB, small wetland on RB

Unnamed tributary to Lily Run

Stream Features
Field Sheet

Date: 10/27/15 Project Site: Amtrak Susquehannah WUS # : 19

Observer(s) D. Smith E. Jellick

Stream Flow:
Perennial: ______ Intermittent X Ephemeral ______

Gradient: 2% Classification: R4SB3/4

Channel Characteristics:
Natural ______ Artificial (man-made) ______ Manipulated (man-altered) +

Explain: Flows through culverts, partially lined w/ concrete

Channel Has (check all that apply):

- [x] Bed and Banks
- [x] OHWM
  - [x] clear, natural line impressed on the bank
  - [x] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [ ] water staining
  - [x] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [x] the presence of wrack line
  - [ ] sediment sorting
  - [x] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ______
- [ ] Discontinuous OHWM (explain): ______

Morphology:
Avg. Channel Width 3' Depth 4' Avg. Water Depth 4"

Habitat and Pollutants:
Substrate (predominant type (s)): cobble, sand, silt, gravel

Habitat Complexity (characterize): moderate, few pools, some rootwads / undercut banks and instream woody debris

Bank Erosion: Severe ______ Moderate ✓ Minor ______

Describe: steep banks with some erosion

Silt Deposition: low

Pollutants (observation / potential sources): Runoff from ball fields, railroad

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species ________ Fish Spawn Areas ________

Other Environmentally-Sensitive Species ________ Aquatic/Wildlife Diversity ________

Explain Findings: fish + S. leopard frog observed

Riparian Zone:

Development: Railroad, mid-successional forest, maintained grass

Riparian vegetation: Forest X Shrubs ________ Herbs ________

Dominant Species: LIST, ROPS, ACRU

Riparian Buffer Width: LB 50' RB 25'

Approximate % Shading by Woody Species: 90

Notes: ph #5 US ph# 6 DS upstream channel has steep 10' slope and highly eroded channel

Stream Features
Field Sheet

Date: 6/27/15 Project Site: Amtrak Susquehanna WUS #: 20 Unnamed tributary to Lily Run

Observer(s) E Jellick D Smith

Stream Flow:
Perennial: X Intermittent ____ Ephemeral ____

Gradient: 3% Classification: R2UB1

Channel Characteristics:
Natural ____ Artificial (man-made) ____ Manipulated (man-altered) X

Explain: Flows through culvert onto cobble, onto concrete and through another culvert

Channel Has (check all that apply):

- [x] Bed and Banks
- [x] OHWM
  - [ ] clear, natural line impressed on the bank
  - [x] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [x] water staining
  - [ ] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [ ] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ____
- [ ] Discontinuous OHWM (explain): ____

Morphology:
Avg. Channel Width 4' Depth 2' Avg. Water Depth 1"

Habitat and Pollutants:
Substrate (predominant type (s)): Cobble, concrete

Habitat Complexity (characterize): low - low flow, no instream cover, few rod weeds

Bank Erosion: Severe ____ Moderate X Minor ____

Describe: Several areas have eroded behind concrete lining

Silt Deposition: low

Pollutants (observation / potential sources): runoff from ball fields / railroad

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species ____________ Fish Spawn Areas ____________

Other Environmentally-Sensitive Species ____________ Aquatic/Wildlife Diversity ____________

Explain Findings: none observed

Riparian Zone:

Development: Mid successional forest

Riparian vegetation: Forest x Shrubs ____________ Herbs ____________

Dominant Species: ROPS, JUNI, LIST, Rubus sp, LOTA

Riparian Buffer Width: >100'

Approximate % Shading by Woody Species: 80

Notes: ph# 7 US, Ph#8 DS

Stream Features
Field Sheet

Date: 6/27/15 Project Site: Amtrak Susquehannah WUS #: 6

Observer(s) D. Smith, E. Tellick

Stream Flow:
Perennial: ______ Intermittent X Ephemeral ______

Gradient: 1% Classification: R4SB3/5

Channel Characteristics:
Natural ______ Artificial (man-made) X Manipulated (man-altered) ______

Explain: Toe of slope channel from Railroad

Channel Has (check all that apply):

- [X] Bed and Banks
- [ ] OHWM
  - [ ] clear, natural line impressed on the bank
  - [ ] changes in character of soil
  - [ ] shelving
  - [ ] vegetation matted down, bent, or absent
  - [ ] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [ ] water staining
  - [ ] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [ ] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ______
- [ ] Discontinuous OHWM (explain): ______

Morphology:
Avg. Channel Width 4 Depth 1' Avg. Water Depth 4"

Habitat and Pollutants:
Substrate (predominant type (s)): Cobble, silt/mud

Habitat Complexity (characterize): low, straight shallow run

Bank Erosion: Severe ______ Moderate ______ Minor X

Describe: lined by cobble

Silt Deposition: low

Pollutants (observation / potential sources): runoff from railroad

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species ____ Fish Spawn Areas ____

Other Environmentally-Sensitive Species ____ Aquatic/Wildlife Diversity X

Explain Findings: Fish, frog observed

Riparian Zone:

Development: Railroad /Forest

Riparian vegetation: Forest X Shrubs ____ Herbs ____

Dominant Species: Rhus copallina, LITU, EUSE, LIST

Riparian Buffer Width: LB 7100' RB - none railroad

Approximate % Shading by Woody Species: 0

Notes:

Stream Features
Field Sheet

Date: 10/27/15 Project Site: Amtrak Susquehannah WUS #: 5 Unnamed tributary to Lily Run

Observer(s) D. Smith E. Jellick

Stream Flow:

Perennial: X Intermittent ____ Ephemeral ____

Gradient: 1% Classification: R3UB1/2

Channel Characteristics:

Natural ____ Artificial (man-made) X Manipulated (man-altered) ____

Explain: Flows from culvert through underpass onto cobbles

Channel Has (check all that apply):

- [x] Bed and Banks
- [x] OHWM
  - [ ] clear, natural line impressed on the bank
  - [x] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [x] sediment deposition
  - [x] water staining
  - [ ] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [ ] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ____
- [ ] Discontinuous OHWM (explain): ____

Morphology:

Avg. Channel Width 3' Depth 1-3' Avg. Water Depth 1'

Habitat and Pollutants:

Substrate (predominant type (s)): silt, cobble, sand

Habitat Complexity (characterize): low - slow moving channel no instream habitat

Bank Erosion: Severe ____ Moderate ____ Minor X

Describe: concrete lined or cobble

Silt Deposition: low

Pollutants (observation / potential sources): Runoff from railroad, surrounding highway + junkyard

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species ____ Fish Spawn Areas ____

Other Environmentally-Sensitive Species ____ Aquatic/Wildlife Diversity ____

Explain Findings: ____

Riparian Zone:

Development: Railroad

Riparian vegetation: Forest ____ Shrubs ____ Herbs X

Dominant Species: Juncus effusus

Riparian Buffer Width: none, railroad cobble/tracks both sides scattered herbs

Approximate % Shading by Woody Species: 0

Notes: #13 US, #14 DS

Stream Features
Field Sheet

Unnamed tributary to Gashey's Creek

Date: 10/27/15 Project Site: Susquehanna Amtrak WUS #: 22

Observer(s) D. Smith, E. Jellick

Stream Flow:

Perennial: X Intermittent ____ Ephemeral ____

Gradient: 2% Classification: R4SB3

Channel Characteristics:

Natural ____ Artificial (man-made) X Manipulated (man-altered) ____

Explain: Cobble

Channel Has (check all that apply):

- [x] Bed and Banks
- [x] OHWM
  - [x] clear, natural line impressed on the bank
  - [ ] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [ ] water staining
  - [ ] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [ ] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ____
- [ ] Discontinuous OHWM (explain): ____

Morphology:

Avg. Channel Width 3 Depth 1/2 Avg. Water Depth <1"

Habitat and Pollutants:

Substrate (predominant type (s)): cobble

Habitat Complexity (characterize): none/low - cobble bottom, straight channel

Bank Erosion: Severe ____ Moderate ____ Minor X

Describe: lined in cobble

Silt Deposition: low

Pollutants (observation / potential sources): Railroad, highway

Stormwater Outfalls: ____

Biological Habitat For (check all that apply):

Federally Listed species ____ Fish Spawn Areas ____

Other Environmentally-Sensitive Species ____ Aquatic/Wildlife Diversity ____

Explain Findings: Fish + frogs observed

Riparian Zone:

Development: ____

Riparian vegetation: Forest X Shrubs ____ Herbs ____

Dominant Species: Rhus sp. Acer rubrum, LIST

Riparian Buffer Width: RB - gravel slope, 20' to forest of 50' wide LB railroad

Approximate % Shading by Woody Species: ____

Notes: Natural canopy from ROW into forest - manipulated along toe of railroad embankment to Gashey's Creek

Attachment D

Mitigation Site Search

Susquehanna River Rail Bridge Project

Preliminary Mitigation Site Search Report

March 2016

Prepared by:

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Maryland Department of Transportation

Tables

Appendices

I. INTRODUCTION

The Maryland Department of Transportation (MDOT) is currently preparing a Natural Resources Technical Report (NETR) to assess the potential effects on natural resources from the Susquehanna River Rail Bridge Project. MDOT, the project sponsor, is proposing to improve the Susquehanna River Rail Bridge between the City of Havre de Grace, Harford County, Maryland and the Town of Perryville, Cecil County, Maryland in order to provide continued rail connectivity along the Northeast Corridor (NEC). The Susquehanna River Rail Bridge is located at Milepost 60 along the NEC. The proposed project would span approximately six miles, between Milepost 63.5 south of the City of Havre de Grace and Milepost 57.3 north of the Town of Perryville. The 109-year-old bridge is a critical link along one of the U.S. Department of Transportation's (USDOT) designated high-speed rail corridors. The NEC is the busiest passenger rail line in the United States. The bridge is used by Amtrak, the Maryland Area Regional Commuter (MARC), and Norfolk Southern Railway (NS) to carry intercity, commuter, and freight trains across the Susquehanna River. If constructed, the project would result in unavoidable impacts to wetlands and waterways, despite early and on-going efforts to avoid and minimize these impacts to the extent practicable. As part of the project planning process, MDOT initiated a preliminary mitigation site search to identify potential suitable sites to compensate for potential project wetland and waterway impacts in accordance with state and federal guidance should the project be constructed. This report details the methods and results of the preliminary mitigation site search and is included as Attachment D to the NETR.

II. BACKGROUND

Section 404 of the Clean Water Act provides regulatory authority to the US Army Corps of Engineers (USACE) to issue or deny permits for the discharge of dredged or fill material into waters of the US, including special aquatic sites (e.g., wetlands, mud flats, riffle pool complexes, and vegetated shallows). Under the requirements of Section 404 and the Maryland Nontidal Wetlands Protection Act, a Joint Federal/State Permit would be required for any impacts to Waters of the U.S., including wetlands, resulting from the Susquehanna River Rail Bridge Project. As part of the permitting process, a detailed compensatory mitigation package, including final mitigation design, would need to be developed and approved by the USACE and Maryland Department of the Environment (MDE) prior to permit issuance. All mitigation would be developed in accordance with 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. When practicable measures have been taken to avoid and minimize impacts to aquatic resources, mitigation may be required in the form of establishment/creation, enhancement, or preservation to replace the loss of wetland, stream and/or other aquatic resource functions. 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.

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. Emergent wetlands are often mitigated on a 1:1 replacement basis, while forested and scrub-shrub wetlands are mitigated on a 2:1 basis. Tidal wetland compensation follows similar ratios, except emergent tidal wetlands are also replaced at a 2:1 ratio. However, these ratios can provide only a preliminary estimate of required mitigation, as functional replacement is the guiding mitigation principal, and ratios may be adjusted at the discretion of the USACE or MDE depending on the practicability and functional effectiveness of the proposed mitigation. 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, and water quality improvements, may also be used at the agencies' discretion.

The NRTR evaluates the potential effects on natural resources from two alternatives, 9A and 9B. These alternatives were selected in part because of their reduced impacts to wetlands/waterways and other natural resources, as compared to the conceptual alternatives considered, however, they would both have some direct impacts on both nontidal and tidal wetland resources and their corresponding buffers, as well as impacts to streams and impacts to the riverbed of Susquehanna River from pier installation. Additional and more specific information on the characteristics of the potentially impacted wetlands, including wetland function, is provided in Appendix E (*Natural Resources Technical Report Susquehanna River Rail Bridge Project*) of the Environmental Assessment.

Impacts to Waters of the U.S., including wetlands, from the two retained alternatives would total less than an acre of wetlands and more than 3,000 linear feet of streams. An additional 0.08 acre of submerged aquatic vegetation will also be permanently impacted. After all practicable measures have been taken to avoid and minimize impacts to aquatic resources, unavoidable impacts may 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. ***Table 1*** summarizes the wetland, stream, and SAV impacts and estimated minimum mitigation required to offset those impacts.

***Table 1* – Wetland and Stream Impacts and Estimated Minimum Required Mitigation for Each Build Alternative**

Resource	Alternative 9A			Alternative 9B		
	Impact (Ac/Lf)	Replacement Ratio[1]	Mitigation (Ac/Lf)	Impact (Ac/Lf)	Replacement Ratio[1]	Mitigation (Ac/Lf)
Nontidal Forested Wetland	0.25	2:1	0.5	0.17	2:1	0.34
Nontidal Emergent Wetland	0.58	1:1	0.58	0.54	1:1	0.54
Tidal Forested Wetland	0.05	2:1	0.1	0.05	2:1	0.1
Tidal Emergent Wetland	0.01	2:1	0.02	0.01	2:1	0.02
Intermittent and Perennial Streams	3,190	1:1	3,190	2,943	1:1	2,943
SAV	0.08	3:1	0.24	0.08	3:1	0.24

[1]Ratios and estimated acreages of wetland compensation are used for mitigation planning purposes only. Final ratios and required acreage of compensation will be negotiated with regulatory agencies during development of the Final Mitigation Plan.

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, including within a nontidal wetland in Cecil County that will not be impacted, but is a disturbed ditch wetland that may be enhanced. 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 in size, more than sufficient size to accommodate the higher enhancement ratio of at least 4:1. SAV impacts cannot realistically be replaced in-kind. Therefore, mitigation would be in the form of water quality or fish passage improvements to area streams or shoreline stabilization opportunities. Other potential onsite mitigation options will also be investigated as the project advances through later design phases. If further onsite 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.

To address the potential need for off-site mitigation, a preliminary 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. Stream impacts will occur within both watersheds, and thus, the site search encompassed both watersheds. This Preliminary Mitigation Site search serves as the first stage in the development of a Phase I Conceptual Mitigation Plan. The methods used in conducting the site search are detailed below. Phase I would be completed in later stages of the project with agency review and input, followed by development of the full Phase II mitigation plan as part of the permit application process during final design.

III. MITIGATION SITE SEARCH METHODS

The Federal Mitigation Rule prioritizes using approved mitigation banks whenever possible. Based on recent research on the Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) one private bank, the Tharpe Mitigation Bank, is located within the Swan Creek watershed. Coordination with the regulatory agencies and bank owners will be initiated in later phases of the project to determine if this bank is a viable option for mitigating the unavoidable nontidal wetland and waterway impacts from the project. Due to the uncertainty of the bank option, the project will need to seek permittee-responsible mitigation opportunities to compensate for unavoidable wetland and stream impacts.

A. WETLANDS

The wetland mitigation site search process focused on locating non-forested areas with the highest potential for wetland creation or restoration with emphasis on "in-kind" replacement within the Lower Susquehanna watershed (HUC-8 02120201).

1. Desktop Wetland Site Identification

a. Watershed Resources Registry Search

The Watershed Resources Registry (WRR) is a GIS-based targeting tool that was created by the Environmental Protection Agency (EPA) and other partners as part of a Green Highways Partnership project to integrate the Clean Water Act with multiple state programs. Potential wetland restoration sites listed in the WRR database are identified as areas that have somewhat, poorly, or very poorly drained soils, and do not consist of existing wetlands or forest. The database scores the potential wetland restoration sites using an array of ecological factors. This web-based application was used to locate potential wetland mitigation sites in the Lower Susquehanna watershed. These sites were further evaluated in a desktop GIS-based search to ensure they are free from obvious constraints such as public utilities or forest cover.

b. GIS-Based Search

In addition to the sites identified from the WRR, potential wetland mitigation sites in the Lower Susquehanna watershed were identified using aerial photographs (BING, 2012) and GIS data layers for soils (NRCS, 2014), NWI wetland data (USFWS, 2002), hydro line data (MDiMAP 2014), and FEMA 100-year floodplains (FEMA, 2013). Open land areas adjacent to mapped wetlands, streams, and floodways were prioritized due to the presence of existing sources of hydrology in those areas. Additionally, the Natural Resources Conservation Service (NRCS) mapped hydric soils and topo maps were referenced to target areas where soils and elevation are desirable for wetland creation. These sites were further investigated using aerial photography, including bird's eye views and street views, to eliminate sites with obvious constraints such as public utilities and forest cover, or sites unable to provide the minimum necessary mitigation acreage. Areas where multiple resource layers overlapped were given the highest priority and were included in the database. Sites located within forested canopy cover and areas overlapping historical preservation, forest conservation easements, and agricultural land preservation were avoided.

2. Windshield Wetland Site Assessment

Following the desktop identification of potential wetland mitigation sites, CRI completed a windshield field assessment of the sites that could be viewed from publicly accessible locations. Sites were viewed for their potential to support wetland creation or enhancement based upon current land use, land form, size, accessibility, and presence of other visible site constraints.

B. STREAMS

The stream mitigation site search process focused on locating stream segments with the highest need and potential for restoration within the Lower Susquehanna River and Swan Creek watersheds.

1. Desktop Stream Site Identification

a. Water Resources Registry Search

The WRR was used to investigate possible stream mitigation sites in the Lower Susquehanna and Swan Creek watersheds. The sites identified on the WRR were investigated during the GIS-based desktop review to ensure that they were free from obvious land use constraints.

b. GIS-Based Search

The GIS-based search involved overlaying federal, state, and regional data over aerial photography in order to locate areas suitable for stream restoration. These data ranged from point-source discharges; fish blockages; land-use and imperviousness; biological monitoring data; 303(d) impaired waters; conservation easements; and sensitive areas as designated by the county. Biological monitoring reports were also consulted to examine areas of impairment or focus. An initial search of streams lacking forested riparian buffers was conducted, to which other suitable areas were added as determined by the incorporation of federal, state, and regional data in GIS. Stream sites were considered somewhat more suitable if there were potential wetland mitigation sites nearby (via WRR or other sources), in order to create an ecological coupling of wetlands, floodplains, and streams.

2. Windshield Stream Site Assessment

Following the desktop identification of potential stream mitigation sites, CRI completed a windshield field assessment of the sites that could be viewed from publicly accessible locations. Sites were viewed for their potential to support stream restoration, in-stream habitat improvements, and fish blockage removal. Sites were eliminated based upon land use, accessibility, and the potential functional uplift likely to be achieved.

IV. MITIGATION SITE SEARCH RESULTS

A. WETLANDS

From the preliminary desk top site search efforts, 27 potential nontidal wetland mitigation sites were identified and determined to be preliminarily suitable as opportunities to mitigate unavoidable nontidal wetland impacts from the Susquehanna River Rail Bridge project (**see Appendix A – Preliminary Mitigation Site Search Map**). Details on the potential nontidal wetland mitigation sites are presented in ***Table 2***. No potential tidal wetland creation sites were found during the desktop review. The absence of potential tidal wetland creation sites results from the generally elevated topography of the landform adjacent to the tidal rivers, making the amount of necessary cut impractical. On-site mitigation for tidal wetland impacts is proposed in the form of wetland enhancement (see above), which should more than compensate for minor tidal wetland impacts resulting from the proposed rail project.

A windshield survey of the 27 potential nontidal wetland mitigation sites was conducted on March 8, 2016. Following the windshield survey, seven (7) of the 27 potential sites identified during the desktop review were determined to warrant further on-site investigations. During the windshield survey an additional site was added, bringing the total number of sites to advance for further on-site investigations to eight (8). Information about these eight sites are included in ***Table 3***. The additional site is is also included on the map in **Appendix A**. One potential off-site tidal enhancement site was also found during the windshield survey. The site is located along the Harford County shoreline just upstream of the US 40 crossing of the Susquehanna River. The site was densely vegetated with common reed, but site access may be a potential issue. This potential tidal wetland enhancement site has also been added to the map in **Appendix A.**

Table 2 **- Potential Wetland Mitigation Sites**

SITE ID	COUNTY	WATERSHED	APPROX SIZE (AC)	ON WRR* (Y/N)	HYDRIC SOILS (Y/N)	MAPPED WETLAND (Y/N)	HYDROLOGY	CURRENT LAND USE
W-1	Cecil	Lower Susquehanna	12	Yes	No	Yes	Multiple stream channels paralleling site	Open/Maintained area
W-2	Cecil	Lower Susquehanna	4	Yes	Yes	No	Stream channel adjacent to site	Agricultural field
W-3	Cecil	Lower Susquehanna	3	Yes	Yes	No	Stream flows through site	Agricultural field with narrow forested strip
W-4	Cecil	Lower Susquehanna	5	No	Yes	No	Stream channel adjacent to site; ditch extending through site	Agricultural field
W-5	Cecil	Lower Susquehanna	4	Yes	Yes	No	Stream channel adjacent to site	Agricultural field
W-6	Cecil	Lower Susquehanna	15	Yes	Yes	Yes	Stream channel flows through site	Agricultural field with narrow forested strip
W-7	Cecil	Lower Susquehanna	4	Yes	Yes	No	Stream channel adjacent to site	Agricultural field
W-8	Cecil	Lower Susquehanna	4	No	No	No	Stream channel adjacent to site; ditch extending through site	Agricultural field
W-9	Cecil	Lower Susquehanna	3	Yes	No	No	Stream channel adjacent to and flowing through site	Open/maintained area
W-10	Cecil	Lower Susquehanna	3	Yes	No	No	Multiple stream channels adjacent to site	Agricultural field & maintained area
W-11	Cecil	Lower Susquehanna	3	No	No	No	Stream channel flows through and adjacent to site, farm pond and ditches present	Agricultural field
W-12	Cecil	Lower Susquehanna	5	No	No	No	Stream channel flows through site; farm pond present	Agricultural field
W-13	Cecil	Lower Susquehanna	3	No	No	No	Stream channel flows through site; ditches extending through site	Agricultural field with a few trees
W-14	Cecil	Lower Susquehanna	3	Yes	No	No	Stream channel adjacent to site; existing wetland abutting site	Agricultural field
W-15	Cecil	Lower Susquehanna	2	Yes	Yes	No	Stream channel adjacent to the site	Agricultural field
W-16	Cecil	Lower Susquehanna	2	Yes	Yes	No	Stream channel adjacent to the site	Open/Maintained area
W-17	Harford	Lower Susquehanna	4	Yes	Yes	No	Stream channel adjacent to and flowing through site; existing wetland abutting site	Scrub-shrub area
W-18	Harford	Lower Susquehanna	3	Yes	Yes	Yes	Stream channel flows through site	Agricultural field with narrow forested strip
W-19	Harford	Lower Susquehanna	3	No	No	No	Stream channel flows through site	Agricultural field with narrow forested strip
W-20	Harford	Lower Susquehanna	3	No	No	No	Stream channel flows through site	Agricultural field with narrow forested strip
W-21	Harford	Lower Susquehanna	4	Yes	Yes	Yes	Stream channel flows through site	Open pasture with forested strip
W-22	Harford	Lower Susquehanna	7	No	No	Yes	Multiple streams channels/ditches flow through site; farm pond present	Open pasture with a narrow forested strip
W-23	Harford	Lower Susquehanna	5	Yes	No	Yes	Multiple stream channels flow through site	Open pasture with a few scattered trees
W-24	Harford	Lower Susquehanna	5	No	No	No	Stream channel adjacent to site	Agricultural field
W-25	Harford	Lower Susquehanna	4	Yes	Yes	No	Stream channel flows through site	Agricultural field
W-26	Harford	Lower Susquehanna	5	No	No	No	Pond/wetland located within site; stream channel adjacent to site	Agricultural field/maintained area
W-27	Cecil	Lower Susquehanna	5	Yes	No	Yes	Stream channel adjacent to site	Agricultural field/maintained area

* WRR: Water Resources Registry

Table 3 **- Potential Wetland Mitigation Sites Carried Forward Post Windshield Survey**

SITE ID	COUNTY	NEAREST ROAD INTERSECTION	APPROX SIZE (AC)	SOURCE	LOCATION NOTES	STATUS/COMMENTS
W-14	Cecil	Philadelphia Rd & Coudon Blvd	5	WRR	East Coudon Blvd and north of Philadelphia Rd	Low lying ag field abuts emergent marsh with thin strip of young trees (willow, sweetgum, planted leyland cypress); 3-4' cut could yield about 5 Ac wetland.
W-15	Cecil	Coudon Blvd & US 40	2	WRR	Between Coudon Blvd and Aiken St	Low lying field lies adjacent to Coudon Creek and potentially created wetland on Perryville Elementary School property. Site not accessible, but might be worth further investigation.
W-17	Harford	Post and Keewee Rds	4	WRR	Between Amtrak rail and Post Rd	Site mostly existing shrubby wetland. Small (<0.5Ac), low lying field adjacent to common reed wetland with creation potential and enhancement of common reed. Lies adjacent to project.
W-22	Harford	Webster Lapidum & Level Rds	7	CRI-Desktop	West of Webster Lapidum Rd	Site not completely visible from road, but part of a large abandoned agricultural area with many small streams/ditches draining through; some portions likely existing wetlands. Site appears relatively flat, but according to contours, has over 10 feet of elevation change. Potential stream restoration opportunities. More investigations warranted.
W-23	Harford	Webster Lapidum & Level Rds	5	WRR	West of Level Rd and north of York Dr	Part of large abandoned agricultural area on the south side of a gravel driveway from Site 22. Land form appears relatively flat, but contours suggest as much as a 20' elevation difference within the site. Existing wetland mapped adjacent to site. Potential stream restoration opportunities. More investigations warranted.
W-25	Harford	Cooley Mill & Rock Run Rds	2	WRR	North of sharp bend in Cooley Mill Rd	Relatively flat field adjacent to forested floodplain of small stream. Wet patches observed in field; portion of field mapped hydric soils. Possibly suitable to create 2 Ac wetlands.
W-27	Cecil	Conowingo Rd & Barrett Ln	1	WRR	East Conowingo Rd	Small (1 Ac.), gently sloping area mapped as hydric soil adjacent to forested floodplain along stream.
W-28	Cecil	Perrylawn Dr & Craigtown Rd	1.5	CRI-Desktop	South of the intersection of Perrylawn Dr and Craigtown Rd	Linear uplands within transmission ROW would require less than 3' of cut. Within transmission ROW so only PSS possible; may restrict access to towers. No more than 2 Ac of creation.

B. STREAMS

From the preliminary desk top site search efforts, 26 potential stream mitigation sites were identified and determined to be preliminarily suitable as opportunities to mitigate unavoidable waterway impacts from the Susquehanna River Rail Bridge Project (**see Appendix A – Preliminary Mitigation Site Search Map**). Details on the potential stream mitigation sites are presented in ***Table 3***.

A windshield survey of the 26 potential stream mitigation sites was conducted on March 8, 2016. Following the windshield survey, 17 of the 27 potential sites identified during the desktop review were determined to warrant further on-site investigations or were inaccessible without gaining land owner permission. Additionally, Site 26 (Lily Run) was extended upstream 1,714 linear feet to include the entire reach within the Havre de Grace Middle School property. Approximately 530 feet of the reach is currently piped beneath an athletic field southeast of the Amtrak right-of-way. If Alternative 9A is selected as the preferred alternative, a portion of this field will be taken for new right-of-way to allow placement of the new track. If this occurs, it may be possible to restore the piped section of stream to a natural flow regime. Information about the 17 sites carried forward are included in ***Table 4***. The extended section of Site 26 is shown in **Appendix A.**

Table 4 **- Potential Stream Mitigation Sites**

SITE ID	COUNTY	WATERSHED	APPROX. LENGTH (LF)	FISH BLOCKAGES (Y/N)	RIPARIAN ZONE	Potential Wetland Mitigation Component (Y/N)	Notes
S-1	Harford	Swan Creek	485	No	Forested	No	Confined between 2 road crossings
S-2	Harford	Lower Susquehanna River	607	Yes	Partially forested, partically maintained	No	Located approximatley 800 lf upstream of Susquehanna River confluence
S-3	Harford	Swan Creek	2,991	Yes	Forested, narrowly forested through residential area	No	Includes multiple fish blockages, includes point source discharge from mobile home park, flows through high density residential area
S-4	Harford	Swan Creek	863	No	Forested between agricultural fields	No	Surrounded by agricultural fields
S-5	Harford	Lower Susquehanna River	508	Yes	Partially forested, residential yards	No	Flows through box culvert in residential area
S-6	Cecil	Lower Susquehanna River	545	Yes	Forested	No	Flows through pipe culvert in medium density residential area
S-7	Harford	Lower Susquehanna River	555	No	Forested, northern bank abuts quarry	No	Flows to road crossing, located adjacent to quarry, approximately 350 lf upstream of the Susuquehanna River confluence
S-8	Cecil	Lower Susquehanna River	830	Yes	Forested, residential property	No	Flows through box culvert at major road crossing
S-9	Harford	Swan Creek	1,482	Yes	Forested, abuts residential properties	No	Flows to dammed impoundment, adjacent to medium density residential
S-10	Cecil	Lower Susquehanna River	474	Yes	Forested/scrub-shrub	No	Includes multiple fish blockages and a road crossing
S-11	Harford	Lower Susquehanna River	1,158	Yes	Forested	No	Rock Run Dam located mid-reach; located approximately 1,800 lf upstream of Susquehanna River confluence
S-12	Harford	Lower Susquehanna River	755	Yes	Forest/scrub-shrub	Yes (site W-22)	Dam at small impoundment, located between agricultural fields
S-13	Harford	Lower Susquehanna River	2,168	Yes	Partially forested, residential properties	No	Multiple road crossings, 2 small dams, high impervious, residential area
S-14	Harford	Swan Creek	266	Yes	Forested	No	Includes 2 small dams and flows through road crossing in residential area
S-15	Harford	Swan Creek	1,314	No	Forested	No	Flows through multiple road crossings in resential area
S-16	Harford	Lower Susquehanna River	1,774	Yes	Forested	No	Includes 2 pipeline crossings, located between agricultural fields
S-17	Harford	Lower Susquehanna River	714	No	Parially forested	No	Flows through box culvert in high density residential area
S-18	Cecil	Lower Susquehanna River	2,331	Yes	Forested	No	Includes pipeline crossing that is a potential fish blockage, flows from culvert at road crossing
S-19	Cecil	Lower Susquehanna River	464	Yes	Forested	No	Includes pipeline crossing that is a potential fish blockage, flows to road crossing in residential area
S-20	Cecil	Lower Susquehanna River	1,550	Yes	Forested	No	Located approximatley 150 lf upstream of Susquehanna River confluence, flows through residential area with adjacent ag fields
S-21	Harford	Swan Creek	1,113	No	Forested and golf course	No	Located adjacent to golf course, includes channel alterations
S-22	Harford	Swan Creek	718	No	Partially forested	No	Adjacent to retention pond in high density residential
S-23	Cecil	Lower Susquehanna River	595	No	Forested and agricultural fields	Yes (site W-2 & W-3)	Includes dirt road crossing, surrounded by ag fields
S-24	Harford	Swan Creek	1,480	No	Forested/scrub-shrub	No	Flows to road crossing, surrounded by ag fields and some residential properties
S-25	Cecil	Lower Susquehanna River	1,141	No	Residential properties and powerline ROW	No	Includes multiple road crossings in high density residential area
S-26	Harford	Lower Susquehanna River	670	No	Maintained school property	No	Stream is channelized through highly impervious area, includes road crossings

Table 5 **- Potential Stream Mitigation Sites Carried Forward Post Windshield Survey**

SITE ID	COUNTY	NEAREST ROAD INTERSECTION	APPROX. LENGTH (LF)	FISH BLOCKAGES (Y/N)	RIPARIAN ZONE	LOCATION NOTES	STATUS/COMMENTS
S-2	Harford	Superior & N Juniata Sts	607	Yes	partially forested, partially maintained	West of Superior St	No obvious blockages; some minor erosion on bends; right bank with scattered planted trees and lawn, more plantings possible, but no restoration.
S-4	Harford	Aldino & Mahan Rds	863	No	forested between agricultural fields	SE of Aldino Rd	Not accessible, but scored low for water quality by MBSS. Potential instream habitat improvements.
S-6	Cecil	Perryville Rd & Clayton St	545	Yes	forested	West of Perryville Rd & East of Lighthouse Dr	Site not visible, but potentially contains an old culverted road crossing that could be a fish blockage
S-8	Cecil	Old Haley & Jackson Station Rds	830	Yes	forested, residential property	Between Old Haley & Jackson Sta Rd	Fish blockage on upstream side of primary channel culvert at Jackson Station Rd where vertical wooden slats have been installed. Secondary channel culvert beneath Jackson Station Rd mostly filled with sediment. No other stream habitat improvements necessary.
S-9	Harford	Chapel Rd & Oak Tree Dr	1,482	Yes	forested, abuts residential properties	South of Chapel Rd & east of War Admiral Way	Impoundment not visible, but likely functions as fish blockage.
S-10	Cecil	Jacob Tome Memorial Hwy & Burlin Rd	474	Yes	forested/ scrub-shrub	SE MD 276 & SW MD 275	Not visible, as site lies within large, fenced Bainbridge Development Corp property.
S-12	Harford	Webster Lapidum & Level Rds	755	Yes	forest/ scrub-shrub	North Webster Lapidum Rd/MD 155 & east York Dr	No visible, but several small streams flow through large abandoned farm site; most of streams without forest cover.
S-13	Harford	Pulaski Hwy & Erie St	2,168	Yes	partially forested, residential properties	From CSX railroad to N Juniata St/Superior St intersection	Between Superior and Erie Sts, recent clearing of vegetation on right bank, left bank mowed lawn with large planted trees. Between Erie St and US 40 gabion baskets on right bank with minor fish blockage.
S-14	Harford	Chapel & Bryan Rds	266	Yes	forested	Upstream and downstream of Chapel Rd	Concrete apron on downstream side of Chapel Road culvert that acts as fish blockage. Large debris jam 200' farther downstream.
S-15	Harford	Hopewell & Hopkins Rds	1,314	No	forested	Upstream and downstream of Hopewell Rd	At Hopewell Road crossing, stream appears stable with forested banks. MBSS site upstream of Hopewll Road with poor habitat index, possible instream improvements.

SITE ID	COUNTY	NEAREST ROAD INTERSECTION	APPROX. LENGTH (LF)	FISH BLOCKAGES (Y/N)	RIPARIAN ZONE	LOCATION NOTES	STATUS/COMMENTS
S-18	Cecil	Frenchtown & Cokesbury Rds	2,331	Yes	forested	Frenchtown Rd to I-95	Fish blockage on downstream side of Frenchtown Rd crossing; remainder of reach not visible
S-19	Cecil	St. Marks Church Rd & Penny Ln	464	Yes	forested	Upstream of St. Marks Church Rd	Reach not fully visible from road; instream habitat improvements possible.
S-20	Cecil	Frenchtown Rd & Sumpter Dr	1,550	Yes	forested	Upstream Frenchtown Rd & west Sumpter Dr	Most of reach not visible from Frenchtown Rd; reach just upstream with high gradient and boulder substrate. Possible instream habitat improvements elsewhere within the reach.
S-22	Harford	Counterpoint & Majestic Prince Cir	718	No	partially forested	West of Counterpoint Cir	Not visible, but left bank not forested; possible planting and/or instream habitat enhancements.
S-23	Cecil	McGothlin & Granite Run Rds	595	No	forested and agricultural fields	SE McGlothlin Rd	Not visible from driveway; flows through agricultural area with thin forest buffer.
S-24	Harford	Aldino Stepney & Churchville Rds	1,480	No	forested/ scrub-shrub	Upstream Aldino Stepney Rd	Flows through old field managed for wild turkey by National Wild Turkey Federation. Stream banks 3' high with minor erosion. Most of reach not accessible.
S-26	Harford	Juniata St N & Pennington Ave	2,384	No	maintained school property	On Havre de Grace Middle School property	Portions of Lily Run through school property lacking forest cover. Other portions of reach are currently piped. If Amtrak takes school ROW for new track, could investigate opening piped sections and doing other instream habitat improvements and tree plantings.

V. CONCLUSIONS

Based on the results of the preliminary mitigation site search, a range of suitable opportunities exist within the Lower Susquehanna River and Swan Creek watersheds to compensate for potential unavoidable wetland and waterway impacts resulting from the Susquehanna River Rail Bridge Project. The preliminary site search efforts identified approximately 123 acres of preliminarily suitable wetland creation area, and over 27,000 linear feet of potential stream restoration.

A windshield survey of those sites with public access was completed in early March 2016 to determine their suitability as a wetland or stream mitigation site. Following the windshield survey, eight (8) wetland and 17 stream sites will be carried forward for more detailed on-site assessments to further evaluate suitability and technical feasibility and to refine site rankings based on more in-depth technical information. Additionally, an off-site tidal enhancement site was also identified along the Susquehanna River shoreline on the Harford County side just upstream of the US 40 Bridge.

The on-site investigations will require a property owner notificiation process to seek permissions for accessing properties. This step will occur following the 30% design/NEPA evaluation stage during future design stages of the project. At that time, coordination with government agencies and watershed groups will be initiated to potentially identify additional sites. Once on-site reviews are conducted, the highest-ranked sites would then be presented to the agencies to solicit comments and concurrence on the sites' suitability and ability to compensate for project related impacts, resulting in a Phase I Conceptual Mitigation Plan. Following agency concurrence on the Phase I plan, a Phase II mitigation plan would be developed in compliance with the Federal Mitigation Rule and State mitigation guidelines as part of the Final Design and permitting phase of the project.

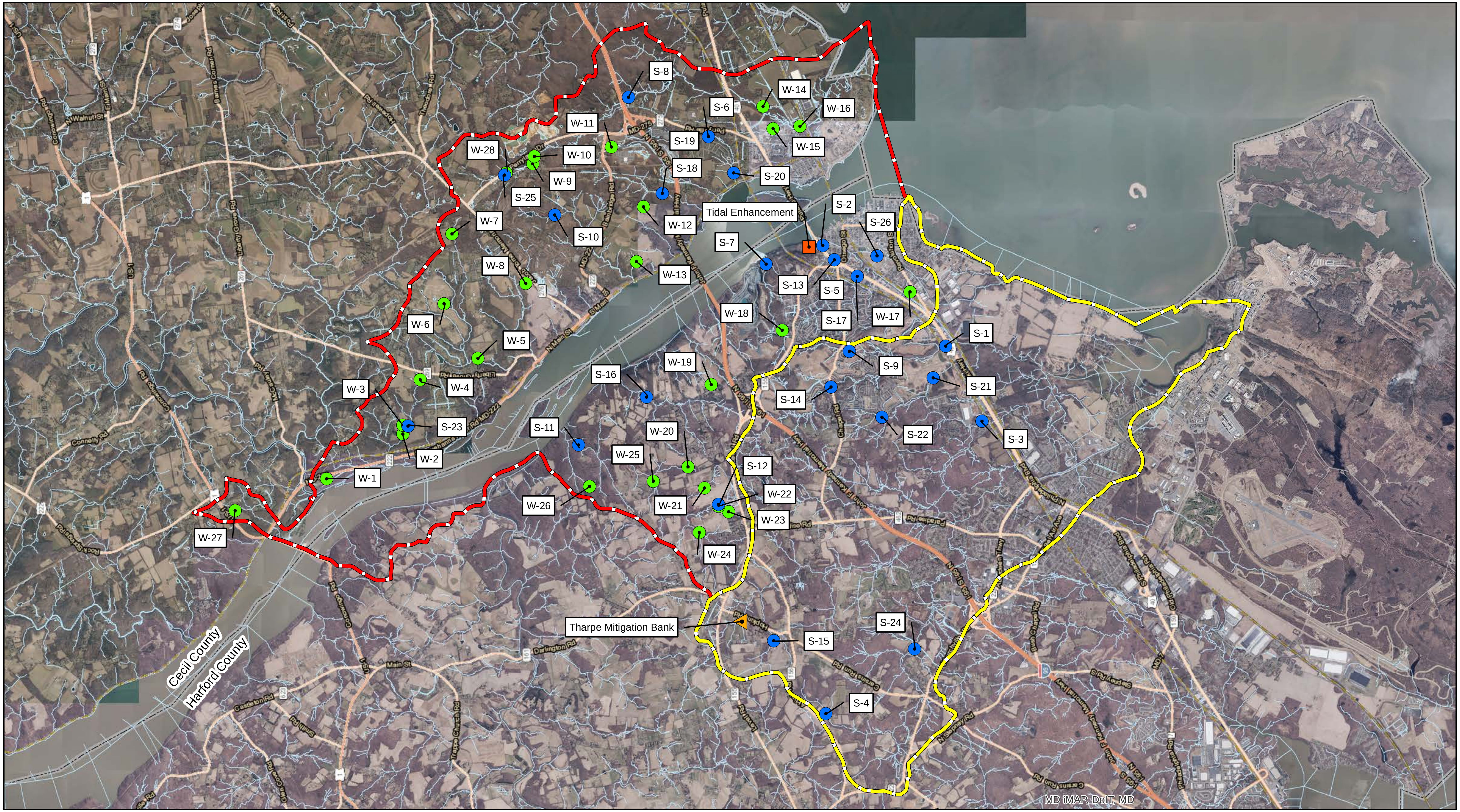
VI. REFERENCES

U.S. Department of Agriculture, Natural Resources Conservation Service. 2014. Soil Survey Geographic (SSURGO) Database for Cecil County, Maryland. Available online: http://websoilsurvey.nrcs.usda.gov

U.S. Department of Agriculture, Natural Resources Conservation Service. 2014. Soil Survey Geographic (SSURGO) Database for Harford County, Maryland. Available online: http://websoilsurvey.nrcs.usda.gov

U.S. Fish and Wildlife Service. 2002. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. http://www.fws.gov/wetlands/

APPENDIX A



Legend

Swan Creek Watershed	County Boundaries	Potential Non-Tidal Wetland Sites
Lower Susquehanna River Watershed	Streams	Potential Stream Sites
	Mitigation Bank	Potential Tidal Enhancement Site

N

0 1.25 2.5 Miles

Susquehanna River Rail Bridge Project

Preliminary Mitigation Site Search Map

Attachment E

Correspondence

Maryland Department of Transportation
The Secretary's Office

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

James T. Smith, Jr.
Secretary

February 14, 2014

Mr. Ren Serey
Executive Director
Critical Area Commission
580 Taylor Avenue
Annapolis MD 21401

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Mr. Serey:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, which is carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Project proposes new and/or rehabilitated structures with up to four-track total capacity crossing the river. The project may also improve the navigation channel for marine users. A project location map is attached for your reference.

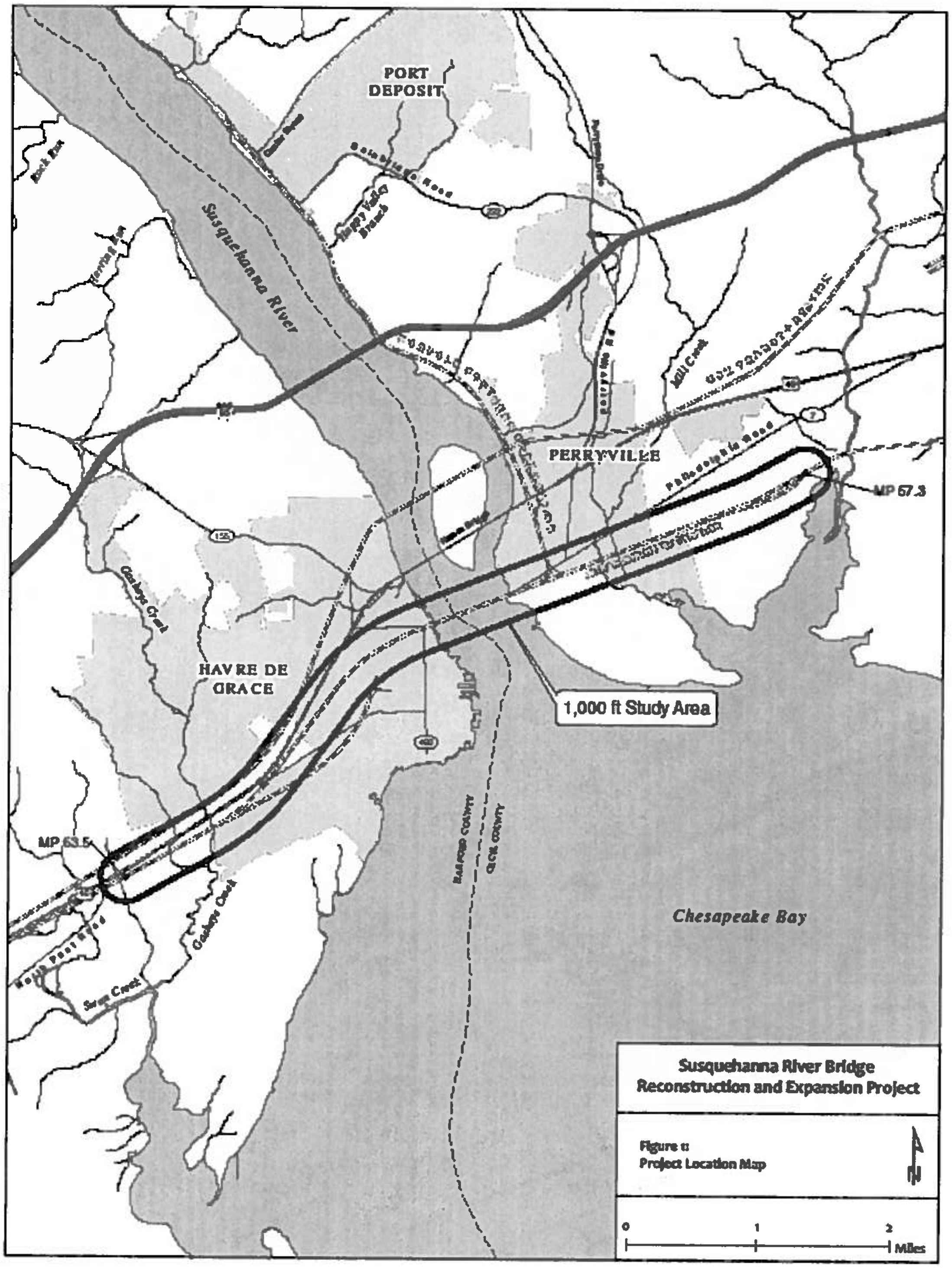
The Project team has initiated conceptual engineering and preliminary environmental studies. Agency coordination is ongoing, including plans to present current project efforts at the February 19, 2014 Interagency Review Meeting (IRM) at the Maryland State Highway Administration (SHA) Headquarters in Baltimore. A public information session is planned for early spring 2014. The project team will continue to coordinate with the Critical Area Commission as more detailed environmental and engineering studies are developed. Please feel free to share any input or Critical Area information that pertains to the proposed project. If you have any questions or need additional information, please contact me at 410-684-7063 or at hromano@mdot.state.md.us.

Sincerely,

HRomano

Harry Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Ms. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Ms. Lisa Hoerger, CAC Regulations and Mapping Coordinator, Harford County
Ms. Julie Roberts, CAC Natural Resources Planner, Cecil County
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration


PORT DEPOSIT
Susquehanna River
PERRYVILLE
HAVRE DE GRACE
MP 67.3
MP 63.5
1,000 ft Study Area
Chesapeake Bay
HARFORD COUNTY
CECIL COUNTY
Susquehanna River Bridge Reconstruction and Expansion Project
Figure 1:
Project Location Map
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Miles

Martin O'Malley
Governor
Anthony G. Brown
Lt. Governor

Margaret G. McHale
Chair
Ren Serey
Executive Director

STATE OF MARYLAND
CRITICAL AREA COMMISSION
CHESAPEAKE AND ATLANTIC COASTAL BAYS
1804 West Street, Suite 100, Annapolis, Maryland 21401
(410) 260-3460 Fax: (410) 974-5338
www.dnr.state.md.us/criticalarea/

February 18, 2014

Harry Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism
MD Department of Transportation
7201 Corporate Center Drive
Hanover, MD 21076

Re: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Mr. Romano,

Thank you for forwarding your letter via email regarding the above referenced project. The Maryland Department of Transportation (MDOT) is seeking comments on a potential bridge replacement, rehabilitation, and/or expansion. I understand that you will be coordinating with us as the project concept becomes more defined. From the map submitted and depending on the extent of the potential reconstruction, it appears that there will be impacts in the Critical Area that may be considered significant.

From this limited information, it appears that a full Critical Area Commission review may be required. Please coordinate with our office as the project becomes more defined and I will provide further information about the materials which will need to be submitted once we have a greater understanding of the impacts associated with the bridge work.

Thank you for coordinating with our office early in the process. I can be reached at 410-260-3476 with any further questions.

Sincerely,

Julie Roberts
Natural Resources Planner

Maryland Department of Transportation
The Secretary's Office

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

James T. Smith, Jr.
Secretary

February 14, 2014

Ms. Mary Colligan
National Marine Fisheries Service
Northeast Regional Office
Protected Resources Division
55 Great Republic Drive
Gloucester MA 01930

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Ms. Colligan:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Reconstruction and Expansion Project proposes new and/or rehabilitated structures carrying up to four tracks across the river. The Project may also improve the navigation channel for marine users.

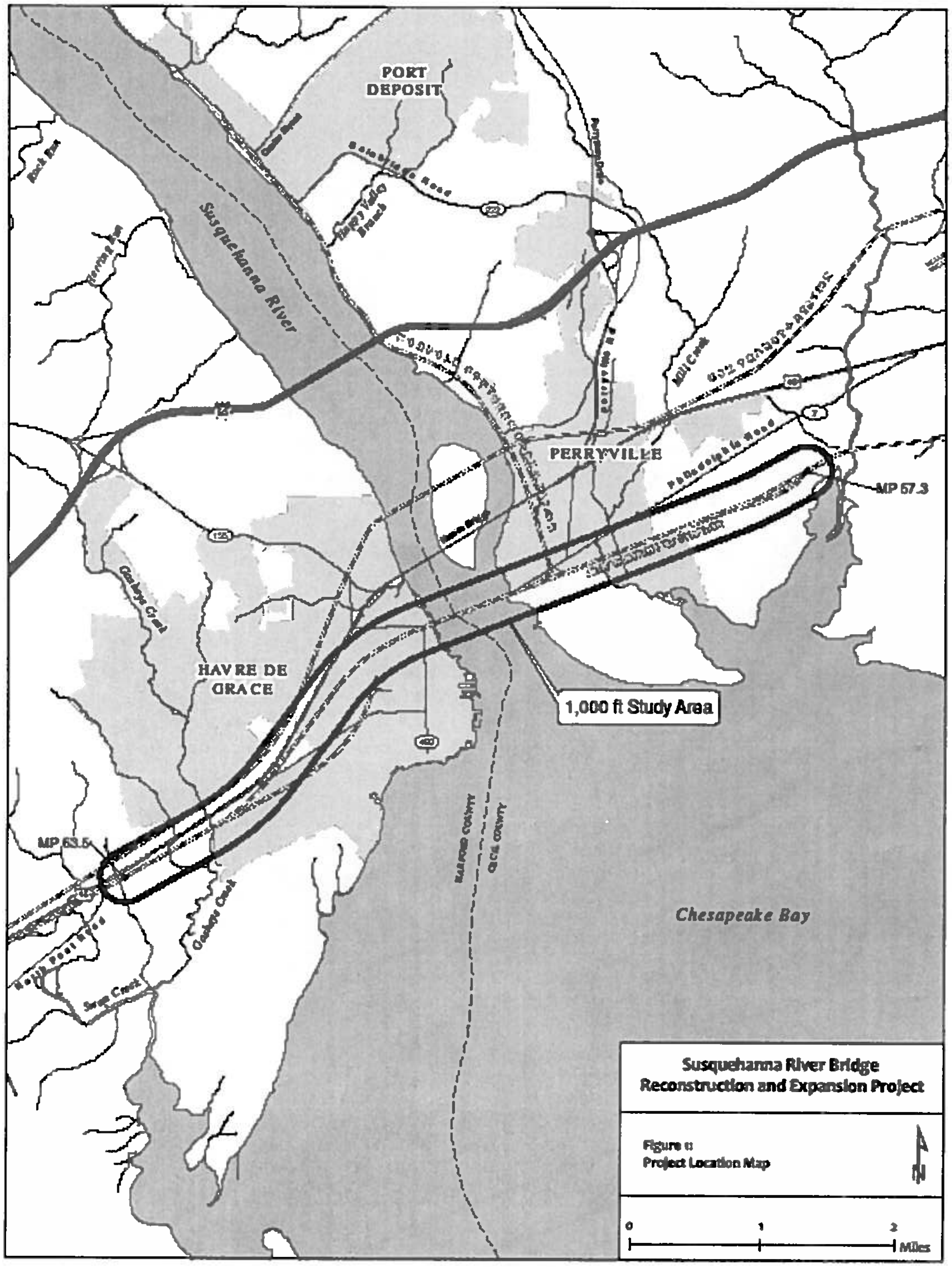
We request any information concerning federally-listed threatened or endangered species and/or any unique habitat that may occur in the study area as shown in the attached map. If you have any questions or need additional information regarding this request, please contact me at 410-684-7063 or hromano@mdot.state.md.us. You may also contact Ms. Leslie Mesnick-Uretsky at 646-388-9756 or lmesnick@akrf.com. Thank you for your assistance.

Sincerely,

HRomano

Harry J. Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Mr. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Mr. John Nichols, NMFS Chesapeake Bay Office
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration


PORT DEPOSIT
Susquehanna River
PERRYVILLE
HAVRE DE GRACE
MP 57.3
MP 63.5
1,000 ft Study Area
Chesapeake Bay
HARFORD COUNTY
CECIL COUNTY
Susquehanna River Bridge
Reconstruction and Expansion Project
Figure 1:
Project Location Map
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Miles

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

MAR - 5 2014

Harry J. Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism
Maryland Dept of Transportation
7201 Corporate Center Drive
Hanover, MD 21076

Re: Susquehanna River Bridge Reconstruction and Expansion Project, Harford and Cecil Counties, Maryland

Dear Mr. Romano,

We received your letter on February 24, 2014 regarding the proposed expansion and reconstruction of Amtrak's Susquehanna River Bridge located in Harford and Cecil Counties, Maryland.

The following endangered species may occur within the waters (i.e., Chesapeake Bay and mouth of the Susquehanna River) of the proposed action: Shortnose sturgeon (*Acipenser brevirostrum*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) (Distinct Population Segments [DPS]: New York Bight, Chesapeake Bay, Carolina, South Atlantic), Kemp's ridley sea turtle (*Lepidochelys kempi*), green sea turtle (*Chelonia mydas*), and leatherback turtle (*Dermochelys coriacea*).

The following threatened species may occur within the waters (i.e., Chesapeake Bay and mouth of the Susquehanna River) of the proposed action: Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) (Distinct Population Segments [DPS]: Gulf of Maine), and Northwest Atlantic Ocean DPS of loggerhead sea turtle (*Caretta caretta*).

To facilitate efficient project review, we have compiled information about the presence of our listed species in the project area and in related Maryland waters that may be helpful in planning your project.

Shortnose Sturgeon
The U.S. Fish and Wildlife Service's (FWS) sturgeon reward program began in 1996. As of 2008, a total of 80 individual shortnose sturgeon had been captured, via commercial or recreational fishery, in Chesapeake Bay and its tributaries as a result of this program. Most of the shortnose sturgeon documented in the reward program have been caught in the upper Bay, from Kent Island to the mouth of the Susquehanna River and the C&D Canal, in Fishing Bay and around Hoopers Island in the middle Bay, and in the Potomac River.

Research on shortnose sturgeon indicates that this species typically spawns just below the limit of upstream passage. In unimpeded rivers systems, spawning typically occurs 200 km or more upstream. In dammed rivers, spawning often occurs at the base of the first dam. Studies indicate that spawning occurred at daily mean temperatures of 6.5-14.7°C in water depths of 1-5 meters with a peak at 1.5-1.9m. Bottom water velocity at the spawning site was a mean of 70cm/s with the greatest usage of 75-125 cm/s. The only substrate type females used was cobble/rubble (101-300 mm diameter). Substrate and flow are consistent in all areas where shortnose sturgeon spawning has been confirmed.

Several Chesapeake Bay tributaries have habitat characteristics such as hard bottom substrate and areas of high flow that may be suitable for spawning. These include the Gunpowder, James, York and Susquehanna Rivers. Adult shortnose sturgeon have been documented in the Susquehanna River in February, April and June, which is consistent with the time of year when spawning adults would be present. However, it is unknown if adequate spawning or nursery habitat occurs in the area below the Conowingo Dam, which is the first barrier to upstream passage. Telemetry data indicates that shortnose sturgeon move between the upper Chesapeake Bay and Delaware River via the C and D canal. These movements did not follow a specific pattern indicative of spawning migrations. Evidence suggests that shortnose sturgeon do not move into smaller creeks and tributaries of the large rivers connected to the Chesapeake Bay.

Although we do not have specific information on shortnose sturgeon movements in the Susquehanna, information gathered from the Potomac may be applicable. Twelve shortnose sturgeon have been captured in the Potomac River since 1996. These shortnose sturgeon were captured in the Potomac River and reported via the FWS reward program and were documented in the following locations: six at the mouth of the river one at the mouth of the Saint Mary's River; one at the mouth of Potomac Creek; one at rkm 63; one at rkm 57 (Cobb Bar); and, one at rkm 48. Additionally, one adult female was captured by U.S. Geological Service (USGS) and National Park Service (NPS) researchers within the Potomac River (at rkm 103) in September 2005.

From 2004-2008 the USGS and NPS conducted a tagging and telemetry study of shortnose sturgeon in the Potomac River (Kynard 2007). Three of the shortnose sturgeon mentioned above have been tagged with Combined Acoustic and Radio Transmitting (CART) tags. Tracking has demonstrated that the two females spent the majority of the year in a 79-km reach between river km 141–63. One female upstream in spring 2006 to a 2-km reach (river km 187–185) containing habitat determined to be suitable for spawning (Kynard et al. 2007). Remote and manual tracking showed a female arrived at the Fletchers Marina (River km 184.5) and remained within a 2-km reach (river km 187-185) for 6 days. During this time, mean daily river temperatures were 12.0–16.0°C and mean daily river discharge was 157–178 m^3/s. However, no sturgeon ELS were captured (Kynard et al. 2007).

During the years when fish were tracked, the two females spent the summer-fall in a 78-km reach (river km 63–141). Most of this area was in tidal freshwater, however, the downstream section of the range experiences tidal salinity. The fish used depths between 4.1–21.3 m, but most locations (89.2%) were in the channel. Throughout the summer and winter, fish used a wide range of water temperature (1.8–32.0°C), DO (4.8–14.6 mg/L) and salinity (0.1–5.6 ppt; Kynard et al. 2007). Substrate measured at fish locations were mud (80.7%), sand/mud (15.8%), and gravel-mud (3.5%). This area is also characterized by prolific tracts of submerged aquatic vegetation and algae blooms.

Atlantic Sturgeon

Atlantic sturgeon spawn in their natal river, with spawning migrations generally occurring during April-May in Mid-Atlantic systems. Young remain in the river/estuary until approximately age 2 and at lengths of 30-36 inches before emigrating to open ocean as subadults. After emigration from the natal river/estuary, subadults and adult Atlantic sturgeon travel within the marine environment, typically in waters between 16 to 164 feet in depth, using coastal bays, sounds, and marine waters. The distribution of Atlantic sturgeon is strongly associated with prey availability, and as a result, Atlantic sturgeon may occur where suitable forage (e.g., benthic invertebrates such as mollusks and crustaceans) and appropriate habitat conditions are present (e.g., areas of submerged aquatic vegetation (SAV). Individuals from any DPS may be found in suitable habitat areas within coastal, marine, or riverine habitat, including tidal creeks greater than 3.3 feet deep, any large or small tributaries of the Chesapeake Bay, coastal embayments where suitable habitat exists, and offshore of Maryland in marine habitat. Currently, Chesapeake Bay DPS Atlantic sturgeon are known to spawn in the James River in Virginia; historic spawning habitat is thought to exist in the Potomac River. Atlantic sturgeon have been recorded at the mouth of the Susquehanna River in recent years.

Sea Turtles

Several species of sea turtles are known to be present in the Chesapeake Bay and off the Atlantic coast of Maryland. Leatherback sea turtles (*Dermochelys coriacea*) are present off the Maryland coast but are predominantly pelagic. Loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempi*), and green sea turtles (*Chelonia mydas*) 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. Satellite tracking studies of sea turtles has found that foraging turtles mainly occurred in areas where the water depth was between approximately 16 and 49 feet. This depth was interpreted not to be as much an upper physiological depth limit for turtles, as a natural limiting depth where light and food are most suitable for foraging turtles. In Maryland waters of the Chesapeake Bay, sea turtles are most often documented in marine and estuarine waters and are not likely to be present in upper reaches of major tributaries because of salinity and prey availability requirements.

Conclusions

As listed species of sea turtles and sturgeon may occur at the mouth of the Susquehanna River and Chesapeake Bay, and thus, within the vicinity of your proposed project, any in-water work, such as excavation, blasting, pile driving, and dredging, has the potential to impact these species. As project details become finalized, a consultation, pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, may be necessary as any discretionary federal action, such as the approval or funding of a project by a federal agency, that may affect a listed species must undergo consultation pursuant to section 7 of the ESA of 1973, as amended. If the proposed project has the potential to affect listed species, and it is being approved, permitted, or funded by a Federal agency, the lead Federal agency, or their designated non-Federal representative, is responsible for determining whether the proposed action is likely to affect the listed species. The Federal agency would submit their determination along with justification for their determination and a request for concurrence, to the attention of the ESA Section 7 Coordinator, NMFS Northeast Regional Office, Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930. After reviewing this information, NMFS would then be able to conduct a consultation under section 7 of the ESA. Should you have any questions about these comments or about the section 7 consultation process in general, please contact Jennifer Goebel at 978-281-6373 or jennifer.goebel@noaa.gov).

Essential Fish Habitat
The location of the proposed Susquehanna River Bridge Reconstruction and Expansion Project is located above the estuarine mixing zone in tidal fresh water and is not designated as essential fish habitat (EFH) for federally managed species. However, the Susquehanna River is an important migration corridor for numerous diadromous species including American shad, alewife, blueback herring, striped bass, hickory shad, gizzard shad, and American eel. Significant efforts are underway to restore the populations of several anadromous species to healthy levels. Therefore, in-water construction activities including but not limited to excavation, blasting, pile driving, and dredging may require time of year restrictions (TOYR) or other mitigative measures for these activities to help protect diadromous species migration and spawning. If you have any questions or need additional information regarding fisheries resources in the project area please contact David O'Brien, NOAA Fisheries Service, Habitat Conservation Division (david.l.o'brien@noaa.gov, 804-684-7828).

Sincerely,

Mark Murray-Brown

for Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

EC: Goebel, O'Brien
File Code: Section 7/Nonfisheries/MD DOT/Susquehanna River Bridge_species present

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

MAY 5 2016

Dan Reagle
Environmental Planner
Maryland Transit Administration
Environmental Planning Division
6 St. Paul Street, 9th Floor, Baltimore, MD 21202

Re: Susquehanna River Rail Bridge Project
Draft Natural Resources Technical Report (NETR)

Dear Mr. Reagle:

Thank you for providing us with your Draft Natural Resources Technical Report (NETR) on April 8, 2016, and for coordinating with the resource and coordinating agencies at the Maryland Department of Transportation Interagency Review Meetings (IRM). The Maryland Department of Transportation (MDOT), project sponsor, is proposing to improve the Susquehanna River Rail Bridge between the City of Havre de Grace, Harford County, Maryland and the Town of Perryville, Cecil County, Maryland in order to provide continued rail connectivity along the Northeast Corridor (NEC).

The NETR evaluates the potential effects on natural resources from Alternative 9A and Alternative 9B. Both Alternative 9A and Alternative 9B would construct:

- a new two-track bridge accommodating train speeds of up to 90 miles per hour (mph) to the west of the existing bridge, and
- a second new two-track bridge along the existing alignment.

The second new bridge would accommodate speeds of up to 160 mph for Alternative 9A and up to 150 mph for Alternative 9B. The bridge to the west of the existing bridge would be constructed first. Once that bridge is completed, the existing bridge would be taken out of service, demolished, and replaced. A new high-speed passenger bridge would be built in the center of the right-of-way of the existing bridge alignment. This bridge would reduce the curve in Havre de Grace and allow for either 160 mph speeds for Alternative 9A or 150 mph speeds for Alternative 9B. All impact analyses and assessments included in the NETR are based on the girder approach / arch main span bridge design.

Both alternatives would impact tidal and non-tidal wetlands, streams (including 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), and the Susquehanna riverbed, including submerged aquatic vegetation (SAV). Impacts to Waters of the U.S. from the build alternatives would total less than an acre of wetlands and more than 3,000 linear feet of streams. Overall, the proposed new alignments would 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 for the construction and maintenance of the existing alignment.

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. As a result, overall wetland and stream impacts are slightly less for Alternative 9B. Alternative 9B would cross the same streams as Alternative 9A, but total stream impacts would be slightly less resulting from a narrower crossing of Lily Run and unnamed tributaries of Lily Run. Bridge pier impacts within the Susquehanna River would be the same for Alternative 9B as for Alternative 9A.

Proposed minimization and mitigation:

- To ensure that floodwater impacts due to rail construction are minimized, drainage structures would be required to maintain the current flow regime and prevent associated flooding (COMAR 26.17.04). At the proposed Lily Run crossing, 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.

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

- Demolition of the existing bridge and remnant piers would allow approximately 0.5 acre of river bottom to return to benthic habitat, thereby more than offsetting losses from the construction of the replacement bridges.

- Maryland Department of Environment (MDE) time of year restrictions listed in the NETR include closure periods:
    - For work within designated SAV areas is from April 1 through October 15.
    - In Use I Streams from March 1 through June 15 for fish spawning and migration.
    - In Use II Streams from June 1 through September 30 and December 16 through March 14 for fish spawning and migration.

- A preliminary mitigation site search was conducted in the Lower Susquehanna River and Swan Creek watersheds to address the potential need for off-site mitigation, and potential wetland and stream mitigation sites were identified. On-site investigations will require a property owner notification process to seek permissions for accessing properties. This step will occur following the 30% design/NEPA evaluation stage during future design stages of the project.

Anadromous fish

The proposed project is located above the estuarine mixing zone in tidal fresh water and is not designated as essential fish habitat (EFH) for federally managed species. However, as you describe in your NETR, semi-anadromous and anadromous species have been documented as spawning near and/or migrating through the study area, including: yellow perch (*Perca flavescens*), white perch (*Morone americana*), blueback herring (*Alosa aestivalis*), alewife (*Alosa pseudoharengus*), and American shad (*Alosa sapidissima*). We generally recommend that in-water construction activities that could impact the migration or spawning of these species be avoided from February 15 through June 15. Although the minimization efforts you describe in the NETR focus more on avoiding injury or mortality to fish in the area, e.g. from shock waves resulting from impact hammering, this time of year restriction is also recommended to minimize impacts to behavior of migrating or spawning fish. We recognize that multiple, overlapping time of year restrictions make construction timelines difficult, and we will be happy to work with you to develop a timeline of what activities would be restricted at what times of year, similar to what was done for the Woodrow Wilson Bridge, to assist in planning purposes.

The low-speed vibratory drilling method that would be used to install the 5 to 6-foot diameter piles for the replacement bridge piers would not generate impulse noise underwater. Any underwater noise produced during the installation of these piles is expected to be below both the physical and behavioral effect thresholds of 206 dB re: 1 μPa SPL peak and 150 dB re: 1 μPa sound pressure level (SPL) root mean square (RMS), respectively, established by the Fisheries Hydroacoustic Working Group. The smaller, 18 to 24 inch piles that would support the temporary finger piers would be installed by impact hammering. Following best management practices (BMP) 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. The duration of impact pile driving is expected to be less than 15 to 20 minutes per pile; less if a vibratory driver was first used to drive the pile to resistance. In addition, impact hammering would begin with a series of light taps of gradually increasing strength to avoid sudden disturbances to fish and provide them with an opportunity to move away from the site (FHWA 2003).

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). Methods such as turbidity curtains, cofferdams, and deck shielding would be implemented as necessary to contain debris. Divers with wire saws would cut bridge piers two feet below the mudline and the pier would be removed using a barge crane. 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. If blasting occurs, it would be conducted in such a manner as to minimize the potential for fish mortalities. In the event that blasting is proposed, a number of protective measures would be implemented, including using blast mats and conducting blasting within steel sheet pile cofferdams. Because demolition methods could result in increased turbidity and impact submerged aquatic vegetation (SAV) in the area and migrating and spawning anadromous fish, we would recommend time of year restrictions for these activities, as described above.

On page E-54 of the NETR, you state that "because the spacing of the new bridges' piers would be closer together than the existing bridge's piers, water velocity and scouring between the piers would potentially increase, but would be expected to be minimal and would not significantly alter the hydrological properties of the river within, upstream, or downstream of the proposed project site and would not alter the site bathymetry." It does not appear that the potential impacts to migrating anadromous fish resulting from the potential increase in water velocity were considered in the NETR. Further evaluation should be undertaken to assess the potential effects the closer piers would have on migrating anadromous fish.

Submerged Aquatic Vegetation (SAV)

Alternative 9A and Alternative 9B would each have the same number of bridge piers in the Susquehanna River. Both alternatives appear to include four bridge piers that would impact SAV habitat in slightly different amounts and locations. Based on the preliminary engineering drawings, two bridge piers for the new west bridge would fall within the mapped SAV area along the Cecil County shoreline. One pier for the new east bridge would also potentially impact a portion of the SAV bed just downstream of the existing bridge alignment. 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.

We typically recommend a compensation ratio for SAV impacts of 3:1, as you note in the NETR. You estimate that for permanent impacts to SAV from either of the two selected alternatives, replacement of at least 0.24 acre would be required. However, you state in the NETR that finger pier construction would result in temporary SAV impacts totaling approximately 0.48 acre. As we discussed at the April 20, 2016, IRM, given the length of time the finger piers would be in place (3+ years), the SAV is unlikely to recover when the finger piers are removed. As a result, these impacts should be considered permanent and you should re-calculate your total mitigation requirements to account for them.

You state in the NETR that "[s]uccessful in-kind compensation for SAV impacts has proven extremely difficult within the Chesapeake Bay area (Submerged Aquatic Vegetation Workgroup 1995), and out-of-kind compensation in the form of water quality or stream habitat improvements is typically accepted by the regulatory agencies." While we recognize the challenges involved in successful replanting of SAV, the U.S. Environmental Protection Agency has designated SAV as a special aquatic site under Section 404(b)(1) of the federal Clean Water Act, due to its important role in the marine ecosystem for nesting, spawning, nursery cover, and forage areas for fish and wildlife, and SAV is a priority habitat for NOAA. Because of the ecological value of SAV, we recommend that if impacts cannot be avoided that in-kind mitigation be undertaken unless it can be demonstrated that the planting of SAV is not practicable.

SAV and their associated epiphytes are highly productive, produce a structural matrix on which many other species depend, improve water quality and stabilize sediments. Seagrasses are among the most productive ecosystems in the world and perform a number of irreplaceable ecological functions which range from chemical cycling and physical modification of the water column and sediments to providing food and shelter for commercial, recreational, as well as economically important organisms. The replacement bridges would result in an increase in shading, and scouring and sedimentation would initially shift upon replacement of the existing bridge outside of its current alignment. Because there is successful SAV in the area now, and you will not be changing the depth or sediment type in the project area, we recommend that after removing the finger piers you:

(1) allow the sediment to settle;
(2) re-plant the area for the following growing season to restore existing conditions;
(3) mitigate for the temporal loss of SAV habitat by planting additional SAV at a 3:1 ratio, preferably in locations where SAV has been successful in the past but has disappeared or has minimal density; and
(4) monitor the entire project site for five years to determine if there are additional SAV losses resulting from the proposed project that require mitigation and to determine the success of re-planting. If SAV growth has not been documented by year three, a second round of planting may be necessary.

We appreciate the efforts you have made to avoid and minimize impacts early in the planning of your proposed project, and the efforts that you have made to coordinate with the regulatory and resource agencies at the Maryland Department of Transportation Interagency Review Meetings and at site visits. We look forward to continued coordination with you on this project as it moves forward. If you have questions or would like to discuss this further, please contact Kristy Beard at (410) 573-4542 or kristy.beard@noaa.gov.

Sincerely,

Karen M Greene

Karen Greene
Mid-Atlantic Field Offices Supervisor
Habitat Conservation Division

Cc: Golden (MDNR)
DaVia (ACOE)
Li (USFWS)
Vaccaro (NMFS PRD)

References:

Federal Highway Administration (FHWA). 2003. Woodrow Wilson Bridge Project, Shortnose Sturgeon Biological Assessment Supplement, January 2003. 19 pp.

National Oceanic and Atmospheric Administration (NOAA). 2008. Impacts to Marine Fisheries Habitat from Nonfishing Activities in the Northeastern United States. NOAA Technical Memorandum NMFS-NE-209, US Department of Commerce, NOAA, National Marine Fisheries Service, Northeast Regional Office, Gloucester, Massachusetts.

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE.
Washington, D.C. 20590

MAY 10 2016

Kim Damon-Randall, Assistant Regional Administrator
NOAA National Marine Fisheries Service
Protected Resources Division
55 Great Republic Drive
Gloucester, MA 01930-2276

Via regular mail and email to Kimberly.Damon-Randall@noaa.gov

Re: Request for Informal Consultation under Section 7 of the Endangered Species Act

Dear Ms. Damon-Randall:

The Maryland Department of Transportation (MDOT) is proposing to improve the Susquehanna River Rail Bridge between the City of Havre de Grace in Harford County, Maryland and the Town of Perryville in Cecil County, Maryland. The Federal Railroad Administration (FRA) and MDOT are preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential environmental impacts of the Susquehanna River Rail Bridge Project (the "Proposed Project"). The National Passenger Railroad Corporation (Amtrak), as bridge owner and operator, is providing conceptual and preliminary engineering designs in coordination with MDOT and FRA. The existing Susquehanna River Rail Bridge is located along Amtrak's Northeast Corridor (NEC). Two build alternatives are under consideration in the EA: Alternative 9A and Alternative 9B. Both alternatives would construct two new two-track bridges—one along the existing alignment and one along a new western alignment. Both alternatives would entail the decommissioning and removal of the existing bridge.

The FRA is transmitting a draft Natural Resources Technical Report (NETR) to initiate informal consultation under Section 7(a)(2) of the Endangered Species Act (ESA). As described in the report, the proposed action may affect, but is not likely to adversely affect shortnose sturgeon (*Acipenser brevirostrum)* or any of the Distinct Population Segments of Atlantic sturgeon (*Acipenser oxyrinchus)* that may be present in the project area. The FRA has evaluated potential impacts to sea turtles in the NETR and has determined that the proposed action will have no effect on leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle

(*Caretta caretta*), Kemp's ridley sea turtle (*Lepidochelys kempi*), or green sea turtle (*Chelonia mydas*) because these species are not expected to occur north of Baltimore and therefore would not be present in the project area. In addition, no critical habitat has been designated for sea turtles within the project area.

We request your concurrence with our determinations for these species, and hereby request informal consultation under Section 7 of the ESA. Please contact Dan Reagle, MTA Environmental Planner at 410-767-3771 or by email at DReagle1@mta.maryland.gov.

Thank you for your assistance with this project.

Sincerely,

Michael Johnsen
Acting Division Chief
Environmental and Rail Planning Division

Enclosure

Cc: Dan Reagle, Maryland Transit Administration
Jacqueline Thorne, Maryland Department of Transportation
Paul DelSignore, Amtrak
Amrita Hill, Amtrak

February 14, 2014

Ms. Lori Byrne
Environmental Review Specialist
Wildlife and Heritage Division
Department of Natural Resources
Tawes State Office Building, E-1
580 Taylor Avenue
Annapolis MD 21401

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Ms. Byrne:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Reconstruction and Expansion Project proposes new and/or rehabilitated structures carrying up to four tracks across the river. The Project may also improve the navigation channel for marine users.

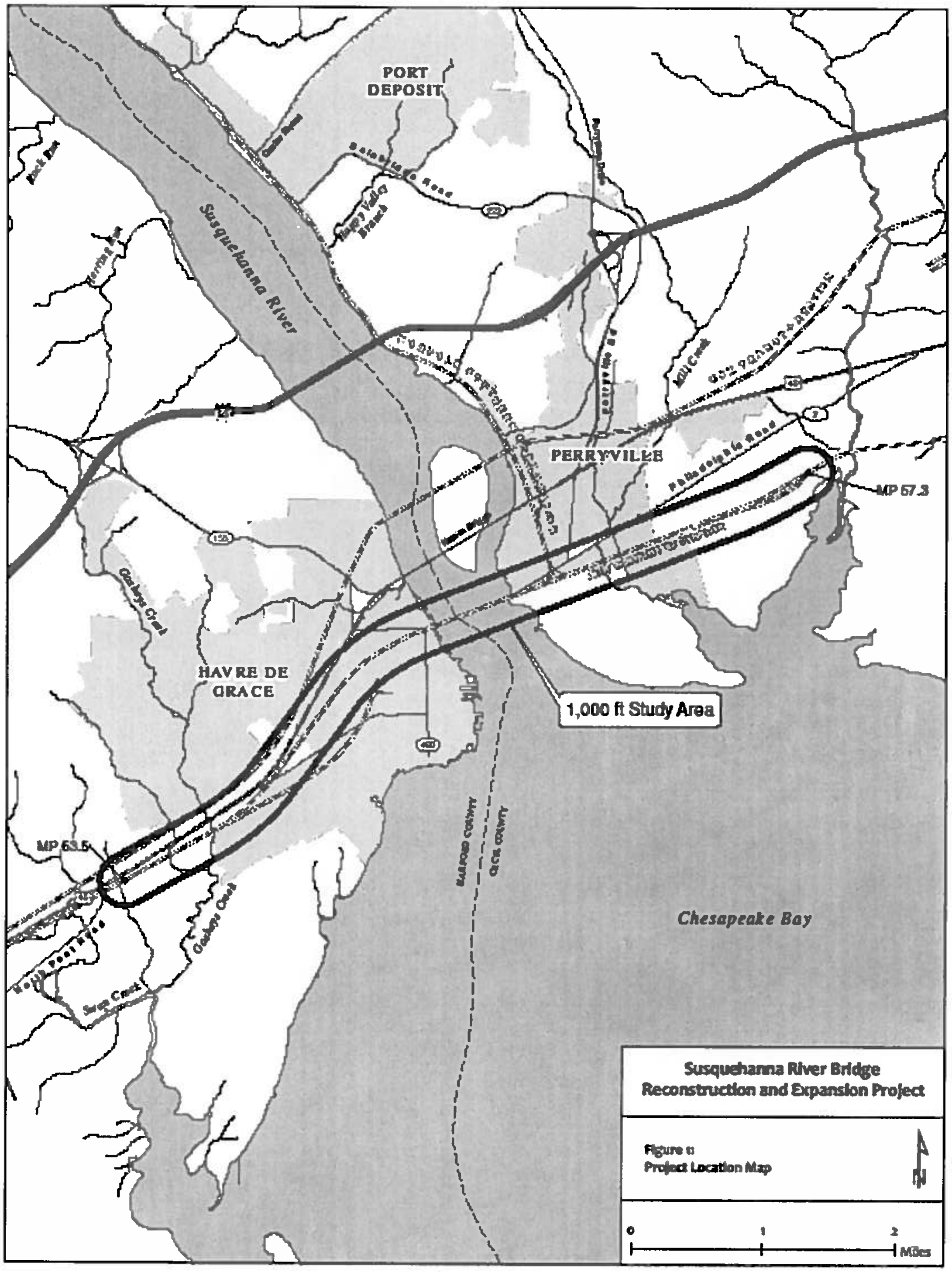
We request any information concerning state-listed threatened or endangered species and/or any unique habitat that may occur in the study area as shown in the attached map. If you have any questions or need additional information regarding this request, please contact me at 410-684-7063 or hromano@mdot.state.md.us. You may also contact Ms. Leslie Mesnick-Uretsky at 646-388-9756 or lmesnick@akrf.com. Thank you for your assistance.

Sincerely,

HRomano

Harry J. Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Mr. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration


PORT DEPOSIT
Susquehanna River
PERRYVILLE
HAVRE DE GRACE
MP 57.3
MP 63.5
1,000 ft Study Area
Chesapeake Bay
HARFORD COUNTY
CECIL COUNTY
Susquehanna River Bridge Reconstruction and Expansion Project
Figure 1:
Project Location Map
0
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2
Miles

March 20, 2014

Mr. Harry J. Romano
Maryland Department of Transportation
7201 Corporate Center Drive
Hanover, MD 21076

RE: Environmental Review for Susquehanna River Bridge Reconstruction and Expansion, Amtrak Rail Bridge, Harford and Cecil Counties, Maryland.

Dear Mr. Romano:

The Wildlife and Heritage Service has determined that there are the following areas of potential concern within the boundaries of the study area as delineated:

The south side of the project route may overlap with Swan Creek which is designated in state regulations as a Nontidal Wetland of Special State Concern (NTWSSC), and is regulated by Maryland Department of the Environment as an NTWSSC, along with its 100-foot upland buffers. Your project may need review by Maryland Department of the Environment for any necessary permits associated with the Swan Creek NTWSSC.

The open waters of the Susquehanna River that are included in the study area have been identified as historic waterfowl concentration and staging areas. If there is to be any construction of water-dependent facilities please contact Larry Hindman of the Wildlife and Heritage Service at (410) 221-8838 ext. 105 for further technical assistance regarding waterfowl.

Just west of Principio Creek and south of the project route is the Furnace Bay site, which supports records of state-listed endangered Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus plaustris*). Given that these are aquatic species, we would encourage the applicant to adhere stringently to all appropriate best management practices for sediment and erosion control during all work near this site.

Our analysis of the information provided also suggests that the forested area on or adjacent to the project site contains Forest Interior Dwelling Bird habitat. Populations of many Forest Interior Dwelling Bird Species (FIDS) are declining in Maryland and throughout the eastern United States. The conservation of FIDS habitat is strongly encouraged by the Department of Natural Resources, and is mandated within the Chesapeake Bay Critical Area. The following guidelines could be incorporated to help minimize the project's impacts on FIDS and other native forest plants and wildlife:

1. Avoid placement of new roads or related construction in the forest interior. If forest loss or disturbance is absolutely unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid road placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forested habitat.

2. Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.
3. Maintain forest habitat as close as possible to the road, and maintain canopy closure where possible.
4. Maintain grass height at least 10" during the breeding season (April-August).

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2014.0271.ha/ce
Cc: D. Brinker, DNR
K. Charbonneau, CAC

September 1, 2015

Ms. Angela Willis
Maryland Transit Administration
6 St. Paul Street
Baltimore, MD 21202-1614

RE: Update to Environmental Review for Susquehanna River Bridge Reconstruction and Expansion, Amtrak Rail Bridge, Harford and Cecil Counties, Maryland.

Dear Ms. Willis:

The Wildlife and Heritage Service has determined that there are the following areas of potential concern within the boundaries of the study area as delineated:

The south side of the project route may overlap with Gasheys Run (draining to Swan Creek) which is designated in state regulations as a Nontidal Wetland of Special State Concern (NTWSSC), and is regulated by Maryland Department of the Environment as an NTWSSC, along with its 100-foot upland buffers. Your project may need review by Maryland Department of the Environment for any necessary permits associated with the Swan Creek NTWSSC.

The open waters of the Susquehanna River that are included in the study area have been identified as historic waterfowl concentration and staging areas. If there is to be any construction of water-dependent facilities please contact Larry Hindman of the Wildlife and Heritage Service at (410) 221-8838 ext. 105 for further technical assistance regarding waterfowl.

Recent data indicates that there have been observations of the state-listed endangered Northern Map Turtle (*Graptemys geographica*) in this portion of the Susquehanna River. It is possible that this species could be impacted by work associated with this bridge replacement. Map Turtles utilize both the riverine and shoreline habitats in the area. Specific protection measurements can be developed as project details become available.

Just west of Principio Creek and south of the project route is the Furnace Bay site, which supports records of state-listed endangered Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus plaustris*). Given that these are aquatic species, we would encourage the applicant to adhere stringently to all appropriate best management practices for sediment and erosion control during all work near this site.

Our analysis of the information provided also suggests that the forested area on or adjacent to the project site contains Forest Interior Dwelling Bird habitat. Populations of many Forest Interior Dwelling Bird Species (FIDS) are declining in Maryland and throughout the eastern United States. The conservation of FIDS habitat is strongly encouraged by the Department of Natural Resources, and is mandated within the Chesapeake Bay Critical Area. The following guidelines could be incorporated to help minimize the project's impacts on FIDS and other native forest plants and wildlife:

1. Avoid placement of new roads or related construction in the forest interior. If forest loss or disturbance is absolutely unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid road placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forested habitat.
2. Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.
3. Maintain forest habitat as close as possible to the road, and maintain canopy closure where possible.
4. Maintain grass height at least 10" during the breeding season (April-August).

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2015.0456.ha/ce
Cc: S. Smith, DNR
D. Brinker, DNR
G. Golden, DNR
K. Charbonneau, CAC

April 7, 2016

Ms. Lori A. Byrne
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401

Dear Ms. Byrne:

Thank you for the response letter dated September 1, 2015 that identified potential rare, threatened, and endangered (RTE) species or species of statewide importance that could occur within the study area for the Susquehanna River Rail Bridge project. The letter identified the presence of a Wetland of Special State Concern (WSSC) located within the Swan Creek drainage just south of the Amtrak right-of-way at the western end of the study area. At the eastern end of the study area, Department of Natural Resources (DNR) identified the presence of a known site within the Furnace Bay wetlands that supports a population of state-listed endangered Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus palustris*). Both plant species are found in aquatic habitats. In addition, the state-listed endangered Northern Map Turtle (*Graptemys geographica*) is documented in the project area. The presence of historic waterfowl concentration within the study area and staging areas within the Susquehanna River was also referenced in the September 2015 letter. No other state-listed species were documented by the DNR as potentially occurring within the study area.

We wish to provide the following response/clarification for each of the resources/species listed above based upon conceptual engineering

Nontidal Wetland of Special State Concern (NTWSSC)
The wetland system associated with the NTWSSC is a large palustrine forested/scrub shrub wetland that lies south and east of Williams Drive and is associated with the headwaters of unnamed tributaries to Swan Creek and Gashey's Creek. Neither of the proposed Build Alternatives (Alternative 9A and 9B) would impact this wetland system and therefore no impacts to NTWSCC would result from the project (**Attachment 1**).

Historic Waterfowl Concentration and Staging Areas
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 (**Attachment 1**). 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. 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 limits of disturbance. Although waterfowl will not be permanently impacted by either Build Alternative, they may be temporarily displaced from the active construction area. By this letter the project team is initiating coordination with Mr. Larry Hindman of the Wildlife and Heritage Service and seeking additional information.

State-listed Endangered Water Horsetail and Vetchling

Both state-listed species, the Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus plaustris*) documented in the September 2015 are located within the Furnace Bay wetlands that lie over a mile and a half east of the project limits for both Build Alternatives (**Attachment 1**). Therefore, no impacts to these species are anticipated to result from the proposed project.

State-listed Endangered Map Turtle

The state-listed endangered Northern Map Turtle (*Graptemys geographica*) is 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 Northern Map Turtle for habitat, nesting, and foraging and the turtles hibernate on the river bottom in winter.

As part of both of the Build Alternatives, operation of the replacement bridges in place of the existing bridge would not have permanent effects on water quality or other habitat characteristics that would alter the biological community present (including Northern Map Turtle) within the project area. Although permanent impacts to the Map Turtle are not anticipated, they may be temporarily displaced from active construction. As the project moves into final design and more project details become available, the project team will work with DNR to develop specific protection measures. We understand these protection measures may include, but not be limited to: conducting nesting surveys during the nesting season to identify the presence/absence of nests within a project area, in-stream time-of-year restrictions, and/or removal of turtles from the work zone using trained scuba divers.

Forest Interior Dwelling Species (FIDS)

One large, contiguous forest habitat is located within the study area and occurs southeast of the Amtrak right-of-way (ROW) at the southwestern end of the study area. The FIDS habitat occurs outside the limit of disturbance (LOD) for both Build Alternatives and no impacts to this forest are anticipated (**Attachment 1**). However, should any potential impacts to this forest become identified in the future, the following techniques, would be implemented to avoid/minimize them:

- Avoid placement of new roads or related construction in the forest interior. If forest loss or disturbance is absolutely unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid road placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forested habitat.
- Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.

- Maintain forest habitat as close as possible to the road, and maintain canopy closure where possible.
- Maintain grass height at least 10" during the breeding season (April-August)

Based on the information provided above, please inform the project team if DNR requires any additional information or if any other follow-up coordination is required at this time. If you have any questions, please contact me at 410-767-3771 or via email at DReagle1@mta.maryland.gov. We appreciate your cooperation and prompt attention to this matter.

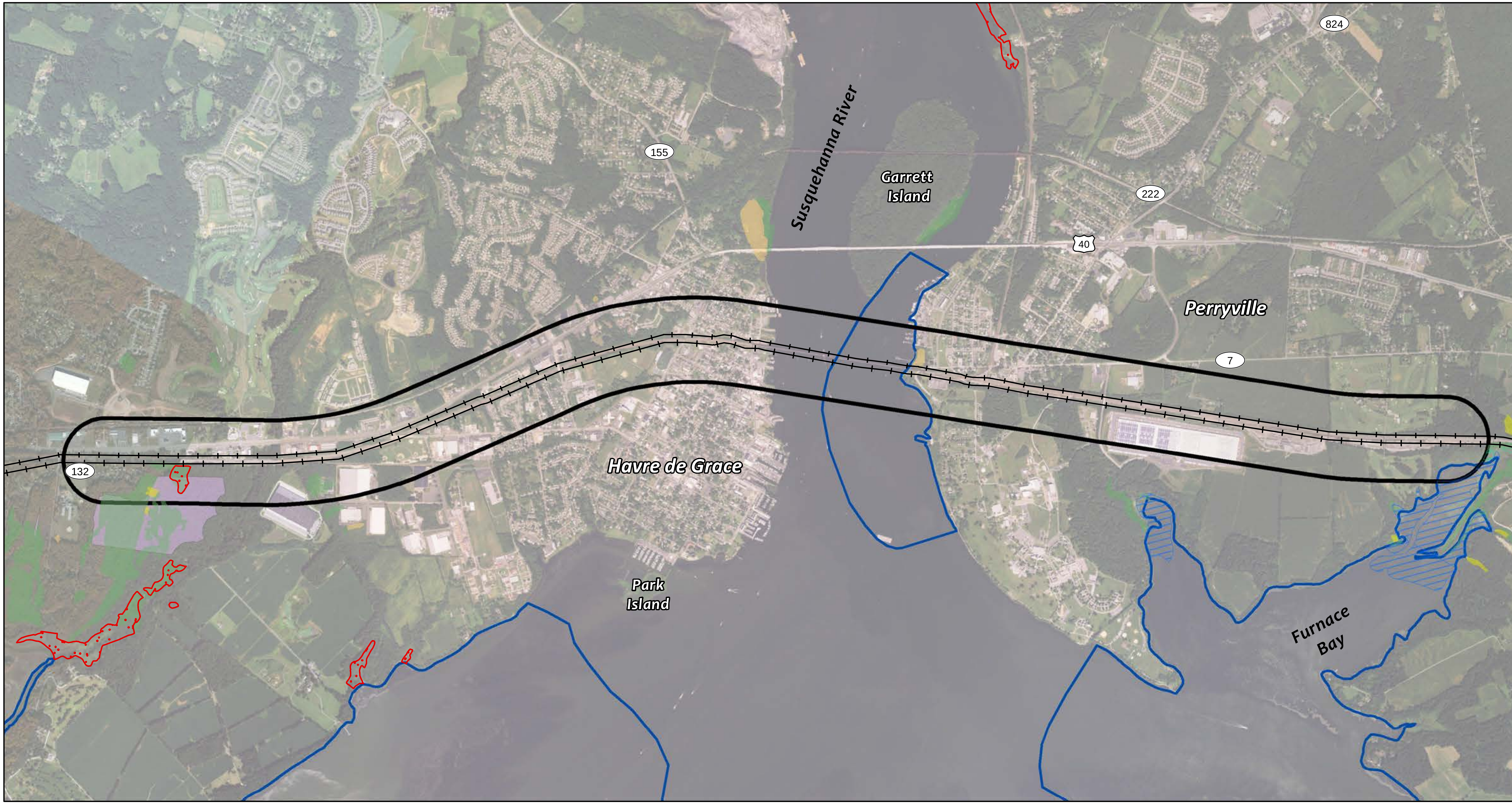
Sincerely,

Dan Reagle

Dan Reagle
Environmental Planning Division
Maryland Transit Administration
6 St. Paul Street, 9th Floor
Baltimore, MD 21202

Enclosure

cc: Ms. Amrita Hill, AMTRAK
Mr. Larry Hindman, DNR
Ms. Jacqueline Thorne, MDOT



Legend

- Esturarine Intertidal Scrub-Shrub
- Esturarine Intertidal Unconsolidated Shore
- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub-Shrub
- Wetlands of Special State Concern
- Historic Waterfowl Concentration and Staging Area
- Forest Interior Dwelling Species (FIDS)
- 1,000 ft Study Area

Data Sources

Wetlands, Waterfowl, and FIDS: Maryland Department of Natural Resources, 2015

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Attachment 1

Environmental Resources

May 9, 2016

Mr. Dan Reagle
Maryland Transit Administration
6 St. Paul Street
Baltimore, Maryland 21202-1614

RE: Follow – up to Environmental Review for Susquehanna River Bridge Reconstruction and Expansion, Amtrak Rail Bridge, Harford and Cecil Counties, Maryland.

Dear Mr. Reagle:

Thank you for providing us with the additional information regarding resources of concern mentioned in our September 1, 2015 letter for this project site.

The Gasheys Run Nontidal Wetland of Special State Concern is regulated by Maryland Department of the Environment as an NTWSSC, along with its 100-foot upland buffers. While the Wildlife and Heritage Service has no concerns for rare species in this NTWSSC at this time, you may want to check with Maryland Department of the Environment.

The open waters of the Susquehanna River that are included in the study area have been identified as historic waterfowl concentration and staging areas. We generally only have concerns for disturbance to wintering waterfowl from construction of water-dependent facilities along the shoreline and adjacent open waters. The new contact person for waterfowl is Josh Homyack of the Wildlife and Heritage Service at (410) 928-3650 or josh.homyack@maryland.gov.

Recent data indicates that there have been observations of the state-listed endangered Northern Map Turtle (*Graptemys geographica*) in this portion of the Susquehanna River. It is possible that this species could be impacted by work associated with this bridge replacement. Map Turtles utilize both the riverine and shoreline habitats in the area. Any specific protection measures should be coordinated with Scott Smith of the Wildlife and Heritage Service, as soon as details become available, at (410) 827-8612 or scott.smith@maryland.gov.

Just west of Principio Creek and south of the project route is the Furnace Bay site, which supports records of state-listed endangered Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus plaustris*). Given that these are aquatic species, we would encourage the applicant to adhere stringently to all appropriate best management practices for sediment and erosion control during all work near this site.

According to our records, this site is adjacent to the study area shown on your map, rather than over a mile away as you had suggested, making the need for best management practices all the more important.

Our analysis of the information provided also suggests that the forested area on or adjacent to the project site contains Forest Interior Dwelling Bird habitat. Populations of many Forest Interior Dwelling Bird Species (FIDS) are declining in Maryland and throughout the eastern United States. The conservation of FIDS habitat is strongly encouraged by the Department of Natural Resources, and is mandated within the Chesapeake Bay Critical Area. The following guidelines could be incorporated to help minimize the project's impacts on FIDS and other native forest plants and wildlife:

1. Avoid placement of new roads or related construction in the forest interior. If forest loss or disturbance is absolutely unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid road placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forested habitat.
2. Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.
3. Maintain forest habitat as close as possible to the road, and maintain canopy closure where possible.
4. Maintain grass height at least 10" during the breeding season (April-August).

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2016.0496.ha/ce
Cc: S. Smith, DNR
D. Brinker, DNR
G. Golden, DNR
K. Charbonneau, CAC

From:	Greg Golden -DNR-
To:	Dan Reagle
Cc:	Kristy Beard - NOAA Federal; Ray Li; Joseph.DaVia@usace.army.mil; Jon Stewart -MDE-
Subject:	MD DNR comments on Susquehanna River Rail Bridge Draft NETR document
Date:	Monday, May 09, 2016 7:28:29 PM

Dan:

I have to be rather informal in my response formatting here, for the opportunity to review the Draft document, in order to make the commenting deadline you requested. I have looked through each topic, section, and page. Obviously though, there are some sections which will require significant additional interagency review coordination and project detail development and review discussion over time, especially for the core subjects associated with wetland and waterway permitting review, including, avoidance, minimization, and compensatory mitigation topics. This would especially be true as design details, and construction and demolition methods, are further developed. I have listed several topics below where we are interested in more detailed participation, but I did not attempt to list each separate category where we will benefit and wish to participate further.

In general, the document was well put together, and included imported content and analysis, and also added value even when discussing certain topics where some agency correspondence already did occur. This is a very good start to the documentation of some very important natural resource protection issues for the project as planning continues, and is then followed by construction.

Individual comments, in very brief format:

1. Be sure to include and incorporate additional DNR Wildlife and Heritage Service (WHS) comments and guidance on State listed Rare, Threatened, and Endangered species as planning and documentation continue. We will continue to participate through the DNR Project Review Division participation as well, but direct WHS content shoudl continue to be updated in the NETR and other future documents.

2. There should be continued interagency discussion of the shade effects of the bridges, piers, and construction related piers (E-55, E-56).

3. TIme of Year restrictions for instream work. The draft document references in several places a Use I restriction of March 1 through June 15. Note that for this project, it will be extended for presence of yellow perch (and also possibly walleye) as our fisheries coordination letter stated, so please plan for a fish spawning protection restriction from February 15 through June 15, for acitivities that could suspend sediments, disturb substrate, or create sound or pressure waves. I believe this is consistent with the NMFS comment. Please DISREGARD for now the Use II restriction periods as referenced (E-57 and E-65, 6/1 to 9/30 and 12/16 to 3/14). Those appear to be an oyster restriction for the simplified older Use II designation. We will now focus in tidal Use II waters for this location on the fisheries period of Feb. 15 to June 15, and also the SAV restriction as well, and any rare species recommendations from WHS or USFWS. In most large bridge project reviews, final restriction periods are often determined by evaluating specific activities, their likelihood to suspend or disturb sediments, their likelihood to create sound or pressure waves, and overall required project timelines and applied BMPs. In other words, rather than blanket restriction periods for an entire large bridge project, they sometimes will need to be evaluated and applied activity by activity. Let's coordinate this with the agencies together, but as an

example, some minor activities might be allowable during a fish or SAV restriction, while other significant activities would not. Note also, our review interests to protect SAVs are for activities within 500 yards of documentedSAV beds, and in some cases, additional surveys might be beneficial, and requested.

4. SAV impact assessment and mitigation efforts and opportunities should be reviewed in detail within the interagency group, as there may be additional knowledge, or agency-specific criteria and policies, to share within the group.

5. Page E-62 - The State program should always be listed as State designated Scenic and Wild Rivers (word "Scenic" first for MD State program, word "Wild" first for Federal). or....(There are no) designated rivers in the State Scenic and Wild Rivers Program. State and Federal programs are completely separate. The NETR draft tends to blend the two. I know it is somewhat difficult to address both together in writing in a single section. Use the two suggestions above, or have a drafter or editor contact me for further guidance for the State references.

6. Sections on pile installation (low-speed vibratory drilling method or other): noise and vibration should be further coordinated with the resource commenting and regulatory agencies in an interagency setting. This is a complex issue that is best coordinated together as planning continues. If ever in doubt, or close to potential impact thresholds, a large tidal project is wise to have contingency plans and equipment available if any pile driving or pile work unexpectedly causes a fish kill at the work area (this did happen on Woodrow Wilson Bridge, although for activities which were later realized to be significant from the start).

7. Likewise, we would like to review matters related to collection of demolition debris in the group setting, since bottom disturbances are very possible. Woodrow Wilson Bridge had extensive coordination and collaboration on this topic.

8. Note: some demolition debris may be valuable for use in fish reef programs within the Bay - please plan to work early with the resource agencies on this possibility. Also, is the nearby set of unused piers from a past crossing still planned for demolition and removal as well?

9. Page E-67, please coordinate details and timing of any aquatic blasting with MD DNR also, through MDE or directly

10. DNR is interested to participate directly in compensatory mitigation review discussions for wetlands and waterways

Thank you for the opportunity to review and comment on the draft NETR document. If you have any questions on the comments above, please contact me at your convenience. I am not certain of the designated MDE and Corps reviewers, and have cc:ed regional managers for those two agencies, to forward as necessary.

Greg Golden
Project Review Division
Integrated Policy and Review Unit
MD Department of Natural Resources
410-260-8331
please note my new email address: greg.golden@maryland.gov

June 14, 2016

Ms. Lori A. Byrne
Environmental Review Coordinator
Wildlife and Heritage Service
Department of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401

Dear Ms. Byrne:

Thank you for the response letter dated May 9, 2016 that provided additional clarification regarding the Furnace Bay site, which supports records of the state-listed Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus palustris*). Our technical studies and associated documentation has been updated to reflect that it is not over a mile away from the study area, but still remains outside the much narrower limit of disturbance (LOD) for the project. Please see the updated mapping which shows the study area (outlined in black) and the project LOD (outlined in yellow and purple) and its distance from the Furnace Bay site (Attachment 1). It should also be noted that best management practices for sediment and erosion control will be strictly adhered to during construction throughout the entire project limits.

Also with regards to your response letter, we have undertaken the following additional actions:

1. We have noted your concerns about Forest Interior Dwelling Bird (FIDS) habitat. No FIDS habitat occurs within the project LOD, but the project will seek to minimize impacts to forest habitat and wildlife.

2. Given that the state-listed endangered Northern Map Turtle (*Graptemys geographica*) may also be impacted by work associated with the bridge replacement, as this species utilizes both the riverine and shoreline habitats within the study area, we have copied on this letter Mr. Scott Smith for additional information regarding appropriate protection measures to avoid negative effects on map turtles during construction.

3. We are also copying on this letter Mr. Josh Homyack for additional information regarding potential disturbances to wintering waterfowl along the shorelines and open waters of the Susquehanna. Waterfowl will not be permanently impacted by bridge construction, but may be temporarily displaced from the active construction area. Therefore, we are requesting additional information from Mr. Homyack regarding appropriate protection measures and other relevant information regarding waterfowl within the study area.

4. Maryland Department of the Environment has not commented on potential effects to the Gasheys Run Nontidal Wetland of Special State Concern (NTSSC), but best management practices for sediment and erosion control will be strictly adhered to during construction to minimize any indirect impacts.

If you have any questions, please contact me at 410-767-3771 or via email at DReagle1@mta.maryland.gov. We appreciate your continued coordination regarding this project.

Dan Reagle

Sincerely,

Dan Reagle
Environmental Planning Division
Maryland Transit Administration
6 St. Paul Street, 9th Floor
Baltimore, MD 21202

Attachment

cc: Mr. Greg Golden, DNR
Ms. Amrita Hill, AMTRAK
Mr. Larry Hindman, DNR
Mr. Josh Homyack, DNR
Mr. Scott Smith, DNR
Ms. Jacqueline Thorne, Maryland Department of Transportation

Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- Estuarine Intertidal Scrub-Shrub
- Estuarine Intertidal Unconsolidated Shore
- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub-Shrub
- Wetlands of Special State Concern
- Historic Waterfowl Concentration and Staging Area
- Forest Interior Dwelling Species (FIDS)
- Streams
- 1,000 ft Study Area

Data Sources

Wetlands, Waterfowl, and FIDS: Maryland Department of Natural Resources, 2015

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Attachment 1

Environmental Resources

Maryland Department of Transportation
The Secretary's Office

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

James T. Smith, Jr.
Secretary

February 14, 2014

Mr. Trevor Clark
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis MD 21401

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Mr. Clark:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Reconstruction and Expansion Project proposes new and/or rehabilitated structures carrying up to four tracks across the river. The Project may also improve the navigation channel for marine users.

We request any information concerning federally-listed threatened or endangered species and/or any unique habitat that may occur in the study area as shown on the first page of the attached Natural Resources of Concern database forms. If you have any questions or need additional information regarding this request, please contact me at 410-684-7063 or hromano@mdot.state.md.us. You may also contact Ms. Leslie Mesnick-Uretsky at 646-388-9756 or lmesnick@akrf.com. Thank you for your assistance.

Sincerely,

HRomano

Harry J. Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Mr. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration

U.S. Fish and Wildlife Service

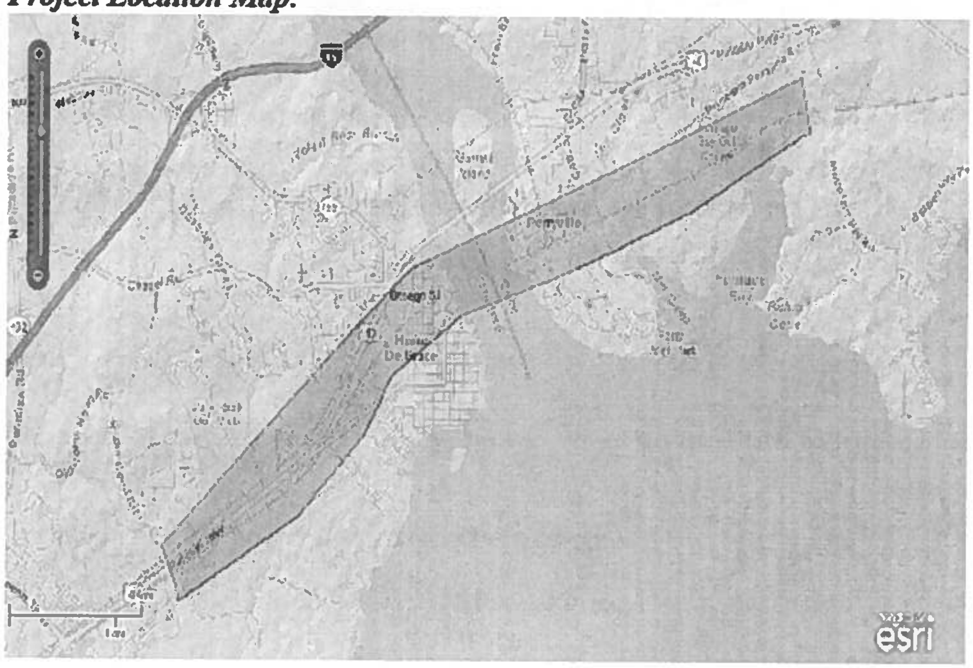
Natural Resources of Concern

This resource list is to be used for planning purposes only — it is not an official species list.

Endangered Species Act species list information for your project is available online and listed below for the following FWS Field Offices:

CHESAPEAKE BAY ECOLOGICAL SERVICES FIELD OFFICE
177 ADMIRAL COCHRANE DRIVE
ANNAPOLIS, MD 21401
(410) 573-4500

Project Location Map:



U.S. Fish and Wildlife Service

Natural Resources of Concern

Project Counties:

Cecil, MD | Harford, MD

Geographic coordinates (Open Geospatial Consortium Well-Known Text, NAD83):

MULTIPOLYGON (((-76.1412395 39.5261442, -76.1096622 39.547731, -76.0973026 39.5556726, -76.0506107 39.5691711, -76.0281231 39.5760518, -76.0265781 39.5702364, -76.0281231 39.5698394, -76.0473491 39.5618928, -76.0629703 39.557135, -76.0722316 39.5546062, -76.0881962 39.5507744, -76.1005558 39.5442818, -76.105534 39.5379342, -76.1170353 39.5293286, -76.1381496 39.520318, -76.1386646 39.5217746, -76.1412395 39.5261442)))

Project Type:

Bridge Construction / Maintenance

Endangered Species Act Species List (USFWS Endangered Species Program).

There are no listed species found within the vicinity of your project.

Critical habitats within your project area: (View all critical habitats within your project area on one map)

The following critical habitats lie fully or partially within your project area.

Fishes	Critical Habitat Type
Maryland darter (*Etheostoma sellare*) Population: Entire	Final designated critical habitat

FWS National Wildlife Refuges (USFWS National Wildlife Refuges Program).

There are no refuges found within the vicinity of your project.

FWS Migratory Birds (USFWS Migratory Bird Program).

Most species of birds, including eagles and other raptors, are protected under the Migratory Bird Treaty Act (16 U.S.C. 703). Bald eagles and golden eagles receive additional protection under the Bald and Golden Eagle Protection Act (16 U.S.C. 668). The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

Migratory bird information is not available for your project location.

NWI Wetlands (USFWS National Wetlands Inventory).

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

The following wetlands intersect your project area:

Wetland Types	NWI Classification Code	Approximate Acres
Freshwater Forested/Shrub Wetland	PFO1B	3.980198
Freshwater Forested/Shrub Wetland	PFO1A	4.402948
Freshwater Pond	PUBHx	5.296552
Freshwater Forested/Shrub Wetland	PFO1B	0.42387
Freshwater Pond	PUBHx	0.116829
Freshwater Emergent Wetland	PEM1C	3.628137
Estuarine and Marine Wetland	E2EM1N6	0.50204
Freshwater Pond	PABF	5.872225
Freshwater Pond	PUBHx	0.793017
Estuarine and Marine Wetland	E2EM1N6	0.32087
Estuarine and Marine Wetland	E2SS1P6	4.779318
Freshwater Pond	PUBHx	0.755149
Estuarine and Marine Wetland	E2SS1P6	1.046289
Freshwater Forested/Shrub Wetland	PFO1B	53.565359
Freshwater Forested/Shrub Wetland	PFO1C	9.943223

U.S. Fish and Wildlife Service

Natural Resources of Concern

Freshwater Forested/Shrub Wetland	PFO1S	5.838008
Freshwater Pond	PAB/SS1F	3.811766
Freshwater Pond	PUBVx	0.872615
Freshwater Emergent Wetland	PEM1/SS1R	2.235942
Freshwater Pond	PUBF	0.148728
Estuarine and Marine Wetland	E2EM1P6	2.015682
Freshwater Forested/Shrub Wetland	PSS1C	2.497754
Freshwater Pond	PUBHx	1.16406
Riverine	R1UBV	4.512323
Freshwater Forested/Shrub Wetland	PFO1S	5.160478
Freshwater Pond	PUBHx	0.382299
Estuarine and Marine Deepwater	E1UBL6	84038.389972
Riverine	R1UBV	2750.663558
Freshwater Pond	PUBVx	0.692103
Freshwater Forested/Shrub Wetland	PFO1B	8.081289
Freshwater Pond	PUBFx	0.029632
Freshwater Forested/Shrub Wetland	PFO1C	7.894979
Estuarine and Marine Wetland	E2EM1/SS1P6	4.45843
Estuarine and Marine Wetland	E2EM1N6	1.392153
Riverine	R2UBH	23.478455

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Ecological Services Field Office
177 ADMIRAL COCHRANE DRIVE
ANNAPOLIS, MD 21401
PHONE: (410)573-4599 FAX: (410)266-9127

Consultation Code: 05E2CB00-2016-SLI-0378 December 18, 2015
Event Code: 05E2CB00-2016-E-00367
Project Name: Susquehanna Rail Bridge Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Susquehanna Rail Bridge Project

Preliminary Species list

Provided by:

Chesapeake Bay Ecological Services Field Office
177 ADMIRAL COCHRANE DRIVE
ANNAPOLIS, MD 21401
(410) 573-4599

Consultation Code: 05E2CB00-2016-SLI-0378
Event Code: 05E2CB00-2016-E-00367

Project Type: TRANSPORTATION

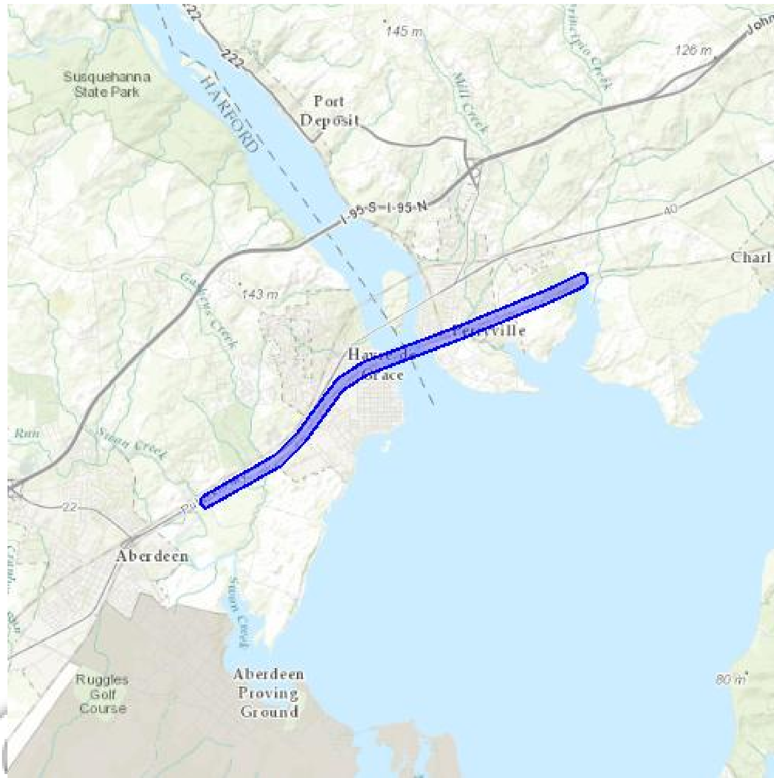
Project Name: Susquehanna Rail Bridge Project
Project Description: The project includes replacing the 106-year old bridge with a new bridge with 4 tracks. The existing bridge is located at Milepost 60 along the Northeast Corridor (NEC). The project would span between approximately Oak Interlocking at Milepost 63.5 in the south to Prince Interlocking at Milepost 57.3 to the north. The project is funded by a grant from the Federal Railroad Administration to the Maryland Dept. of Transportation and Amtrak is the owner of the railroad corridor and bridge.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

United States Department of Interior
Fish and Wildlife Service

Project name: Susquehanna Rail Bridge Project

Project Location Map:



Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Cecil, MD | Harford, MD

Endangered Species Act Species List

There are a total of 1 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Mammals	Status	Has Critical Habitat	Condition(s)
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

January 15, 2016

Mr. Dan Reagle
STATE OF MARYLAND
Maryland Transit Administration, Office of Planning
6 St. Paul Street, 9th Floor
Baltimore, Maryland 21202

RE: "Not Likely to Adversely Affect" northern long-eared bat determination; Susquehanna Rail Bridge Project in Cecil and Harford Counties, MD

Dear Mr. Reagle:

The U.S. Fish and Wildlife Service (Service) has reviewed your project information from the Service's Information for Planning and Conservation (IPaC) online system dated December 18, 2015. The Service has evaluated the potential effects of this project to the threatened northern long-eared bat (*Myotis septentrionalis*). The comments provided below are in accordance with Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

This project is within the range of the northern long-eared bat, a federally listed threatened species. The northern long-eared bat is a temperate, insectivorous migratory bat that hibernates in mines and caves in the winter and summers in wooded areas. Since the forest clearing for this proposed project is minimal, and there are no current records of northern long-eared bats in the project vicinity, this project as proposed is "not likely to adversely affect" the northern long-eared bat, therefore, there are no time of year restrictions on forest clearing.

Except for occasional transient individuals, no other Federal proposed or listed endangered or threatened species under our jurisdiction are known to exist within the project impact area. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

We appreciate the opportunity to provide information relevant to threatened and endangered fish and wildlife resources. This Endangered Species Act determination does not exempt this project from obtaining all permits and approvals that may be required by other State or Federal agencies.

If you have any questions or concerns regarding this letter, please contact Trevor Clark of my Endangered Species staff at (410) 573-4527 or by email at Trevor_Clark@fws.gov.

Sincerely,

G. La Rouche

Genevieve LaRouche
Supervisor

Maryland Department of Transportation
The Secretary's Office

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

James T. Smith, Jr.
Secretary

February 14, 2014

Mr. Tony Redman
Integrated Policy Review Unit
Department of Natural Resources
Tawes State Office Building, C-3
580 Taylor Avenue
Annapolis MD 21401

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Mr. Redman:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Reconstruction and Expansion Project proposes new and/or rehabilitated structures carrying up to four tracks across the river. The Project may also improve the navigation channel for marine users.

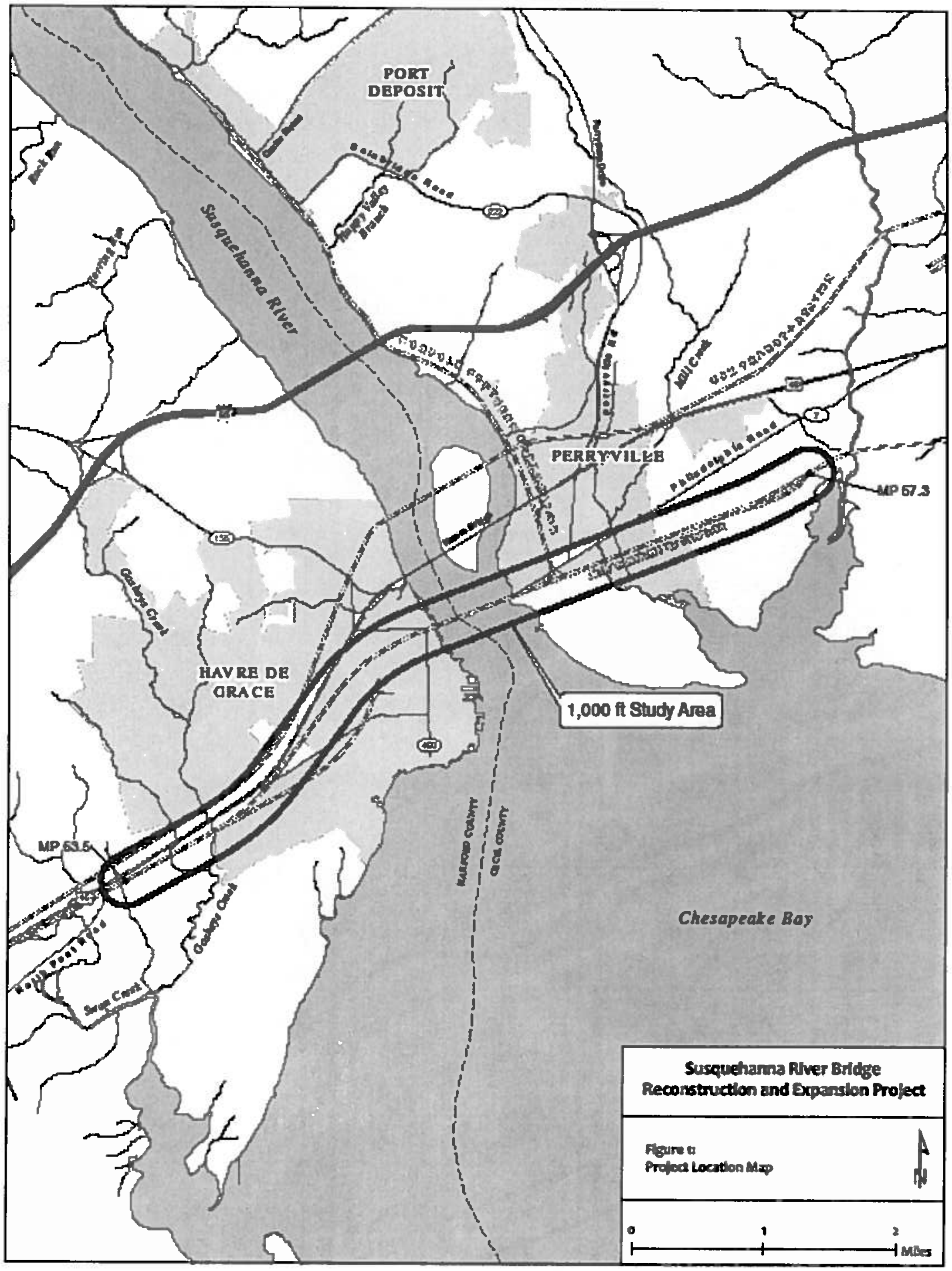
We request any information concerning state-listed threatened or endangered species and/or any unique habitat that may occur in the study area as shown in the attached map. If you have any questions or need additional information regarding this request, please contact me at 410-684-7063 or hromano@mdot.state.md.us. You may also contact Ms. Leslie Mesnick-Uretsky at 646-388-9756 or lmesnick@akrf.com. Thank you for your assistance.

Sincerely,

HRomano

Harry J. Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Mr. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration


PORT DEPOSIT
PERRYVILLE
HAVRE DE GRACE
Susquehanna River
Chesapeake Bay
1,000 ft Study Area
MP 57.3
MP 63.5
Susquehanna River Bridge Reconstruction and Expansion Project
Figure 1:
Project Location Map
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1
2
Miles

Martin O'Malley, *Governor*
Anthony G. Brown, *Lt. Governor*
Joseph P. Gill, *Secretary*
Frank W. Dawson III, *Deputy Secretary*

14-MIS-162

October 22, 2014

Harry Romano
Maryland Department of Transportation
7201 Corporate Center Drive
Hanover, MD 21076

Subject: Fisheries Information for the Proposed Susquehanna River Bridge Reconstruction and Expansion Project, in Harford and Cecil Counties, Maryland.

Dear Mr. Romano:

The above referenced project has been reviewed to determine fisheries species and aquatic resources in the vicinity of the proposed project. The proposed activities include the Susquehanna River Bridge Reconstruction and Expansion Project, in Harford and Cecil Counties, Maryland. Note that Maryland Department of Natural Resources is actively involved in the review and interagency coordination on this project, and that this response is only for the fisheries information coordination, and contains no other project analysis or comments.

Gasheys Creek and Mill Creek (Bush River Basin) and tributaries near the site are classified as Use I streams (Water Contact Recreation, and Protection of Aquatic Life). Susquehanna River (Lower Susquehanna River Basin) mainstem and tidal tributary reaches near the site 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).

Yellow perch, white perch, herring species, and shad species have been documented spawning near and/or migrating through the project study area. Where the presence of yellow perch has been documented along with these other anadromous fish species, generally no instream work is permitted in Use I streams during the period of February 15 through June 15, inclusive, during any year. Instream work in Use II waters that would suspend sediments in the water column, move sediments along the bottom, or create disturbances from sound or pressure waves should also not occur during the same period, February 15 through June 15, inclusive, of any year.

Principio Creek (Elk River Basin) and tributaries near the site are classified as Use III streams (Natural Trout Waters). Generally, no instream work is permitted in Use III streams during the period of October 1 through April 30, inclusive, during any year. Several very small tributaries to the Susquehanna River on the Cecil County side have been documented to support wild trout, either consistently, or occasionally. Survey work is ongoing in this region. Two new Use III stream designations in this area include Happy Valley Branch and all tributaries above US 222 in Cecil County, and an unnamed tributary to Susquehanna River crossing Frenchtown Road in

Cecil County (our attached map does not yet show these two new designations). As the bridge study proceeds, we will coordinate further on these small trout tributaries, based on determinations of potential impact areas for the project. If small tributaries may be impacted for approach work or infrastructure related to the bridge, additional coordination will be necessary for evaluating potential trout presence in the tributaries in this vicinity, and for setting Best Management Practices including instream work time of year restrictions.

The site is also near Submerged Aquatic Vegetation (SAV) beds in the Susquehanna River; no instream work that would suspend sediments in the water column or significantly disturb the bottom should occur from April 15 through October 15, inclusive, during any year, within 500 yards of documented SAV beds. Exact locations of current, recent, and historic SAV beds can be further coordinated during the project review. Field work will eventually be required to survey and map SAV beds in and near the work area.

Some of the streams near the site are listed as Tier II High Quality Waters, and may require additional restrictions or Best Management Practices. Please refer to the attached map for the location of Tier II streams and Use Classifications.

The smaller streams in the study area support many resident fish species documented by our Maryland Biological Stream Survey. MBSS data can be accessed via the MDDNR web page at http://www.dnr.state.md.us/map_template/streamhealth/index.html, allowing access to resource surveys in neighboring tributaries.

The Susquehanna River mainstem supports populations of several gamefish species, including striped bass, catfish species, walleye, and black bass. These species and other gamefish in the area spawn during the spring season referenced above for anadromous fish species, and should also be protected by the referenced corresponding instream work restriction period. Fishing activities for these species can occur year around.

Other important fisheries resources in this area include American eel presence, and potential presence of sturgeon (shortnose and Atlantic). American eels migrate upstream through this region to smaller streams where they grow to adult stages. Some eels may reside within the project study area long term. Their spawning runs then take them back through this area as they migrate downstream as adults to a specific region of the Atlantic Ocean to spawn. Special attention has been given to American eel management in recent years, due to their ecological and economic importance, and their declining numbers. The two sturgeon species are protected species, and have specific management requirements and efforts by National Marine Fisheries Service and US Fish and Wildlife Service, and cooperation with MD DNR. Further coordination with these three agencies will be required for these sturgeon species for this project.

Freshwater mussels are a category of aquatic species with growing focus, management effort, and protection methods. Some freshwater mussels are State listed as threatened or endangered. Our Wildlife and Heritage Service is the State lead for State listed freshwater mussel species. Since new field data is constantly being developed on freshwater mussels, and there is potential for these species to be found within the project area, further coordination will be necessary on potential mussel presence and Best Management Practices for protection as the project study continues.

As the above information demonstrates, this is a region and area very rich and diverse in fisheries and aquatic resources. This letter serves as an overall view for these resources, and MD DNR will remain available for further coordination on project and resource specifics as the study continues.

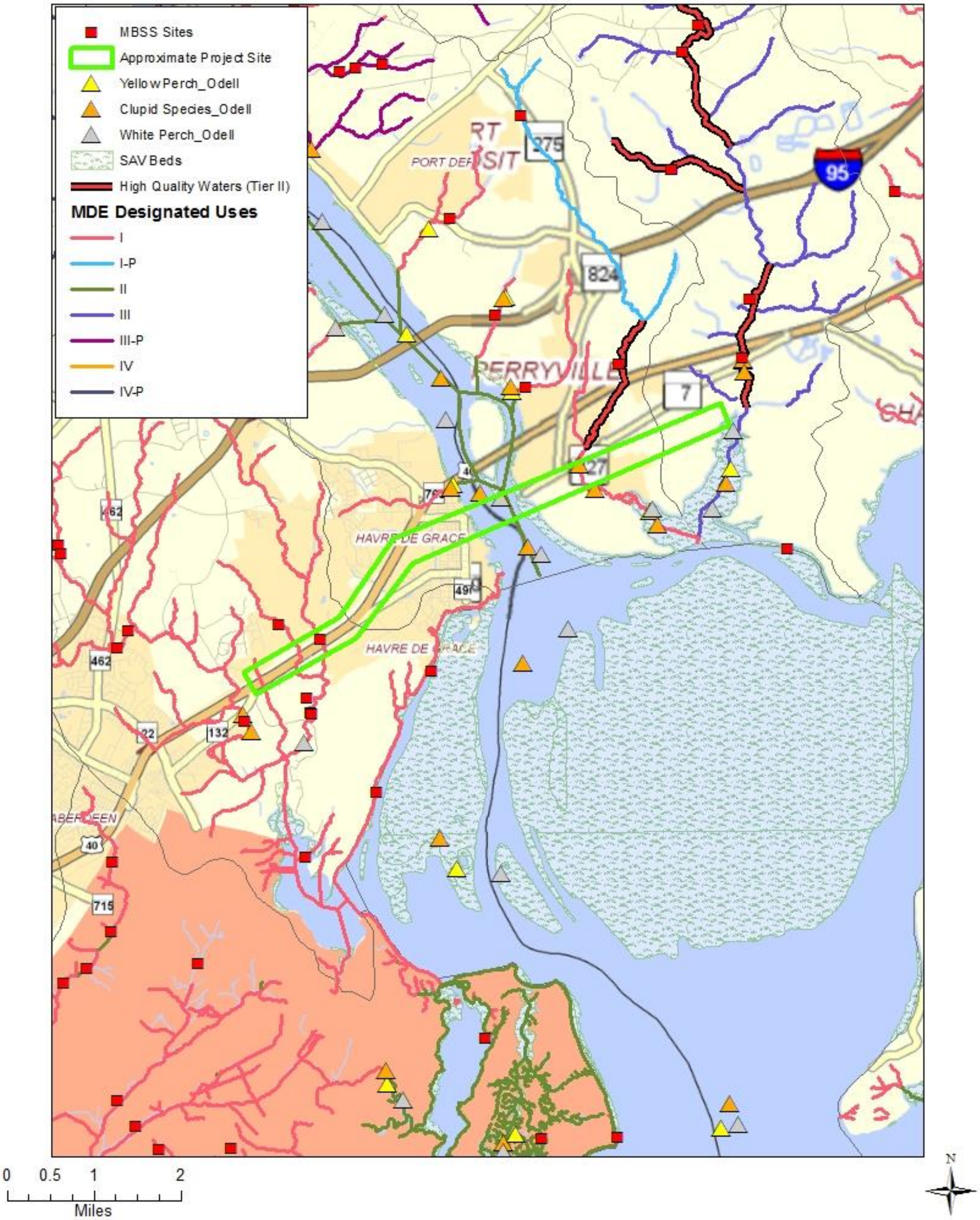
If you have further questions, please contact me at your convenience at 410-260-8331, or greg.golden@maryland.gov

Sincerely,

Gregory J Golden

Greg Golden
Project Review Division
Integrated Policy and Review Unit

cc: Lori Byrne, WHS, DNR


MBSS Sites
Approximate Project Site
Yellow Perch_Odell
Clupid Species_Odell
White Perch_Odell
SAV Beds
High Quality Waters (Tier II)
MDE Designated Uses
I
I-P
II
III
III-P
IV
IV-P
PORT DEP
PERRYVILLE
HAVRE DE GRACE
ABERDEEN
95
275
824
7
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462
22
132
715
490
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Miles
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February 14, 2014

Mr. Bob Rosenbush
Maryland Department of Planning
Clearinghouse and Plan Review Unit
301 W Preston Street
Baltimore MD 21201

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Mr. Rosenbush:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, which carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Project proposes new and/or rehabilitated structures with up to four-track total capacity crossing the river. The project may also improve the navigation channel for marine users. A project location map is attached for your reference.

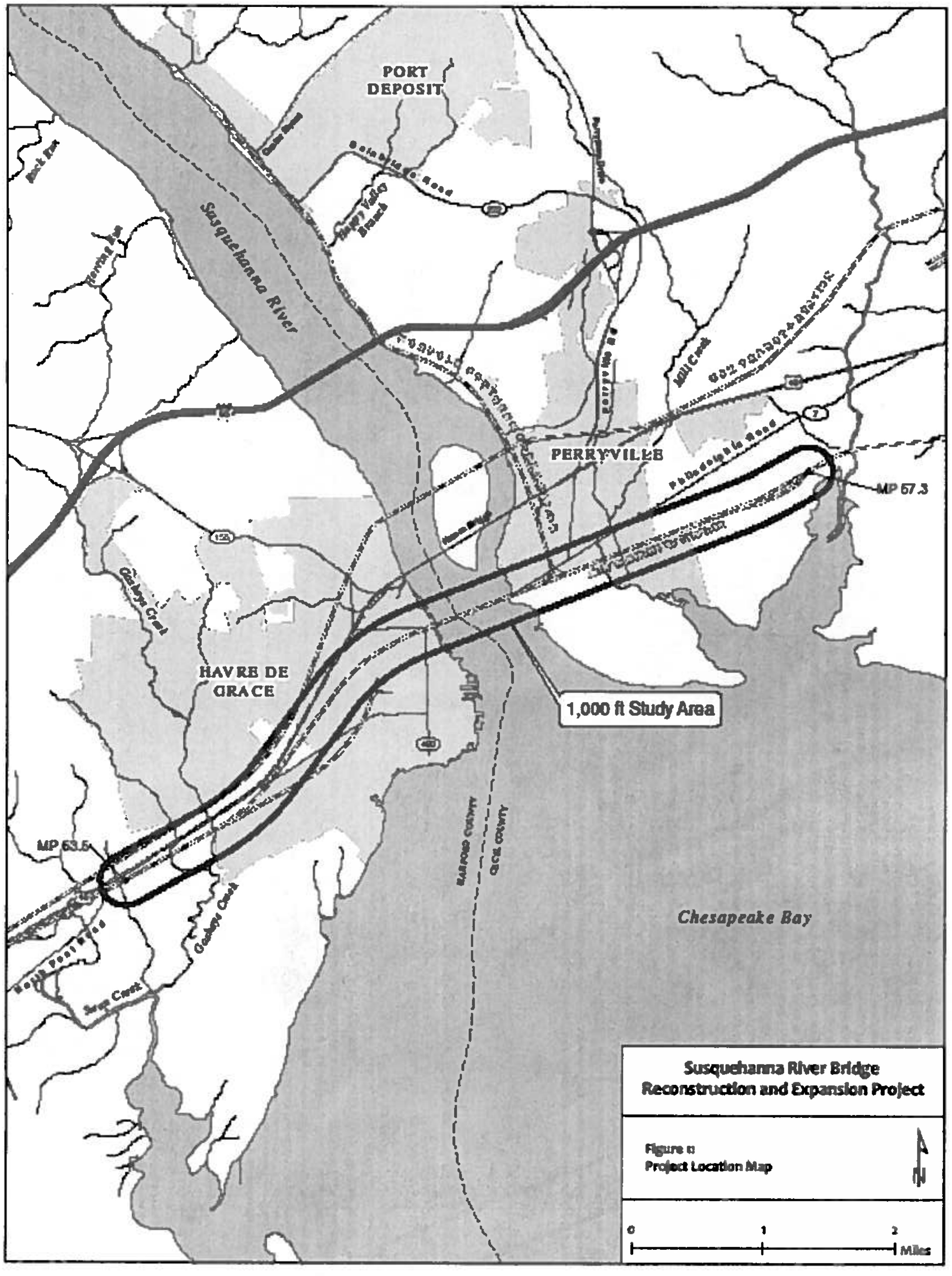
The Project team has initiated conceptual engineering and preliminary environmental studies. Agency coordination is ongoing, including plans to present current project efforts at the February 19, 2014 Interagency Review Meeting (IRM) at the Maryland State Highway Administration (SHA) Headquarters in Baltimore. A public information session is planned for early spring 2014. With the Project in the preliminary planning phase, we request that the Clearinghouse distribute this letter to member agencies for initial comment. If you require additional information, please contact me at 410-684-7063 or hromano@mdot.state.md.us. Thank you for your assistance.

Sincerely,

HRomano

Harry Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Ms. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration


PORT DEPOSIT
Susquehanna River
PERRYVILLE
HAVRE DE GRACE
MP 57.3
MP 63.5
1,000 ft Study Area
Chesapeake Bay
Mill Creek
Swan Creek
Philadelphia Road
HARFORD COUNTY
CECIL COUNTY
Susquehanna River Bridge
Reconstruction and Expansion Project
Figure 1
Project Location Map
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Miles

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

November 28, 2016

NOAA's National Marine Fisheries Service
Protected Resources Division
55 Great Republic Drive
Gloucester, MA 01930

Attn: Mrs. Kimberly Damon-Randall

Re: Request for Informal Consultation under Section 7 of the Endangered Species Act (ESA) for the Susquehanna River Rail Bridge Project

Dear Mrs. Kimberly Damon-Randall,

This letter is to request informal consultation under Section 7(a)(2) of the Endangered Species Act (ESA) for the activities proposed to construct the Susquehanna River Rail Bridge Project (an earlier, brief letter request was submitted on May 10, 2016). The Federal Railroad Administration (FRA), as part of the project team with Maryland Department of Transportation (MDOT) and Amtrak, has determined that the proposed activity may affect, but is not likely to adversely affect, listed species under jurisdiction of the NMFS, as defined in the 1973 Endangered Species Act (ESA). Additionally, we have determined the project is not likely to adversely affect critical habitat – existing or proposed. We request NMFS concurrence with these determinations.

The Project Team is transmitting a Natural Resources Technical Report (NETR) for your review and to initiate informal consultation. Detailed project activities and supporting analysis are provided in the referenced electronic copy of the NETR. A summary is provided below.

Proposed Project

The Maryland Department of Transportation (MDOT) is proposing to replace the Susquehanna River Rail Bridge between the City of Havre de Grace in Harford County, Maryland and the Town of Perryville in Cecil County, Maryland.

FRA and MDOT are preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential environmental impacts of the Susquehanna River Rail Bridge Project (the "Proposed Project"). FRA is funding preliminary engineering and NEPA analysis for the project. The National Passenger Railroad Corporation (Amtrak), as bridge owner and operator, is providing conceptual and preliminary engineering designs in coordination with MDOT and FRA.

Currently, the Proposed Project is not funded for construction. Should the Proposed Project receive future federal funding for construction, the intent is that FRA or another lead federal agency could rely on the environmental analysis that has been conducted at this preliminary engineering stage, i.e., that the future construction project would be "NEPA ready."

The existing Susquehanna River Rail Bridge is located along Amtrak's Northeast Corridor (NEC). The Preferred Build Alternative 9A would construct two new bridges with two tracks each—one along the existing alignment and one along a new western alignment. The bridge to the west of the existing alignment would allow speeds of up to 90 miles per hour (mph). The new bridge along the existing alignment would allow speeds of up to 160 mph. The Preferred Alternative would entail the decommissioning and removal of the existing bridge as well as the removal of remnant piers from an earlier bridge structure slightly downstream.

The existing bridge is 110 years old, has functionally-obsolete and aging infrastructure, speed and capacity constraints, operational inflexibility, maintenance difficulties, and presents conflicts with maritime uses.

Based on the work that needs to be completed prior to the contractor procurement, the Proposed Project schedule assumes that contracted construction would commence in 2019, subject to project funding. The schedule for the Proposed Project would include in-water restrictions, and other limitations likely to be required by permits. Anticipated stream closure periods prohibit in-stream work from February 15 through June 15 for protection of fish spawning or migration in tidal Use II streams and April 1 through October 15 within designated SAV areas. With these potential schedule limitations, the FRA and MDOT anticipate that construction work for the project could be completed over five-years.

Construction would require in-water work with the potential to re-suspend bottom sediment, resulting in minimal, temporary, and localized effects on water quality of the Susquehanna River in the vicinity of the Proposed Project site. These activities include the following:

Construction of temporary finger piers. Finger piers would be used to connect to access roads for optimum movement of equipment, as well as to avoid the need for dredging. These temporary piers would remain for the majority of the construction period (3 to 5 years). Construction of the proposed temporary finger piers would eliminate the need for dredging that would otherwise be required for construction barges to access the Proposed Project site, and would thereby avoid the more substantial disturbance to river sediments that would be caused by dredging. Finger piers would likely be supported by up to 180 small (18 to 24 inches) steel pipe piles. Following best management practices (BMPs) 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 using a vibratory driver to advance the piles to resistance. Piles would be impact driven to their final elevation. The project team anticipates duration of impact pile driving at less than 5 to 10 minutes per pile. Crews would install an average of 6 piles each day. At this rate there would be an average daily duration of 1 hour of impact pile driving and not likely more than 2 hours per day. To minimize underwater noise levels, a wooden cushion block would be used, which would provide approximately 11 to 24 dB of noise attenuation. In addition, impact hammering would begin with a series of light taps of gradually increasing power, 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 prior to exposure to injurious noise levels (FHWA 2003).

Construction of west and east replacement bridge piers. The new girder approach / arch main span bridge would have a total of 37 in-water piers (with a pier diameter of 5.67 feet for all piers except piers 13 and 14 at 6.67 feet). 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. The construction approach used for each pier pairing would depend on the location of the pier in relation to water depth. In deeper waters, drilled caissons (concrete-filled steel pipe piles) would be used for the pier construction and in shallower waters cofferdams would be utilized. Pile drilling results in minimal river bottom disturbance relative to other large-diameter pile installation methods. No dredging, sheet pile cells, or cofferdams would be required with the exception of the deep-water piers (Piers 3 and 4) that would potentially require a cofferdam during construction.

Demolition of the existing bridge and remnant piers. There are currently 16 in-water piers supporting the existing bridge and 13 remnant piers just downstream of the existing bridge that were left in place following demolition of the 1866 Philadelphia, Wilmington & Baltimore Railroad (PW&B) bridge. During demolition, the existing bridge would be dismantled by removing parts of the superstructure by barge or crane. The existing piers would be removed with an excavator and their support piles would either be cut two feet below the mud line with a wire saw or demolished by blasting inside a temporary cofferdam. Use of turbidity curtains and floating booms during the bridge removal activities would minimize the potential for resuspended sediment to result in significant adverse impacts to water or sediment quality.

Description of the Action Area

The Susquehanna River Rail Bridge is located along the Chesapeake Bay near the mouth of the Susquehanna River, at river Milepost 1. The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50CFR§402.02). For this project, an area, 1,000-feet upstream and 1,000 feet downstream of the current rail right-of-way, was evaluated for potential impacts to forests and wetlands. The project team identified 22 waters of the U.S. within this area. The majority of the identified systems included nontidal forested wetlands within the floodplain of lower and upper perennial streams that drain to the Chesapeake Bay, Susquehanna River, or Furnace Bay. 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, which drain directly to streams or forested wetlands along the streams. Two identified forested wetlands and one emergent wetland appeared to be hydrologically isolated. Two systems were identified as tidal emergent or forested wetlands, one along the Susquehanna River and the other along the perimeter of Furnace Bay. Other habitat in the action area is described in detail in the NETR.

The study area for aquatic resources in the Susquehanna River was the larger area of 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 (see Figure E-6 in the NETR). The aquatic resources study area also included 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.

NMFS Listed Species (and Critical Habitat) in the Action Area

The shortnose sturgeon (Acipenser brevirostrum) and Atlantic sturgeon (Acipenser oxyrinchus), were identified by NMFS as endangered species that may occur within the action 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 action 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 species that also occurs along the Atlantic coast of North America in estuaries and large rivers, including the Susquehanna (Chesapeake Bay). On February 6, 2012, certain Distinct Population Segments were designated as federally endangered. Atlantic sturgeon from the Chesapeake Bay and New York Bight Distinct Population Segment may occur in the action area. 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 action area, and are most likely to occur between April and June, they are not found in exceptionally high abundance (USFWS 2007 Atlantic sturgeon reward program). Atlantic sturgeon may occur in the action 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) and there is no hard-bottom spawning habitat present within the action area; therefore, Atlantic sturgeon eggs, larvae, and early juveniles are not expected to occur in the action area. On June 3, 2016, NMFS proposed a rule to designate critical habitat for three listed distinct population segments (DPSs) of Atlantic sturgeon found in U.S. waters (Gulf of Maine, New York Bight, and Chesapeake Bay DPSs) under GARFO jurisdiction (81 FR 35701). The proposed action occurs within the proposed Susquehanna River area.

Effects Determination

The work planned for the Susquehanna River Rail Bridge is within the known and expected range of shortnose sturgeon and Atlantic sturgeon. Both species are susceptible to the anticipated effects (i.e., increased turbidity, habitat modification, and vessel interactions). Construction or operation of the replacement bridges would not be expected to result in significant changes to water quality or other aquatic habitat parameters that would affect aquatic organisms. As described in detail in the attached NETR, the proposed action may affect, but is not likely to adversely affect shortnose sturgeon (*Acipenser brevirostrum*) or any of the Distinct Population Segments of Atlantic sturgeon (*Acipenser oxyrinchus*) that may be present in the action area. The table contained in this letter summarizes the total potential effects on natural resources from the Susquehanna River Rail Bridge Project.

Turbidity and Water Quality

Bottom disturbance during the construction of the in-water elements would have the potential to result in temporary sediment resuspension, and in turn, increased turbidity. However, any such effects would be highly localized and temporary, and would be expected to dissipate quickly, such that no significant or long-lasting changes in turbidity or other water quality parameters would occur. As the total suspended solids (TSS) will not reach levels that are toxic to benthic communities, the proposed action is extremely unlikely to result in reductions in the quality or quantity of sturgeon prey currently available. TSS is most likely to affect sturgeon if a plume creates a barrier in the waterway, and/or triggers an alteration of normal behaviors. However, because of turbidity curtains, sturgeon will not be exposed to elevated levels of resuspended sediment. Based on this, and the best available information, we conclude that when added to the baseline conditions, the effects of suspended sediment will be too small to be meaningfully measured or detected, and are therefore insignificant. The project will have no effect on salinity. No impacts to dissolved oxygen or temperature are anticipated.

Habitat Modification

The action area consists of soft substrate that may support benthic prey organisms. Sturgeon could opportunistically forage in the action area based on current conditions. The only activities that will impact soft substrate are pile installation. The estimated acreage of habitat loss due to the pile footprints of the bridge piers is <0.1 acres. The area of permanent habitat loss is therefore equivalent to <0.1% of the available soft-sediment benthic habitat in the action area and an even smaller percentage of the total soft-sediment benthic habitat in the Susquehanna River. Given the small size of the bridge piers and the extremely small loss of soft-bottom benthic habitat, effects of habitat modification will be too small to be meaningfully measured or detected, and are therefore insignificant.

The proposed action will not affect the habitat in a way that impedes the movements of spawning adults or juveniles; this is because it will not alter the depth of the action area in a way that makes the area inaccessible or will result in the placement of physical barriers to passage. While the project will result in additional structures in the water, neither the existing bridge piers, nor the replacement piers to be constructed, are likely to impede the movements of juvenile or adult sturgeon, as fish monitored with acoustic tags in the action area were unaffected and the new piers are designed to minimize surface area.

Acoustic Impacts

The installation and removal of steel piles using impact and vibratory hammers will produce sound pressure waves and therefore may affect aquatic species, including sturgeon. Underwater sound pressure waves can injure or kill fish (Reyff 2003; Abbott and Bing-Sawyer 2002; Longmuir and Lively 2001; Stephenson et al. 2010; Stotz and Colby 2001). Effects to fish can range from temporary startle resulting in avoidance of an area to death due to injury of internal organs, such as swim bladders. The type of hammer (i.e., vibratory hammer vs. impact hammer), size of the organism (smaller individuals are more susceptible to effects), and distance from the sound source (i.e., sound dissipates over distance, so noise levels are greater closer to the source) all contribute to the likelihood of effects to the individual.

During unattenuated impact pile driving of steel pipe piles for temporary finger piers, underwater noise levels associated with the potential onset of physiological injury to fish (i.e., 206 dB re: 1μPa SPL_{peak}) would extend up to 50 feet from the pile[1]. The use of a wooden cushion block during impact pile driving would provide approximately 11 to 26 dB of noise attenuation, which would reduce the extent of the ensonified (sound-filled) area to within less than 33 feet of the pile. Given the small extent of the 206 dB SPL_{peak} noise isopleth, injurious effects to sturgeon in the action area are extremely unlikely and therefore discountable. The potential impacts of underwater noise would be further minimized if the impact pile driving was conducted between July and December, when sturgeon are less likely to occur in the action area.

Underwater noise levels associated with the potential onset of behavioral effects to fish (i.e., 150 dB re: 1μPa SPL_{rms}) would extend across the river during unattenuated impact pile driving of piles and approximately 1,800 feet (i.e., 50% of the river width within the action area) if a wooden cushion block was used to attenuate noise levels. These noise levels would only occur over a period of 1 to 2 hours per day. If an average of 6 piles were driven per day and 3 days of impact pile driving occurred each week, then impact pile driving would be completed within 2.5 months. The most likely response of sturgeon to the underwater sound produced during pile driving for the finger piers would

[1] Noise isopleth estimates were made using the GARFO Acoustics Tool for analyzing the effects of pile driving on ESA-listed species in the Greater Atlantic Region.

Potential Effects on Natural Resources from the Susquehanna River Rail Bridge Project			
Resource Type	**Resource Category**	**Alternative 9A**	**Alternative 9B**
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 from bridge piers and construction (e.g., includes temporary finger pier and cofferdam impacts owing to length of construction)	0.61	0.61

Critical Habitat

A proposed rule regarding the designation of critical habitat for the Chesapeake Bay Distinct Population Segment (DPS) of the Atlantic sturgeon was published in the Federal Register on June 3, 2016. The proposed critical habitat includes the entirety of the action area. Once critical habitat is proposed, the requirement to conference is in place. Conference is required when a proposed action is likely to result in the destruction or adverse modification of proposed critical habitat. We have determined that conference is not necessary; here, we consider the impacts of the proposed action on critical habitat proposed for designation for the Chesapeake Bay DPS.

The critical habitat designation is for habitats that support successful Atlantic sturgeon reproduction and recruitment. In order to determine if the project may affect critical habitat, we consider whether it would impact the habitat in a way that would affect its ability to support reproduction and recruitment. Specifically, we consider the effects of the project on the physical and biological features of the proposed critical habitat. The be temporary avoidance of the area (AKRF and Popper 2012a,b). Behavioral avoidance by sturgeon would be temporary and limited to 1 to 2 hours during impact pile driving on any given day. Because the extent of the 150 dB SPL_{rms} isopleth is greater than the extent of the 187 dB re: $1\mu Pa^2 \cdot s$ cSEL isopleth (i.e., the potential onset of physiological injury due to prolonged sound exposure), sturgeon would avoid the ensonified area and would not likely be exposed to noise levels exceeding the 187 dB cSEL threshold.

Should sturgeon move into the action area where the 150 dBRMS isopleth extends, as described above, it is reasonable to assume that a sturgeon, upon detecting underwater noise levels of 150 dBRMS, will modify its behavior such that it redirects its course of movement away from the ensonified area and therefore, away from the project site. If any movements away from the ensonified area do occur, it is extremely unlikely that these movements will affect essential sturgeon behaviors (e.g., spawning, foraging, resting, and migration), as the area is not a spawning or overwintering area, and the Susquehanna River is sufficiently large enough to allow sturgeon to avoid the ensonified area while continuing to forage and migrate. Given the small distance a sturgeon would need to move to avoid the disturbance levels of noise, any effects will not be able to be meaningfully measured or detected. Therefore, the effects of noise on sturgeon are insignificant.

Increased Vessel Traffic

The proposed project may result in a temporary increase in vessel traffic in the action area; however, at this time, the exact number of project vessels operating within the action area at any given time and the precise number of operating hours for those vessels are not known. At a minimum, the project will utilize work barges, delivery barges, and crew vessels (with personnel lifts). The drafts of these vessels are not likely to exceed 6 to 8 feet in most cases. Water depths within most of the action area range from 20 to 50 feet at mean lower low water. Therefore, the vessel clearance above the river bottom would be at least 12 feet. The factors relevant to determining the risk to listed species from vessel strikes vary, but may be related to the size and speed of the vessels, navigational clearance (i.e., depth of water and draft of the vessel) in the area where the vessel is operating, and the behavior of fish in the area (foraging, migrating, etc.). 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 and below 15 feet from the water's surface for Atlantic sturgeon (Balazik et al. 2012), vessel interaction with sturgeon is extremely unlikely and, therefore, discountable.

essential features identified in the proposed rule are:

- suitable hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand range) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- transitional salinity zones of 0.5-30 parts per thousand inclusive of waters with a gradual downstream gradient and soft substrate (e.g., sand, mud) downstream of spawning sites for juvenile foraging and physiological development;
- water depth of up to 27 meters absent physical barriers to passage (e.g., locks, dams, reservoirs, gear, etc.) between the river mouth and spawning sites for unimpeded movements of spawning adults as well as seasonal and physiological-dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary, and;
- water with the temperature, salinity, and oxygen values that, combined, provide for dissolved oxygen values that support successful reproduction and recruitment (e.g., 6 mg/L for juvenile rearing habitat) and are within the temperature range that supports the habitat function (e.g., 13 to 26° C for spawning habitat and no more than 30° C for juvenile rearing habitat).

The first feature (hard bottom habitat with salinity less than 0.05 ppt) is not present in the action area.

The remaining three features are present in the action area. The only activity remaining as part of the proposed action that will impact soft substrate is pile installation. The estimated acreage of habitat loss due to the pile footprints of the bridge piers is <0.1 acres. The area of permanent habitat loss therefore is equivalent to <0.1% of the available soft-sediment benthic habitat in the action area and an even smaller percentage of the total soft-sediment benthic habitat in the Susquehanna River. Given the small size of the bridge piers and the extremely small loss of soft-bottom benthic habitat, effects will be insignificant.

The proposed action will not affect the habitat in a way that impedes the movements of spawning adults or juveniles; this is because it will not alter the depth of the action area in a way that makes the area inaccessible or result in the placement of physical barriers to passage. While the project will result in additional structures in the water, neither the existing bridge piers, nor the replacement piers to be constructed, would impede the movements of juvenile or adult sturgeon, as fish monitored with acoustic tags in the action area were unaffected and the new piers are designed to minimize surface area.

The project will have no effect on salinity. No impacts to dissolved oxygen or temperature are anticipated. Effects to water quality are extremely unlikely to occur and are, therefore, discountable.

In sum, it is not expected that the temporary loss of a minimal amount of soft substrate that could be used for juvenile foraging would result in a direct or indirect alteration of the proposed critical habitat that appreciably diminishes the value of the critical habitat for the conservation of Atlantic sturgeon. Therefore, we do not anticipate the destruction or adverse modification of the proposed critical habitat and conference with NMFS is not necessary.

Conclusion

Overall, we have determined that the Susquehanna River Rail Bridge Project may affect, but is not likely to adversely affect, any listed species, or pending critical habitat, under NMFS' jurisdiction. We request your concurrence with our determinations for these species, and hereby request informal consultation under Section 7 of the ESA. Please contact me, FRA Environmental Protection Specialist, at (202) 493-0844 or by email at Brandon.Bratcher@dot.gov.

Thank you for your assistance with this project.

Sincerely,

Brandon L. Bratcher
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(202) 493-0844

Literature Cited

All references are included in the referenced electronic copy of the NETR.

CC:
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I. ENVIRONMENTAL OVERVIEW AND IMPACT ASSESSMENT

The following report has been developed to assess the potential effects on natural resources from the Susquehanna River Rail Bridge Project (Proposed Project). The Maryland Department of Transportation (MDOT), project sponsor, is proposing to improve the Susquehanna River Rail Bridge between the City of Havre de Grace, Harford County, Maryland and the Town of Perryville, Cecil County, Maryland in order to provide continued rail connectivity along the Northeast Corridor (NEC). The U.S. Secretary of Transportation selected the MDOT for an award of $22 million through a cooperative agreement between the Federal Railroad Administration (FRA) and MDOT for the preliminary engineering and National Environmental Policy Act of 1969 (NEPA) phases of the Proposed Project. The FRA is the lead federal agency and the National Railroad Passenger Corporation (Amtrak), as bridge owner and operator, is providing conceptual and preliminary engineering designs and is acting in coordination with MDOT and FRA.

The Susquehanna River Rail Bridge is located at Milepost 60 along the NEC. The Proposed Project would span approximately six miles, between the "Oak" Interlocking at Milepost 63.5 south of the City of Havre de Grace and the "Prince" Interlocking at Milepost 57.3 north of the Town of Perryville. The 110-year-old bridge is a critical link along one of the U.S. Department of Transportation's (USDOT) designated high-speed rail corridors. The NEC is the busiest passenger rail line in the United States. The bridge is used by Amtrak, the Maryland Area Regional Commuter (MARC), and Norfolk Southern Railway (NS) to carry intercity, commuter, and freight trains across the Susquehanna River.

This document evaluates the potential effects on natural resources from Alternative 9A and Alternative 9B. Both Alternative 9A and Alternative 9B would construct:

- a new two-track bridge accommodating train speeds of up to 90 miles per hour (mph) to the west of the existing bridge, and
- a second new two-track bridge along the existing alignment.

The second new bridge would accommodate speeds of up to 160 mph for Alternative 9A and up to 150 mph for Alternative 9B. The bridge to the west of the existing bridge would be constructed first, including the river spans, approach structures, railroad systems, and embankment. The use of conventional ballasted track is anticipated for the fixed bridge portion of the Proposed Project. Under normal operations, this bridge would be used primarily by MARC commuter rail and NS freight rail service.

Once the new bridge to the west is completed, the existing bridge would be taken out of service, demolished, and replaced. A new high-speed passenger bridge would be built in the center of the right-of-way of the existing bridge alignment. This bridge would reduce the curve in Havre de Grace and allow for either 160 mph speeds for Alternative 9A or 150 mph speeds for Alternative 9B. Due to the flat curvature of Alternative 9A, it would require additional property acquisition outside of the current Amtrak-owned right-of-way (ROW). Since the west bridge will be built first, freight, MARC and Amtrak operations will be maintained throughout construction of both bridges. The south wye track (connecting the NS Port Road to the NEC in Perryville) would be realigned to accommodate the revised configuration of Perry Interlocking. It is assumed that a new undergrade bridge over Broad Street would be required to support the realignment of the south wye track. Although Alternative 9A and Alternative 9B are based on a four-track scenario, they could accommodate a three-track scenario with an option of a future fourth-track expansion.

Separate from alignment Alternative 9A and Alternative 9B, the Project Team evaluated four bridge type alternatives: girder approach / arch main span bridge design; delta frame approach / arch main span bridge design; truss approach / truss main span bridge design; and the girder approach / truss main span bridge design. Additional information regarding the evaluated bridge types can be found in ***Appendix A-2, Bridge Design Selection.*** All impact analyses and assessments included in this document are based on the girder approach / arch main span bridge design.

A. TOPOGRAPHY, GEOLOGY, AND SOILS

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Maryland Department of Environment Erosion and Sediment Control Regulations (COMAR 26.17.02)
Maryland's Erosion Control Law and regulations specify the general provisions for program implementation; procedures for delegation of enforcement authority; requirements for erosion and sediment control ordinances; exemptions from plan approval requirements; requirements for training and certification programs; criteria for plan submittal, review, and approval; and procedures for inspection and enforcement. The Maryland Department of the Environment (MDE) has established minimum criteria for effective erosion and sediment control practices. The *2011 Standards and Specifications for Soil Erosion and Sediment Control* serve as the official guide for erosion and sediment control principles, methodology, and practices (MDE 2014).

Farmland Policy Protection Act (FPPA) of 1981
The Farmland Protection Policy Act (FPPA) of 1981, 7 U.S.C. 4201, was enacted to minimize the loss of prime farmland and unique farmlands from Federal actions that convert these lands to nonagricultural land uses. Actions that result in the conversion of prime or unique farmland not already committed to urban development or water storage are reviewed for compliance with the FPPA. Compliance is coordinated with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).

Methodology

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.

2. AFFECTED ENVIRONMENT

a. Topography

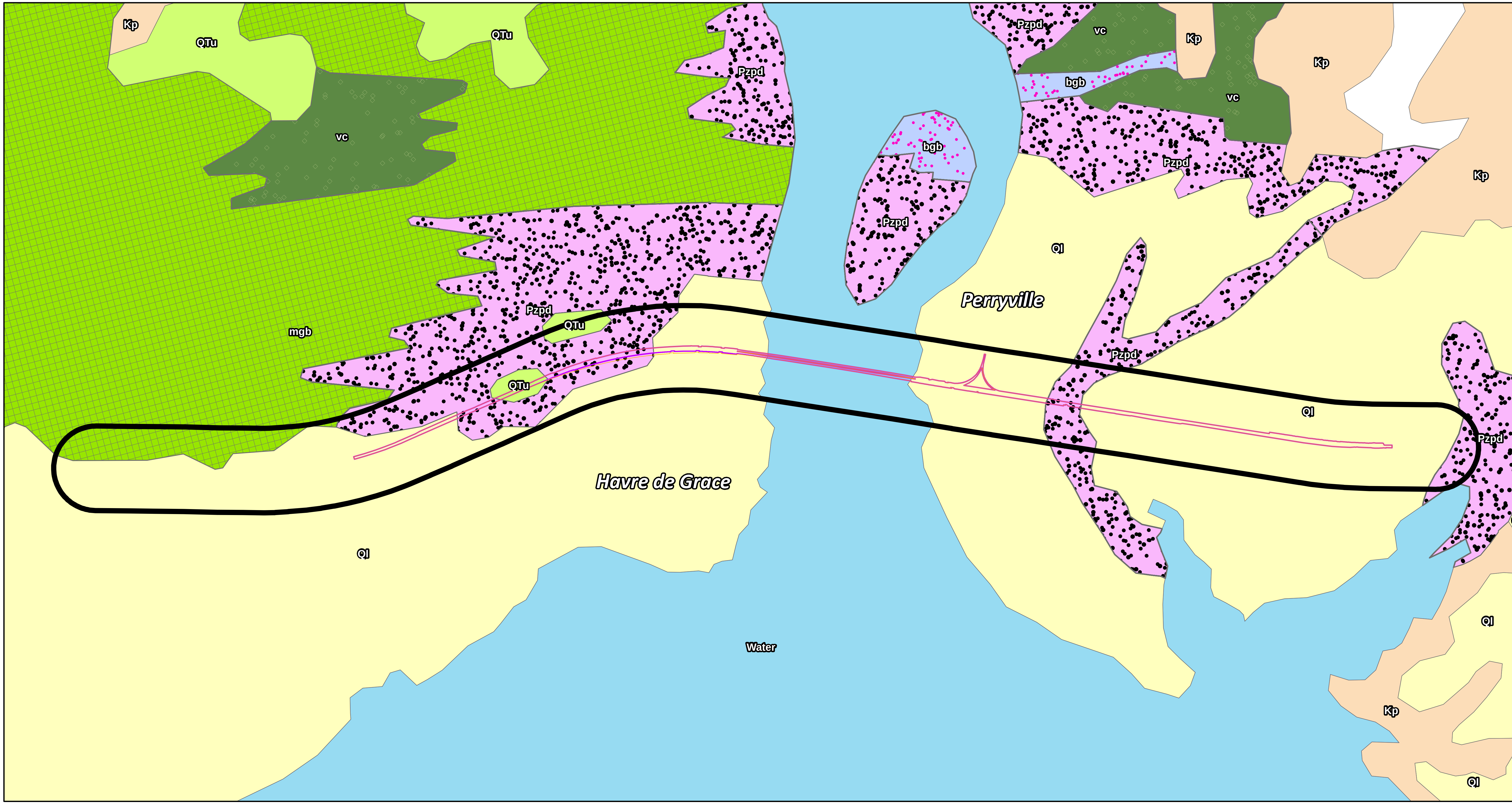
The topography at the study area ranges from less than 20 feet above sea level to over 100 feet. The topography in the Atlantic Coastal Plain physiographic province (south of the study area) is fairly flat. The topography in the Piedmont physiographic province is generally rolling hills, rising to over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

b. Geology

The Maryland Geologic Survey defines a physiographic province as a geographic area in which the geology (including lithology and structure) and climate history have resulted in landforms that are distinctly different from adjacent areas. Harford and Cecil Counties lie within the Fall Line separating two physiographic provinces, the Piedmont and the Atlantic Coastal Plain. 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. The study area is primarily located within the Atlantic Coastal Plain, with a small portion located within the Piedmont Province.

The study area contains two Quaternary-age deposits, the Coastal Plain deposits and upland deposits. The Coastal Plain deposits are fluvial and are characterized by thin (less than 98 feet thick) sequences of sand, gravel, and silty clay that overlies Piedmont bedrock or upper Coastal Plain marine deposits.

According to the Geological Survey of Maryland (1968), the majority of sediments associated with Coastal Plain deposits present in the study area are lowland (QI) composed of gravel, sand, silt, and clay (***Figure E-1***). Medium- to coarse-grained sand and gravel up to boulder size are common near the base of the deposits. The thickness ranges from 0 to 150 feet. These deposits have been classified by others as the Talbot and Kent Island Formations.



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Potomac Group (kp)
- Port Deposit Gneiss (Pzpd)
- Upland Deposits - Western Shore (QTu)
- Lowland Deposits (Ql)
- Water
- Baltimore Gabbro Complex (bgb)
- Metagabbro and Amphilobite (mgb)
- Volcanic Complex of Cecil County (vc)

Data Sources

Geology:
U.S. Geological Survey, 2005

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Figure E-1

Study Area Geology Map

The second Quaternary deposits are the Upland Deposits (Qtu). The Upland Deposits contain gravel and sand, which is commonly orange-brown and locally limonite-cemented. The Upland Deposits contain minor silt and red, white, or gray clay. There is a lower gravel member and an upper loam member with varying thickness of 0 to 50 feet.

There are four small portions of the study area that contain rocks from the Piedmont Province. Most of the bedrock deposits are composed of Port Deposit Gneiss (Pzpd). The Port Deposit Gneiss is a moderately to strongly deformed intrusive complex composed of gneissic biotite quartz diorite, hornblende-biotite quartz diorite, and biotite granodiorite. All these rocks are foliated and some are strongly sheared. There is one small area composed of metamorphosed gabbro and amphibolite deposits (mgb).There is a ready source of sand and gravel at the Havre de Grace Quarry (Vulcan Havre de Grace Quarry) located approximately 7,800 feet northwest of the bridge.

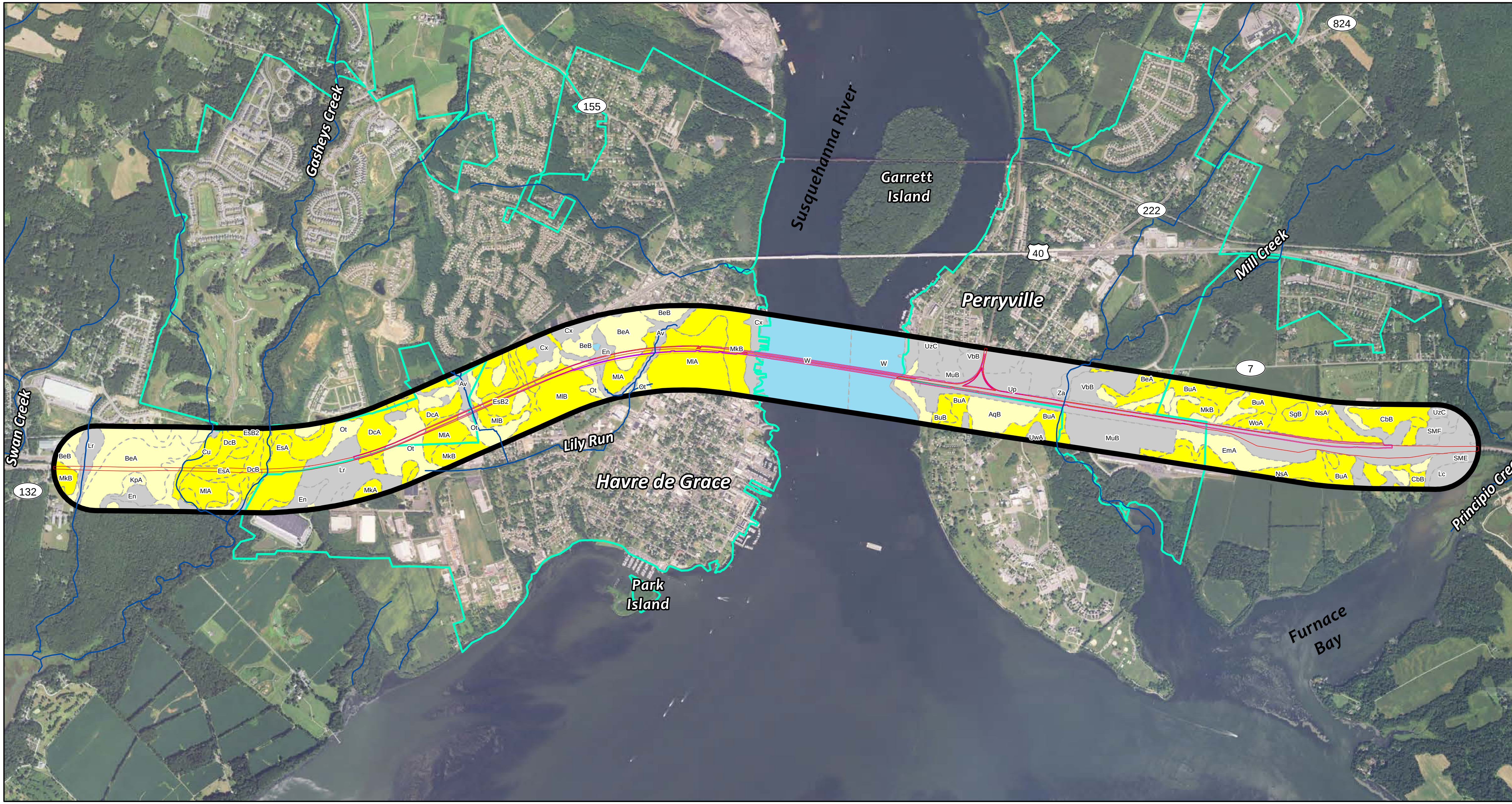
c. Soils

According to the USDA Web Soil Survey, there are 31 soil series and 47 mapping units within the study area. A table listing the characteristics of the most significant percentages of mapped soil types is shown below (***Table E-1***) and illustrated on ***Figure E-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). Hydric classification indicates if a soil type meets the hydric criteria which USDA defines as soil formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. This definition includes soils that developed under anaerobic conditions in the upper part but no longer experience these conditions due to hydrologic alteration such as those hydric soils that have been artificially drained or protected (e.g., ditches or levees). Two soil mapping units in the study area, Elsinboro loam and Matapeake silt loam, are considered not hydric; the majority of other soils units have some degree of hydric classification.

Table E-1
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



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- Disturbed Area
- 1,000 ft Study Area
- Municipal Boundary
- Prime Farmland Soils
- Soils of Statewide Importance
- Not prime farmland
- Water
- Streams

Data Sources

Soils:
NCRS Soil Survey, Harford County, 2010
NCRS Soil Survey, Cecil County, 2009

Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Figure E-2

Study Area Soils Map

The Erosion Class indicates the erodibility of a soil type. Only two soils that are classified as highly erodible are located within the study area: Sassafras and Croom soils (Cecil County) and Elsinboro loam (Harford County).

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.

d. Prime Farmland Soils/Soils of Statewide Importance

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 2010). 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*** 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.

3. NO ACTION ALTERNATIVE

No effects to topography or geology in the study area are anticipated with the No Action Alternative. Changes to soils, erosion and sedimentation may change due to siltation and other natural processes. The No Action Alternative is used as a baseline scenario against which potential impacts of the Proposed Project will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

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 impact 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 Alternative 9A and Alternative 9B would impact Prime Farmland Soils and Soils of Statewide Importance (***Table E-2***). However, as previously noted, the majority of these soil types are located within the existing ROW. Impacts to Prime Farmland Soils and Soils of Statewide Importance are not subject to FPPA coordination when the land is "is within or committed to urban development or water storage, or land that occurs in an existing ROW purchased on or before August 4, 1984." Therefore, impacts were quantified to soils outside of ROW and designated as Prime Farmland and/or Soils of Statewide Importance. Alternative 9A would have a larger impact to Prime Farmland (1.37 acres) and Soils of Statewide Importance (0.62 acre). Alternative 9B would impact a smaller amount of Prime Farmland and Soils of Statewide Importance (0.18 acre and 0.04 acre, respectively). However, on February 8, 2016, the NRCS determined that the Proposed Project is not subject to the provisions of the Policy Act and therefore exempt. No further coordination is required.

Please refer to ***Attachment A*** for the Farmland Conversion Impact Rating Form (NRCS-CPA-106) for corridor type projects submitted to NRCS, pursuant to FPPA.

Table E-2
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**

5. MINIMIZATION AND MITIGATION OF IMPACTS

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 (see Sections D and H). 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.

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

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Executive Order 11988

Several federal regulations govern the act of fill and construction in floodplains to ensure that proper consideration is given to the avoidance, minimization, and mitigation of adverse floodplain effects. These regulations include Executive Order 11988, U.S. Department of Transportation Order 5650.2, entitled the “Floodplain Management and Protection” and the National Flood Insurance Act of 1968. MDE is responsible for coordination of all state floodplain programs, and floodplains are also governed by local Flood Insurance Programs administered by localities and supervised by the Federal Emergency Management Agency (FEMA).

Executive Order 13690 on “Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input”

On January 30, 2015, Executive Order 13690 “Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input” was issued. The new Executive Order amends the existing Executive Order 11988 on Floodplain Management and adopts a higher flood standard for future federal investments in projects affecting floodplains, which will be required to meet the level of resilience established in the Federal Flood Risk

Management Standard. According to FEMA, the Standard establishes the flood level to which new and rebuilt federally funded structures or facilities must be resilient. Agencies will be given the flexibility to select one of three approaches for establishing the flood elevation and hazard area they use in siting, design, and construction:

- Utilizing best available, actionable data and methods that integrate current and future changes in flooding based on climate science;
- Two or three feet of elevation, depending on the criticality of the building, above the 100-year, or 1%-annual-chance, flood elevation; or
- 500-year, or 0.2%-annual-chance, flood elevation.

National Flood Insurance Program

All Maryland counties and 92 municipalities participate in the National Flood Insurance Program (NFIP). Local governments must adopt ordinances to manage development within 100-year floodplains to prevent increased flooding and minimize future flood damage. NFIP requires counties and towns to issue permits for all development in the 100-year floodplain. Development is broadly defined to include any man-made change to land, including grading, filling, dredging, extraction, storage, subdivision of land, and the construction or improvement of structures. If state and federal permits are required, development may not begin until all necessary permits are issued. Proposed development must not increase flooding or create a dangerous situation during flooding, especially on another person's property. If a structure is involved, it must be constructed to minimize damage during flooding.

Section 404 of the Clean Water Act and Maryland Wetlands Regulations

Section 404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers (USACE) to issue permits regulating the discharge of dredged or fill material into the Waters of the United States (WUS), including wetlands. Discharges require a permit from USACE based on regulatory guidelines developed in conjunction with the U.S. Environmental Protection Agency (USEPA), and will only be permitted if: the project avoided impacts to wetlands and waterways, where practicable; minimized potential impacts, and mitigated any remaining unavoidable impacts. Additionally, the state of Maryland regulates nontidal wetland resources via the Maryland Non-tidal Wetlands Protection Act and tidal wetlands via the Tidal Wetlands Act. Impacts to WUS, including wetlands, deemed unavoidable will also require nontidal wetland permits issued by MDE and a tidal wetland license issued by the Board of Public Works under these Acts.

Methodology

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 have been included in this technical report. 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). This approach requires interpretation of indicators representing wetland hydrology, vegetation, and soils. Soils were sampled using three-inch diameter Dutch augers, and Munsell Color charts were used to characterize soil color (Munsell 1975). Wetland Determination Data Forms (USACE 2010) were completed during the field work in order to describe wetland characteristics and provide a rationale for delineation of the wetland boundary. Copies of each of the field marked datasheets are included in ***Attachment C***. The wetland delineation was conducted within the existing Amtrak ROW and in areas except where the proposed alternatives extend beyond the existing ROW. All identified wetlands and waterways were flagged with pink wetland delineation tape and surveyed using a Trimble Global Positioning System (GPS). Stream resources within the 1,000-foot study area were identified using the National Hydrography Dataset (NHD) from USGS, Harford and Cecil County hydrology GIS layers, and FEMA FIRMs. Classification of these streams was based upon the 2014 inventory level field assessment and the 2015 wetland and waters delineation.

2. AFFECTED ENVIRONMENT

a. 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. According to the effective FEMA floodplain maps, approximately 320 acres of FEMA designated 100-year floodplains occur within the 1,560-acre study area. 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. According to the preliminary FEMA floodplain maps for Harford County, the 100-year floodplain area in Harford County would be reduced to 203 acres and the 500-year floodplain area reduced to 209 acres if this mapping is finalized in its current form.

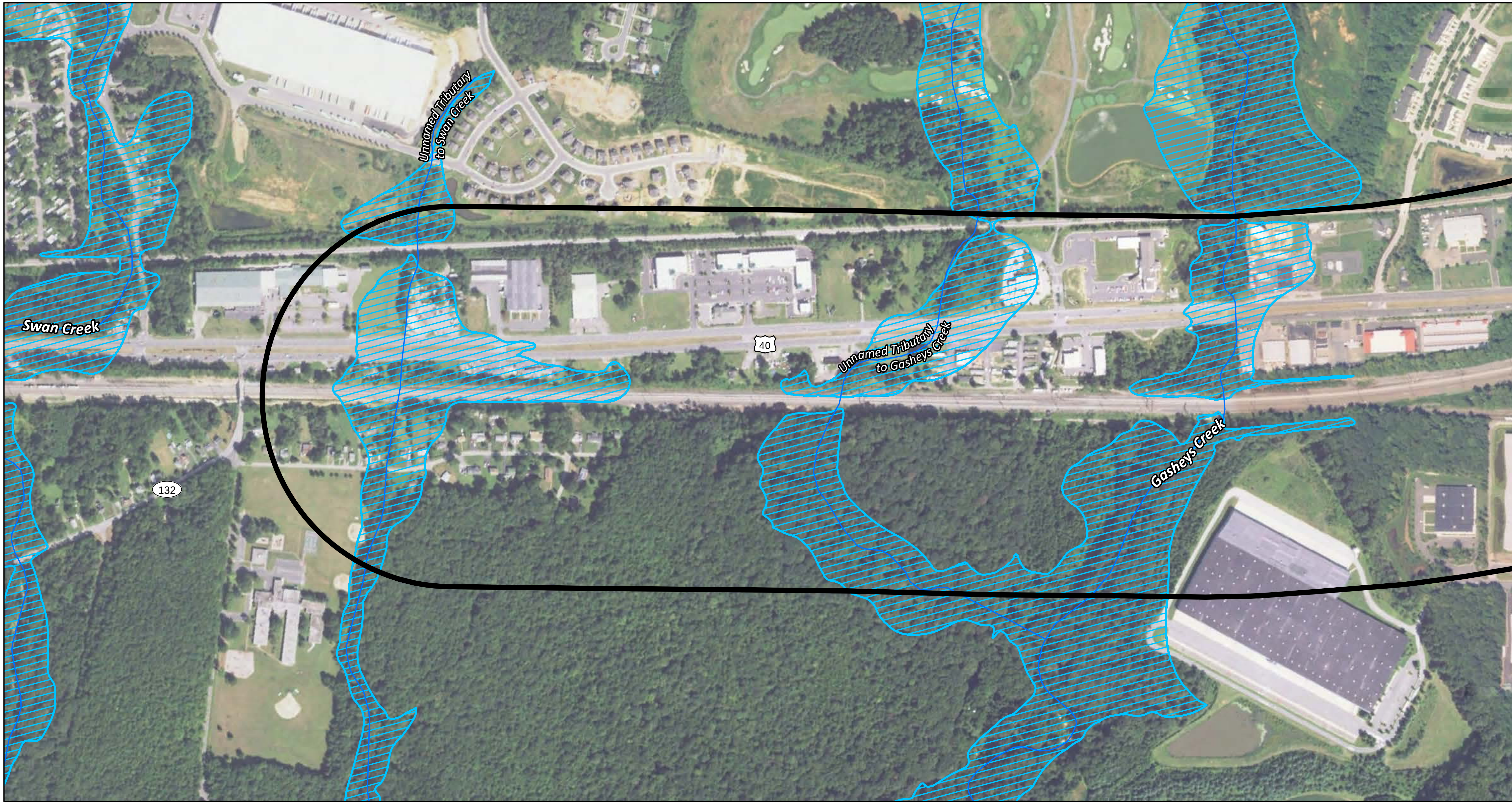
The preliminary FEMA floodplain mapping indicates that within the study area, two of these waterways, an unnamed tributary to Lily Run and Lily Run, also have a regulated floodway within the overall floodplain. A floodway is “the channel of a…watercourse and the adjacent land areas that must be reserved 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.

Floodplains along the Susquehanna River primarily consist of 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 FEMA, the majority of the study area is outside the 100- and 500-year floodplain. The 100- and 500-year FEMA designated floodplains located within the study area are illustrated on ***Figure E-3***.

b. Wetlands/Waters of the U.S.

Across the entire study area, 22 waters of the U.S., including wetlands, were identified. The majority of the identified systems included nontidal forested wetlands within the floodplain of lower and upper perennial streams that drain to the Chesapeake Bay, Susquehanna River, or Furnace Bay. These systems included a few emergent/open water wetland stormwater management (SWM) ponds or drainage swales and a forested wetland ditch along the Amtrak railroad tracks,



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- 100-Year Floodplain
- 500-Year Floodplain

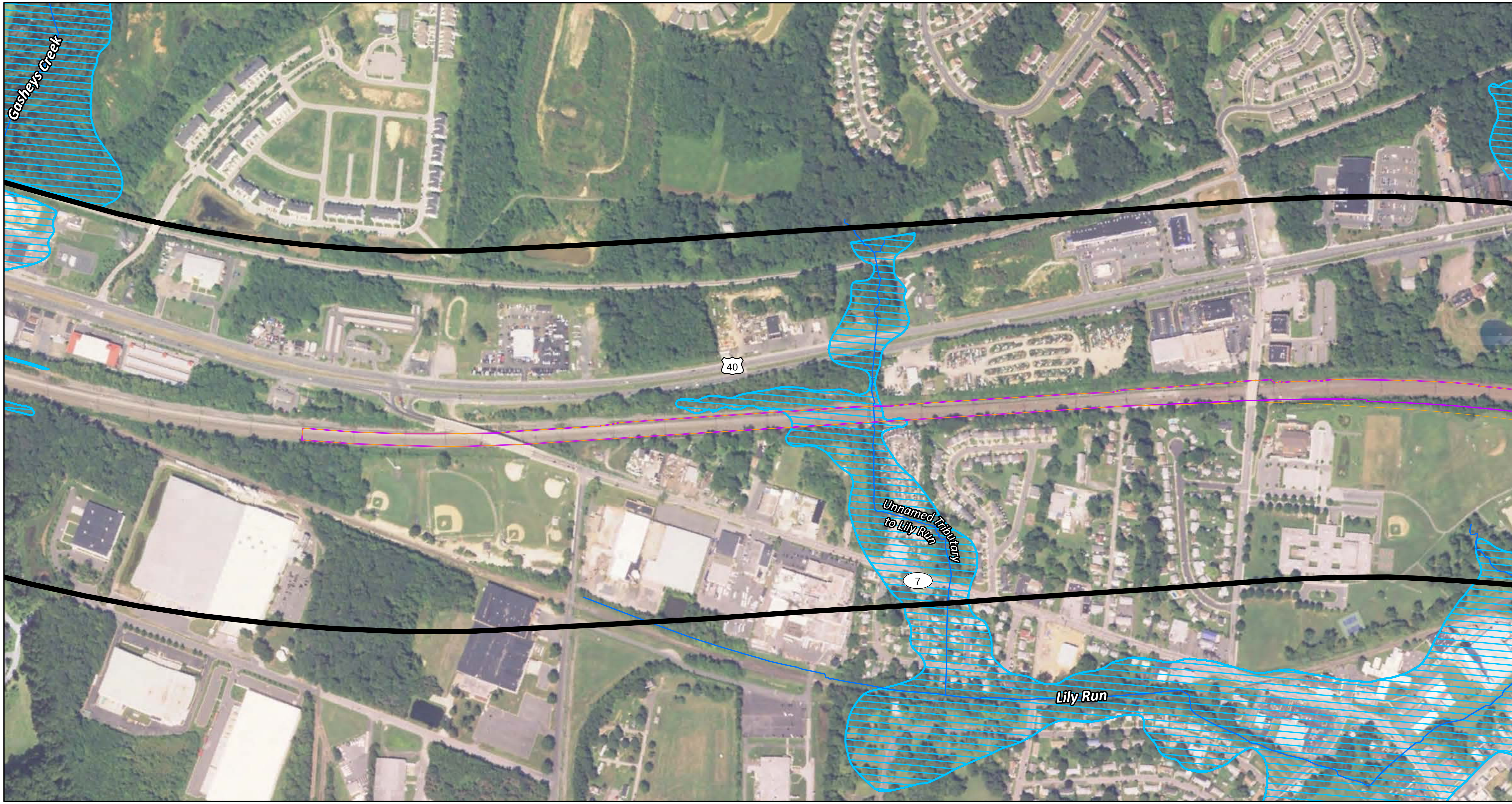
Data Sources

Streams:
MDE, 2012
100 and 500 Year Floodplain:
National Flood Hazard Layer, FEMA, 2013
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-3
Floodplain Mapping
Page 1 of 5



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- 100-Year Floodplain
- 500-Year Floodplain

Data Sources

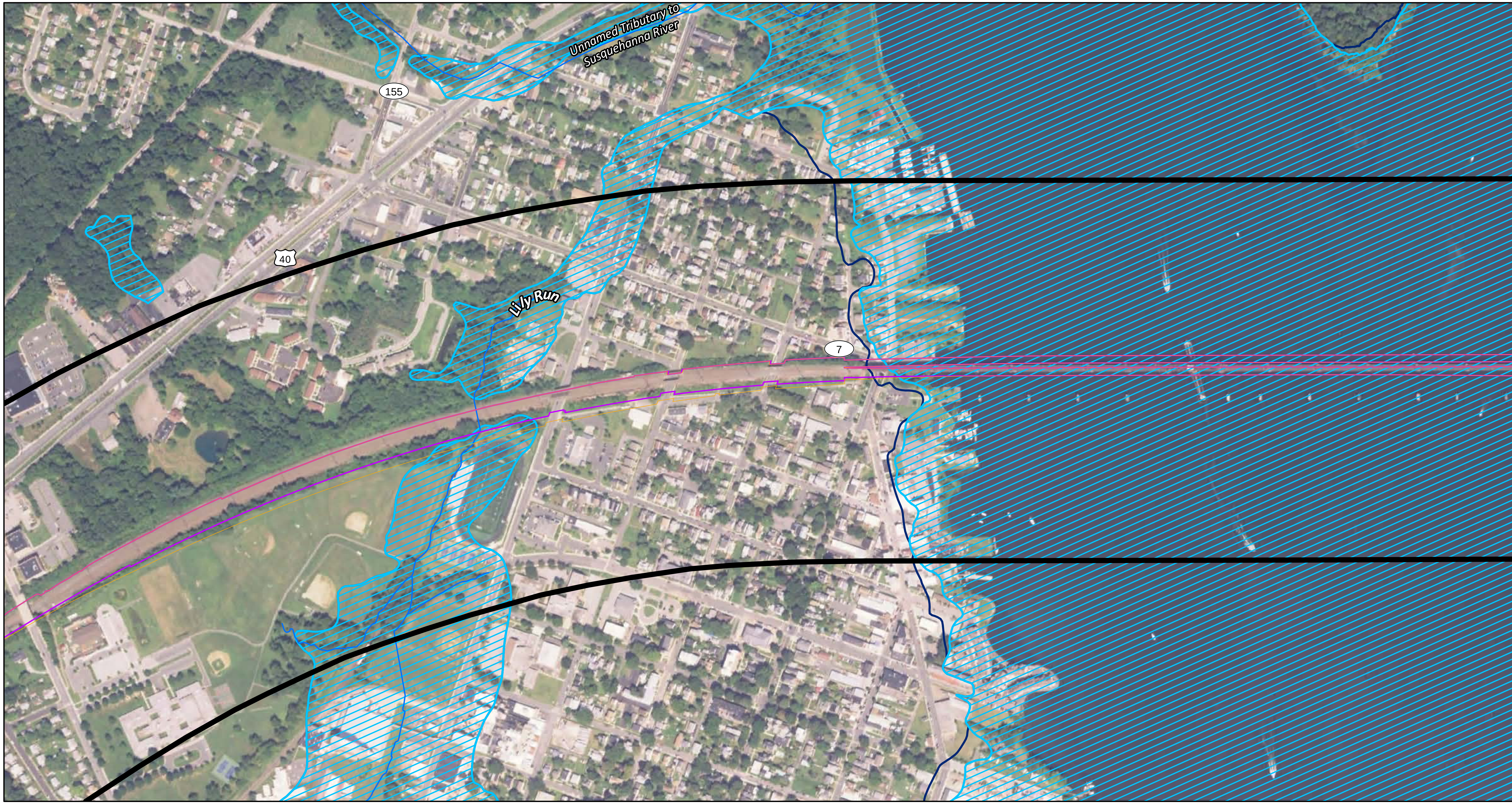
Streams:
MDE, 2012
100 and 500 Year Floodplain:
National Flood Hazard Layer, FEMA, 2013
Imagery:
2015 National Agriculture Imagery Program (NAIP)

N

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-3
Floodplain Mapping



Legend

LOD 9A Calculation Area
LOD 9B Calculation Area
1,000 ft Study Area
Streams
100-Year Floodplain
500-Year Floodplain

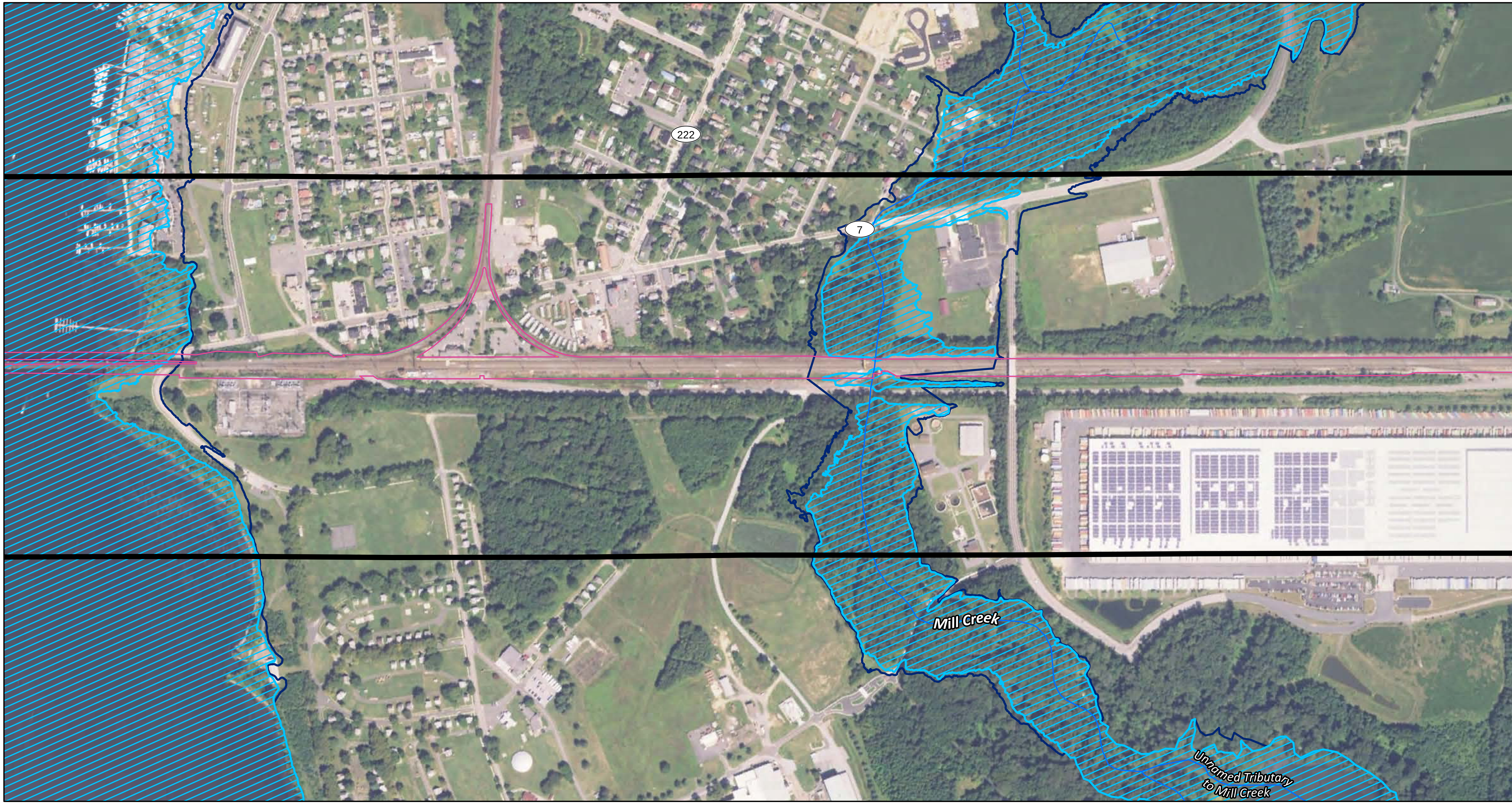
Data Sources

Streams:
MDE, 2012
100 and 500 Year Floodplain:
National Flood Hazard Layer, FEMA, 2013
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-3
Floodplain Mapping



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- 100-Year Floodplain
- 500-Year Floodplain

Data Sources

Streams:
MDE, 2012
100 and 500 Year Floodplain:
National Flood Hazard Layer, FEMA, 2013
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-3
Floodplain Mapping

Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- 100-Year Floodplain
- 500-Year Floodplain

Data Sources

Streams:
MDE, 2012
100 and 500 Year Floodplain:
National Flood Hazard Layer, FEMA, 2013
Imagery:
2015 National Agriculture Imagery Program (NAIP)

N

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-3
Floodplain Mapping

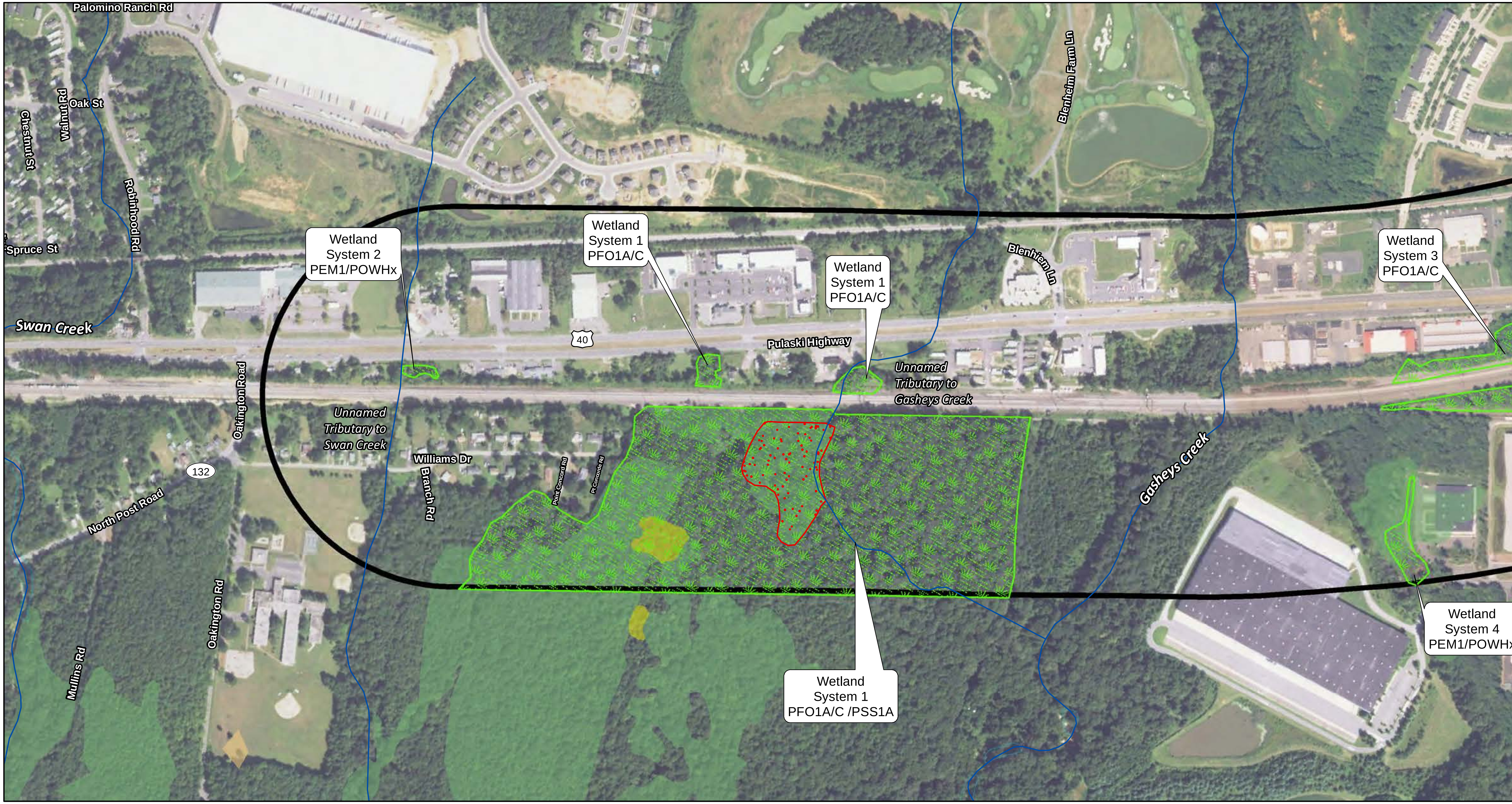
which drain directly to streams or forested wetlands along the streams. Two identified forested wetlands and one emergent wetland appeared to be hydrologically isolated. Two systems were identified as tidal emergent or forested wetlands, one along the Susquehanna River and the other along the perimeter of Furnace Bay. ***Table E-3*** provides a brief summary of the type and size of each wetland system identified within the Proposed Project study area.

Wetlands are important natural resources, providing numerous values and functions to society, including fish and wildlife habitat, flood protection, erosion control and water quality preservation (MDE 2007). Since most of the wetlands in the study area are near the headwaters of their small watersheds and abut or lie adjacent to tributaries to the Susquehanna River, they are likely important in providing flood protection, production export, and water quality functions. Production Export is a wetland function that evaluates how effective a wetland is at producing food or other useful products for humans or other living organisms. This can include timber for wood products or decomposed organics that provide food for aquatic organisms. Water quality functions include short and long-term trapping of nutrients, sediments, and pollutant-laden water before it enters the tributaries and the Susquehanna River. Additionally, these wetlands would be expected to provide habitat for wildlife. The estuarine system in the eastern portion of the study area also likely provides flood protection to upland areas from tidal surges. The following is a brief description of wetlands and waters of the U.S., separated by county.

Harford County

In Harford County, twelve (12) potential nontidal wetlands were identified within the study area (***Figure E-4***). These include natural palustrine forested (PFO)/scrub shrub (PSS)/emergent (PEM) wetlands and manmade palustrine emergent/open water (POW and PUBH) wetlands. Eight (8) nontidal intermittent or perennial streams and one tidal river also cross the Amtrak ROW within Harford County, including:

- an unnamed tributary to Swan Creek;
- two unnamed tributaries to Gashey’s Creek;
- Gashey’s Creek mainstem;
- three unnamed tributaries to Lily Run;
- Lily Run; and
- the mainstem of the Susquehanna River (tidal).



Legend

DNR & NWI Wetlands

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Wetlands of Special State Concern
- Inventory Level Assessment Streams*
- Inventory Level Assessment Wetlands*
- Esturarine Intertidal Scrub-Shrub
- Esturarine Intertidal Unconsolidated Shore
- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub-Shrub
- Riverine

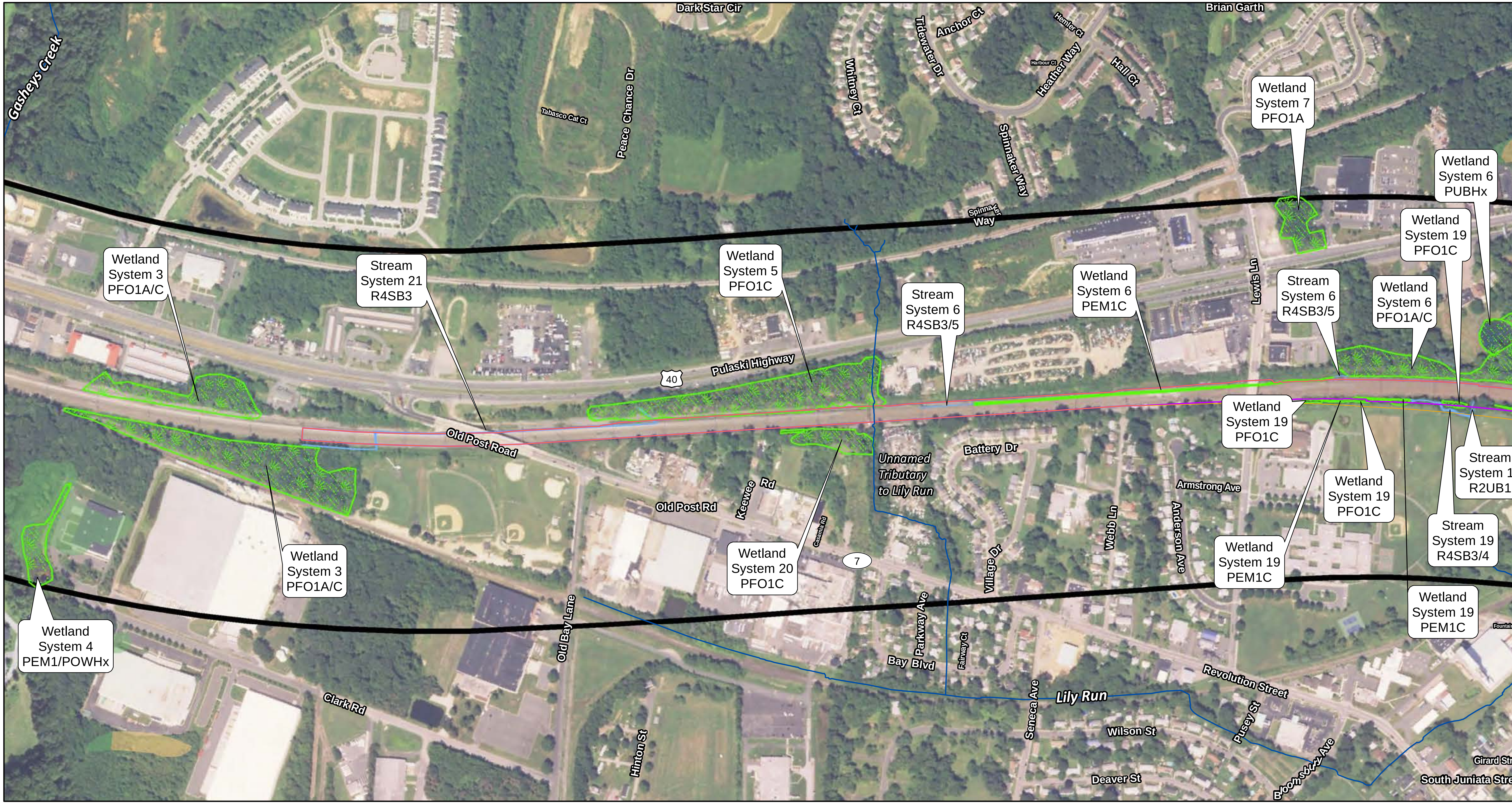
Data Sources

Streams:
MDE, 2012
DNR Wetlands:
MD DNR, 1993
National Wetland Inventory:
National Wetland Inventory, 2011
Imagery:
2015 National Agriculture Imagery Program (NAIP)

N
0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-4
Waters of the U.S., Including Wetlands Map
Page 1 of 5



Legend

DNR & NWI Wetlands

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Wetlands of Special State Concern
- Inventory Level Assessment Streams*
- Inventory Level Assessment Wetlands*
- Esturarine Intertidal Scrub-Shrub
- Esturarine Intertidal Unconsolidated Shore
- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub-Shrub
- Riverine

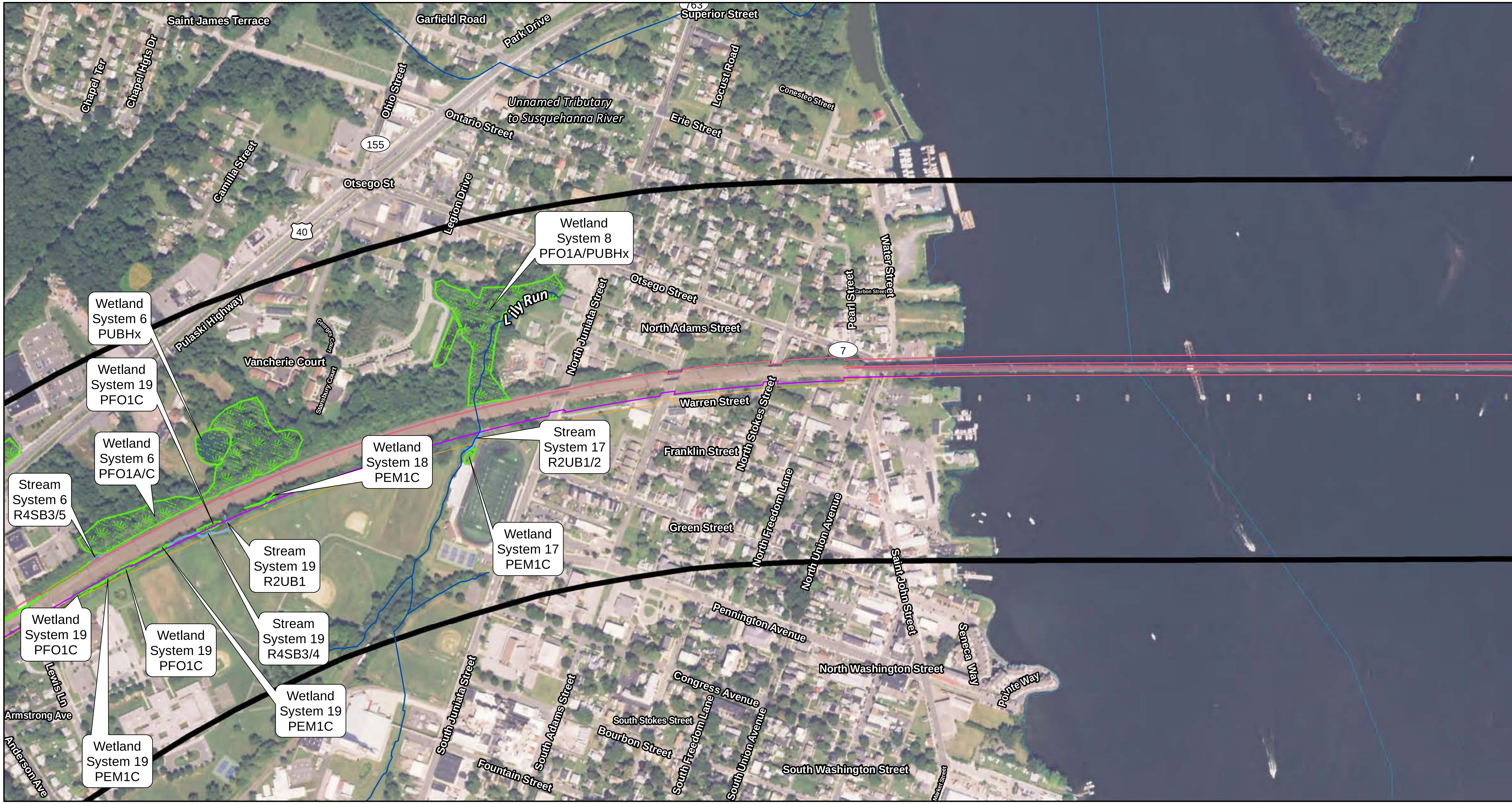
Data Sources

Streams:
MDE, 2012
DNR Wetlands:
MD DNR, 1993
National Wetland Inventory:
National Wetland Inventory, 2011
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-4
Waters of the U.S., Including Wetlands Map



Legend

DNR & NWI Wetlands

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Wetlands of Special State Concern
- Inventory Level Assessment Streams*
- Inventory Level Assessment Wetlands*
- Esturarine Intertidal Scrub-Shrub
- Esturarine Intertidal Unconsolidated Shore
- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub-Shrub
- Riverine

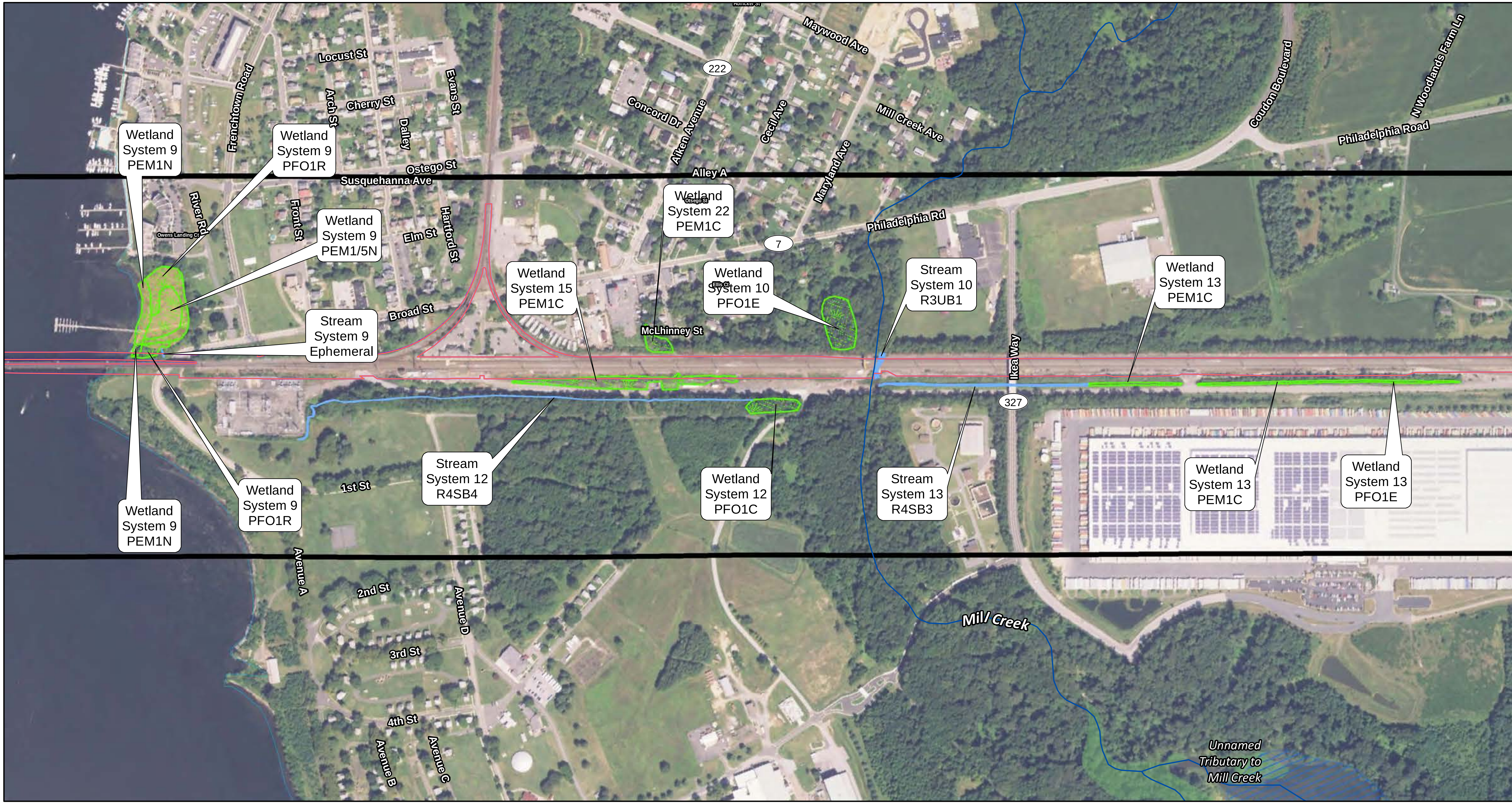
Data Sources

Streams:
MDE, 2012
DNR Wetlands:
MD DNR, 1993
National Wetland Inventory:
National Wetland Inventory, 2011
Imagery:
2015 National Agriculture Imagery Program (NAIP)

N
0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-4
Waters of the U.S.,
Including Wetlands Map



Legend

LOD 9A Calculation Area
LOD 9B Calculation Area
1,000 ft Study Area
Streams
Wetlands of Special State Concern
Inventory Level Assessment Streams*
Inventory Level Assessment Wetlands*

DNR & NWI Wetlands

Esturarine Intertidal Scrub-Shrub
Esturarine Intertidal Unconsolidated Shore
Palustrine Emergent
Palustrine Forested
Palustrine Scrub-Shrub
Riverine

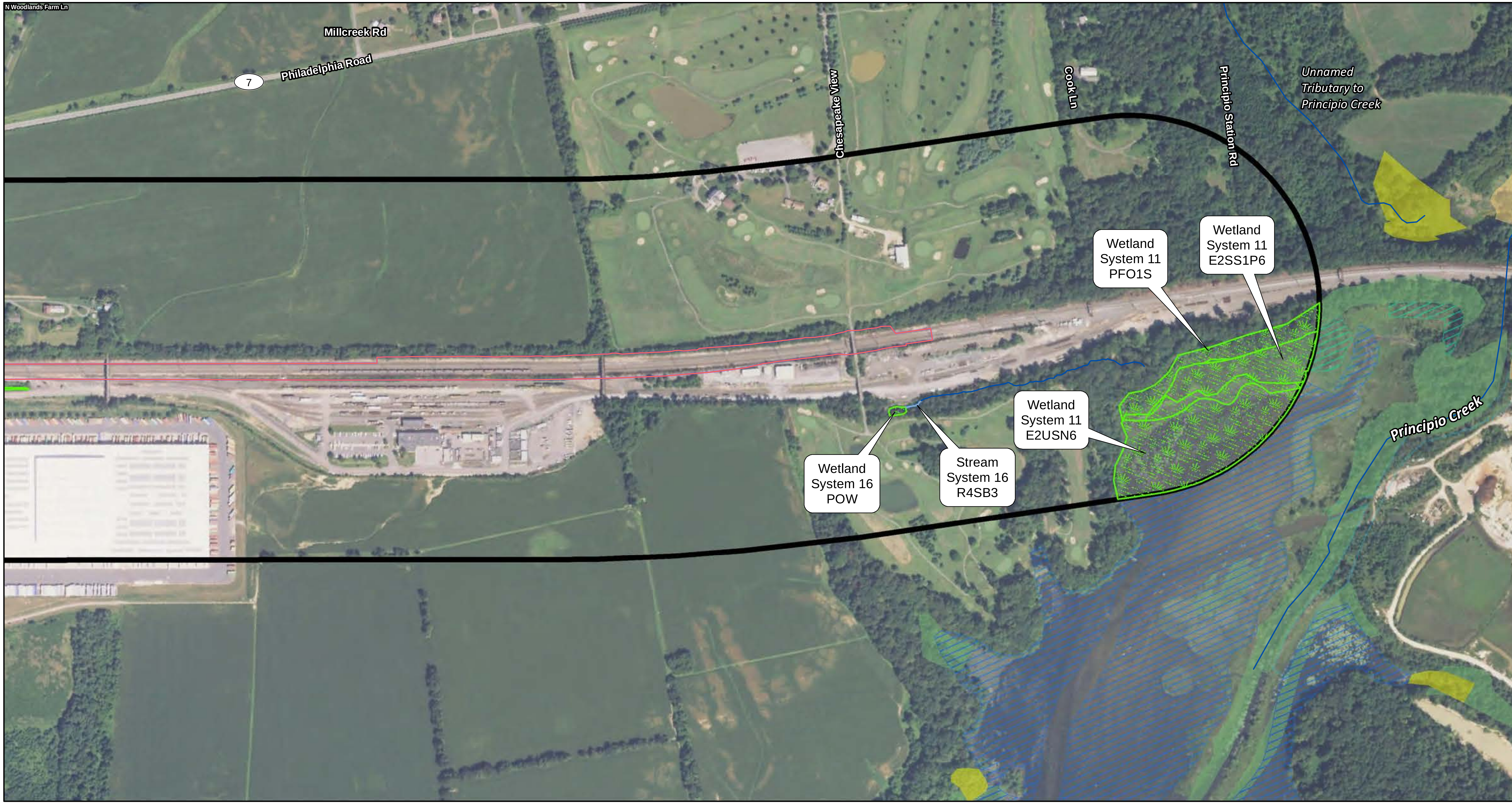
Data Sources

Streams:
MDE, 2012
DNR Wetlands:
MD DNR, 1993
National Wetland Inventory:
National Wetland Inventory, 2011
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-4
Waters of the U.S., Including Wetlands Map



Legend

LOD 9A Calculation Area
LOD 9B Calculation Area
1,000 ft Study Area
Streams
Wetlands of Special State Concern
Inventory Level Assessment Streams*
Inventory Level Assessment Wetlands*

DNR & NWI Wetlands

Esturarine Intertidal Scrub-Shrub
Esturarine Intertidal Unconsolidated Shore
Palustrine Emergent
Palustrine Forested
Palustrine Scrub-Shrub
Riverine

Data Sources

Streams:
MDE, 2012
DNR Wetlands:
MD DNR, 1993
National Wetland Inventory:
National Wetland Inventory, 2011
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-4
Waters of the U.S., Including Wetlands Map
Page 5 of 5

Table E-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 R2UB1 (Unnamed tributary to Gashey's Creek)	Nontidal	53.7 -	- 2,800
2	PEM1/POWHx R2UB1(Two unnamed tributaries to Swan Creek)	Nontidal	0.2 -	- 2,500
3	PFO1A/C R3UB1 (Gashey's Creek) R2UB3 (Unnamed tributary to Gashey's Creek)	Nontidal	7.8 - -	- 2,275 2,297
4	PEM1/POWHx	Nontidal	1.0	-
5	PFO1C R2UB1/2 (Unnamed tributary to Lily Run)	Nontidal	5.4 -	- 1,953
6	PFO1A/C PEM1C PUBHx R3UB1 (Unnamed tributary to Lily Run) R4SB3/5 (Unnamed tributary to Lily Run)	Nontidal	4.9 0.2 0.6 - -	- - - 2,659 4,546
7	PFO1A	Nontidal	1.1	-
8	PFO1A/PUBHx	Nontidal	3.3	-
14	Susquehanna River (R1UBV/R1OWV)	Tidal	-	2,000
17	PEM1C R2UB1/2 (Lily Run)	Nontidal	0.05 -	- 2,893
18	PEM1C	Nontidal	0.04	-
19	PFO1C PEM1C R4SB3/4 (Unnamed tributary to Lily Run) R2UB1 (Unnamed tributary to Lily Run)	Nontidal	0.2 0.1 - -	- - 725 228
20	PFO1C	Nontidal	0.9	-
21	R4SB3	Nontidal	-	4,197

Table E-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				
9	PFO1R PEM1N PEM1/5N Ephemeral	Tidal Nontidal	0.9 0.4 0.8 -	- - - 128
10	PFO1E R3UB1 (Mill Creek)	Nontidal	0.9 -	- 2,495
11	PFO1S E2SS1P6 E2USN6 (Including Furnace Bay)	Tidal	2.5 2.3 8.3	- - -
12	PFO1C R4SB4 (unnamed tributary to Susquehanna River	Nontidal	0.4 -	- 2,500
13	PFO1C PEM1C R4SB3 (unnamed tributary to Mill Creek)	Nontidal	0.2 0.3 -	- - 1,100
15	PEM1C	Nontidal	1.1	-
16	POW R4SB3 (unnamed tributary to Furnace Creek)	Nontidal	0.1 -	- 1,500
22	PEM1C	Nontidal	0.3	-

[1]PFO1A = Palustrine Forest, Broad-leaved Deciduous Vegetation, Temporarily Flooded
PFO1C = Palustrine Forest, Broad-leaved Deciduous Vegetation, Seasonally Flooded
PFO1E = Palustrine Forest, Broad-leaved Deciduous Vegetation, Seasonally Saturated
PFO1R = Palustrine Forest, Broad-leaved Deciduous Vegetation, Seasonal Tidal
PFO1S = Palustrine Forest, Broad-leaved Deciduous Vegetation, Temporary Tidal
PSS1A = Palustrine Scrub Shrub, Broad-leaved Deciduous Vegetation, Temporarily Flooded
PEM1H = Palustrine Emergent, Persistent Vegetation, Permanently Flooded
PEM1C = Palustrine Emergent, Persistent Vegetation, Seasonally Flooded
PEM1N = Palustrine Emergent, Persistent Vegetation, Regularly Flooded
PUBHx = Palustrine Unconsolidated Bottom, Permanently Flooded, Excavated
E2SS1P6 = Estuarine Intertidal, Scrub Shrub, Broad-leaved Deciduous Vegetation, Irregularly Tidal, Oligohaline
E2USN6 = Estuarine Intertidal, Unconsolidated Shoreline, Regularly Flooded, Oligohaline
R2UB1 = Riverine lower perennial, unconsolidated bottom, cobble/gravel
R2UB1/2 = Riverine lower perennial, unconsolidated bottom, cobble/gravel/sand
R3UB3 = Riverine upper perennial, unconsolidated bottom, mud
R3UB1 = Riverine upper perennial, unconsolidated bottom, cobble/gravel
R4SB3 = Riverine intermittent, stream bed, cobble/gravel
R4SB3/4 = Riverine intermittent, stream bed, cobble/gravel/sand
R4SB3/5 = Riverine intermittent, stream bed, cobble/gravel/mud
R1UB/OWV = Riverine tidal, unconsolidated bottom/open water, permanent tidal

Wetland 1 – This wetland was assessed at the inventory level. The large palustrine forested/scrub shrub wetland lies mostly south of the NEC, south and east of Williams Drive (***Figure E-4***). This system is associated with the headwaters of unnamed tributaries to Swan Creek and Gashey's Creek. The USFWS/DNR mapped portions of this wetland system are classified as palustrine forested with a temporarily to seasonally flooded water regime (PFO1A/C) and palustrine scrub shrub with a temporarily flooded water regime (PSS1A). The portion of the forested wetland immediately adjacent to Williams Drive was dominated by red maple (*Acer rubrum*), sweet-gum (*Liquidambar styraciflua*), pin oak (*Quercus palustris*), sycamore (*Platanus occidentalis*), and tulip tree (*Liriodendron tulipifera*). Understory vegetation included spicebush (*Lindera benzoin*), rambler rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), poison ivy (*Toxicodendron radicans*), and grape (*Vitis* sp.). Surface water and saturation was visible within portions of this wetland system. A Code of Maryland Regulations (COMAR) designated Wetland of Special State Concern (WSSC) is also located within this system just south of the Amtrak ROW along an unnamed tributary to Gashey's Creek (***Figure E-4***). Based on best professional judgment, this wetland complex provides numerous functions and is of high ecological and societal value. Functions provided by the system include flood flow alteration, nutrient removal/retention/transformation, sediment/toxicant/pathogen retention, production export, wildlife habitat, and endangered species habitat. An unnamed, perennial tributary to Gashey's Creek crosses the ROW west of the Gashey's Creek crossing. It is classified as R2UB1.

Wetland 2 – This wetland was assessed at the inventory level. The wetland is a small, excavated, emergent, and open water pond located just south of US 40 and just east of an unnamed tributary to Swan Creek. Based on the field assessment, the wetland is classified as palustrine emergent/open water with a permanently flooded water regime (PEM1/POWHx). Vegetated portions of the wetland contained broad-leaf cat-tail (*Typha latifolia*). Functions provided by the wetland include sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and wildlife habitat. The system includes two unnamed, perennial tributary streams that drain south to Swan Creek. The streams are classified as R2UB1.

Wetland 3 – This wetland was assessed at the inventory level. The system includes forested wetlands that occur north and south of the Amtrak ROW just west of Stancil Field. This system is associated with an unnamed tributary to Gashey's Creek, and based on the field assessment, is classified as PFO1A/C. Dominant canopy trees included red maple, sweet-gum, pin oak, and sycamore. Understory vegetation included rambler rose, Japanese honeysuckle, and crow garlic (*Allium vineale*). No surface hydrologic indicators were evident from the field assessment; however, it is possible that near-surface groundwater was present and not visible from the inventory level assessment. Functions provided by this wetland include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/ transformation, production export, and wildlife habitat. This system includes the crossing of Gashey's Creek and an unnamed tributary to Gashey's Creek that lies north of the ROW and east of Gashey's Creek. Gashey's Creek is classified as R3UB1, while the unnamed tributary is classified as R2UB3.

Wetland 4 – This wetland was assessed at the inventory level. The wetland is an excavated SWM system adjacent to an industrial development located south of the Amtrak ROW and west of Old Bay Lane. The wetland is classified as PEM1/POWHx. The vegetated portions of the wetland contained broad-leaf cat-tail, lamp rush (*Juncus effusus*), and scattered black willow (*Salix nigra*) saplings. The pond was full of water during the field assessment. Functions provided by the wetland include sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and wildlife habitat.

Wetland 5 – This wetland was assessed at the inventory level. The wetland occurs as a linear strip located between US 40 and the Amtrak ROW. It begins just east of where MD 7 intersects US 40 and extends east to an unnamed tributary to the Susquehanna River. Based on the field assessment, the wetland is classified as PFO1C. Dominant canopy trees observed included red maple, sweet-gum, and green ash (*Fraxinus pennsylvanica*). Understory vegetation included southern arrow-wood (*Viburnum dentatum*), rambler rose, Japanese honeysuckle, grape, and an unknown species of grass that was emerging within the depressional areas with saturation or shallow inundation. Functions provided by the wetland likely include minor flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/ transformation, production export, and wildlife habitat. The system includes an unnamed tributary stream that drains south across the ROW to Lily Run. The stream is classified as R2UB1/2.

Wetland 6 – This wetland/stream complex was assessed at both the inventory level and through delineation. The system abuts the Amtrak ROW on the north side and generally lies east of Lewis Lane. The forested wetland and perennial stream portion of this wetland was assessed at the inventory level. An intermittent stream and emergent wetland along the intermittent stream were delineated in October 2015. The system includes PFO1A/C and PUBHx adjacent to an unnamed tributary to Lily Run. Dominant canopy trees within the forested wetland included red maple, sweet-gum, and tulip tree. Understory vegetation included northern spicebush, rambler rose, Japanese honeysuckle, and poison ivy. There were no visible signs of hydrology observed during the inventory level assessment, but the system lies within a depression in the floodplain of the stream. The perennial stream lies north of the ROW; however, the intermittent stream channel drains east along the toe of the railroad embankment, beginning approximately 1,600 feet west of Lewis Lane. The stream discharges into the perennial stream within the PFO portion of the wetland. PEM1C lies within the intermittent channel and extends approximately 1,400 feet west of Lewis Lane. Dominant plants within the PEM wetland include broad-leaf cat-tail, rice cutgrass (*Leersia oryzoides*), and rough barnyard grass (*Echinochloa muricata*). Likely functions provided by the system include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal, retention/transformation, production export, and wildlife habitat.

Wetland 7 – This wetland was assessed at the inventory level. The potential wetland lies within the floodplain of the same unnamed tributary stream as Wetland 6, but lies north of US 40. Based on the inventory level field assessment, the wetland is classified as PFO1A. Dominant canopy trees included red maple and sweet-gum. Visible understory vegetation included rambler rose, Japanese honeysuckle, crow garlic, grape, and Asiatic bittersweet (*Celastrus orbiculatus*). Pockets of saturation were visible in micro depressions within the floodplain. Likely functions provided by this wetland include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal, retention/transformation, production export, and wildlife habitat.

Wetland 8 – This wetland was assessed at the inventory level. It is located along an unnamed tributary to the Susquehanna River on the north side of the Amtrak right-of-way between Juniata Street North and Ohio Street. The system includes PFO1A within the floodplain of the stream and PUBHx. During the inventory level field assessment, visibility of the floodplain was difficult, but the stream appeared to be six to eight feet below the elevation of the floodplain. Dominant canopy trees included red maple, silver maple (*Acer saccharinum*), and sweet-gum. The understory included northern spicebush, rambler rose, Japanese honeysuckle, English ivy (*Hedera helix*), and grape. As a result of the dense vegetation, there were no visible signs of hydrology present. The pond was mostly open water with a narrow broad-leaf cat-tail fringe. Likely functions provided by the system include flood flow alteration, sediment/toxicant/ pathogen retention, nutrient removal, retention/transformation, production export, and wildlife habitat.

Wetland 17 – This wetland was delineated in October 2015. The system is located within the eastern floodplain of Lily Run, just west of the athletic track at Havre de Grace Middle School, and south of the Amtrak ROW. The system is classified PEM1C. The wetland appeared to be hydrologically supported by surface runoff from a culvert that discharges water from the athletic fields to the floodplain. At the time of the delineation in October 2015, soils were saturated throughout the wetland area. A few planted and natural trees were situated at the perimeter of the wetland, including bald cypress (*Taxodium distichum*) and black willow. However, the majority of the wetland was comprised of herbaceous plants, including rice cutgrass and planted harlequin blueflag (*Iris versicolor*). Likely functions provided by the system include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/ transformation, and minor wildlife habitat. The system includes Lily Run, which is a second order stream that flows north through the ROW to a culvert that carries the flow to the Susquehanna River. The stream is classified as R2UB1/2.

Wetland 18 – This wetland was delineated in October 2015. The wetland is located within the Amtrak ROW, south of the railroad tracks west of the Lily Run crossing. It lies within a swale at the toe of the railroad embankment. The system is classified as PEM1C. The wetland appeared to be hydrologically supported by a perched, seasonal water table. During the October 2015 delineation, the hydrologic indicator was met by oxidized rhizospheres along living roots, active crayfish burrows, drainage patterns, and Facultative (FAC)-neutral test.[1] Dominant vegetation within the swale was common reed (*Phragmites australis*). Likely functions provided by the system include sediment/toxicant/pathogen retention and nutrient removal/retention/transformation.

Wetland 19 – This wetland was delineated in October 2015. The wetland lies within the Amtrak ROW south of the tracks and east of Lewis Lane. The system is comprised of swales along the toe of the railroad fill slope and floodplain wetlands adjacent to unnamed tributaries of Lily Run. The wetlands are classified as PFO1C and PEM1C. The forested wetland within the floodplain of an intermittent stream was hydrologically supported by near-surface groundwater, while PEM within a swale upslope of the stream had only secondary hydrologic indicators, including crayfish burrows, surface soil cracks, drainage patterns, and FAC-neutral test. Vegetation within PFO was dominated in the canopy by red maple, in the shrub layer by black elder (*Sambucus nigra*), in the herbaceous layer by common reed and rice cutgrass, and in the vine layer by fox grape (*Vitis labrusca*). PEM was dominated by rough barnyard grass (*Echinochloa muricata*) and fall panic grass (*Panicum dichotomiflorum*). Likely functions provided by the system include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and minor wildlife habitat.

Wetland 20 – This wetland was assessed at the inventory level. The system lies on the south side of the railroad tracks opposite Wetland 5. It is classified as PFO1C. Wetland hydrology included shallow inundation and surface soil saturation. Dominant canopy vegetation included red maple and sweet-gum. Common understory vegetation included white grass (*Leersia virginica*), Japanese stilt grass (*Microstegium vimineum*), and, in more open areas, reed canary grass (*Phalaris arundinacea*). Likely functions provided by the system include flood flow alteration, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and minor wildlife habitat.

Waters of the U.S. 21 – This relatively permanent waterway was delineated in October 2015. Relatively Permanent Waters is a category of Waters of the US as defined by the USACE and resulting from the 2006 Supreme Court case (Rapanos) to clarify Clean Water Act protections. The stream flows onto the ROW from Wetland 5 north of the railroad tracks, and extends west along the toe of slope of the tracks for approximately 1,400 feet to a culvert. It flows through the culvert, under the tracks, and continues west along the tracks out of the limits of disturbance to Gashey's Creek. The intermittent stream is classified as R4SB3. There is very little in-stream habitat available, as the channel is mostly a shallow run within the Amtrak ROW. However, small fish and frogs were observed within the stream.

Streams - With the exception of Gashey's Creek and the Susquehanna River, all perennial streams were identified as lower perennial and had a cobble/gravel, sand, or mud substrate. These stream channels ranged in width from three to 40 (Gashey's Creek) feet, and the streams were down-cut between four and 12 feet below the elevation of the floodplain. The easternmost tributary to Gashey's Creek, between US 40 and the Amtrak ROW, had a mud bottom substrate and was less down-cut than the other lower perennial streams. Bank height was less than two feet. The intermittent streams that flowed

[1] The FAC-neutral test is performed by compiling a list of dominant plant species across all strata in the community, and dropping from the list any species with a Facultative indicator status (i.e., FAC). The FAC-neutral test is met if more than 50 percent of the remaining dominant species are rated Facultative Wetland (FACW) and/or Obligate (OBL). This indicator can be used in communities that contain no FAC dominants. If there are an equal number of dominants that are OBL and FACW verses Facultative Upland (FACU) and Upland (UPL), or if all dominants are FAC, non-dominant species should be considered (USACE 2011).

along the base of the railroad tracks were very shallow and were manipulated to maintain flow. Where these streams flow through the more developed areas or along the tracks, habitat complexity is relatively low, as the channels have been straightened to accommodate placement within culverts or bridges. For the streams draining to Swan Creek, habitat complexity is likely higher within the undeveloped forested sections. The Susquehanna River at the Amtrak crossing is classified as riverine tidal and is about 3,400 feet wide.

Cecil County

In Cecil County, two tidal wetland systems and six potential nontidal wetland systems were identified within the Proposed Project study area (***Figure E-4***). 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.

Wetland 9 – This tidal wetland system lies along the east side of the Susquehanna River in Perryville just north of the Amtrak ROW. According to the USFWS/DNR wetland mapping, the system is classified as palustrine scrub shrub and estuarine intertidal emergent with a seasonal tidal water regime and a mesohaline salinity range. Based on the wetland delineation in October 2015, the emergent wetland appears to be PEM1N and PEM1/5N. The forested portion of the wetland occurs on the periphery of the tidal emergent wetland and is dominated by black willow, ash-leaf maple (*Acer negundo*), and silver maple trees. This area was classified as PFO1R. The emergent portion of the wetland is dominated by common reed, Canadian clearweed (*Pilea pumila*), and marsh primrose-willow (*Ludwigia palustris*), and floating primrose-willow (*Ludwigia peploides*). Considerable trash has accumulated within the wetland, lowering its overall quality. Likely functions provided by the system include sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production export, and sediment/shoreline stabilization. A two-foot wide ephemeral channel drains runoff from an adjacent substation to the tidal wetland.

Wetland 10 – This potential wetland is located within the floodplain of Mill Creek just upstream of the Amtrak right-of-way (ROW) and was assessed at the inventory level. The area was not mapped as wetland by the USFWS or DNR, but during the inventory level assessment, a portion of the floodplain at the toe of the east facing slope contained standing water and skunk cabbage (*Symplocarpus foetidus*), an OBL wetland plant. Canopy vegetation included red maple, sweet-gum, and sycamore. Based on these visible characteristics, this wetland portion is classified as PFO1E. The remainder of the floodplain was comprised of a mix of wetland and upland vegetation and no visible signs of hydrology. Likely functions provided by the relatively small wetland include groundwater recharge/discharge, flood flow alteration, sediment/toxicant/pathogen retention, and nutrient removal/retention/transformation. Mill Creek is classified as lower perennial with a cobble/gravel bottom substrate. The stream channel width is about 15 feet and the channel depth averages about three feet. Habitat complexity between MD 7 and Amtrak appeared good, with numerous riffle/pool complexes and in-stream habitat.

Wetland 11 – This wetland was assessed at the inventory level. According to the NWI wetland mapping, a fringe of palustrine forested seasonally tidal wetland (PFO1S) borders the large estuarine system associated with Furnace Bay. A portion of the estuarine system is classified as scrub shrub wetland (E2SS1P6). The remainder of the system is classified as unconsolidated shoreline (E2USN6). Likely functions provided by wetlands along the periphery of Furnace Bay include sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production export, and sediment/shoreline stabilization.

Wetland 12 – This wetland was assessed at the inventory level. The depressional wetland system is located between Avenue G and the Amtrak paved access road south of the railroad tracks, and just west of Mill Creek. The wetland is classified as PFO1C. Dominant trees within the wetland include red maple, sweet-gum, and pin oak. Rambler rose was the dominant understory plant. Standing water was present within the depression and stained leaves were also observed. An intermittent stream channel drains excess water from this depression through a shallow channel that runs parallel to the Maintenance-of-Way access road on the south side. The two-foot-wide by a 0.5-feet-deep channel is classified as R4SB4. It extends west to the Amtrak substation. Shallow flow was observed during the field assessment. Likely functions provided by the system include sediment/toxicant/pathogen retention, nutrient removal/retention/ transformation, and possibly production export.

Wetland 13 – This wetland and stream system was assessed at the inventory level. The system is an incised ditch that occurs along the south side of the railroad tracks, between the tracks and the access road to the Amtrak Maintenance-of-Way facility. It extends approximately 3,000 feet and discharges into Mill Creek. From the confluence with Mill Creek to approximately 1,100 feet east, the system was determined to be an intermittent stream only. This stream was classified as R4SB3. The stream channel was about five feet wide and one foot deep with several inches of flowing water at the time of the field assessment. Fish were observed in the stream. Upslope of the intermittent stream, the channel was comprised of emergent and forested wetlands. The westernmost 950 feet or so of the wetland is classified as palustrine emergent with persistent vegetation and a seasonally flooded water regime (PEM1C). This portion of the wetland had been recently managed by the removal of woody vegetation from the side slopes. Emergent vegetation within the wetland was predominately comprised of unknown grasses. The easternmost approximately 900 feet of the wetland is classified as PFO1C. The bottom of the ditch lies six to eight feet below the ground elevation, and likely receives some groundwater input at least early in the growing season. It also serves to divert surface runoff to Mill Creek. Damp to shallowly inundated soils were present during the site visit. Dominant woody vegetation included red maple and sweet-gum. Likely functions provided by the system include groundwater recharge/discharge, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, and production export.

Wetland 15 – This wetland was delineated in October 2015. The system is associated with a drainage ditch east of the Perryville Station that runs along the south side of the railroad tracks and north of Broad Street. The wetland is classified as PEM1C. The system drains west along the toe of the railroad embankment to a culvert beneath Broad Street. It was unclear where the water drains downstream of Broad Street, as it appeared to pool within a riprap lined swale. Hydrology of this system appears to be shallow groundwater, as a water table was present within 10 inches of the soil surface. The vegetated portion on the north side of Broad Street contained common reed, broad-leaf cat-tail, wand panic grass (*Panicum virgatum*), and rice cutgrass. Shallow surface water or saturation to the surface was present throughout the system at the time of the wetland delineation in October 2015. Mucky modified mineral soils meeting the redox dark surface wetland indicator were observed during the October 2015 delineation. Likely functions provided by the system include sediment/toxicant/pathogen retention and nutrient removal/retention/transformation.

Wetland 16 – This wetland was assessed at the inventory level. The system is composed of an excavated impoundment with an intermittent stream that drains excess water from the impoundment to Principio Creek. The system starts adjacent to the Prince Interlocking on the south side of the gravel access road, just east of the cart path crossing for the Furnace Bay Golf Course. The pond is classified as POW. At the time of the field assessment the pond was filled to capacity and water was observed flowing through the intermittent channel at the eastern end. The pond did not appear to contain a vegetated wetland fringe. The intermittent channel is classified as R4SB3. The channel varied in size from three feet wide and a half foot deep at the upstream end and eight feet wide and three feet deep at the downstream end. Functions likely provided by the system include sediment/toxicant/pathogen retention.

Wetland 22 – This wetland was assessed in the inventory level assessment. The wetland is located within a drainage ditch along the north side of the Amtrak ROW at the end of McLhinney Street. The wetland drains northwest to a culvert. Saturated soils were present within the swale. Common vegetation included red maple and sweet-gum. Functions likely provided by the system include sediment/toxicant/pathogen retention, and flood flow alteration.

Summary

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.

3. NO ACTION ALTERNATIVE

Without the Proposed Project, existing floodplains and wetlands/waters of the U.S. will remain as described in Affected Environment above. The No Action Alternative is used as a baseline scenario against which potential impacts of the Proposed Project will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

a. Floodplains

Both Build Alternatives will occur within regulated floodplains. As noted above, 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 effective and preliminary 100-year and 500-year floodplains are included in ***Table E-4***. These values represent Proposed Project footprint encroachments within the floodplain only and do not reflect actual fill volumes. Project alternatives are not configured in such a manner that major longitudinal floodplain encroachments (encroachment that parallels the stream channel) would occur. The majority of floodplain encroachments would be from transverse crossings for each of the alternatives (encroachment that crosses the valley width of floodplains).

Any construction within the 100-year floodplain would require a Waterway Construction Permit from the MDE. 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 floodways is not anticipated. However, the Proposed Project will require additional fill in both of these floodways. The new crossings of the Susquehanna River will occur in the same location as the existing crossing and on the upstream side of the existing crossing, with the bridge piers aligned with the stream to minimize any change in the flow characteristics. The new bridge may have a slightly higher water velocity owing to the closer spacing of more bridge piers. The closer spacing of the bridge piers of 30 to 90 feet over 3,200 feet of the river will only result in a very slight change in velocity and therefore would not produce a significant impact to the hydrologic properties of the river upstream or downstream. More detailed hydrologic and hydraulic studies will be undertaken later in design, allowing for more precise floodplain impacts and scour analyses at that time.

Table E-4
Floodplain Encroachments and Impacts to Waters of the U.S., Including Wetlands

Resource Type	Resource Category	Alternative 9A	Alternative 9B
Effective FEMA Floodplains (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

Susquehanna Riverbed (acres)	Girder Approach/Arch Main Span Bridge	0.37	0.37

**Preliminary FEMA floodplain information available for Harford County only*

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, bridge and approach heights, etc.), as applicable.

b. 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 rail existing 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.

Alternative 9A

Alternative 9A would result in direct impacts to tidal and nontidal wetland resources along the Amtrak ROW (***Table E-4***). Nontidal wetland impacts in Cecil County would occur within Wetland 15 that lies between the existing railroad tracks and the access road to the Perryville Maintenance Facility, just east of the Perryville Station (***Table E-5***). The only tidal wetland in the study area, Wetland 9, would also be slightly impacted (0.06 acre) by the construction of the west bridge over the Susquehanna River. In Harford County, nontidal wetland impacts would occur within Wetlands 5 and 6 on the north side of the ROW east and west of Lewis Lane and within Wetlands 18 and 19 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 impacts to these waterways (***Table E-5***). The total 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 impacted on the Cecil County portion adjacent to the tidal wetland along the Susquehanna River. The crossing impacts to Lily Run and two unnamed tributaries 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 two unnamed tributaries to Lily Run. The intermittent stream that drains west along the existing tracks from Wetland 5 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.

Table E-5
Wetlands and Waters of the U.S. Effects by System and Habitat Classification

System Number	Waters of the U.S. Classification	Wetland Type	Potential Wetland (Ac) and Stream (Lf) Impacts	
			Alternative 9A	Alternative 9B
5	PFO1C	Nontidal	0.06	0.06
6	PEM1C R4SB3/5 (Unnamed tributary to Lily Run)	Nontidal	0.28 1,717	0.28 1,717
9	PFO1R PEM1N Ephemeral	Tidal Nontidal	0.06 0.01 19	0.06 0.01 19
10	R3UB1	Nontidal	83	83
14	Susquehanna River (R1UBV/R1OWV)	Tidal	0.37	0.37
15	PEM1C	Nontidal	0.20	0.20
17	R2UB1/2 (Lily Run)	Nontidal	84	11
18	PEM1C	Nontidal	0.04	0.03
19	PFO1C PEM1C R4SB3/4 (Unnamed tributary to Lily Run) R2UB1 (Unnamed tributary to Lily Run)	Nontidal	0.19 0.06 286 84	0.11 0.03 169 28
21	R4SB3	Nontidal	936	935

The girder approach / arch main span bridge design would include 37 in-water piers (with a pier diameter of 5.67 feet for all piers except 13 and 14 at 6.67 feet). 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 are included in ***Table E-4***. Potential impacts to submerged aquatic vegetation (SAV) within the Susquehanna River are discussed in **Section D**, "Aquatic Resources."

Alternative 9B

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 wetland and stream impacts are slightly less for Alternative 9B (***Table E-5***). Wetland buffer impacts are also slightly lower overall for Alternative 9B (***Table E-5***). Alternative 9B would cross the same streams as Alternative 9A, but total stream impacts would be slightly less (***Table E-5***) resulting from a narrower crossing of Lily Run and unnamed tributaries of Lily Run. Bridge pier impacts within the Susquehanna River would be the same for Alternative 9B as for Alternative 9A.

5. MINIMIZATION AND MITIGATION OF IMPACTS

a. Floodplains

Efforts to minimize impacts to 100-year and 500-year floodplains are ongoing, and will continue throughout the Proposed 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 due to rail construction are minimized, drainage structures are required to maintain the current flow regime and prevent associated flooding (COMAR 26.17.04). 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-year and 500-year floodplains could also include:

- Bridge spans over the 100-year 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.

b. Wetlands/Waters of the U.S.

Unavoidable impacts to wetlands and other waters of the U.S. will require federal and state permit authorizations. A Section 404 permit from the USACE is required for the discharge of dredged or fill materials into waters of the U.S., including wetlands. The Proposed Project will require a Section 404 Individual Permit, as it will result in greater than 2,000 linear feet of stream impact. A USACE Section 10 permit will also be required for construction of bridge structures over the navigable waters of the Susquehanna River. A U.S. Coast Guard (USCG) permit under Section 9 of the Rivers and Harbors Act will also be required for construction of a new bridge over a navigable waterway. Impacts to waters of the U.S., including wetlands also require a Section 401 Water Quality Certification from MDE. In addition, MDE requires a Nontidal Wetland and Waterways permit for impacts to nontidal wetlands and streams, including a 25-foot buffer surrounding the wetland; a Waterway Construction Permit for work in streams and floodplains; and a Tidal Wetland License issued by the Board of Public Works for impacts to tidal wetlands and waters associated with the Susquehanna River.

The two alternatives retained for detailed study were selected in part because of their reduced impacts to wetlands/waterways and other natural resources, as compared to the conceptual alternatives considered. These alternatives lie closer to the existing track ROW and generally involve replacement of the existing track with the new eastbound and westbound tracks. These two alternatives would have some direct impacts on both nontidal and tidal wetland resources and their corresponding buffers. Both alternatives would also have 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.

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 measure during final design (e.g., considering steeper slopes and/or additional retaining walls). 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.

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 may 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.

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. Emergent wetlands are often mitigated on a 1:1 replacement basis, while forested and scrub-shrub wetlands are mitigated on a 2:1 basis. Tidal wetland compensation follows similar ratios, except emergent tidal wetlands are also replaced at a 2:1 ratio. However, these ratios can provide only a preliminary estimate of required mitigation, as functional replacement is the guiding mitigation principal, and ratios may be adjusted at the discretion of the USACE or MDE depending on the practicability and functional effectiveness of the proposed mitigation. 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, and water quality improvements, may also be used at the agencies' discretion. ***Table E-6*** summarizes the wetland and stream impacts and estimated minimum mitigation required to offset those impacts.

Table E-6
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 (acre)	0.25	2:1	0.5	0.17	2:1	0.34
Nontidal Emergent (acre)	0.58	1:1	0.58	0.54	1:1	0.54
Tidal Forest (acre)	0.05	2:1	0.1	0.05	2:1	0.1
Tidal Emergent (acre)	0.01	2:1	0.02	0.01	2:1	0.02
Intermittent and Perennial Streams (linear feet)	3,190	1:1	3,190	2,943	1:1	2,943

Few onsite 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 Proposed Project design, including within nontidal Wetland 13 in Cecil County that will not be impacted, but is a disturbed ditch wetland that may be enhanced. 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 in size, 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 onsite 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.

Based on the currently identified 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. 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 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 level desktop mitigation site search was conducted within the Lower Susquehanna River and Swan Creek watersheds, as Proposed 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.

The results of the preliminary desktop site search identified 27 potential nontidal wetland creation sites totaling approximately 123 acres; 10 in Harford County (43 acres) and 17 in Cecil County (80 acres). Twenty-six (26) stream restoration sites were identified, including nine (9) in the Swan Creek watershed and 17 in the Lower Susquehanna River watershed. Fifteen (15) of the sites had potential fish blockage removal opportunities and two (2) sites also had wetland creation potential. A map of the potential wetland and stream mitigation sites and a summary of the site search process are described in more detail in ***Attachment D***. For those potential mitigation sites visible from publicly accessible locations, a windshield survey was completed in March 2016 to confirm landscape position and existing conditions within the potential site. Based on the windshield surveys, one new potential wetland creation site was added, but the number of potential nontidal wetland creation sites to carry forward was reduced to eight. For potential stream restoration sites, one site was extended and the overall number of potential stream sites to carry forward was reduced to 17. Information on potential wetland and stream sites recommended for more detailed on-site investigations are shown in ***Tables E-7*** and ***E-8***, respectively. 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.

Any mitigation measures employed due to unavoidable Proposed 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.

Table E-7
Potential Nontidal Wetland Mitigation Sites: Post Windshield Site Search

SITE ID	COUNTY	CURRENT LAND USE	APPROXIMATE SIZE (AC)	HYDRIC SOILS (Y/N)	STATUS/COMMENTS
W-14	Cecil	Agricultural Field	5	N	Low lying ag field abuts emergent marsh with thin strip of young trees (willow, sweetgum, planted leyland cypress); 3-4' cut could yield about 5 Ac wetland.
W-15	Cecil	Agricultural Field	2	Y	Low lying field lies adjacent to Coudon Creek and potentially created wetland on Perryville Elementary School property. Site not accessible, but might be worth further investigation.
W-17	Harford	Scrubby / Mowed Field	4	Y	Site mostly existing shrubby wetland. Small (<0.5Ac), low lying field adjacent to common reed wetland with creation potential and enhancement of common reed. Lies adjacent to Proposed Project.
W-22	Harford	Pasture	7	N	Site not completely visible from road, but part of a large abandoned agricultural area with many small streams/ditches draining through; some portions likely existing wetlands. Site appears relatively flat, but according to contours, has over 10 feet of elevation change. Potential stream restoration opportunities. More investigations warranted.
W-23	Harford	Pasture	5	N	Part of large abandoned agricultural area on the south side of a gravel driveway from Site 22. Land form appears relatively flat, but contours suggest as much as a 20' elevation difference within the site. Existing wetland mapped adjacent to site. Potential stream restoration opportunities. More investigations warranted.
W-25	Harford	Agricultural Field	2	Y	Relatively flat field adjacent to forested floodplain of small stream. Wet patches observed in field; portion of field mapped hydric soils. Possibly suitable to create 2 Ac wetlands.
W-27	Cecil	Agricultural Field	1	N	Small (1 Ac.), gently sloping area mapped as hydric soil adjacent to forested floodplain along stream.
W-28	Cecil	Maintained ROW	1.5	Y	Linear uplands within transmission ROW would require less than 3' of cut. Within transmission ROW so only PSS possible; may restrict access to towers. No more than 2 Ac of creation.

Table E-8
Potential Stream Mitigation Sites: Post Windshield Site Search

SITE ID	COUNTY	WATER-SHED	APPROX. LENGTH (LF)	FISH BLOCK-AGES (Y/N)	RIPARIAN ZONE	STATUS/COMMENTS
S-2	Harford	Lower Susquehanna River	607	Yes	Partially forested, partially maintained	No obvious blockages; some minor erosion on bends; right bank with scattered planted trees and lawn, more plantings possible, but no restoration.
S-4	Harford	Swan Creek	863	No	Forested between agricultural fields	Not accessible, but scored low for water quality by MBSS. Potential instream habitat improvements.
S-6	Cecil	Lower Susquehanna River	545	Yes	Forested	Site not visible, but potentially contains an old culverted road crossing that could be a fish blockage.
S-8	Cecil	Lower Susquehanna River	830	Yes	Forested, residential property	Fish blockage on upstream side of primary channel culvert at Jackson Station Rd where vertical wooden slats have been installed. Secondary channel culvert beneath Jackson Station Rd mostly filled with sediment. No other stream habitat improvements necessary.
S-9	Harford	Swan Creek	1,482	Yes	Forested, abuts residential properties	Impoundment not visible, but likely functions as fish blockage.
S-10	Cecil	Lower Susquehanna River	474	Yes	Forested/ scrub-shrub	Not visible, as site lies within large, fenced Bainbridge Development Corp property.
S-12	Harford	Lower Susquehanna River	755	Yes	Forest/ scrub-shrub	No visible, but several small streams flow through large abandoned farm site; most of streams without forest cover.
S-13	Harford	Lower Susquehanna River	2,168	Yes	Partially forested, residential properties	Between Superior and Erie Sts, recent clearing of vegetation on right bank, left bank mowed lawn with large planted trees. Between Erie St and US 40 gabion baskets on right bank with minor fish blockage.

Table E-8 (cont'd)
Potential Stream Mitigation Sites: Post Windshield Site Search

SITE ID	COUNTY	WATER-SHED	APPROX. LENGTH (LF)	FISH BLOCK-AGES (Y/N)	RIPARIAN ZONE	STATUS/COMMENTS
S-14	Harford	Swan Creek	266	Yes	Forested	Concrete apron on downstream side of Chapel Road culvert that acts as fish blockage. Large debris jam 200' farther downstream.
S-15	Harford	Swan Creek	1,314	No	Forested	At Hopewell Road crossing, stream appears stable with forested banks. MBSS site upstream of Hopewll Road with poor habitat index, possible instream improvements.
S-19	Cecil	Lower Susquehanna River	464	Yes	Forested	Reach not fully visible from road; instream habitat improvements possible.
S-20	Cecil	Lower Susquehanna River	1,550	Yes	Forested	Most of reach not visible from Frenchtown Rd; reach just upstream with high gradient and boulder substrate. Possible instream habitat improvements elsewhere within the reach.
S-22	Harford	Swan Creek	718	No	Partially forested	Not visible, but left bank not forested; possible planting and/or instream habitat enhancements.
S-23	Cecil	Lower Susquehanna River	595	No	Forested and agricultural fields	Not visible from driveway; flows through agricultural area with thin forest buffer.
S-24	Harford	Swan Creek	1,480	No	Forested/ scrub-shrub	Flows through old field managed for wild turkey by National Wild Turkey Federation. Stream banks 3' high with minor erosion. Most of reach not accessible.
S-26	Harford	Lower Susquehanna River	2,384	No	Maintained school property	Portions of Lily Run through school property lacking forest cover. Other portions of reach are currently piped. If Amtrak takes school ROW for new track, could investigate opening piped sections and doing other instream habitat improvements and tree plantings.

No matter what form of compensatory mitigation is adopted, the mitigation plan must follow the same 12 fundamental components that are required for permit issuance. These components include:

- Objectives
- Site selection criteria
- Site protection instruments (e.g., conservation easements)
- Baseline information (for impact and compensation sites)
- Credit determination methodology
- Mitigation work plan
- Maintenance plan
- Ecological performance standards
- Monitoring requirements
- Long-term management plan
- Adaptive management plan
- Financial assurances

C. TERRESTRIAL RESOURCES

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Maryland Reforestation Law & Maryland Forest Conservation Act

The Maryland Reforestation Law establishes a program to produce a no-net-loss impact to wooded acres resulting from State funded transportation projects. The Maryland Forest Conservation Act regulates any activity requiring an application for a subdivision, grading permit, or sediment erosion control permit on areas 40,000 square feet or greater.

Nongame Endangered Species Conservation Act

The Nongame Endangered Species Conservation Act regulates activities that impact the habitats of plants and animals listed on the Maryland Threatened and Endangered Species list. Any constructing agency (federal, state, local or private) is required to cooperate and consult with DNR regarding: the presence of listed species within a project area; field verification of habitat and/or populations of listed species, and avoidance and minimization efforts as appropriate.

Forest Interior Dwelling Species (FIDS) (COMAR 27.01.09.04C(2) (b)(iv)

FIDS are regulated as a protected resource within the Chesapeake Bay Critical Area (Critical Area). Regulated FIDS habitat includes documented FIDS breeding areas within existing riparian forests that are at least 300 feet in width and that occur adjacent to streams, wetlands, or the Bay shoreline, and other forest areas used as breeding areas by forest interior dwelling birds (for example, relatively mature forested areas within the Critical Area of 100 acres or more, or forest connected with these areas).

Methodology

Forest boundaries were identified using the most recent publically available aerial imagery and vegetation GIS layers from both counties. For the desktop review, 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). Based on this guidance, FIDS habitat exists where riparian forests average a minimum of 300 feet in total width and occur in blocks of at least 50 acres. FIDS habitat is also present where forests occur in blocks of at least 50 contiguous acres with 10 or more acres of forest interior (defined as the area of the forest minus a 300-foot wide edge). Areas meeting these definitions were mapped within the Proposed

Project study area. For the inventory level assessment, 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 below in tables of potential and observed species within the study area.

To assess potential terrestrial rare, threatened, or endangered (RTE) species, Proposed Project review letters, dated January 13, 2014, 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.

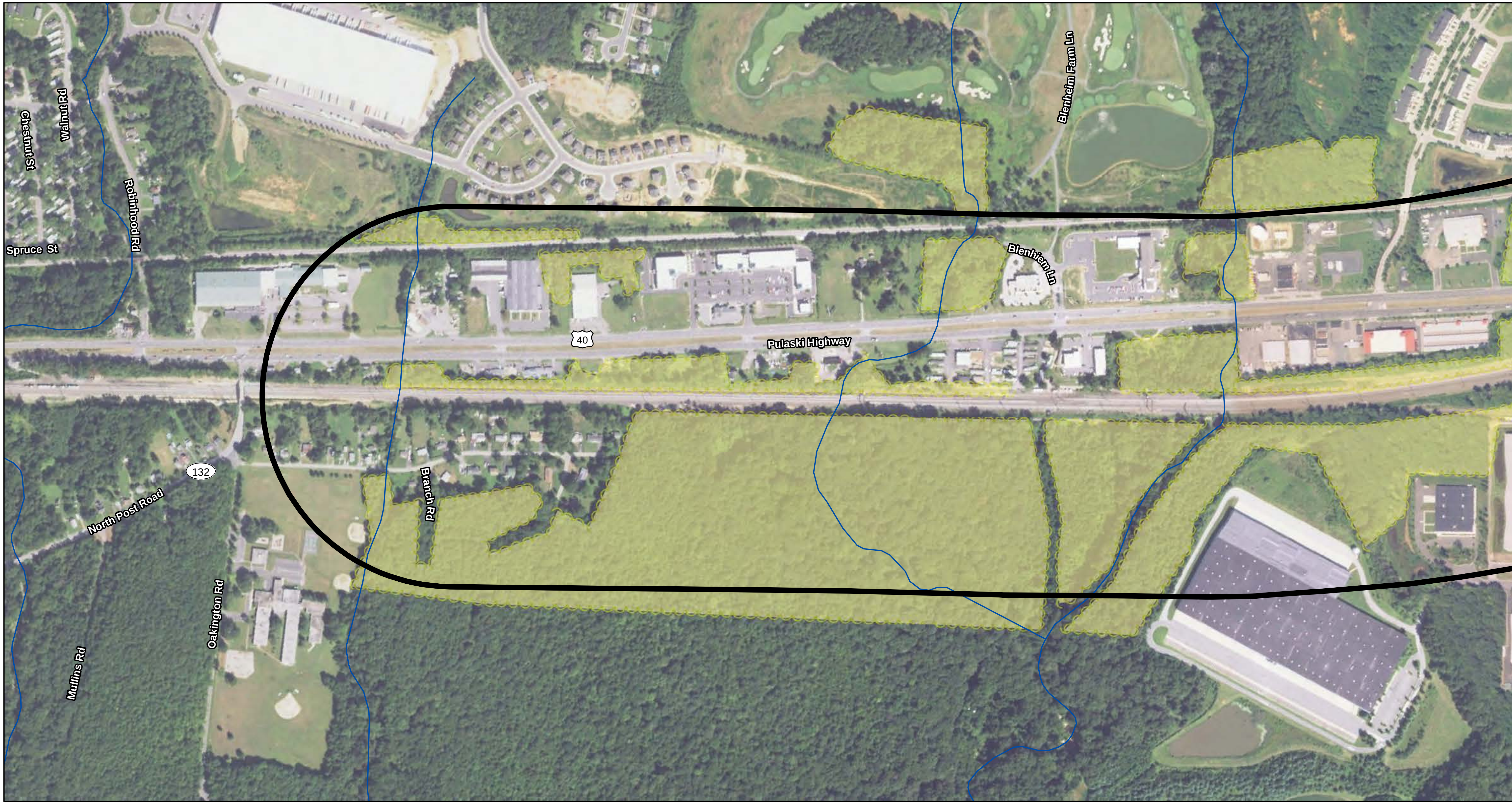
2. AFFECTED ENVIRONMENT

a. Forest Resources

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 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.

All forests in Harford County are classified within the Tulip Poplar Association according to Brush et al. 1976 (***Figure E-5***). Characteristic species in this forest association include, tulip tree, red maple, flowering dogwood (*Cornus florida*), Virginia creeper *(Parthenocissus quinquefolia*), black gum *(Nyssa sylvatica*), and white oak *(Quercus alba*). The results of the inventory level field assessment were generally consistent with the mapped association according to Brush et al. The primary differences occurred within forested wetland areas. As noted in the "Wetlands and Waters of the U.S." section, forested wetlands were dominated by red maple and sweet-gum trees with scattered tulip tree, pin oak, and sycamore. Upland forest stands within the Harford County portion of the study area occur within relatively small, isolated patches, often along streams, and are characterized by varying degrees of disturbance. Other upland forest stands were linear strips of trees that border roadways, property boundaries, and the railroad ROW. The majority of these stands were early to mid-successional in seral stage, and contained canopy species, including tuliptree, white oak, red maple, sweet-gum, ash *(Fraxinus* sp.), American beech *(Fagus grandifolia*), and black locust *(Robinia pseudoacacia*). The average size of canopy trees was generally greater than four inches for red maple and sweet-gum and larger than eight inches for tuliptree. The understory was generally dense with either shrubs or vines or a combination of both. Common species included rambler rose, bush honeysuckle *(Lonicera* sp.), Japanese honeysuckle, and grape. One mature forest stand was identified on the south side of the Amtrak ROW between two industrial warehouse buildings west of Old Bay Lane. This stand was comprised of mature oaks (primarily white oak) and tuliptree in the 10 to 20-inch diameter size range. Slightly smaller red maple and sweet-gum were also common in the canopy. The understory was sparse, with scattered American beech and American hornbeam *(Carpinus caroliniana*).

Cecil County has fewer forest resources within the study area than Harford County (***Figure E-5***). Most of the forests in the study area have also been classified by Brush et al. within the Tulip Poplar Association. However, the floodplain of Mill Creek has been classified by Brush et al. within the Sycamore-Green Ash-Box Elder-Silver Maple Association.



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Sycamore, Green Ash, Ash-leaf Maple, Silver Maple Forest Association
- Tulip Poplar Forest Association

Data Sources

Streams:
MDE, 2012
Forest Assocaition:
Vegetation Map of Maryland (Brush et al. 1976)
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-5
Forest Resources Map

Legend

LOD 9A Calculation Area

LOD 9B Calculation Area

1,000 ft Study Area

Streams

Sycamore, Green Ash, Ash-leaf Maple, Silver Maple Forest Association

Tulip Poplar Forest Association

Data Sources

Streams:
MDE, 2012

Forest Assoication:
Vegetation Map of Maryland (Brush et al. 1976)

Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-5
Forest Resources Map

Page 2 of 5

Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Sycamore, Green Ash, Ash-leaf Maple, Silver Maple Forest Association
- Tulip Poplar Forest Association

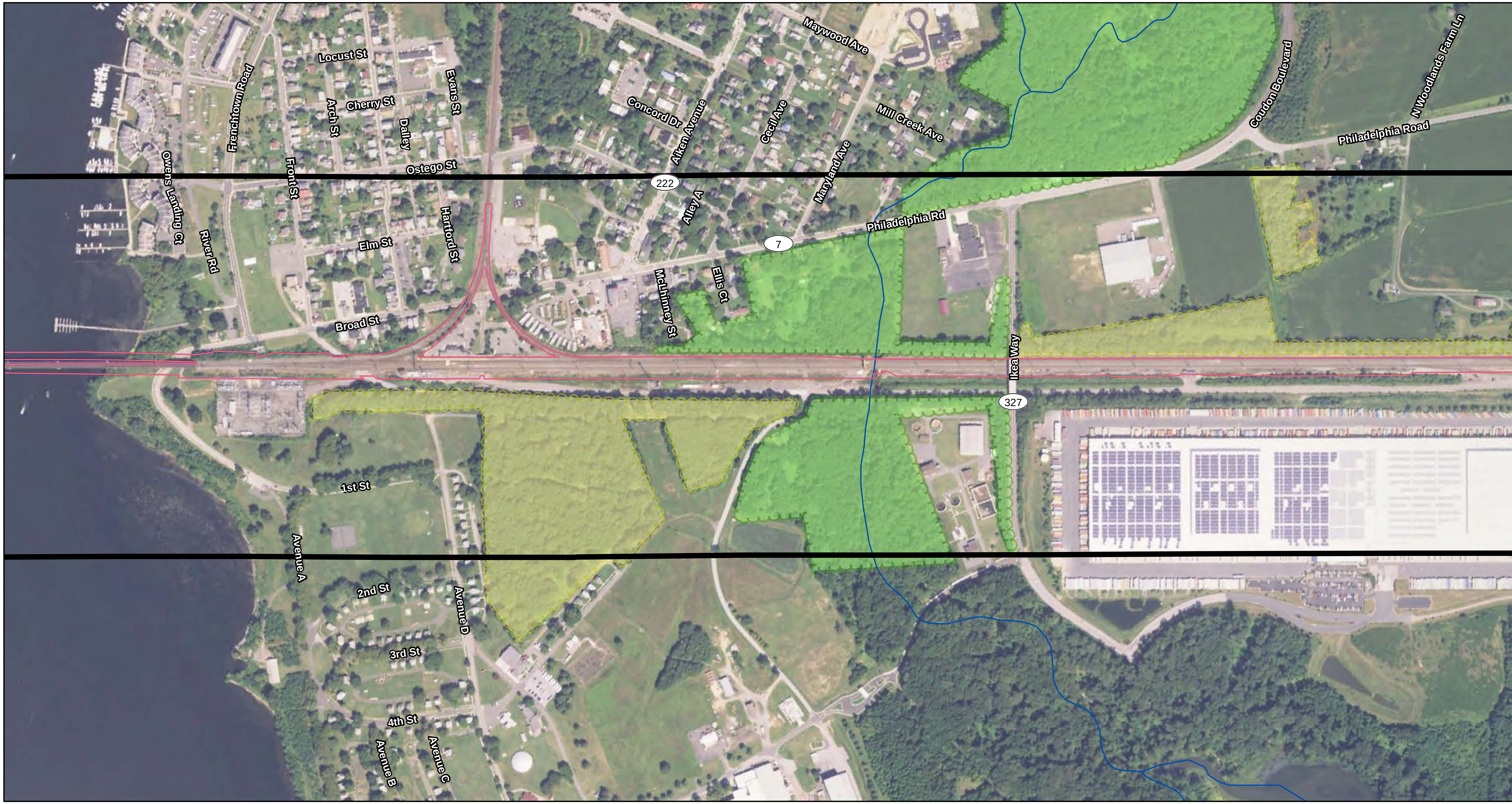
Data Sources

Streams:
MDE, 2012
Forest Assocation:
Vegetation Map of Maryland (Brush et al. 1976)
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-5
Forest Resources Map

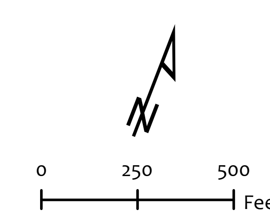


Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Sycamore, Green Ash, Ash-leaf Maple, Silver Maple Forest Association
- Tulip Poplar Forest Association

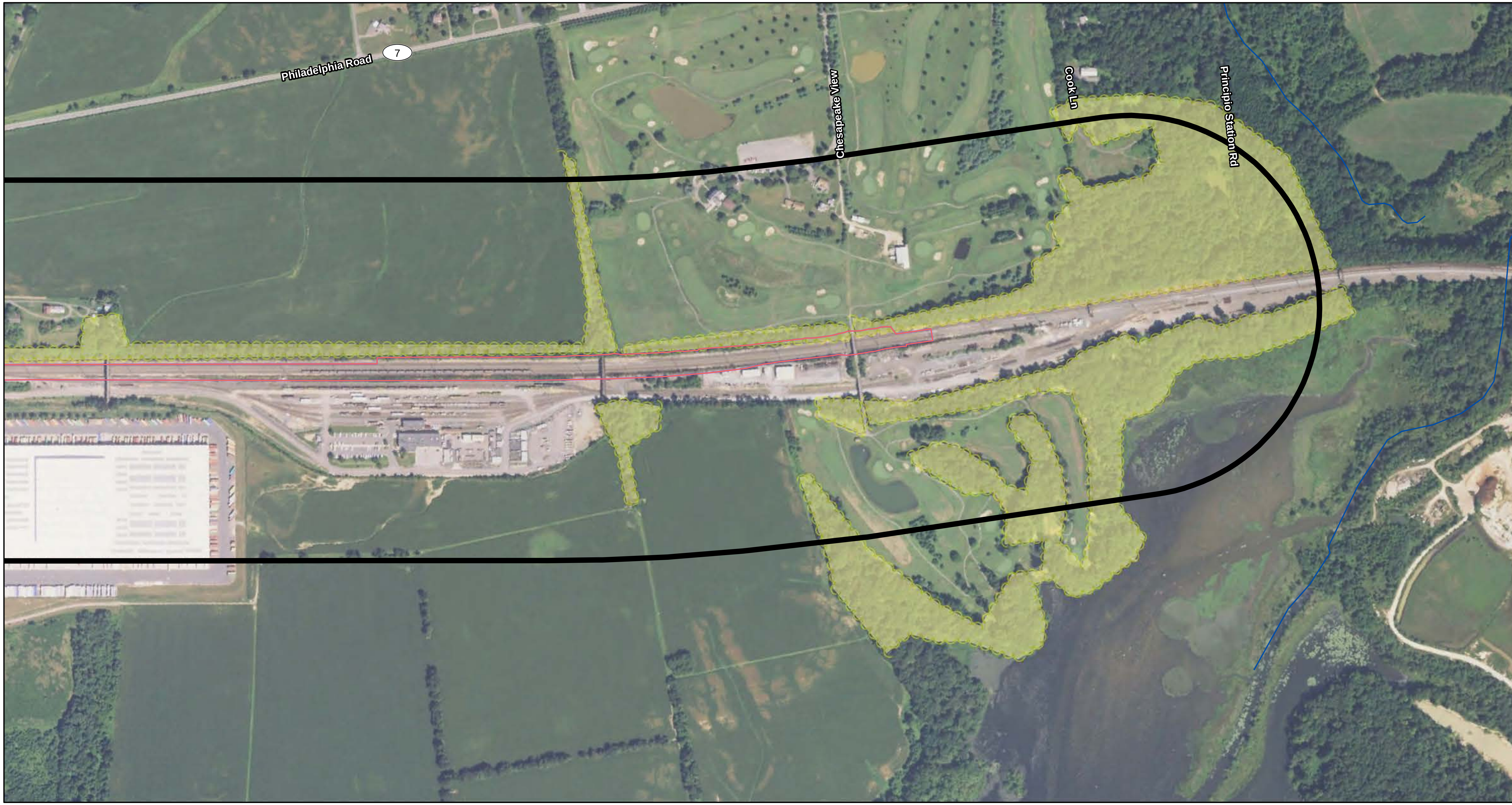
Data Sources

Streams:
MDE, 2012
Forest Assoication:
Vegetation Map of Maryland (Brush et al. 1976)
Imagery:
2015 National Agriculture Imagery Program (NAIP)



Susquehanna River Rail Bridge Project

Figure E-5
Forest Resources Map
Page 4 of 5



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Sycamore, Green Ash, Ash-leaf Maple, Silver Maple Forest Association
- Tulip Poplar Forest Association

Data Sources

Streams:
MDE, 2012
Forest Assocation:
Vegetation Map of Maryland (Brush et al. 1976)
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 250 500 Feet

Susquehanna River Rail Bridge Project

Figure E-5
Forest Resources Map

Characteristic species in this forest association include sycamore, green ash, box elder (*Acer negundo*), silver maple, red maple, Virginia creeper, white oak, flowering dogwood, and grape. Results of the inventory level field assessment in Cecil County were generally consistent with the mapped forest associations according to Brush et al. Most of the forested areas in Cecil County are smaller rows of deciduous trees bordering the Amtrak ROW and roads within the study area. The canopy species composition of these generally small, disturbed upland stands includes tuliptree, red maple, and sweet-gum. The understory is characterized by dense vines and shrubs, including rambler rose, Japanese honeysuckle, Asiatic bittersweet, and grape. The forest stand associated with Mill Creek was characterized by relatively mature upland and wetland cover types. Common canopy trees included tuliptree, sweet-gum, and sycamore in the 10 to 30-inch diameter size class and red maple in the four to ten-inch diameter size class. Common understory species included black cherry (*Prunus serotina*), American beech, American holly (*Ilex opaca*), rambler rose, bush honeysuckle, and Japanese honeysuckle. At the extreme eastern end of the study area, forest stands lie on the north and south sides of the Amtrak ROW just east of the Furnace Bay Golf Course.

While a formal specimen tree survey has not been conducted, trees with diameters of 30 inches or greater were observed as individual trees along the shoreline of the Susquehanna River just south of the Amtrak ROW adjacent to Avenue A. On the grounds of the Rodgers Tavern, two trees appeared to be greater than 30 inches in diameter, including a sycamore and willow oak (*Quercus phellos*). Within the floodplain of Mill Creek between MD 7 and the Amtrak ROW, several trees (sweet-gum, sycamore) appeared to have diameters equal to or greater than 30 inches.

b. 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 ***Table E-9*** lists Herpetofauna documented near the study area.

Table E-9
Herpetofauna Documented Near the Study Area

Scientific Name	Common Name	Scientific Name	Common Name
AMPHIBIANS		**REPTILES**	
Acris crepitans	Eastern cricket frog	*Chelydra serpentine*	Eastern snapping turtle
Ambystoma maculatum	Spotted salamander	*Chrysemys picta*	Painted turtle
Anaxyrus fowleri	Fowler's toad	*Clemmys guttata*	Spotted turtle
Eurycea bislineata	Northern two-lined salamander	*Coluber constrictor constrictor*	Northern black racer
Eurycea longicauda longicauda	Long-tailed salamander	*Diadophis punctatus*	Ring-necked snake
Hyla versicolor	Gray treefrog	*Kinosternon subrubrum subrubrum*	Eastern mud turtle

Table E-9 (cont'd)
Herpetofauna Documented Near the Study Area

Scientific Name	Common Name	Scientific Name	Common Name
AMPHIBIANS		**REPTILES**	
Lithobates clamitans melanota	Northern green frog	*Nerodia sipedon sipedon*	Northern watersnake
Lithobates palustris	Pickerel frog	*Plestiodon fasciatus*	Common five-lined skink
Plethodon cinereus	Eastern redbacked salamander	*Lampropeltis traingulum Triangulum*	Eastern milksnake
Pseudacris crucifer	Spring peeper*	*Pantherophis alleghaniensis*	Eastern ratsnake
Pseudemys rubriventris	Northern red-bellied cooter	*Storeria dekayi dekayi*	Northern brownsnake
Rana catesbeiana	American bullfrog	*Thamnophis sirtalis sirtalis*	Eastern gartersnake
		Trachemys scripta elegans	Red-eared slider
		Virginia valeriae valeriae	Eastern smooth earthsnake

Source: Maryland Amphibian and Reptile Atlas 2010-2014, Natural History Society of Maryland, Interim results used with permission)
* Observed during the inventory level field assessment.

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 (***Table E-10***).

Table E-10
Breeding birds documented near the study area

Scientific Name	Common Name	Scientific Name	Common Name
Accipiter cooperii	Cooper's hawk*	*Melanerpes carolinus*	Red-bellied woodpecker*
Actitis macularius	Spotted sandpiper	*Melanerpes erythrocephalus*	Red-headed woodpecker
Agelaius phoeniceus	Red-winged blackbird*	*Meleagris gallopavo*	Wild turkey
Aix sponsa	Wood duck*	*Melospiza melodia*	Song sparrow*
Anas discors	Blue-winged teal	*Mimus polyglottos*	Northern mockingbird*
Anas platyrhynchos	Mallard*	*Mniotilta varia*	Black-and-white warbler
Anas rubripes	American blackdDuck	*Molothrus ater*	Brown-headed cowbird*
Antrostomus carolinensis	Chuck-will's-widow	*Myiarchus crinitus*	Great crested flycatcher
Antrostomus vociferous	Whip-poor-will	*Nyctanassa violacea*	Yellow-crowned night-heron
Archilochus colubris	Ruby-throated hummingbird	*Nycticorax nycticorax*	Black-crowned night-heron
Ardea alba	Great egret	*Pandion haliaetus*	Osprey*
Ardea herodias	Great blue heron*	*Parkesia motacilla*	Louisiana waterthrush
Baeolophus bicolor	Tufted titmouse*	*Passer domesticus*	House sparrow*

Table E-10 (cont'd)
Breeding birds documented near the study area

Scientific Name	Common Name	Scientific Name	Common Name
Bombycilla cedrorum	Cedar waxwing	*Passerculus sandwichensis*	Savannah sparrow
Botaurus lentiginosus	American bittern	*Passerina caerulea*	Blue Grosbeak
Branta canadensis	Canada goose*	*Passerina cyanea*	Indigo bunting
Bubo virginianus	Great horned owl	*Phalacrocorax auritus*	Double-crested cormorant*
Buteo jamaicensis	Red-tailed hawk	*Phasianus colchicus*	Ring-necked pheasant
Buteo lineatus	Red-shouldered hawk	*Picoides pubescens*	Downy woodpecker*
Butorides virescens	Green heron	*Pipilo erythrophthalmus*	Eastern towhee*
Cardinalis cardinalis	Northern cardinal*	*Piranga olivacea*	Scarlet tanager
Cathartes aura	Turkey vulture*	*Podilymbus podiceps*	Pied-billed grebe
Catharus fuscescens	Veery	*Poecile carolinensis*	Carolina chickadee*
Chaetura pelagica	Chimney swift	*Polioptila caerulea*	Blue-gray gnatcatcher
Charadrius vociferous	Killdeer*	*Porzana carolina*	Sora
Circus cyaneus	Northern harrier	*Progne subis*	Purple martin
Cistothorus palustris	Marsh wren	*Protonotaria citrea*	Prothonotary warbler
Coccyzus americanus	Yellow-billed cuckoo	*Quiscalus quiscula*	Common grackle*
Colaptes auratus	Northern flicker*	*Rallus elegans*	King rail
Colinus virginianus	Northern bobwhite	*Riparia riparia*	Bank swallow
Columba livia	Rock pigeon*	*Sayornis phoebe*	Eastern phoebe*
Contopus virens	Eastern wood-pewee	*Scolopax minor*	American woodcock
Coragyps atratus	Black vulture*	*Seiurus aurocapilla*	Ovenbird
Corvus brachyrhynchos	American crow*	*Setophaga americana*	Northern parula
Corvus ossifragus	Fish crow*	*Setophaga citrina*	Hooded warbler
Cyanocitta cristata	Blue jay*	*Setophaga discolor*	Prairie warbler
Cygnus olor	Mute swan	*Setophaga petechia*	Yellow warbler
Dryocopus pileatus	Pileated woodpecker	*Setophaga ruticilla*	American redstart
Empidonax virescens	Acadian flycatcher	*Sitta carolinensis*	White-breasted nuthatch*
Eremophila alpestris	Horned lark	*Spinus tristis*	American goldfinch*
Falco peregriuns	Peregrine falcon	*Spizella passerina*	Chipping sparrow*
Geothlypis formosa	Kentucky warbler	*Stelgidopteryx serripennis*	Northern rough-winged swallow*
Geothlypis trichas	Common yellowthroat	*Setophaga pinus*	Pine warbler
Haemorphous mexicanus	House finch*	*Sternula antillarum*	Least tern
Haliaeetus leucocephalus	Bald eagle	*Strix varia*	Barred owl
Helmitheros vermivorum	Worm-eating warbler	*Sturnella magna*	Eastern meadowlark
Hylocichla mustelina	Wood thrush	*Sturnus vulgaris*	European starling*
Icteria virens	Yellow-breasted chat	*Tachycineta bicolor*	Tree swallow*
Icterus galbula	Baltimore oriole	*Thryothorus ludovicianus*	Carolina wren*
Icterus spurius	Orchard oriole	*Toxostoma rufum*	Brown Thrasher
Ixobrychus exilis	Least bittern	*Troglodytes aedon*	House wren
Larus argentatus	Herring gull*	*Turdus migratorius*	American robin*
Larus delawarensis	Ring-billed gull*	*Tyrannus tyrannus*	Eastern kingbird
Larus marinus	Great Black-backed gull*	*Vireo gilvus*	Warbling vireo
Lophodytes cucullatus	Hooded merganser	*Vireo griseus*	White-eyed Vvireo

Table E-10 (cont'd)
Breeding birds documented near the study area

Scientific Name	Common Name	Scientific Name	Common Name
Megaceryle alcyon	Belted kingfisher	*Vireo olivaceus*	Red-eyed vireo
Megascops asio	Eastern screech-owl	*Zenaida macroura*	Mourning dove*

Source: 2nd Atlas of the Breeding Birds of Maryland and the District of Columbia
*Observed during the inventory level field assessment.

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. ***Table E-11*** includes a list of mammal species that could potentially inhabit the study area (DNR-WHS website accessed November 20, 2014).

Table E-11
Mammals potentially occurring near the study area

Scientific Name	Common Name	Scientific Name	Common Name
Blarina brevicauda	Northern short-tailed shrew	*Nycticeius humeralis*	Evening bat
Canis latrans	Coyote	*Odocoileus virginianus*	White-tailed deer*
Castor canadensis	American beaver*	*Ondatra zibethicus*	Muskrat
Condylura cristata parva	Southeastern star-nosed mole	*Oryzomys palustris*	Marsh rice rat
Cryptotis parva	Least shrew	*Peromyscus leucopus*	White-footed deer mouse
Didelphis virginiana	Virginia opossum	*Peromyscus maniculatus*	Deer mouse
Eptesicus fuscus	Big brown bat	*Pipistrellus subflavus*	Eastern pipistrelle
Glaucomys volans	Southern flying squirrel	*Procyon lotor*	Raccoon*
Lasionycteris noctivagans	Silver-haired bat	*Rattus norvegicus*	Norway rat
Lasiurus borealis	Eastern red bat	*Rattus rattus*	Black rat
Lasiurus cinereus	Hoary bat	*Reithrodontomys humulis*	Eastern harvest mouse
Lutra canadensis	Northern river otter	*Scalopus aquaticus*	Eastern mole
Marmota monax	Woodchuck*	*Sciurus carolinensis*	Eastern gray squirrel*
Mephitis mephitis	Striped skunk	*Sciurus niger*	Eastern fox squirrel
Microtus pennsylvanicus	Meadow vole	*Sorex hoyi winnemana*	Southern pygmy shrew
Microtus pinetorum	Woodland vole	*Sylvilagus floridanus*	Eastern cottontail*
Mus musculus	House mouse	*Synaptomys cooperi*	Southern bog lemming
Mustela vison	Mink	*Tamiasciurus hudsonicus*	Red squirrel
Myocastor coypus	Nutria	*Urocyon cinereoargenteus*	Gray fox
Myotis lucifugus	Little brown myotis	*Vulpes vulpes*	Red fox
Myotis septentrionalis	Northern long-eared bat[1]	*Zapus hudsonius*	Meadow jumping mouse
Napaeozapus insignis	Woodland jumping mouse		

*Observed (directly or indirectly – tracks) during the inventory level field assessment.
[1] Federally Endangered

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 (*Anaxyrus* spp.), common five-lined skink (*Plestiodon fasciatus*), eastern redbacked salamander (*Plethodon cinereus*), northern black racer, (*Coluber constrictor constrictor*), eastern ratsnake (*Pantherophis alleghaniensis*), eastern garter snake (*Thamnophis* *sirtalis sirtalis*), and the eastern box turtle (*Terrapene carolina carolina*), among other species. Mammals such as mice (*Peromyscus* spp.), voles (*Microtus* spp.), the eastern mole (*Scalopus aquaticus*), bats (*Myotis* spp.), squirrels (*Sciurus* spp. and *Tamiasciurus hudsonicus*), foxes (*Urocyon cinereoargenteus* and *Vulpes vulpes*), raccoon (*Procyon lotor*), woodchuck (*Marmota monax*), and white tailed deer (*Odocoileus virginianus*), 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 (*Rattus norvegicus*) and the black rat (*Rattus rattus*). Bird species likely to occur within the smaller, more disturbed forests with abundant edge habitat would be common species such as red-bellied woodpecker (*Melanerpes carolinus*), downy woodpecker (*Picoides pubescens*), eastern wood-pewee (*Contopus virens*), American crow (*Corvus brachyrhynchos*), blue jay (*Cyanocitta cristata*), Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), white-breasted nuthatch (*Sitta carolinensis*), Carolina wren (*Thryothorus ludovicianus*), American robin (*Turdus migratorius*), and northern cardinal (*Cardinalis cardinalis*). 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 (See ***Table E-10***).

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 a specialized group of birds of FIDS. ***Table E-12*** lists the FIDS potentially occurring within the Critical Area. According to the breeding birds listed in ***Table E-12***, 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.

Table E-12
List of Maryland's FIDS

Scientific Name	Common Name
Buteo lineatus	Red-shouldered hawk[1]
Buteo platypterus	Broad-winged hawk[1]
Strix varia	Barred owl[1]
Caprimulgus vociferous	Whip-poor-will
Picoides villosus	Hairy woodpecker
Dryocopus pileatus	Pileated woodpecker
Empidonax virescens	Acadian flycatcher
Certhia Americana	Brown creeper[1]
Catharus fuscescens	Veery
Hylocichla mustelina	Wood thrush
Vireo flavifrons	Yellow-throated vireo
Vireo olivaceus	Red-eyed vireo
Setophaga americana	Northern parula
Setophaga virens waynei	Black-throated green warbler[1]
Setophaga cerulea	Cerulean warbler[1]
Mniotilta varia	Black-and-white warbler[1]
Setophaga ruticilla	American redstart[1]
Protonotaria citrea	Prothonotary warbler
Helmitheros vermivorum	Worm-eating warbler[1]
Limnothlypis swainsonii	Swainson's warbler[1,2]
Seiurus aurocapillus	Ovenbird
Parkesia motacilla	Louisiana waterthrush[1]
Setophaga citrina	Hooded warbler[1]
Geothlypis formosa	Kentucky warbler[1]
Piranga olivacea	Scarlet tanager

[1]Highly area-sensitive species most vulnerable to forest loss, fragmentation, and overall habitat degradation.

[2]State-listed as Endangered.

Wetlands and vernal pools within the study area could support herpetofauna species such as the eastern cricket frog (*Acris crepitans*), spring peeper (*Pseudacris crucifer*), American bullfrog (*Rana catesbeiana*), northern green frog (*Lithobates clamitans melanota*), pickerel frog (*L. palustris*), wood frog (*L. sylvaticus*), painted turtle (*Chrysemys picta*), snapping turtle (*Chelydra serpentina*), northern watersnake (*Nerodia sipedon sipedon*), and spotted salamander (*Ambystoma maculatum*), among other species. The spring peeper was observed during the early spring inventory level field assessment (See ***Table E-9***). Smaller streams could support the northern two-lined salamander (*Eurycea bislineata*) and the long-tailed salamander (*E. longicauda longicauda*). Larger waterbodies within the study area, such as the Susquehanna River, are also habitat for species such as the northern map turtle (*Graptemys geographica*), red-bellied cooter (*Pseudemys rubriventris*), American beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and the northern river otter (*Lutra canadensis*). The northern map turtle is a state-endangered aquatic turtle discussed in Section D. 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 (*Agelaius phoeniceus*) would be expected. In addition, many species of waterfowl, gulls and terns, and raptors, such as the osprey (*Pandion haliaetus*) and bald eagle (*Haliaeetus leucocephalus*), forage in and rest on the Susquehanna River during different seasons.

c. Threatened, Endangered, or Special Concern Terrestrial Species

Listed Species

On April 2, 2015, USFWS listed the northern long-eared bat (NLEB) (*Myotis septentrionalis*) 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.

In response to a December 13, 2013 letter requesting information on RTE species in the Proposed Project study area, DNR issued a letter dated March 20, 2014 and an updated response in September 1, 2015 (Refer to ***Attachment E***) that identified potential RTE species or species of statewide importance that could occur within the study area. The letter identified the presence of a WSSC located within the Swan Creek drainage just south of the Amtrak ROW at the western end of the study area. The presence within the study area of historic waterfowl concentration and staging areas within the Susquehanna River was also referenced in the March 2014 DNR letter (see below). At the eastern end of the study area, DNR identified the presence of a known site within the Furnace Bay wetlands that supports a population of state-listed endangered water horsetail (*Equisetum fluviatile*) and vetchling (*Lathyrus palustris*). Both plant species are found in aquatic habitats. No other state-listed species were documented by the DNR as potentially occurring within the study area. A response letter was submitted to DNR on April 7, 2016 regarding all potentially occurring resources within the study area (***Attachment E****)*. On May 9, 2016, DNR issued a subsequent letter elaborating on the aforementioned resources and listing additional concerns with the state-listed endangered northern map turtle (Graptemys geographica) and Forest Interior Dwelling Bird Species (FIDS). A follow-up response letter was submitted to DNR on June 14, 2016 providing additional information on further coordination on these resources and documenting that the listed plant species are outside of the project limit of disturbance and will receive additional protection by the project strictly adhering to best management practices for sediment and erosion control.

Waterfowl Concentrations & 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 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 begun to rebound, 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 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.

3. NO ACTION ALTERNATIVE

Without the Proposed Project, terrestrial resources are expected to remain the same as described in Affected Environment. The No Action Alternative is used as a baseline scenario against which potential Proposed Project impacts will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

a. Forest Resources

Forest resources are protected in Maryland under the Maryland Forest Conservation Act for any activity requiring application for a subdivision, grading permit, or sediment and erosion control plan that will disturb at least 40,000 square feet of area. 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.

The two Build Alternatives will have minor 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 Proposed Project study area. The Build Alternatives all terminate over a mile east of this forested area thus avoiding any impact to these resources.

Alternative 9A

Alternative 9A would have the greatest forest impacts of the two Build Alternatives. 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. Forest impacts from Alternative 9A would total approximately 2.92 acres.

Alternative 9B

Alternative 9B would also impact the same forested habitat adjacent to Havre de Grace Middle School/High School. However, the Proposed Project footprint for Alternative 9B is narrower than that of Alternative 9A, resulting in a potential impact of approximately 2.08 acres.

b. Wildlife

Few wildlife impacts are anticipated from construction of the 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," 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 residential 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 impacted or displaced.

c. Threatened, Endangered, or Special Concern Terrestrial Species

NLEB roost during the summer months in forested areas; therefore, Alternative 9A has a higher potential for impacts to NLEB habitat. However, the majority of forest impact occurs in relatively narrow and disturbed areas immediately adjacent to the existing tracks/ROW. In a letter dated January 15, 2016 (Refer to ***Attachment E***), the USFWS indicated that because of the relatively small forest impacts and the absence of documented NLEB within the area, the Proposed Project is "not likely to adversely affect" the species. The letter 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 Proposed Project area.

Neither of the Build Alternatives will impact 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 more than a mile west of the termination of Alternative 9A and Alternative 9B. Two state-endangered plants, water horsetail (*Equisetum fluviatile*) and vetchling (*Lathyrus palustris*), are aquatic plants that lie within tidal marsh wetlands of Furnace Bay directly south of the eastern end of the project area. While these plants would not be directly impacted by the Proposed Project, DNR has recommended that, to avoid indirect impacts to the plants, the project strictly adhere to best management practices for sediment and erosion control. 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 Proposed Project area.

An historic waterfowl staging area occurs within the Proposed Project footprint of the two Build Alternatives in the Susquehanna River along the Cecil County side. This area is known to support winter concentrations of ducks and geese that forage on fish, invertebrates, and submerged aquatic vegetation. Waterfowl will not be permanently impacted by either bridge alternative, but may be temporarily displaced from the active construction area. DNR has indicated that further coordination will be required, as the project progresses into later phases of design, regarding any potential disturbances along the shoreline and adjacent open waters, and appropriate protection measures.

5. MINIMIZATION AND MITIGATION OF IMPACTS

a. Forest Resources

Both Alternative 9A and Alternative 9B lie immediately adjacent to the existing track alignment, resulting in only minor forest impacts on the south side of the existing alignment near Havre de Grace Middle School/High School. This forest is relatively narrow and disturbed. Avoidance of a much larger forest tract farther to the west 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 FCP will be coordinated, reviewed, and approved by DNR.

Where unavoidable 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: maintain forest at or above the break-even point, protecting 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.

D. AQUATIC RESOURCES

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Clean Water Act (33 USC §§ 1251-1387)

The objective of the Clean Water Act, also known as the Federal Water Pollution Control Act, is to restore and maintain the chemical, physical, and biological integrity of the waters of the United States. It regulates point sources of water pollution, such as discharges of municipal sewage, industrial wastewater, and stormwater runoff; the discharge of dredged or fill material into navigable waters and other waters; and non-point source pollution (e.g., runoff from streets, construction sites, etc.) that enter water bodies from sources other than the end of a pipe. Applicants for discharges to navigable waters in Maryland must obtain a Water Quality Certification from MDE.

Safe Drinking Water Act (42 USC §§ 330f-300j)

The Safe Drinking Water Act Amendments of 1986 requires each state to develop Wellhead Protection Programs. The EPA approved Maryland's Wellhead Protection Program in June of 1991. Maryland's program provides technical assistance, information, and funding to local governments, to help them protect their water supplies. Wellhead Protection is a strategy designed to protect public drinking water supplies by managing the land surface around a well where activities might affect the quality of the water.

Section 7 of the Endangered Species Act

Section 7 of the ESA protects listed species, assists with species recovery, and protects lands that provide critical habitat for federally-listed endangered and threatened species. Section 7 requires that federal agencies consult with the National Marine Fisheries Service (NMFS) for marine and anadromous species, or the USFWS for freshwater species and wildlife, on any federal action that has the potential to affect listed species or critical habitats.

Executive Order 13508 on Chesapeake Bay Protection and Restoration

The purpose of the Executive Order, signed on May 12, 2009, is to "protect and restore the health, heritage, natural resources, and social and economic value of the nation's largest estuarine ecosystem and the natural sustainability of its watershed." Under the Executive Order, multiple federal agencies were required to make recommendations concerning water quality, agricultural conservation practices, SWM practices, impacts of climate change, public access, and environmental research. These recommendations were integrated into a coordinated strategy for restoration and protection, which was presented on May 12, 2010. The strategy launches major environmental initiatives, establishes two-year milestones for water quality and other action items, and sets specific and measurable restoration and water quality goals with the help and partnership of local communities.

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).

State Environment Article, Title 9, Subtitle 3 authorizes the MDE to develop comprehensive programs and plans for the prevention, control, and abatement of pollution of the waters of the State and to issue, modify, or revoke orders and permits that prohibit discharges of pollutants into Maryland waters, in accordance with Section 402 of the federal Clean Water Act. The MDE regulates discharges to Maryland State waters under COMAR 26.08.04. Activities requiring a NPDES permit include point source discharges of wastewater, discharge of stormwater runoff, thermal discharges, and construction activities that disturb one or more acres.

Methodology

Existing conditions for aquatic resources were summarized using the following:

- 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; river bathymetry; 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.

2. AFFECTED ENVIRONMENT

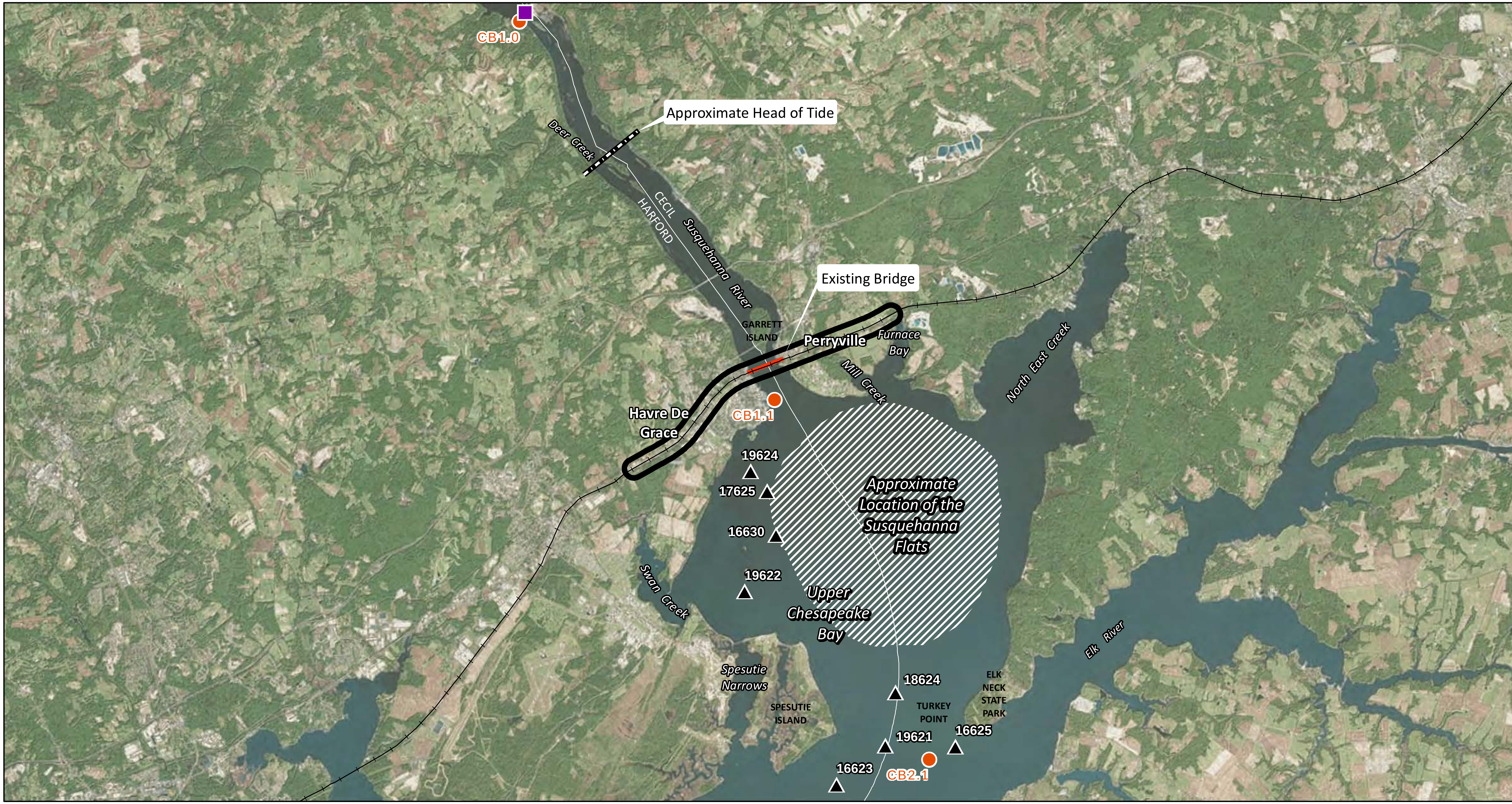
The study area for aquatic resources comprises the Lower Susquehanna River from the head of tide north of Port Deposit to the confluence with the Upper Bay, and the Upper Bay down to the Elk River at Turkey Point to include the shallow Susquehanna Flats area where much of the larger grained sediment discharged by the Susquehanna River is deposited (***Figure E-6***) (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.

a. Hydrology

The Susquehanna River Rail Bridge crosses the Lower Susquehanna River[2], just north of its confluence with the Chesapeake Bay (***Figure E-6***), 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 main portion of the Chesapeake Bay extends approximately 186 miles from the Atlantic Ocean up to the Susquehanna River, varying in width from about 3.4 miles near Aberdeen, Maryland, to 35 miles near the mouth of the Potomac River (USEPA 2010).

The Susquehanna River supplies most of the freshwater (about 60 percent) to the Bay, with the remainder primarily supplied by the Potomac, Rappahannock, York, and James Rivers (Cerco et al. 2013). Much of the freshwater inputs to the Bay occur during winter and spring, with occasional large discharges in late summer during tropical storm events

[2] 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



Legend

- ▲ Chesapeake Bay Program Benthic Monitoring Stations
- ■ USGS Gage
- ● Chesapeake Bay Program Water Quality Stations
- Existing Bridge
- 1,000 ft Study Area
- Rail line

Data Sources

Monitoring Locations:
USGS, Chesapeake Bay Program
County Boundaries:
Maryland Department of Planning, 2006

N

0 1 2 Miles

Susquehanna River Rail Bridge Project

Figure E-6
Aquatic Monitoring Stations within the Vicinity of the Existing Susquehanna River Bridge

(Cerco and Noel 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 Conowingo Project has limited active storage available due to reservoir size and a relatively small allowable variation in headwater level. Additionally, the Conowingo Project must also maintain certain minimum flows downstream of the dam: 3,500 cubic feet per second (cfs) or natural river flow in March; 10,000 cfs or natural river flow, whichever is less in April; 7,500 cfs or natural river flow in May; 5,000 cfs or natural river flow, whichever is less from June 1 through September 14; 3,500 cfs or natural river flow, whichever is less from September 15 to November 30; and 3,500 cfs intermittent from December 1 through February 28 (NAI and Gomez and Sullivan 2011a). Mean Susquehanna River flow recorded at Conowingo (USGS gage 01578310) located just downstream of the Conowingo Dam was about 41,233 cfs for the period between January 1, 2008 and November 11, 2013. The average flow at Havre de Grace is 40,100 cfs (SRBC 2013). According to USGS, the mean river discharge is 65,700 cubic feet per second (cfs) averaged over 46 years of records at the Conowingo Dam, 9.9 miles upstream from the mouth. Minimum discharge was 10,700 cfs in 1993 and the maximum was 330,000 cfs in 1975 (USGS 2014).

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. Wind and other climatic events can disrupt this pattern (Cerco et al. 2013; USEPA 2004) and during storm events, with large discharges of freshwater all water depths within the Upper Bay flow south (STAC 2000). The mean tide range in the Bay decreases from about 2.5 feet at the mouth to less than 1.3 feet in the Upper Bay (Cerco et al. 2013). The Lower Susquehanna is tidal up to the northern end of Robert Island to the north of Port Deposit, where Deer Creek discharges to the river on the western bank (Gomez and Sullivan Engineers, P.C. 2011). Salinity within the Bay ranges from marine levels at the mouth to freshwater in the Upper Bay in the vicinity of the Susquehanna River (Cerco et al. 2013, Chesapeake Bay Program 2016).

Within the study area, the tide ranges from 0.2 feet at Mean Low Water (MLW) to 2.1 feet at Mean High Water (MHW) at Havre de Grace. The Susquehanna River is tidal at Havre de Grace with a mean semi-diurnal variation of 2.1 feet and approximately 2.5 feet during spring neap tides. The Susquehanna River empties into the head of Chesapeake Bay from northwestward. The entrance is between Concord Point and Perry Point, one mile east-northeastward.

Bathymetry of Susquehanna River

A review of the NOAA Nautical Chart: Head of the Chesapeake Bay (NOAA Chart 12274) was conducted to determine approximate bathymetry for the Susquehanna River within the vicinity of the study area. The Upper Bay in the Susquehanna Flats (shallow waters at the mouth of the Susquehanna River) region is shallow, ranging from about 0.5 feet to 10 feet at Mean Lower Low Water (MLLW). Deeper channels exist along the borders of this shallow region, ranging in depth from 16 to 35 feet at MLLW on the west side and from 15 to 30 feet at MLLW on the east side. At Turkey Point, south of the Susquehanna Flats, depths range from three feet at MLLW in the shallows near the banks to about 22 feet in the deeper channel (NOAA Chart 12274).

In the vicinity of 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. Where the Susquehanna River discharges to the Upper Bay, water depths are up to approximately 42 feet at MLLW, and decrease rapidly to the shallow depths of the Susquehanna Flats area of the Upper Bay (NOAA Chart 12274).

Maryland's Tier II High Quality Waters

Maryland's Antidegradation Policy under COMAR 26.08.02.04 was implemented due to required water quality standards under the Clean Water Act. The Antidegradation Policy requires the State of Maryland to identify Tier II Waters where water quality is better than the minimum requirements and where water quality should be maintained. The Proposed Project area is located along the southern edge of the Mill Creek 1 and Principio Creek 3 Tier II Catchments in Cecil County. The MDE regulates activities with potential discharges or impacts to water quality within Tier II catchments.

b. Groundwater

The groundwater system is controlled by the thickness of the residual weathered bedrock (saprolite) and the degree of fracturing in the bedrock. The saprolite is usually thickest on hilltops and slopes and thinnest in valleys. The saprolite is relatively porous and permeable, and acts as a source of recharge to the bedrock below. Where the saprolite is saturated, groundwater occupies the spaces between unconsolidated soil particles and rock fragments and is under unconfined conditions. The flow water table water-bearing zone generally mimics the land surface contours.

In contrast, groundwater in the bedrock is only in secondary porosity caused by stresses and weak spots. The number and size of the voids determine the secondary porosity of the bedrock; the degree to which the openings are interconnected determines its secondary permeability, and hence groundwater yield. Groundwater in bedrock is commonly under confined conditions due to the essentially impermeable bedrock on the sides of the voids. However, because there are no well-defined, continuous confining beds and because the degree of hydraulic connection between the saprolite and the secondary openings in the underlying bedrock is generally high, the entire groundwater flow system may be considered one complex unconfined aquifer.

The flow system is recharged by precipitation that infiltrates the saprolite and percolates to the water table unit. Frequently, this groundwater is of poor quality and low yield. The bedrock, on the other hand, has very low primary porosity and is less permeable than the saprolite. The number, size, and interconnection of the secondary openings differ with depth below land surface and with topographic setting. Secondary porosity and permeability decrease with depth owing to the increase in pressure and the decrease in weathering and solution. Also, secondary porosity and permeability are relatively low under hilltops and relatively high under draws and valleys.

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.

Wellhead Protection Areas

A wellhead protection area (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. Designation of WHPA has been established under the Safe Drinking Water Act and is implemented through the Maryland Department of the Environment (MDE). Existing and potential sources of contamination are identified for each WHPA which may include: underground storage tanks, sources of discharge to septic systems, agricultural operations, solid waste disposal facilities, and abandoned wells. Limited data is available regarding existing wellhead protection areas within the vicinity of the study area. However, several Source Water Assessment Program (SWAP) reports have been prepared for communities in both Harford and Cecil Counties. The intent of the SWAP reports are to document to delineate the area that contributes to the water source, identify potential sources of contamination and susceptibility of the water supply to contamination. SWAP reports completed within the vicinity of the study area include:

- Swan Harbor Dell Mobile Home Community, Harford County (2003)
- Havre De Grace, Harford County (2003)
- Chestnut Estates Mobile Home Park, Cecil County (2003)
- Perryville, Cecil County (2003)

c. Water Quality

Water quality of the Chesapeake Bay is poor—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 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 TMDL is required under the Clean Water Act and responds to consent decrees in Virginia and the District of Columbia from the late 1990s. It is also the principal component of a federal strategy to meet Executive Order 13508. It sets watershed limits of 185.9 million pounds of nitrogen, 12.5 million pounds of phosphorus, and 6.45 billion pounds of sediment per year. The pollution limits are further divided by jurisdiction and major river basin based on modeling, extensive monitoring data, peer-reviewed science, and close interaction with jurisdiction partners (USEPA 2010).

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.[3]

The Proposed 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. There are no Maryland Biological Stream Survey (MBSS) sites in the unnamed tributary to Swan Creek, but volunteer monitoring data shows the benthic Index of

[3] 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.

Biotic Integrity (IBI) is "Fair." Similarly, in the unnamed tributary to Gashey's Creek there are no MBSS sites, but volunteer monitoring data shows the benthic IBI is "Poor." According to MBSS data, fish and benthic IBIs for Gashey's Creek within the rail corridor are both defined as "Poor." Habitat quality including instream habitat, epifaunal substrate, and pool quality are Optimal, and velocity/depth diversity and riffle quality are Suboptimal. Within the unnamed tributary to Lily Run there are no MBSS sites, though volunteer monitoring shows the benthic IBI is "Poor" (labeled as Lillie [sic] Run in volunteer data). No MBSS or volunteer monitoring sites are located in Lily Run near the rail corridor. There are no MBSS sites in Mill Creek near the rail corridor on the eastern shore of the Susquehanna, but volunteer monitoring data shows that the benthic IBI is "Fair." Principio Creek is tidal within the rail corridor, and its tributaries near the site are classified as Use III streams (natural trout waters). Principio Creek has "Good" IBIs for both fish and benthic invertebrates; instream habitat, epifaunal substrate, velocity/depth diversity, pool quality, and riffle quality are all defined as Optimal according to MBSS data.

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). A draft TMDL for PCBs is currently under development to support the "fishing" designated use of the Lower Susquehanna River, which is protective of human health related to the consumption of fish (MDE 2013). The Lower Susquehanna River was listed in 1996 by MDE as impaired by cadmium. However, this impairment listing was removed in 2009 after further studies indicated that cadmium levels within the Lower Susquehanna River segment remained below water quality criteria.

The Susquehanna River is used as a public water supply source by the City of Havre de Grace and Town of Perryville. The City of Havre de Grace water treatment plant also supplies drinking water to Harford County. Municipal wastewater treatment plants (WWTP) discharging to the Lower Susquehanna and the Upper Bay include the Aberdeen Advanced WWTP (NPDES MD0021563), Aberdeen Proving Ground (NPDES MD0021237), the Havre de Grace WWTP (NPDES MD0021750), and the Perryville WWTP (NPDES MD0020613) (MDE 2010).

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. The nutrient impairment was further refined on Maryland's 2008 list to indicate that phosphorus was the specific nutrient for which the listing was made. After further studies, MDE's water quality analysis indicated that the impairments for both phosphorus and sediment should be removed. The USEPA agreed in letters dated May 18, 2012. 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 2010 Chesapeake Bay TMDL allocates a total nitrogen load of 1,466,462 lbs/yr, a total phosphorus load of 70,734 lbs/yr, and a TSS load of 70,310,967 lbs/yr for the portion of the Upper Bay within the study area (MDE 2010).

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 report card combines multiple water quality and habitat indicators into a single score for 15 regions of the Bay; scores are presented in numeric and narrative formats. Indicators include: chlorophyll-*a*, SAV, dissolved oxygen (DO), Benthic Index of Biological Integrity, water clarity, total nitrogen, total phosphorus, and Bay Health Index. Chlorophyll-*a* is used as a measure of phytoplankton biomass, excess levels of which can lead to reduced water clarity and DO levels. Aquatic grasses and Benthic Index of Biological Integrity give a picture of available habitat conditions. Water clarity, DO, total nitrogen, and total phosphorus are important water quality parameters that affect the quality of aquatic life. The Bay Health Index is an average of the other seven indicators. In 2015, the Upper Bay received scores of 58 percent for total nitrogen ("C"), 23 percent for water clarity ("D"), 35 percent for chlorophyll-*a* ("D"), 39 percent for aquatic grasses ("D"), 61 percent for benthic habitat ("B"), 70 percent for total phosphorus ("B"), and 88 percent for DO ("A"). The overall Bay Health score in 2015 for all regions of the Bay combined was 53 percent, or a C, which was improved from 50 in 2014.

DNR conducts regular water quality monitoring of tidal tributaries and the mainstem of the Chesapeake Bay. Sampling for various forms of the nutrient elements (e.g., nitrogen, phosphorus, carbon), the photosynthetic pigment chlorophyll *a*, silicon, suspended solids, and water clarity and/or turbidity, in addition to water temperature, conductivity, salinity, DO, and pH, began in June 1984. Sampling at each station was conducted biweekly during spring, summer, and fall months, and monthly during the winter. ***Table E-13*** summaries water quality monitoring data for water temperature, DO, and chlorophyll-*a*, three parameters important to survival of aquatic life, and parameters related to the Chesapeake Bay TMDL (Total Nitrogen [TN], Total Phosphorous [TP], and TSS) for one DNR sampling stations on the Lower Susquehanna River (CB1.0 at Conowingo Dam), two Chesapeake Bay mainstem sampling locations within the study area (CB1.1 at the mouth of the Susquehanna River, midchannel, and CB2.1 at Elk Neck State Park, just southeast of the Susquehanna Flats) (see ***Figure E-6***) for a five year period (August 5, 2008 through July 31, 2013). Sampling of surface and bottom waters was conducted at Stations CB1.1 and CB2.1. Only sampling of the surface was conducted at the Conowingo Dam station, CB1.0.

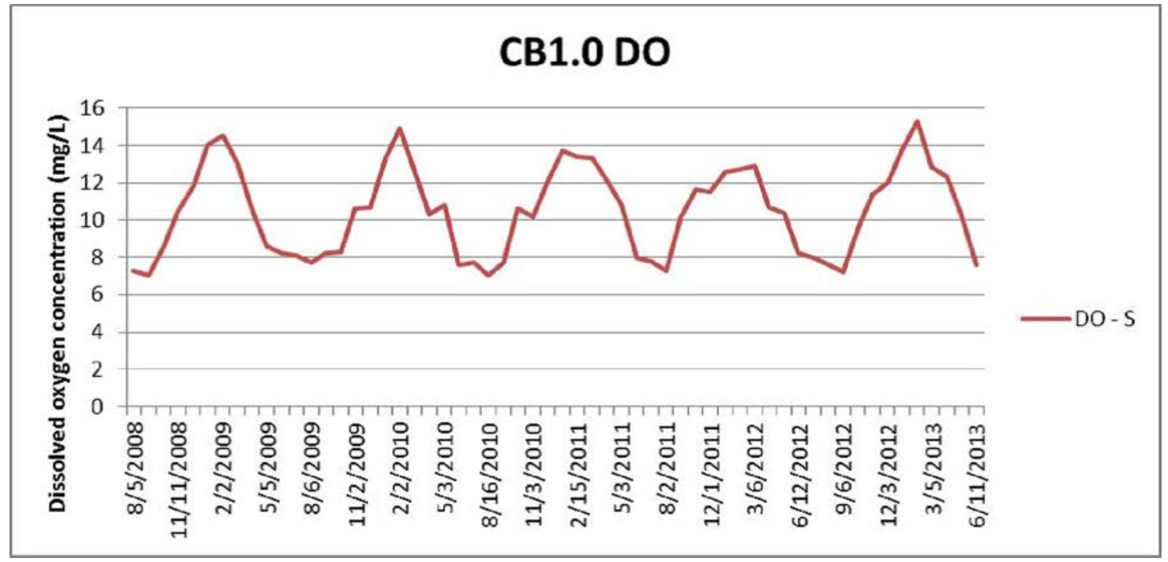
Figures E-7 through E-10 show the seasonal variation of DO, total suspended solids, and total nitrogen and phosphorous from 2008 through 2013. Measurements taken on September 7 and 8, 2011 were excluded from analysis; these data were collected immediately following flooding from Tropical Storm Lee and are not representative of typical conditions. DO concentrations were always above the criteria, were fairly similar at surface, mid, and bottom depths for the Upper Bay stations, peaked in late winter to early spring and were lowest during the summer, typically in August (***Figure E-7***).

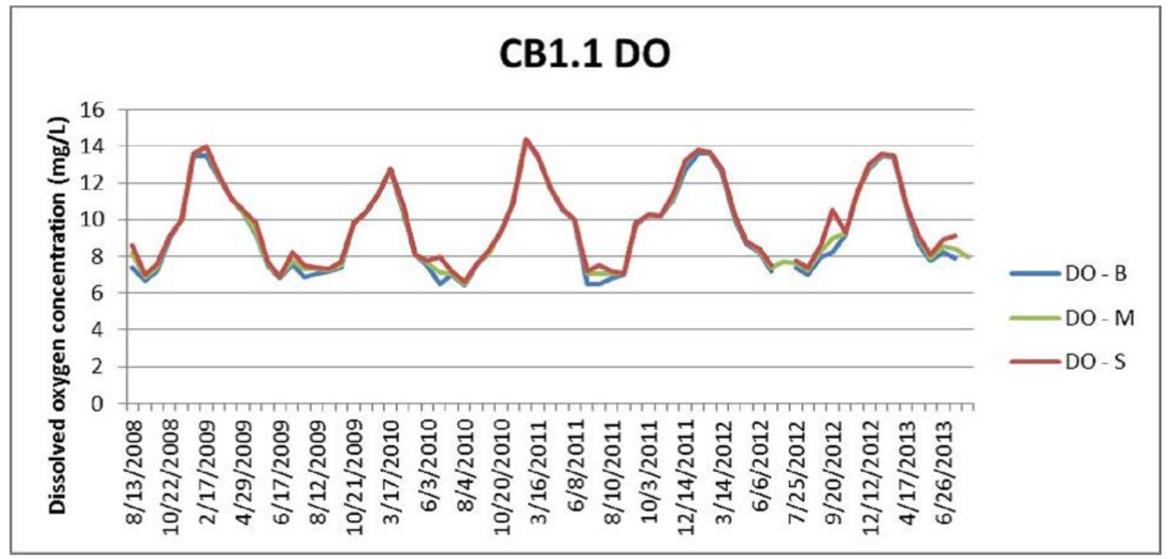
TSS (***Figure E-8***) concentrations at Conowingo Dam (CB1.0) fluctuated over the course of the time period, with the highest discharges typically in the spring and fall. The Upper Bay station at the mouth of the Susquehanna River (CB1.1) showed greater fluctuation in TSS concentration than the Conowingo Dam Station, but surface and bottom concentrations were fairly similar and peak concentrations generally occurred in the spring and fall. The Upper Bay station at the southern end of the study area, CB2.1, showed the greatest fluctuation, with substantially higher bottom than surface concentrations.

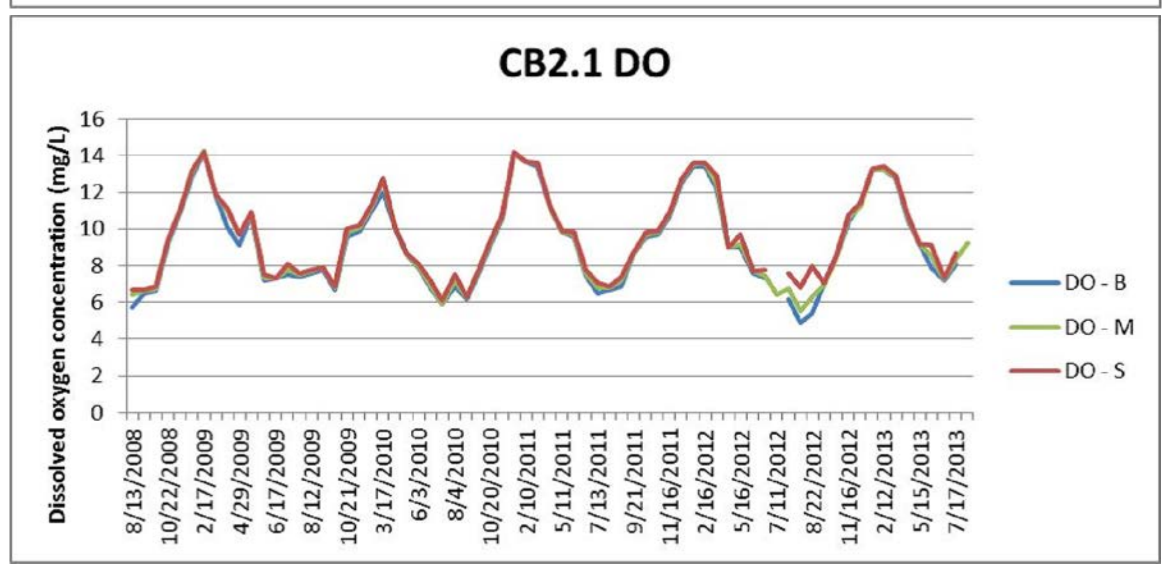
This station is located within the area of the Chesapeake Bay Estuarine Turbidity Maximum (ETM), generally located between Turkey Point and Tolchester, Maryland, which likely contributes to the higher TSS concentrations. ETM traps particles of intermediate settling speeds—larger particles from the Susquehanna River settle out in the Susquehanna Flats before reaching the ETM, smaller slow settling particles are carried through the ETM toward the Atlantic Ocean (STAC 2000).

Excess nutrients, especially nitrogen and phosphorus, can lead to eutrophication and excess growth of plant matter. When these plants decompose, the decomposition process depletes the water of available oxygen, which can lead to hypoxic (low DO) or anoxic (lack of DO) conditions and result in a loss of aquatic life. National criteria have not been established for total nitrogen or phosphorus; however, USEPA has recommended a desired goal of 0.1 mg/L for total phosphorus and 0.38 mg/L for total nitrogen (USEPA 2013).

Maryland has not set water quality standards for either nitrogen or phosphorus in either dissolved or particulate forms, but reduction of these nutrients has been a major focus of the Chesapeake Bay TMDL efforts. Surface and bottom values were fairly similar for both total nitrogen and total phosphorus at the Upper Bay stations, with peak concentrations usually occurring in the fall and early spring (***Figures E-9 and E-10***). The highest concentration of total nitrogen was 2.3 mg/L and occurred at Station CB1.0. The highest concentration of total phosphorus was 0.12 mg/L and occurred at Station CB2.1. Nutrient loads from the Susquehanna River are the major source of nutrients to the mainstem of the Bay, with the

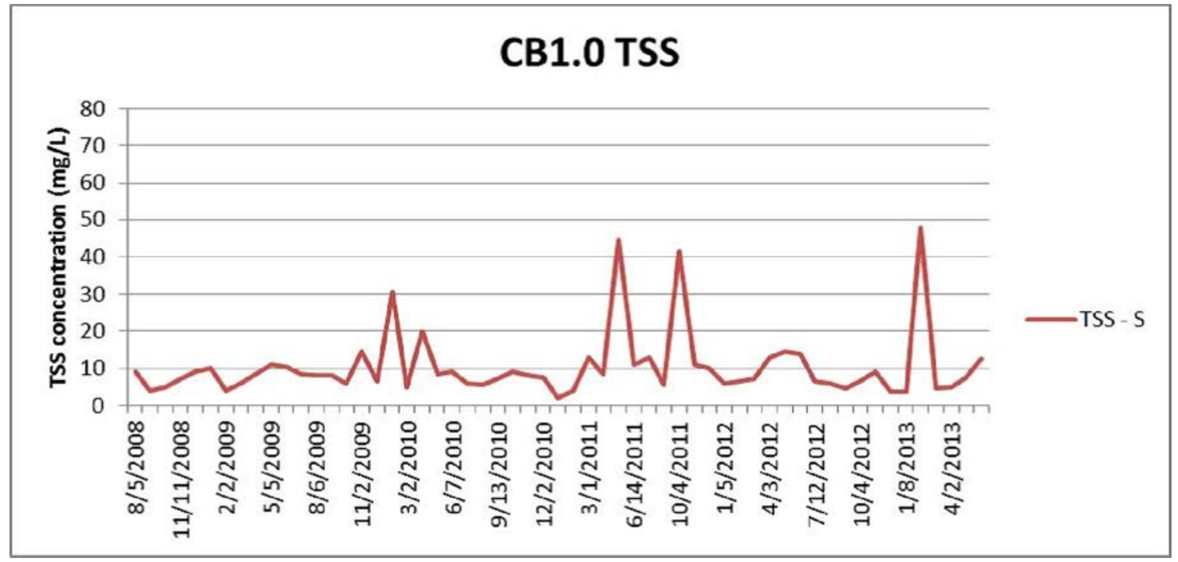


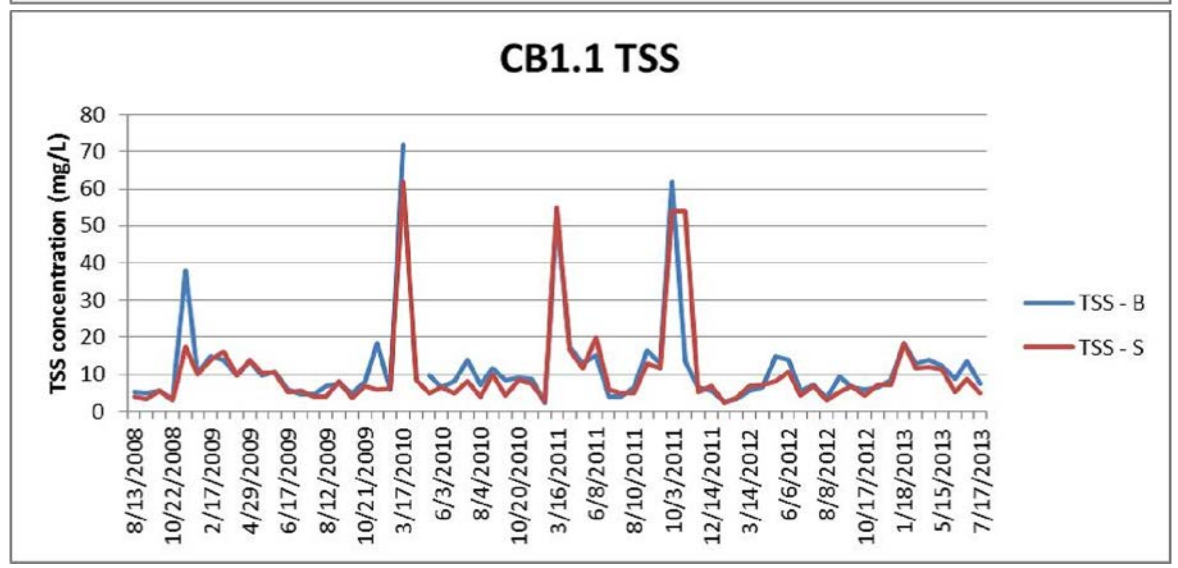


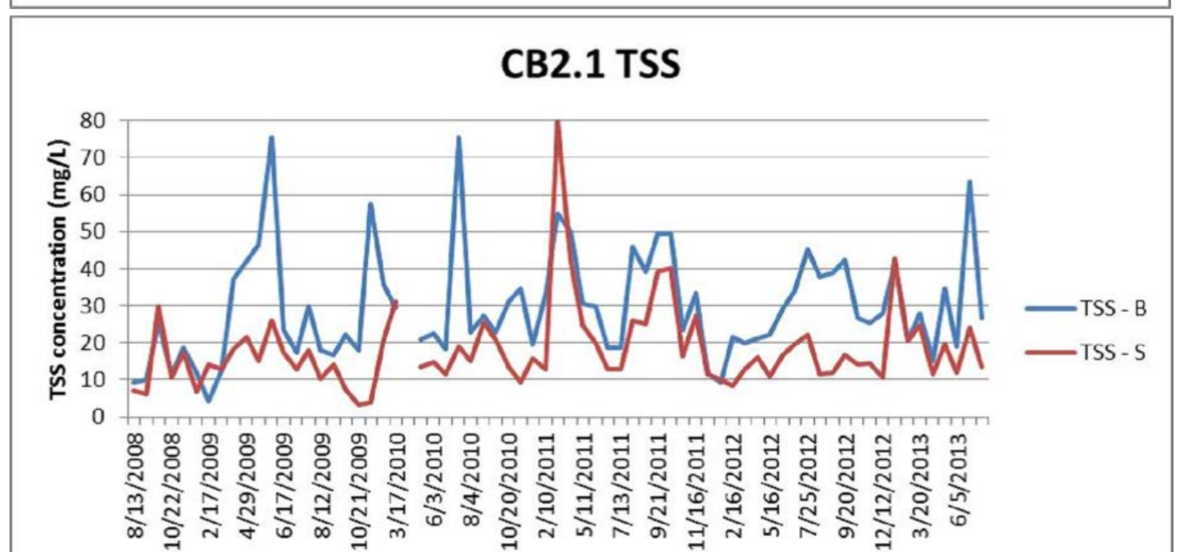


Susquehanna River Rail Bridge Project

Figures E-7
Dissolved Oxygen
2008 through 2013

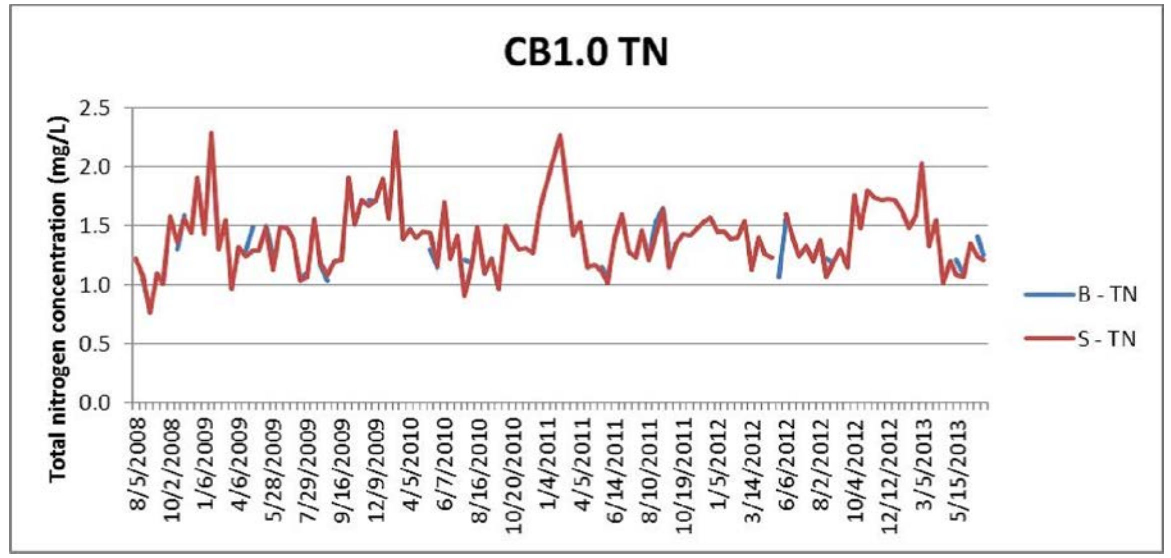


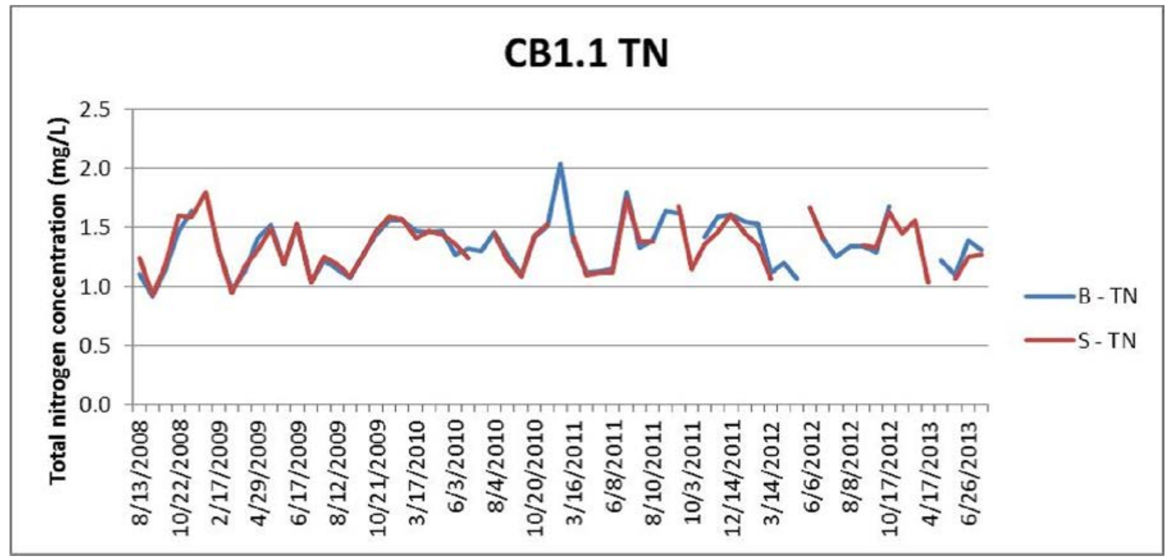


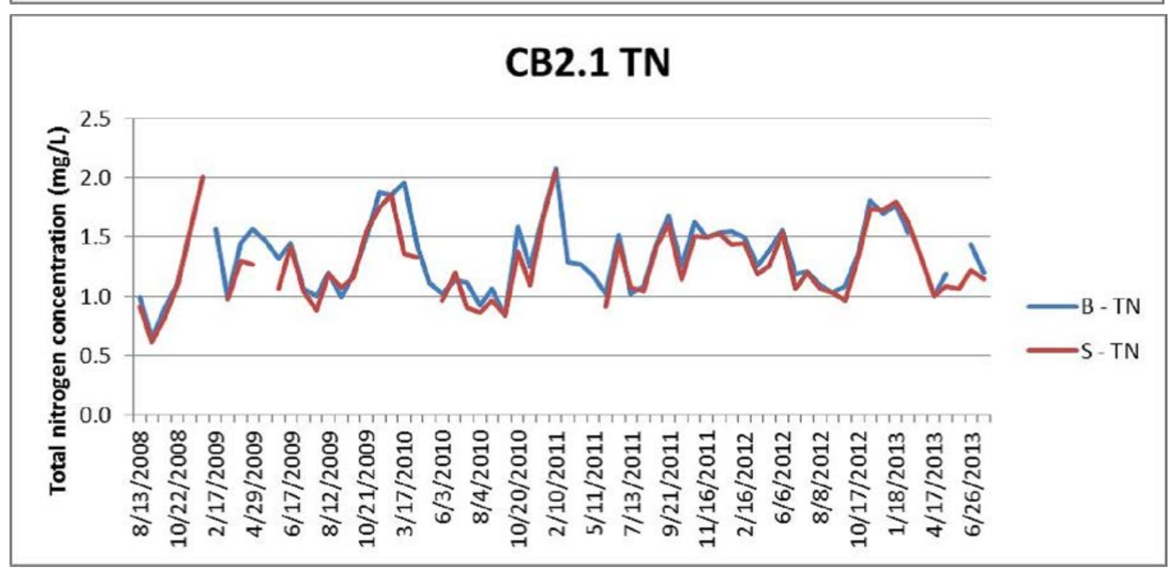


Susquehanna River
Rail Bridge Project

Figures E-8
Total Suspended
Solid Concentrations
2008 through 2013



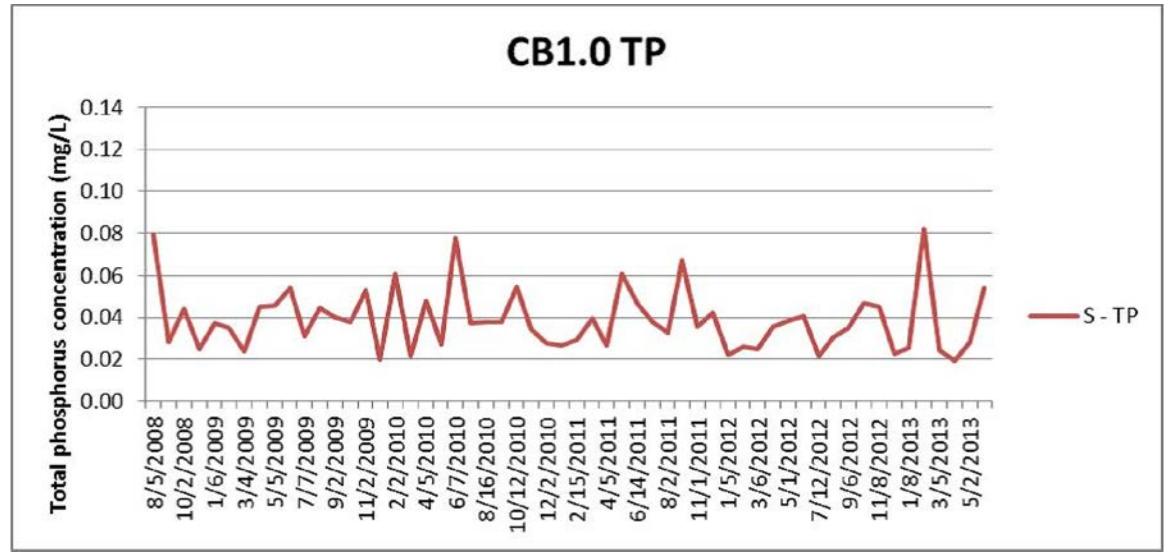


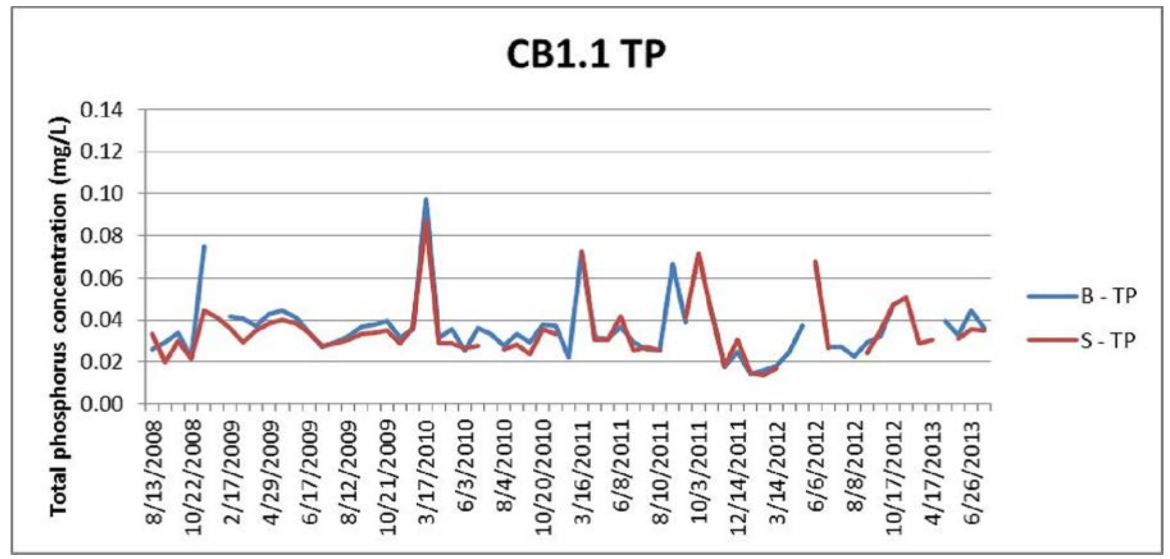


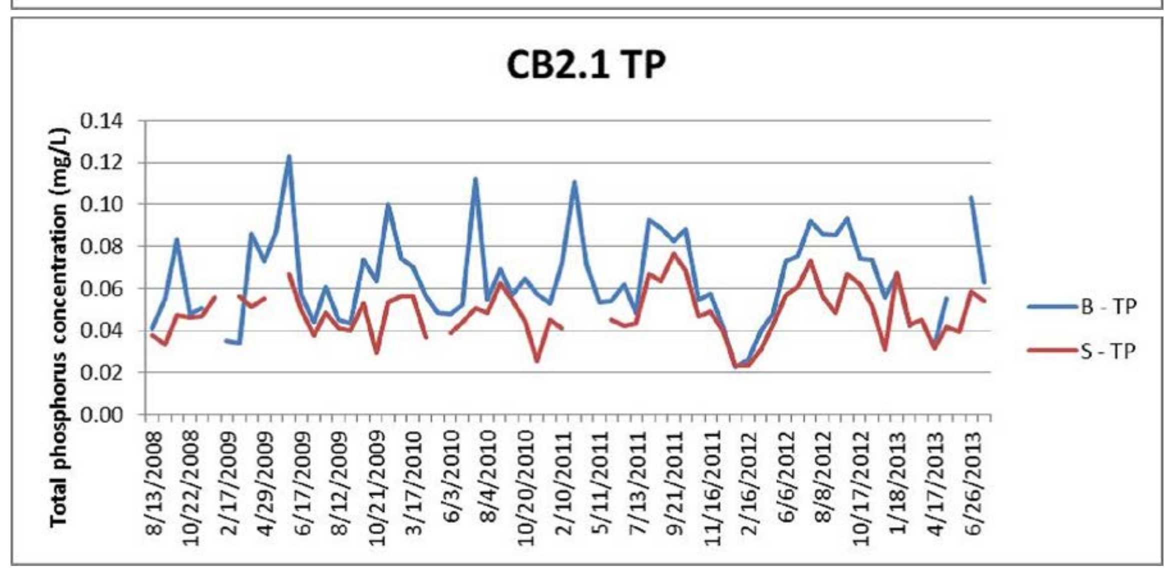
Susquehanna River Rail Bridge Project

Figures E-9

Total Nitrogen Concentration 2008 through 2013







Susquehanna River Rail Bridge Project

Figures E-10
Total Phospherous Concentrations
2008 through 2013

largest contributions occurring during times of largest flows (Cerco and Noel 2013).

Table E-13
Water Quality Measurements for Stations in the Lower Susquehanna River and Upper Chesapeake Bay, August 2008 – July 2013

Parameter	Position in Water Column	Station CB1.0 (Conowingo Dam)				Station CB1.1 (Mouth of Susquehanna River)				Station CB2.1 (Chesapeake Bay at Elk Neck State Park)			
		Min	Max	Avg	Use Class II-P Criteria	Min	Max	Avg	Use Class II-P Criteria	Min	Max	Avg	Use Class II-P Criteria
Water temperature (°C)	Surface	0.7	31.4	15.0	NC	2	30.2	18.0	NC	0.1	29.7	17.2	NC
	Bottom	-	-	-		2	29.9	17.8		0.1	29.5	17.1	
Dissolved oxygen (mg/L)	Surface	7	15.3	10.5	5	6.6	14.4	9.7	5**	6.1	14.2	9.6	5**
	Mid	-	-	-		6.5	14.4	9.6		5.1	14.3	9.4	
	Bottom	-	-	-		6.4	14.3	9.5		4.9	14.2	9.3	
Chlorophyll-*a* (micrograms/L)	Surface	0.9	31.6	6.3	NC	0.9	27.3	8.5	NC	1.5	31.1	10.2	NC
	Bottom	-	-	-		0.8	27.8	7.3		1.5	28.8	11.8	
Total suspended solids (mg/L)	Surface	1.5	49	22.4	NC	2.4	62	10.7	NC	3.1	80	18.2	NC
	Bottom	-	-	-		2.4	72	11.8		4.3	75.5	29.5	
Total nitrogen (mg/L)	Surface	1.1	2.33	1.5	0.38***	0.9	1.8	1.3	0.38***	0.6	2.1	1.3	0.38***
	Bottom	-	-	-		0.9	2.0	1.3		0.6	2.1	1.3	
Total dissolved nitrogen (mg/L)	Surface	0.9	2.26	1.4	NC	0.8	1.7	1.2	NC	0.5	1.9	1.1	NC
	Bottom	-	-	-		0.8	2.0	1.2		0.5	1.7	1.1	
Total phosphorus (mg/L)	Surface	0.01	0.08	0.04	0.1***	0.01	0.09	0.03	0.1***	0.02	0.11	0.05	0.1***
	Bottom	-	-	-		0.01	0.10	0.04		0.02	0.12	0.07	
Total dissolved phosphorus (mg/L)	Surface	0.006	0.057	0.017	NC	0.005	0.039	0.013	NC	0.006	0.040	0.018	NC
	Bottom	-	-	-		0.004	0.035	0.012		0.006	0.044	0.021	

Notes: Avg = average NC – denotes no criteria for that parameter

* Measurements taken on September 7 and 8, 2011 were excluded from analysis; these data were collected immediately following flooding from Tropical Storm Lee and are not representative of typical conditions.

** Because multiple subcategories, each with their own criteria, apply to the CB1.1 and CB2.1 stations, the most protective criteria would be enforced. These stations are subject to additional DO criteria based on the use class subcategories. For Migratory Spawning & Nursery Use, DO must be greater than or equal to 5 mg/L as an instantaneous minimum and must have a 7-day average of at least 6 mg/L between February 1st and May 31st. For both Shallow Water SAV Use and Open Water Fish & Shellfish Use, DO must be at least 5.5 mg/L as a 30-day average, at least 4 mg/L as a 7-day average, and at least 3.2 mg/L as an instantaneous minimum.

*** In lieu of national criteria, which have not yet been established for total nitrogen or total phosphorus, USEPA has recommended a desired goal of 0.38 mg/L for TN and 0.1 mg/L for TP.

TN comprises all forms of nitrogen in a waterbody, including both dissolved and particulate forms. TDN comprises the forms of nitrogen that will pass through a filter, including ammonia, nitrate, and nitrite. TP comprises both soluble and insoluble forms of phosphorus in a sample, including orthophosphate, condensed phosphate, and organic phosphate. TDP is a measurement of organic and inorganic phosphorus that will pass through a filter.

Sources: Chesapeake Bay Program Water Quality Database

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). However, in the marginal shallow areas of the bay (depths less than 11 feet), mechanical energy tends to be higher and sediments are generally sand-sized (STAC 2000). The sediments in the Upper Bay comprise fine grain sediments of the Susquehanna Flats with between 0 and 20 percent silt and clay, and finer grained sediments toward the southern end of the study area with between 20 and 80 percent silt and clay (Hartwell and Hameedi 2007; STAC 2000).

The rate of sediment deposition throughout much of the bay is less than about 0.06 inches/year. Deeper channel regions show higher rates of accumulation, approaching about 0.2 inches/year in the middle and lower portions of the estuary. In the Upper Bay, however, rates of sediment accumulation are influenced by the large sediment loads supplied by the Susquehanna River. Between 1980 and 2000, the mean annual discharge of sediment from the Susquehanna River was 1.31 million metric tons per year (Mt/y), with a median annual discharge of 0.95 Mt/y (STAC 2000). Sediment accumulation in the Upper Bay reaches an average of about 2 to 3 inches/year, with significantly higher rates, up to 7 inches/year, in deeper maintained shipping channels (STAC 2000). In general, sediment accumulation rates in the upper Bay are 2 to 10 times higher than sedimentation rates in the middle and lower Bay, and sediment that accumulates in the Upper Bay tends to remain settled for longer than it would in other areas farther downstream (Hartwell and Hameedi 2007). Almost all of the sediment delivered by the Susquehanna River is deposited north of Baltimore, with higher rates of accumulation of finer materials in the deeper channels.

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). Depositional areas in the Susquehanna Flats region and the upper portions of the deep trough of the mainstem, two areas where sedimentation rates are high and sediments are fine grained, have higher concentrations of contaminants (e.g., Polycyclic Aromatic Hydrocarbons [PAHs], PCBs, dichlorodiphenyltrichloroethane [DDT], pesticides and metals) than the middle and lower Bay (Hartwell and Hameedi 2007). 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).

e. Aquatic Biota

Phytoplankton & Zooplankton

Phytoplankton are microscopic plants whose movements within the system are largely governed by prevailing tides and currents. Several species can reach larger sizes as chains or in colonial forms. Light penetration, turbidity and nutrient concentrations are important factors in determining phytoplankton productivity and biomass. Phytoplankton are most abundant within the Chesapeake Bay during spring, as a result of the high level of nutrients washed into the Bay from snow melt and rain. In 2012, *Cyclotella* spp, and *Synechococcus* spp., were the most abundant phytoplankton throughout much of the year, along with unidentified flagellates, particularly in the spring at Station CB2.1 located at the southern end of the study area. *Cyclotella*, *Diatoma*, *Melosira*, *Cyanobium*, *Kirchneriella*, and unidentified flagellates were the most abundant phytoplankton within the Upper Bay in 2010 and 2011 (DNR 2012).

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 (*Bosmina longirostris*, *Diaphanosoma leuchtenbergianus*, *Moina micrura*), cyclopoid Copepods (*Cyclops bicuspidatus*, *Mesocyclops edax*, *Cyclops vernalis*), and calanoid Copepods (*Eurytemora affinis*) are the most abundant zooplankton within the freshwater portions of the Chesapeake Bay. Cladocerans are the most numerically abundant in the warmer months and the calanoid copepod *Eurytemora affinis* is usually the most numerically abundant zooplankton in the winter months (DNR 2014b).

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 (Ephemerellidae), non-biting midges (*Cricotopus* spp. and *Orthocladius* spp.), blackflies (Simuliidae), and caddisflies (*Cheumatopsyche* spp.). The most common taxa found by the Maryland Biological Stream Survey was a burrowing mayfly, which occurred in 86 percent of samples taken throughout the basin, followed by non-biting midges at 78 percent (Millard et al. 1999). Other macroinvertebrates collected within the Lower Susquehanna River include the primitive flatworm (*Dugesia* spp.), and oligochaete worms (*Nais* spp.) (NAI and Gomez and Sullivan 2012). At the mouth of the Susquehanna River, benthic macroinvertebrates are found at extremely low numbers possibly due to low residence time resulting from high river flow (Versar and CES 1995). 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). Within the Susquehanna Flats, the most abundant benthic invertebrates sampled between 2009 and 2013 belonged to the Gammaridae and Tubificidae families. *Gammarus daiberi* was the most common species collected, comprising about 36 percent of the total (CBP 2014). 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.

Maryland Stream Waders data show that mayflies (32 percent) and midges (Chironomidae; 32 percent) are the most common macroinvertebrates in Mill Creek near its confluence with the Bay on the eastern shore of the Susquehanna. Blackflies and stoneflies (*Acroneuria* spp. and *Strophopteryx* spp.) were also found, each comprising about 5 percent of samples. Caddisflies (20.5 percent) were the most common macroinvertebrates found in MBSS samples from Principio Creek, followed by midges (*Orthocladius* spp. and *Hydrobaenus* spp.; 16.9 percent total) and stoneflies (9 percent total). Blackflies and mayflies were found in smaller numbers, comprising about 7.1 percent and 3.6 percent of samples, respectively. Benthic IBI data were not provided for Gashey’s Creek, on the western shore of the Susquehanna.

Submerged Aquatic Vegetation (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, providing food and shelter for waterfowl, fish, shellfish and invertebrates, by addition oxygen to the water, and by their capacity to trap sediments, absorb nutrients, and reduce erosion (USEPA 2004). SAV have high light requirements and are adversely affected by suspended sediment, due to surface deposits of sediment on leaves and by the attenuation of light that occurs with increased turbidity. Suspended sediments have the greatest potential to adversely affect SAV during the growing period (March to November), and have less potential to adversely affect them outside this period when light requirements are low due to decreased metabolic rates (STAC 2000). More than 20 species of bay grasses grow in the Bay and its tributaries, with more diversity in less saline areas. Widgeon grass (*Ruppia maritima*), Eurasian watermilfoil (*Myriophyllum spicatum*), sago pondweed (*Stuckenia pectinata*), redhead grass (*Potamogeton perfoliatus*), Curly pondweed (*Potamogeton crispus*), Slender pondweed (*Potamogeton pusillus*), horned pondweed (*Zannichellia palustris*), wild celery (*Vallisneria americana*), common elodea (*Elodea canadensis*), coontail (*Ceratophyllum demersum*), hydrilla (*Hydrilla verticillata*), water stargrass (*Heteranthera dubia*), southern naiad (*Najas guadalupensis*), brittle waternymph (*Najas minor*), slender waternymph (*Najas gracillima*), and at least one other species of *Najas* sp. are the SAV species present within the Upper and Middle

Bay (VIMS 2013). 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).

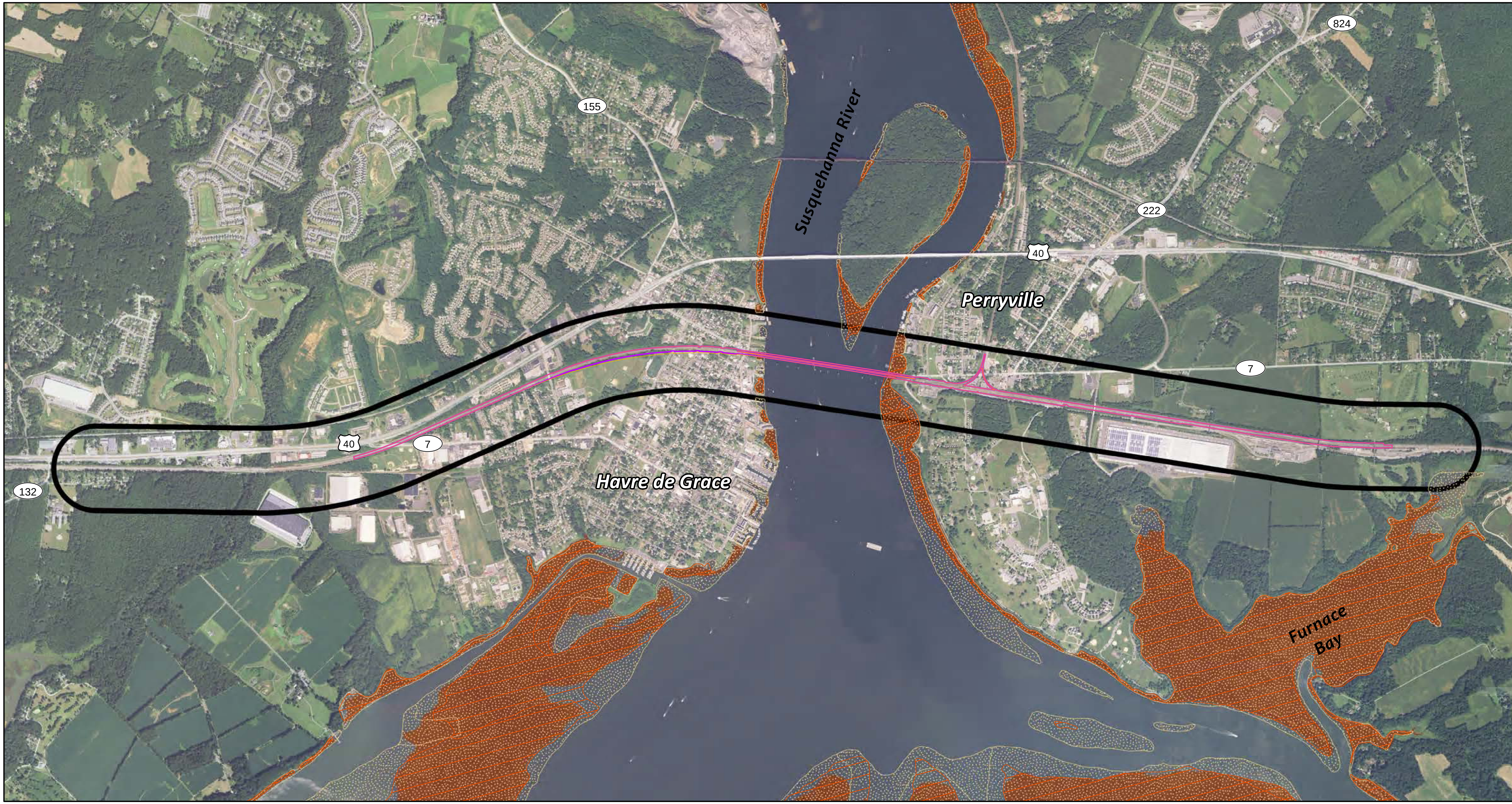
Presence and density of SAV vary from year to year and are mapped annually within the Chesapeake Bay (VIMS 2013). ***Figure E-11*** presents the distribution of SAV within the study area in 2009, 2012, and 2013. Over a five-year period (2009 to 2013), the location of the SAV beds in the Lower Susquehanna River portion of the study area have remained relatively consistent, except for a decrease in coverage in 2011 and 2012. Again with the exception of 2011 and 2012, SAV density within the beds has also remained consistent. Bed densities were generally dense (70 to 100 percent coverage) from 2009 through 2010, and decreased to very sparse (0 to 10 percent), sparse (10 to 40 percent) and moderate (40 to 70 percent) density classes in 2011 and 2012. Within the Upper Bay/Susquehanna Flats portion of the study area, SAV beds have shown a similar decrease in areal extent and density with the majority of the Susquehanna Flats bed remaining at dense cover where present. The changes in SAV beds in 2011 reflect the effects of Hurricane Irene in August and Tropical Storm Lee in September that resulted in high turbidity and deposition of large amounts of sediment in the system (VIMS 2013). Projected SAV coverage in 2014 is similar to that of 2013. However, the unconfirmed 2014 SAV results indicate that no SAV occurred under the existing Amtrak bridge on the Cecil County side and SAV occurred both upstream and downstream of the Amtrak bridge on the Harford County side.

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 (*Crassostrea virginica*). 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). A number of semi-anadromous and anadromous species have been documented as spawning near and/or migrating through the study area, including: yellow perch (*Perca flavescens*), white perch *(Morone americana*), blueback herring (*Alosa aestivalis)*, alewife (*Alosa pseudoharengus)*, and American shad *(Alosa sapidissima)*. Game fish known to occur in the mainstem of the Susquehanna River include striped bass (*Morone saxatilis*), walleye (*Sander vitreus)*, largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*) and catfish species (Siluriformes) (DNR 2014c). ***Table E-14*** lists the fish taxa known to occur within the study area.



Legend

- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Submerged Aquatic Vegetation (2009)
- Submerged Aquatic Vegetation (2012)
- Submerged Aquatic Vegetation (2013)

Data Sources

Submerged Aquatic Vegetation: Maryland Department of Natural Resources
Imagery: 2015 National Agriculture Imagery Program (NAIP)

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Figure E-11

Submerged Aquatic Vegetation

Table E-14
Fish of the Lower Susquehanna River and Susquehanna Flats

Common Name	Scientific Name	Common Name	Scientific Name
Alewife	*Alosa pseudoharengus*	Inland silverside	*Menidia beryllina*
American eel	*Anguilla rostrata*	Inshore lizardfish	*Synodus foetens*
American shad	*Alosa sapidissima*	Killifish	*Fundulus* spp.
Atlantic croaker	*Micropogonias undulatus*	Largemouth bass	*Micropterus salmoides*
Atlantic menhaden	*Brevoortia tyrannus*	Northern pipefish	*Syngnathus fuscus*
Atlantic silverside	*Menidia menidia*	Pumpkinseed	*Lepomis gibbosus*
Atlantic sturgeon	*Acipenser oxyrinchus*	Redear sunfish	*Lepomis microlophus*
Bay anchovy	*Anchoa mitchilli*	Shorthead redhorse	*Moxostoma macrolepidotum*
Black crappie	*Pomoxis nigromaculatus*	Shortnose sturgeon	*Acipenser brevirostrum*
Black drum	*Pogonias cromis*	Smallmouth bass	*Micropterus dolomieu*
Blueback herring	*Alosa aestivalis*	Spot	*Leiostomus xanthurus*
Bluefish	*Pomatomus saltatrix*	Spottail shiner	*Notropis hudsonius*
Bluegill	*Lepomis macrochirus*	Striped anchovy	*Anchoa hepsetus*
Bluespotted sunfish	*Enneacanthus gloriosus*	Striped bass	*Morone saxatilis*
Brown bullhead	*Ameiurus nebulosus*	Summer flounder	*Paralichthys dentatus*
Chain pickerel	*Esox niger*	Tessellated darter	*Etheostoma olmstedi*
Channel catfish	*Ictalurus punctatus*	Walleye	*Sander vitreus*
Common carp	*Cyprinus carpio*	White catfish	*Ictalurus catus*
Eastern silvery minnow	*Hybognathus regius*	White perch	*Morone americana*
Golden shiner	*Notemigonus crysoleucas*	Winter flounder	*Pseudopleuronectes americanus*
Hickory shad	*Alosa mediocris*	Yellow perch	*Perca flavescens*
Hogchoker	*Trinectes maculatus*		

Source: NOAA Maryland Environmental Sensitivity Index Maps 115 and 123 (NOAA 2007)

A large body of data on the fishes of the Lower Susquehanna River is available from decades of electrofishing, fish ladder, gill net, and creel surveys conducted in association with the operation of Conowingo Hydroelectric Project. While the relative abundance of different fish species has fluctuated over time, the most abundant species are generally gizzard shad (*Dorosoma cepedianum*), American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), American eel (*Anguilla rostrata*), white perch (*Morone americana*), channel catfish (*Ictalurus punctatus*), banded killifish (*Fundulus diaphanus*), sunfish (*Lepomis* spp.), largemouth bass (*Micropterus salmoides*), and yellow perch. Common carp (*Cyprinus carpio*), quillback (*Carpiodes cyprinus*), comely shiner (*Notropis amoenus*), walleye, smallmouth bass, alewife (*Alosa pseudoharengus*), sea lamprey (*Petromyzon marinus*), and striped bass also occur within this portion of the river (NAI and Gomez and Sullivan 2012a). Comely shiner is a state-threatened species, but was not specifically referenced as a species of concern on the Proposed Project by the DNR-WHS. Gizzard shad, a pollution tolerant species, has become increasingly abundant in the Lower Susquehanna River since the 1970’s while other species, such as white crappie (*Pomoxis annularis*) and blueback herring, have declined (NAI and Gomez and Sullivan 2012a). The abundance of diadromous species (fish that migrate between fresh and salt waters, e.g., American shad, blueback herring, striped bass, alewife) reflects the importance of the Lower Susquehanna River, the Chesapeake Bay and other Bay tributaries as important spawning and nursery habitat.

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, although they are not protected under the Endangered Species Act. American eels migrate upstream through the Upper Chesapeake Bay region to smaller streams where they grow to adult sizes. They then migrate downstream on spawning runs as adults to the Sargasso Sea region of the Atlantic Ocean. Some eels may reside in the study area long-term (DNR 2014c).

Since the construction of the Conowingo Dam in the 1920s, the Lower Susquehanna River has not supported large runs of Atlantic sturgeon (*Acipenser oxyrinchus*) or shortnose sturgeon (*A. brevirostrum*). 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). Atlantic and shortnose sturgeon are discussed in further detail below, under "Threatened and Endangered Species."

The nontidal and tidal tributaries to the Susquehanna River support a number of fish species found in brackish or freshwater habitats. American eel (50 percent of samples), blacknose dace (*Rhinichthys atratulus*; 20.5 percent), bluegill (*Lepomis macrochirus*; 15.9 percent), creek chub (*Semotilus atromaculatus*; 6.8 percent), green sunfish (*Lepomis cyanellus*; 4.5 percent), and tessellated darter (*Etheostoma olmstedi*; 2.3 percent) dominated MBSS samples collected in Gashey's Creek. Common shiner (*Luxilus cornutus*; 28.2 percent), rosyside dace (*Clinostomus funduloides*; 14.1 percent), tessellated darter (13.3 percent), blacknose dace (12 percent), American eel (9 percent), and white sucker (*Catostomus commersonii*; 8.8 percent) dominated the MBSS samples collected in Principio Creek. Cutlip minnow (*Exoglossum maxillingua*), creek chub, swallowtail shiner (*Notropis procne*), northern hogsucker (*Hypentelium nigricans*), river chub (*Nocomis micropogon*), margined madtom (*Noturus insignis*), pumpkinseed (*Lepomis gibbosus*), satinfin shiner (*Cyprinella analostana*), redbreast sunfish (*Lepomis auritus*), and rainbow trout (*Oncorhynchus mykiss*) were found in smaller numbers within Principio Creek.

Invasive Species

Some of the aquatic invasive species currently known to occur in the Lower Susquehanna River Basin include zebra mussels (*Dreissena polymorpha*), quagga mussels (*Dreissena bugensis*), Asian clam (*Corbicula fluminea*), purple loosestrife (*Lythrum salicaria*), water chestnut (*Eleocharis dulcis*), rusty crayfish (*Orconectes rusticus*), and flathead catfish (*Pylodictis olivaris*). Zebra mussels had spread to the Lower Susquehanna River by 2008 (SRBC 2013).

f. Threatened, Endangered, or Special Concern Aquatic Species/Section 7 Consultation

Federally Listed Species

An on-line Proposed Project review with the U.S. Fish and Wildlife Service (USFWS) indicated that there are no federally listed species within the study area, but critical habitat is present for the federally-endangered Maryland darter (*Etheostoma sellare*). However, Maryland darter has not been found within the study area since 1965, and occurs only in Deer Creek (DNR 2016). The Project Team sent a letter requesting information on threatened and endangered species to NMFS on February 14, 2014. In a response dated March 5, 2014, NMFS identified the Atlantic sturgeon from the Gulf of Maine Distinct Population Segment (DPS) and the loggerhead sea turtle (*Caretta caretta*) as threatened species that may be found within the Chesapeake Bay and mouth of the Susquehanna River and shortnose sturgeon, Atlantic sturgeon (New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPS), Kemp's ridley sea turtle (*Lepidochelys kempi*), green sea turtle (*Chelonia mydas*), and leatherback turtle (*Dermochelys coriacea*) as endangered species that may occur within that area. NMFS noted that "in Maryland waters of the Chesapeake Bay, sea turtles are most often documented in marine and estuarine waters and are not likely to be present in upper reaches of major tributaries because of salinity and prey availability requirements." The study area is located in tidal fresh waters above the estuarine mixing zone where salinities in this area of the Susquehanna Flats and lower Susquehanna River are less than 0.5 parts per thousand year round (Chesapeake Bay Program, 2016). According to Endangered Species Maps provided as Section 7 guidance by NMFS (2016), none of the sea turtle species are expected to occur in the Chesapeake Bay north of Baltimore, which includes the study area in the lower Susquehanna River. While sea turtles are expected to be present in the Chesapeake Bay between April 1 and November 30, there are no confirmed sitings of live sea turtles north of Baltimore. The occasional reported strandings of dead turtles are believed to have been swept north by winds or currents (Aberdeen Proving Ground 1998).

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 (*Scophthalmus aquosus*) (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.

Section 7(a)(2) of the Endangered Species Act (ESA) requires federal agencies to consult on any action that may affect a federally listed endangered or threatened species. Initial stages of this process typically begin with a request to the National Marine Fisheries Service (NMFS) or U.S. Fish and Wildlife Service (USFWS) for information on listed species in the vicinity of the Proposed Project area. This stage may be followed by formal or informal consultation with NMFS or USFWS depending on the degree of potential impacts to listed species as determined by the federal sponsor. Alternatively, if the federal sponsor concludes that the Proposed Project will have “no effect” on listed species, consultation with NMFS or USFWS is not initiated. In the event that consultation is necessary, the federal sponsor evaluates the potential effects of the Proposed Project on listed species, makes a determination, and requests concurrence from NMFS or USFWS.

FRA, as the lead agency of the Proposed Project, initiated informal consultation with NMFS regarding federally listed species on May 10, 2016 (***Attachment E***). Coordination is ongoing. If NMFS concurs with FRA’s determination, Section 7 consultation will be concluded.

Shortnose Sturgeon

Shortnose sturgeon is a federally and state-listed endangered species. Shortnose sturgeon are found along the Atlantic coast of North America in estuaries and large rivers such as the Hudson, Delaware, and Susquehanna (Chesapeake Bay). It is considered "amphidromous" – that is, like anadromous species it spawns in freshwater but regularly enters saltwater. In general, adult shortnose sturgeon occur primarily in either brackish estuarine waters or, more rarely, higher salinity coastal waters, while juveniles tend to remain in the estuary. There are currently 19 riverine populations of shortnose sturgeon recognized by NMFS; however, there does not appear to be a spawning population in the Susquehanna River, only migrants from the Delaware River (Wirgin et al. 2009).

Shortnose sturgeon may occur in the study area year round (NOAA 2007), but are most likely to occur there between January and April based on previous observations (NOAA 2007). Between 1996 and 2008, the USFWS sturgeon reward program captured shortnose sturgeon in the vicinity of the southern portion of the study area in the upper Bay, between Kent Island and the mouth of the Susquehanna River (NMFS 2014). Although they have been reported in the study area, they are thought to be uncommon. For this reason, little is known about the abundance, local home range, or habitat use by shortnose sturgeon in the study area and in the Chesapeake Bay in general (Welsh et al. 2002). Historically, shortnose sturgeon have been observed in the Susquehanna River and in the Susquehanna Flats area of northern Chesapeake Bay just downstream of the river mouth (Dadswell et al. 1984; SRAFRC 2010). More recently, between 1992 and 2004, approximately twenty shortnose sturgeon were reported within the tidal portion of the Susquehanna River and on the Susquehanna Flats; however, there have been no reports of shortnose sturgeon in this area since 2004 (NMFS 1998; NAI and Gomez and Sullivan 2011b). Monitoring for acoustic-tagged sturgeon in the tidal Susquehanna River between March and November 2010 failed to detect any shortnose sturgeon (NAI and Gomez and Sullivan 2011b). Shortnose sturgeon are more likely to occur 9 to 22 miles downstream of the study area and closer to the freshwater-saltwater interface where primary productivity is high (Crance 1986; Sanford et al. 2001). Shortnose sturgeon tracking in another tributary of the

Chesapeake Bay indicated that the sturgeon were predominantly located over mud substrates and were in areas characterized by prolific SAV and algae blooms (NMFS 2014).

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. Because of the presence of dams on many historical spawning rivers, shortnose sturgeon have been observed to spawn in the area just downstream of dams (Kynard et al. 2012; NMFS 2014). The eight shortnose sturgeon reported prior to 2004 occurred in the tidal Susquehanna River just downstream of the Conowingo Dam during winter and spring (January to April). Because adult shortnose sturgeon are known to overwinter just downstream of the spawning grounds, the presence of these fish during the winter and early spring months suggests the presence of overwintering and/or spawning habitat in the river. Spawning habitat is commonly located in waters ranging from 3 to 16 feet deep, with relatively strong currents (1 to 4 feet per second (fps)) and daily mean temperatures of 44 to 58º F, and over substrates composed of coarse gravel or cobble (Crance 1986; NMFS 2014). Suitable spawning area between the Conowingo Dam and I-95 is relatively limited (approximately 19 percent of the available habitat; NAI and Gomez and Sullivan 2012b). Moreover, the availability of suitable larval and juvenile habitat in this area is even more limited (1.2 to 2.1 percent). Critical habitat has not been designated for shortnose sturgeon; therefore, the Proposed Project will not impact critical habitat for this species.

Atlantic Sturgeon

Atlantic sturgeon is a federally-listed threatened and endangered[4] species that occurs along the Atlantic coast of North America in estuaries and large rivers such as the Hudson, Delaware, and 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. Of the two species, Atlantic sturgeon can grow considerably larger, is more oceanic, and does not typically migrate as far upstream to spawn. Although Atlantic sturgeon are expected to occur at least intermittently in the study area, it has not been found there in exceptionally high abundance (USFWS 2007 Atlantic sturgeon reward program). In the Chesapeake Bay, Atlantic sturgeon are more commonly associated with deep-water areas (typically 16 to 164 feet) of the estuary and its tidal tributaries and have been most frequently reported from the mainstem of the estuary (USFWS 2007; NMFS 2014). Critical habitat has not been designated for Atlantic sturgeon; however NMFS issued a proposed critical habitat in June 2016 with a final designation scheduled for summer 2017. At that time, potential impacts for Atlantic sturgeon will be re-evaluated.

Atlantic sturgeon may occur in the study area year round as juveniles and sub-adults (NOAA 2007). Sub-adults are most likely to occur in the study area between spring and fall, spending the colder months in the Atlantic Ocean (Bain 1997). Individuals from any DPS may occur throughout the Chesapeake Bay, provided suitable habitat is present, and distribution is strongly associated with prey availability (NMFS 2014). Although they have been reported in the study area, these fish are thought to have migrated from the Delaware or Hudson River populations and occur relatively infrequently. For this reason, little is known about the abundance, local home range, or habitat use by Atlantic sturgeon in the study area. While Atlantic sturgeon were historically once abundant in the Susquehanna River and in the Susquehanna Flats area of northern Chesapeake Bay just downstream of the river mouth (SRAFRC 2010), only four Atlantic sturgeon have been collected in the Susquehanna Flats area during a 19-year monitoring program conducted by the USFWS; these sturgeon were collected between 1996 and 1999 (= NAI and Gomez and Sullivan 2011b). Collections were far more common in the mainstem of the estuary downstream of the Susquehanna River. Monitoring for acoustic-tagged sturgeon

[4] On April 6, 2012, Atlantic sturgeon was designated as federally threatened (Gulf of Maine Distinct Population Segment) or endangered (New York Bight, Chesapeake, Carolina, and South Atlantic DPS). Atlantic sturgeon from each of these DPSs may occur in the study area.

in the tidal Susquehanna River between March and November 2010 failed to detect any tagged Atlantic sturgeon (NAI and Gomez and Sullivan 2011b).

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. Adult sturgeon spend most of their time in the Atlantic Ocean, returning to the estuary in the spring and early summer to spawn. Older juveniles that have emigrated from the estuary (i.e., subadults) are thought to mimic the migratory patterns of the adults as they return to coastal rivers and bays during the spring and summer months, and probably use the estuary to forage.

Sea Turtles

Several species of sea turtles, including loggerhead, green, Kemp's ridley, and leatherback, 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 and not expected to occur in the study area. Loggerhead and Kemp's ridley are the two most common sea turtle species in the estuary (VIMS 2016, DGIF 2016) and are not expected to occur in the Chesapeake Bay north of Baltimore where salinities are typically less than 5 ppt (CBP 2016, NMFS 2016). Green sea turtles are less common and are present primarily during late summer and early fall (VIMS 2016). In general, sea turtles are present in the Chesapeake Bay between April 1 and November 30 when water temperatures are relatively warm. Satellite tracking studies of sea turtles has found that foraging sea turtles mainly occurred in areas where the water depth was between approximately 16 and 49 feet. This depth was interpreted not to be as much an upper physiological depth limit for turtles, as a natural limiting depth where light and food are most suitable for foraging turtles. In Maryland waters of the Chesapeake Bay, sea turtles are most often documented in marine and estuarine waters and are not likely to be present in upper reaches of major tributaries because of salinity tolerance and prey availability requirements. Given the tidal freshwater conditions (< 0.5 ppt) conditions on the Susquehanna Flats and lower Susquehanna River (CBP 2016), sea turtles are not expected to occur in the vicinity of the Proposed Project. This is consistent with Section 7 guidance (NMFS 2016) that indicates the northern extent of sea turtle distribution in the Chesapeake Bay is Baltimore, which is downstream of the study area.

Critical habitat has not been designated for sea turtles in the vicinity of the Proposed Project area; therefore, Proposed Project activities will not affect critical habitat for sea turtles.

State Listed Species

The Project Team also sent a letter to DNR's Integrated Policy Review Unit on February 14, 2014. In a response dated October 22, 2014, DNR identified American eel as an important fishery within the study area, as discussed previously, and the presence of shortnose and Atlantic sturgeon was noted within the study area. Both sturgeon are protected species, and are under specific management requirements and the subject of research and conservation efforts undertaken by NMFS, USFWS, and with cooperation from DNR. DNR also identified the presence of freshwater mussels within the study area, some of which are state-listed as threatened or endangered. As discussed previously, DNR Wildlife and Heritage Service is the state lead for state-listed freshwater mussel species. As there is a potential for these species to be found within the study area, further coordination will be necessary on the potential mussel presence and Best Management Practices for their protection in later phases of design.

Logperch

Logperch (*Percina caprodes*) is state-listed in Maryland as threatened and is considered imperiled or critically imperiled due to its rarity. This freshwater perch in the family Percidae is most commonly found in riverine habitats characterized by coarse sand and gravel substrates with or without aquatic vegetation. This species can be found in swift currents or slow-moving lotic habitats.

Adult logperch may occur year-round upstream of the study area between the Conowingo Dam and the Interstate 95 bridge. Spawning occurs in the spring and summer between March and July.

Northern Map Turtle

The state-listed endangered northern map turtle (*Graptemys geographica*) is documented in the Proposed Project study area both within and along the banks of the Susquehanna River. The shores of the Susquehanna River are used by the northern map turtle for habitat, nesting, and foraging and the turtles hibernate on the river bottom in winter. DNR has indicated that further coordination will be required as the project progresses into later phases of design to ensure that appropriate protection measures are in place to avoid negative effects on Norther Map Turtles during construction.

3. NO ACTION ALTERNATIVE

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, bathymetry, 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.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

a. 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 Proposed Project site relative to the existing condition. The number of bridge piers in the river would be 37 for the girder approach / arch main span bridge design. There are currently 16 in-water piers supporting the existing bridge and 13 remnant piers just downstream of the existing bridge that were left in place following demolition of the 1866 Philadelphia, Wilmington & Baltimore Railroad (PW&B) bridge. The spacing of the new bridge piers for the girder approach / arch main span bridge design ranges from 160-170 feet. The spacing of the existing bridge piers is 200-260 feet. 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. As such, sediment deposition, scour, and overall hydrology in this section of the river would not be expected to significantly change. Most of the river in the vicinity of the Proposed Project site is expected to be a mix of areas of dynamic scour, likely occurring around the downstream side of the existing bridge’s piers, and dynamic drift (areas characterized by deposition in the lee of obstacles), likely occurring around their upstream side. However, the contrast may not be well pronounced because flow direction alternates with the tide. Replacement of the existing bridge with the proposed west and east bridges would likely cause a small shift in this current spatial distribution of areas with scour and sediment deposition. Also because the spacing of the new bridges’ piers would be closer together than the existing bridge’s piers, water velocity and scouring between the piers would potentially increase, but would be expected to be minimal and would not significantly alter the hydrological properties of the river within, upstream, or downstream of the Proposed Project site and would not alter the site bathymetry.

In-water structures of the new bridges under Alternative 9B would be identical to those of Alternative 9A, and any differences between the two alternatives in other ways would be inconsequential with regard to potential operational effects on hydrology.

b. 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. Contamination of groundwater resources occurs when man-made chemicals such as gasoline, oil, and road salts enter aquifers and render the water unsafe and unfit for human use. Some of the major sources of these contaminants include storage tanks, septic systems, hazardous waste sites, landfills, and the widespread use of salts and chemicals. The improved design of the new bridges complies with all federal, state and local safety regulations that improve the safety and reliability of the rail bridge, and which will reduce the chances of contaminant spills from derailments

The Proposed Project entails primarily aerial bridge work with extension of the existing trackbed berm along landward areas. Impacts to groundwater resources are anticipated to be negligible. In addition, treatment of surface water runoff from Proposed Project construction and stormwater best management practices (BMPs) will effectively reduce even further these negligible impacts on groundwater.

c. Water Quality

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. As discussed above, under “Hydrology,” some minor changes in sedimentation and scouring properties within the Proposed Project area would possibly occur shortly following the completion of the new bridges’ in-water support structures and the removal of the existing bridge, but no significant increases in turbidity or other water quality parameters would be expected to occur. Operational differences between Alternative 9A and Alternative 9B would be inconsequential with regard to potential operational effects on water quality. The improved design of the new bridges complies with all federal, state and local safety regulations that improve the safety and reliability of the rail bridge, and which will reduce the chances of contaminant spills from derailments.

d. Sediment Quality & Contaminants

Sediment containment techniques, such as turbidity curtains and other approved best management practices, will be used during construction to minimize sediment releases from the Proposed Project. However, under Alternative 9A, some minor resuspension of sediment and changes in sedimentation properties within the Proposed Project area have the potential to occur following the completion of the new bridges’ in-water support structures and the removal of the existing bridge. Any such redistribution of sediments within the area would be minor and temporary, and therefore, would not be expected to cause a significant release of any contaminants or otherwise impact sediment quality in the area. Operational differences between Alternative 9B and Alternative 9A would be inconsequential with regard to potential operational effects on sediment quality and contaminants. As such, operation of Alternative 9B would not be expected to have any significant or long-lasting effects on sediment quality and sediment-bound contaminants.

e. Aquatic Biota

Under Alternative 9A, 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 Proposed Project area. As discussed above, under “Water Quality,” areas of scouring and sedimentation would initially shift upon replacement of the existing bridge outside of its current alignment, but erosion and sedimentation processes would not change substantially, and overall bottom conditions for benthic organisms and their predators would not differ from the existing condition. The same assemblages of aquatic species would be expected to occur as at present. Although the replacement bridges under Alternative 9A 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 are generally considered to occur (0.7; Struck et al. 2004). The east and west bridges would be separated by open space varying from 16 to 25 feet wide through which light could pass, and because the sun changes positions throughout the day, no area of river around the proposed bridges would be shaded for prolonged periods of time. As such, no shading effects on aquatic biota would be expected to occur during operation of Alternative 9A.

As with Alternative 9A, the operation of the replacement bridges under Alternative 9B would not differ from the operation of the existing bridge in a way that would impact aquatic biota. The current community of aquatic organisms would not be altered by the operation of Alternative 9B, and because the dimensions of the replacement bridges would be the same under both alternatives, no impacts to aquatic biota from shading would be expected to occur.

SAV

SAV is regulated at the federal and state levels. At the federal level, SAV is regulated under Section 404 of the Clean Water Act (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Act (33 U.S.C. 403). In the Section 404(b)(1) Guidelines, SAV is referred to as vegetated shallows, which are defined under 40 CFR 230.43(a) as “permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation.” The definition also includes vegetated shallows that may occur in marine and estuarine systems as well as in freshwater lakes and rivers. SAV is regulated under this vegetated shallows definition as one of several categories of “Special Aquatic Sites,” each of which is a subset of Waters of the United States. SAV is also directly protected under the Coastal Zone Management Act (15 CFR 930.11) as a “resource,” and indirectly protected under the Environmental Protection Agency’s National Pollutant Discharge Elimination Program (NPDES; 40 CFR 122.26), which regulates point source discharge of pollutants into navigable waters. At the state level, SAV may be regulated under seven statutes of COMAR, including those related to Section 401 water quality certifications, NPDES permits, Surface Water Use Designations, and dredging.

Alternative 9A and Alternative 9B would each have the same number of bridge piers within the Susquehanna River depending upon bridge design. Both alternatives appear to include four bridge piers that would intercept SAV resources in slightly different amounts and locations. Based on the preliminary engineering drawings, two bridge piers for the new west bridge would fall within the mapped SAV area along the Cecil County shoreline. Following removal of the existing bridge, one pier for the new east bridge would also potentially impact a portion of the SAV bed just downstream of the existing bridge alignment. 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. As noted under the Aquatic Biota section, the lowest bridge height to width ratio is 0.8 along the Cecil County shoreline. On the Harford County shoreline, the ratio would be 1.22 (48.8 feet in height and 40 feet wide). The existing bridge is approximately 32 feet wide and the base of the catwalk and girder structure is approximately 25 feet high over the Susquehanna River at the approaches (the river segments of the track outside of the channel section) yielding a ratio of 0.8. This ratio is comparable to the proposed bridge designs at the Cecil County shoreline. These results suggest that SAV should continue to be able to grow beneath the replacement bridge, regardless of which alternative is selected.

Fish

As noted above, water velocities through the bridge structure may be slightly higher for the new bridge than for the existing bridge because of the closer spacing of more bridge piers. However, the replacement bridge will occur within the tidal portion of the river, with daily changes in flow direction and velocity. Also, the change in velocity is expected to be minimal since the decrease in the spacing of the bridge piers of 30 to 90 feet would occur over a span of 3,200 feet of the Susquehanna River. In addition, anadromous fish moving upriver to the dam and fish ladder are stimulated to do so by much faster flows than would be experienced at the bridge. Therefore, no effect on anadromous fish behavior through the Proposed Project area would be expected from the new bridge structures.

f. Threatened, Endangered, or Special Concern Aquatic Species/Section 7 Consultation

As discussed above, under "Aquatic Biota," operation of the replacement bridges under Alternative 9A 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 northern map turtles potentially occurring in the Proposed Project area. Potential effects to these resources from construction of the Proposed Project are discussed in Section H.

As with Alternative 9A, the operation of the replacement bridges under Alternative 9B would not differ from the operation of the existing bridge in a way that would impact aquatic biota, including Atlantic sturgeon, shortnose sturgeon, sea turtles, freshwater mussels, logperch, and northern map turtles. Operation of Alternative 9B would not have significant adverse impacts to any federally- or state-listed species. FRA will continue with the informal consultation process with NMFS regarding a selected/preferred alternative. As noted above, potential effects to these resources from construction of the bridge are discussed in Section H.

5. MINIMIZATION AND MITIGATION OF IMPACTS

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 will be achieved 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 February 15 through June 15 for tidal Use II streams. Additional restrictions for work in SAV areas in described below. As with most large bridge projects, certain activities may be allowable within time of year restriction periods and these will be determined through coordination with the responsible agencies.

SAV

Sediment containment techniques, such as turbidity curtains and other approved best management 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.

As noted under Section B.4.b above, mitigation for unavoidable 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. Successful in-kind compensation for SAV impacts has proven extremely difficult within the Chesapeake Bay area (Submerged Aquatic Vegetation Workgroup 1995), and out-of-kind compensation in the form of water quality or stream habitat improvements is typically accepted by the regulatory agencies. However, the NMFS has indicated that mitigation of SAV impacts should include replanting the beds disturbed during construction following removal of all temporary structures. The NMFS provided the following recommendations for mitigation after removal of the temporary finger piers:

- Allow the sediment to settle.
- Replant the area during the following growing season to restore existing conditions.
- Mitigate for the temporal loss of SAV habitat by planting additional SAV at a 3:1 ratio, preferably in locations where SAV has been successful in the past but has disappeared or has minimal density.
- Monitor the entire project site for five years to determine if there are additional SAV losses resulting from the proposed project that require mitigation and to determine the success of replanting. If SAV growth has not been documented by year three, a second round of planting may be necessary.

If sufficient SAV planting area cannot be found or SAV replanting efforts fail, the remainder of the mitigation requirement would need to be compensated out-of-kind. As noted under Section B.4.b above, 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. As discussed in Section B.5.b, a preliminary site search was conducted to identify potential mitigation sites to offset wetland, stream, and special aquatic sites (SAV). Details of the mitigation site search, including sites that could potentially be used to offset Proposed Project SAV impacts above those compensated through the replanting of the temporarily disturbed existing SAV bed, are included in (***Attachment D***). 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.

E. CHESAPEAKE BAY CRITICAL AREA

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Chesapeake Bay Critical Area Protection Act

In 1984, the Chesapeake Bay Critical Area Law was passed in response to a decline in the overall quality of the Chesapeake Bay. This law created a special planning area, known as the Critical Area and establishes the Chesapeake Bay Critical Area Commission (CAC). The intent of the Commission is to formulate protective criteria for the use and development of this planning area and to oversee the development of Critical Area land use programs by local jurisdictions.

Methodology

The 1,000 foot Critical Area located within the study area limits have been determined using statewide mapping developed and maintained by DNR (DNR 2001) 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., Proposed Project Build Alternatives footprint).

2. AFFECTED ENVIRONMENT

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. These 100-foot buffers provide a heavily vegetated filter strip adjacent to the shoreline for storm water infiltration and water quality improvements on projects that have direct and immediate impact on the Chesapeake Bay. The Critical Area Buffer is defined as "*the area of at least 100 feet located directly adjacent to the tidal waters, tidal wetlands, and tributary streams*" (DNR 2012). 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.
- 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.

The study area is located within designated RCA and IDA designated Chesapeake Bay Critical Area (***Figure E-12***). 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 within the vicinity of Gashey's Creek and Swan Creek and in Cecil County near the eastern terminus of the study area/Principio Creek. Approximately 207 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 E-15***.

Table E-15
Critical Areas 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**

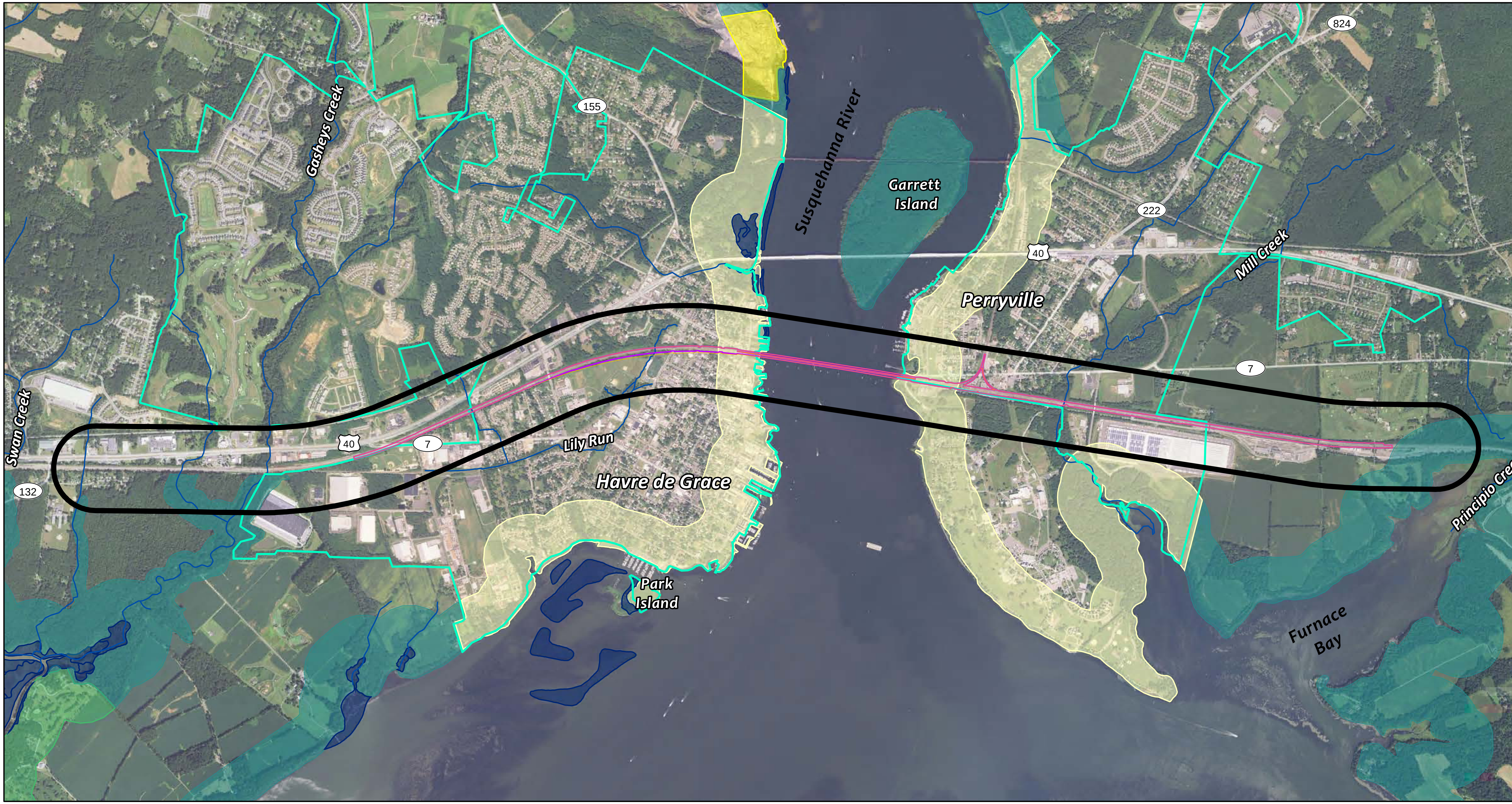
The 100-foot Critical Area Buffer is located within the Corporate Limits of Havre de Grace and Perryville as well as the RCA designated portions of Critical Area located within Harford and Cecil Counties.

3. NO ACTION ALTERNATIVE

The No Action Alternative assumes conditions will remain the same as in existing conditions. The No Action Alternative is used as a baseline scenario against which potential impacts from the Proposed Project will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

Impacts to the Critical Areas resulting from the Proposed Project are expected to result from earth disturbance, removal of vegetation, placement of fill, and increased impervious area. The anticipated impacts resulting from Alternative 9A are 6.4 acres and 6.1 acres for Alternative 9B. All impacts to Critical Area are limited to the Corporate Limits of Havre de Grace and Perryville; no impacts to RCA designated Critical Area is anticipated. Detailed analyses regarding Critical Area impacts, including 100-foot buffer impacts, will be completed during the design phase of the project.



Legend

1,000 ft Critical Area Boundary:
- Corporate Limits
- Intensly Developed Areas
- Limited Development Areas
- Resource Conservation Areas
- Wetland
- LOD 9A Calculation Area
- LOD 9B Calculation Area
- 1,000 ft Study Area
- Streams
- Municipal Boundary

Data Sources

Streams:
MDE, 2012
Critical Area:
MD DNR, 2001
Imagery:
2015 National Agriculture Imagery Program (NAIP)

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Figure E-12

Critical Area Mapping

The Project Team sent a letter requesting information on February 14, 2014 to the CAC for the Chesapeake and Atlantic Coastal Bays. In a letter dated February 18, 2014, the CAC requested continued coordination as the Proposed Project becomes more defined to determine whether a full CAC review is required (***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.

5. MINIMIZATION AND MITIGATION OF IMPACTS

Minimization efforts to avoid Critical Areas were incorporated as part of the early design for the Proposed Project. Also, whenever possible, Critical Areas have been further avoided by the Build Alternatives. Mitigation measures for impacts to Critical Areas could include:

- Replacement lands of equal or greater natural resource and economic value.
- Erosion and sediment control measures would be provided and strictly enforced to minimize impacts.
- 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 project's potential impacts to Critical Areas and mitigation measures that could lessen potential impacts.

F. COASTAL ZONE MANAGEMENT

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Section 307 of the Federal Coastal Zone Management Act of 1972 (CZMA)

CZMA and NOAA regulations (15 CFR part 930) requires that federal actions which are reasonably likely to affect any land or water use, or natural resource of a state's coastal zone be conducted in a manner that is consistent with a state's federally approved Coastal Zone Management Program (CZMP).

The Coastal Zone Act Reauthorization Amendments of 1990 (CZARA)

CZARA amended the CZMA to clarify that federal consistency requirements apply when any federal activity, regardless of location, effects on any land or water use or natural resource of the coastal zone (also referred to as coastal uses or resources, or coastal effects) must be consistent with the enforceable policies of a coastal state's federally approved coastal management program, before they can occur. Effective January 8, 2001, NOAA revised the regulations implementing the federal consistency provisions of the CZMA. The revisions were necessary based on new provisions in the 1990 CZARA and the 1996 Coastal Zone Protection Act. Effects include both direct effects that result from the activity and occur at the same time and place as the activity, and indirect (cumulative and secondary) effects that result from the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

Methodology

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.

2. AFFECTED ENVIRONMENT

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.

3. NO ACTION ALTERNATIVE

Without the Proposed Project, it is assumed that Coastal Zone conditions will remain the same as in existing conditions. The No Action Alternative is used as a baseline scenario against which potential impacts from the Proposed Project will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

The proposed Susquehanna River Rail Bridge Project is subject to the provisions of Section 307 of CZMA, and therefore 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. ***Attachment B*** lists examples of state approvals and other state agency actions related to the federal consistency decision and the overall review process.

Pursuant to Section 307 of the CZMA, Coastal Zone consistency 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.

5. MINIMIZATION AND MITIGATION OF IMPACTS

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.

G. UNIQUE AND SENSITIVE AREAS

1. REGULATORY CONTEXT AND METHODOLOGY

Regulatory Context

Natural Heritage Areas (COMAR 08.03.08)

Natural Heritage Areas (NHAs) are composed of plant or animal communities within the Critical Area that are considered to be among the best statewide examples of their kind. In addition, all NHAs contain at least one species designated or proposed as endangered, threatened, or in need of conservation. According to COMAR 08.03.08, in order to qualify as a NHA a natural community shall: (1) Contain one or more threatened or endangered species or wildlife species in need of conservation; (2) Be a unique blend of geological, hydrological, climatological, or biological features; and (3) Be considered to be among the best Statewide examples of its kind.

Scenic and Wild Rivers System Act of 1968

According to DNR, a Scenic River is a "free-flowing river whose shoreline and related land are predominantly forested, agricultural, grassland, marshland, or swampland with a minimum development for at least two miles of the river length" [8-402(d)(2)]. A Wild River is a "free-flowing river whose shoreline and related land are undeveloped, inaccessible except by trail, or predominately primitive in a natural state for at least four miles of the river length" [8-402(d)(3)]. Rivers under this program are protected from development that would diminish the character of the resources.

Maryland's Green Infrastructure Assessment

The GreenPrint Program (2001) was established by the Maryland General Assembly in an effort to “preserve the most ecologically valuable natural lands in Maryland” (Maryland’s Green Infrastructure Assessment 2003). Green infrastructure data, in coordination with County planners and the regulatory agencies, identifies areas of land that could be targeted for protection or restoration to help ensure habitat for Maryland’s plants and wildlife, as well as to promote a healthier environment including improved outdoor recreation, clean drinking water, and erosion prevention.

Forest Conservation Act Easements

Under the Maryland Forest Conservation Act, referenced in Section C, lands set aside under a forest conservation and management agreement must be maintained in perpetuity in a conservation easement. These easements set restrictions on development of the land but the landowner retains ownership of the land.

Federal Lands

Beginning in 1903, Theodore Roosevelt established the first federal wildlife refuge, Pelican Island National Wildlife Refuge, along Florida’s central Atlantic coast. The Mission of the National Wildlife Refuge System is to, “administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

Methodology

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

2. AFFECTED ENVIRONMENT

a. Natural Heritage Areas

According to COMAR 08.03.08, there are no NHAs in Harford County and two NHAs are designated within Cecil County: Grove Creek and Plum Creek. There are no NHAs within the study area.

b. 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 within the vicinity of 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 (***Figure E-5***).

c. State Scenic and Wild Rivers and Federal Wild and Scenic Rivers

There are no rivers or their tributaries designated by either the State Scenic and Wild Rivers Program or the Federal Wild and Scenic Rivers Program located within the study area.

d. Forest Conservation Act Easements

According to Maryland's Environmental Resource and Land Information Network (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.

e. Federal Lands

Federally designated National Wildlife Refuge lands occur on Garrett Island within the Susquehanna River approximately 1,428 feet north of the Proposed Project 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.

3. NO ACTION ALTERNATIVE

Without the Proposed Project, it is assumed that conditions will remain the same as in existing conditions. The No Action Alternative is used as a baseline scenario against which potential impacts from the Proposed Project will be measured.

4. POTENTIAL IMPACTS OF THE BUILD ALTERNATIVES

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 impact 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.

5. MINIMIZATION AND MITIGATION OF IMPACTS

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.

H. CONSTRUCTION EFFECTS

1. WETLANDS/WATERS OF THE U.S.

Temporary construction impacts to wetland and stream resources will occur from either build alternative. 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. The temporary tidal wetland impact from the upstream finger pier would be approximately 1,743 square feet or 0.04 acre.

Bridge piers may be constructed using either typical cofferdams in shallow water or float-in precast cofferdams in deeper water. These structures would be removed once piers are completed. The riverbed impact from use of these temporary cofferdam structures would be 0.2 acre for the girder approach / arch main span bridge design. Additional temporary riverbed impact would result from the pilings used in the construction of the finger piers and the sheet piles used to envelop the existing piers and remnant piers to be removed, should blasting be the removal technique of choice. The temporary riverbed impact from the finger piers would total approximately 680 square feet. 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.

2. TERRESTRIAL RESOURCES

Forest Resources

Construction related 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. 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

During construction, 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. Again, this is most likely to occur within the small forest patch adjacent to Havre de Grace Middle School/High School.

Threatened, Endangered, or Special Concern Wetland and Terrestrial Species

No construction related impacts to terrestrial federally or state-listed endangered or threatened species are anticipated. For example, a response from USFWS dated January 15, 2016 indicated that the northern long-eared bat 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.. Temporary displacements of waterfowl within the Susquehanna River are likely during the construction phase of the Proposed Project.

3. AQUATIC RESOURCES

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 Proposed Project site. These activities include the following:

- Construction of temporary finger piers: Finger piers would be used to connect to access roads for construction efficiency and optimum movement of equipment, as well as to avoid the need for dredging. These would remain for the majority of the construction period (3 to 5 years). Support for the finger piers would likely include small (18 to 24 inches) driven piles.
- Construction of west and east replacement bridge piers: The new girder approach / arch main span bridge would have a total of 37 in-water piers. The construction approach used for each pier pairing would depend on the location of the pier in relation to water depth. In deeper waters, drilled caissons (concrete-filled steel pipe piles) would be used for the pier construction and in shallower waters cofferdams would be utilized.
- Demolition of the existing bridge and remnant piers: Bottom disturbance during the construction of the in-water elements of Alternative 9A and Alternative 9B would have the potential to result in temporary sediment resuspension, and in turn, increased turbidity. However, any such effects would be highly localized and temporary, and would be expected to dissipate quickly, such that no significant or long-lasting changes in turbidity or other water quality parameters would occur. Pile drilling results in minimal river bottom disturbance relative to other large-diameter pile installation methods, and no dredging, sheet pile cells, or cofferdams would be required with the exception of the deep-water piers (Piers 3 and 4) that would potentially require a cofferdam during construction.

During demolition, the existing bridge would be dismantled by removing parts of the superstructure by barge or crane. The existing piers would be removed with an excavator and their support piles would either be cut two feet below the mud line with a wire saw or demolished by blasting inside a temporary cofferdam. Use of turbidity curtains and floating booms during the bridge removal activities would minimize the potential for resuspended sediment to result in significant adverse impacts to water or sediment quality.

Construction along the Proposed Project corridor could also potentially result in short-term water quality effects, such as: increased sedimentation, increased turbidity from in-stream work, and possible spills. Construction activities that could affect stormwater runoff include:

- Excavating to widen any “cut” sections and removing unsuitable (organic) material from “fill” sections
- Filling and placing ballasts to support the new track
- Relocating access roads
- Relocating or creating new trackside swales, and

- Implementing any substructure work required for the catenary foundations, or bridge or culvert installation.

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 (MDE 2007). The MDE-approved Erosion and Sediment Control Plan will reduce the risk of surface water contamination, and minimize the harmful effects of increased impervious surfaces on surface waters. Erosion and sediment control measures include sediment traps and basins, super silt fence, in-stream closure periods, and other construction BMPs designed in compliance with current regulations. In-stream work restrictions include the following:

- Tidal Use II Streams restrictions for fish spawning and migration from February 15 through June 15
- Designated SAV beds between April 1 and October 15.

All measures will be reviewed and approved by MDE as part of the permitting process during Final Design to ensure that the Proposed Project is in compliance with the most current regulations. Adherence to the Clean Water Act's TMDL provisions will be addressed through coordination with MDE and compliance with NPDES permit process for Proposed Project stormwater. Over the long-term, all SWM facilities would be monitored and maintained in accordance with NPDES permits to ensure that each facility continues to provide the intended level of quantity and/or quality control.

The extent and duration of in-water construction activity would not differ between Alternative 9A and Alternative 9B, and as such, for the reasons discussed above, construction of the replacement bridges under Alternative 9A or Alternative 9B would not have significant adverse impacts to water quality in the Susquehanna River.

Sediment Quality & Contaminants

As discussed above, under "Water Quality," in-water construction activities for Alternative 9A and Alternative 9B would have the potential to result in the resuspension of bottom sediment and sediment-bound contaminants within the work area. However, any sediment resuspension would be temporary, minimal, and highly localized, such that no significant or long-lasting adverse impacts would occur. Suspended sediment would be expected to dissipate quickly, and would not cause a significant liberation or redistribution of existing contaminants. 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 Proposed Project site, and would thereby avoid the more substantial disturbance to river sediments that would be caused by dredging.

Aquatic Biota

As discussed above, under "Water Quality," construction of the replacement bridges and demolition of the existing bridge under Alternative 9A and Alternative 9B would not affect water or sediment quality in the Susquehanna River, and therefore, would not impact habitat conditions for fish and other aquatic biota. In-water construction activities would be limited to the drilling of large-diameter piles for the replacement bridges and the driving of small-diameter piles for the temporary finger piers, which would cause minimal bottom disturbance. Any sediment suspension that would occur during pile installation and the demolition of the existing bridge would be temporary and localized, and would be expected to be well below physiological impact thresholds of adult and larval fish and benthic macroinvertebrates.

Shading from the temporary finger piers would also not have the potential to result in significant adverse impacts to aquatic biota given their narrow width. Two finger piers would be constructed on the Perryville side. The overwater length of the upstream pier would be approximately 495 feet, while the downstream pier would be approximately 260 feet, but each pier would be only approximately 38 feet wide**.** Shading effects from low-lying overwater structures such as docks and piers generally begin at points beyond 15 feet inward from a structure's outer edges (Able and Grouthues 2011, Able et al. 2013). Angled light sufficiently reaches these areas of bottom that are within 15 feet of the edge such that conditions for aquatic biota do not appear to be altered. At a width of only 38 feet, only a small area beneath the finger piers would be more than 15 feet inward from the closest edge, and therefore, no significant shading effects would be expected to occur. Because the finger piers would be removed upon completion of the replacement bridges, there would be no cumulative shading effect from the combination of the structures.

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. Benthic invertebrates unable to move away from these areas would be lost during pile installation. Following the completion of the replacement bridges, the finger piers would be removed, and the areas occupied by their piles would begin to accumulate sediment, return to benthic habitat, and become recolonized by benthic organisms. Demolition of the existing bridge and remnant piers would allow approximately 0.5 acre of river bottom to 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 5 to 6-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. Any underwater noise produced during the installation of these piles would be minimal and well below both the physical and behavioral effect thresholds of 206 dB re: 1 µPa SPL_{peak} and 150 dB re: 1 µPa SPL_{RMS}, respectively, which have been established by the Fisheries Hydroacoustic Working Group and adopted by NMFS. 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 µPa SPL_{peak} at a distance of 10 meters from the pile (Caltrans 2009). Following BMP's 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 self weight before impact hammering the remainder of the pile. The duration of impact pile driving is expected to be less than 5 to 10 minutes per pile, which would be minimized if a vibratory driver was first used to drive the pile to resistance. 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). During impact pile driving of unattenuated steel pipe piles for temporary finger piers, underwater noise levels associated with the potential onset of physiological injury to fish (i.e., 206 dB re: 1µPa SPLpeak) would extend up to 50 feet from the pile [1]. The use of a wooden cushion block during impact pile driving would provide approximately 11 to 26 dB of noise attenuation, which would reduce the extent of the ensonified (sound-filled) area to within less than 33 feet of the pile. Given the small extent of the 206 dB SPLpeak noise isopleth, effects to sturgeon in the action area are likely to be discountable. The potential impacts of underwater noise would be further minimized if the impact pile driving was conducted between July and December, when sturgeon are less likely to occur in the action area.

Underwater noise levels associated with the potential onset of behavioral effects to fish (i.e., 150 dB re: 1µPa SPLrms) would extend across the river during impact pile driving of unattenuated piles and approximately 1,800 feet (i.e., 50 percent of the river width within the action area) if a wooden cushion block was used to attenuate noise levels. These noise levels would only occur over a period of 1 to 2 hours per day. If an average of 6 piles were driven per day and 3 days of impact pile driving occurred each week, then impact pile driving would be completed within 2.5 months. The most likely response of sturgeon to the underwater sound produced during pile driving for the finger piers would be temporary avoidance of the area (AKRF and Popper 2012a,b). Behavioral avoidance by sturgeon would be temporary and limited to 1 to 2 hours during impact pile driving on any given day. Because the extent of the 150 dB SPLrms isopleth is greater than the extent of the 187 dB re: 1µPa2 s cSEL isopleth (i.e., the potential onset of physiological injury due to prolonged sound exposure), sturgeon would avoid the ensonified area and would not likely be exposed to noise levels exceeding the 187 dB cSEL threshold. 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.

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), as described in EA ***Chapter 17 Construction Effects***. Methods such as turbidity curtains, cofferdams, and deck shielding would be implemented as necessary to contain debris. Divers with wire saws would cut bridge piers two feet below the mudline and the pier would be removed using a barge crane. 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 the potential for fish mortalities. In the event that blasting is proposed, a number of protective measures would be implemented. Blasting would use blast mats and would be conducted within steel sheet pile cofferdams that would: 1) physically exclude fish and turtles from the immediate area of the Proposed Project, 2) minimize peak pressures experienced by aquatic organisms in the vicinity of demolition activities, and 3) reduce potential increases in suspended sediments. Monitoring for listed fish and turtles during blasting would occur and any observations of these species would be reported to NMFS or USFWS. Blasting would be scheduled to occur during a work window that will be defined during coordination with NMFS and will be protective of listed species in the Proposed Project area. Any potential impacts from blasting activities that may occur outside of this window would be minimized through the implementation of additional best management practices, including the preparation of a detailed blasting plan, implementation of noise attenuation measures, detonation of low-energy scare charges to repel fish and turtles just prior to blasting, and limitations to the charge size and detonation velocity of the explosives to minimize underwater pressure changes experienced by fish and turtles.

At this time, the number of project vessels operating within the action area at any given time and the number of operating hours for those vessels are not known. At a minimum, the project will utilize work barges, delivery barges and crew vessels (with personnel lifts). The drafts of these vessels are not likely to exceed 6 to 8 feet in most cases. Water depths within most of the action area range from 20 to 50 feet at mean lower low water. Therefore, the vessel clearance above the river bottom would be 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 and below 15 feet from the water's surface for Atlantic sturgeon (Balazik et al. 2012), the risk of vessel interaction with sturgeon is small.

SAV

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. Displaced sediment could also 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, due 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 impact SAV as described above for potential dredging operations.

For both Alternatives 9A and 9B, the total permanent SAV impact from bridge construction would total approximately 0.61 acre.

Threatened, Endangered, or Special Concern Aquatic Species

Atlantic and Shortnose Sturgeon

Atlantic and shortnose sturgeon have the potential to occur within the Proposed Project area, although they have not been documented in the lower Susquehanna River since 1999 and 2004, respectively. As discussed under "Water Quality", "Hydrology", and "Aquatic Biota," construction of Alternative 9A or Alternative 9B would not have significant adverse effects on water quality or other habitat conditions for fish, including both sturgeon species and would not be expected to significantly change river hydrology in the Proposed Project site relative to the existing condition. Sediment resuspension during bottom-disturbing construction and demolition activities would be temporary and localized, and in many cases would be minimized through the use of turbidity curtains and temporary cofferdams. Dredging is not planned for the Proposed Project and there would be a net gain in benthic habitat following the removal of the existing bridge piers, which would result in no net loss of benthic habitat where sturgeon might forage. Critical habitat has not been designated for either sturgeon species; therefore, Proposed Project activities will not affect critical habitat for Atlantic or shortnose sturgeon.

Underwater noise levels will be minimized by drilling shafts rather than impact pile driving the large-diameter piles for the replacement bridges' piers, and are expected to be below both the physiological (206 dB re: 1 µPa SPL_{peak}) and behavioral (150 dB re: 1 µPa SPL_{RMS}) 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. Noise generated by the driving of the small-diameter piles using low-energy impact hammers and cushion blocks for the temporary finger piers would likewise be expected to be below levels at which physical injury to sturgeon could occur. Any effects to sturgeon potentially occurring in the area during impact pile driving would be limited to temporary avoidance of the immediate area of activity. Potential noise impacts of demolition activities performed using mechanical means and methods to remove existing bridge piers are expected to be minimized by using relatively low noise, non-impact equipment including wire saws and cranes. Although blasting is not planned for demolition, the potential impacts of any blasting activities would be minimized by implementing the protective measures discussed above. Additionally, blasting would be scheduled to occur within a work window that corresponds to the time of the year when sturgeon are least likely to occur in the vicinity of the Proposed Project area. Moreover, the very short duration (i.e., several seconds) of elevated sound pressure levels during blasting greatly minimizes the potential impacts to fish that are not in the immediate vicinity of the activity. In the event that blasting is being considered, FRA will coordinate with NMFS to develop an agreed upon approach for minimizing the potential impacts to sturgeon.

For the reasons given above, the construction of Alternative 9A or Alternative 9B and demolition of the existing bridge may affect, but are not likely to adversely affect Atlantic or shortnose sturgeon that may occur in the Susquehanna River.

Sea Turtles

Loggerhead, Kemp’s ridley, and green sea turtles occur in the Chesapeake Bay, while the leatherback sea turtle is a more pelagic species that is occurs less frequently in the Bay and is not expected to occur in the Susquehanna River. As noted in the Affected Environment section above, the other sea turtles most commonly occur in the marine and estuarine portions of the estuary and are not likely to be present in the major tributaries which would include the Susquehanna River. Sea turtles occur seasonally in the Chesapeake Bay between April and November and are not expected to be present between during the winter and early spring months. During the months that sea turtles are present in the Bay, they are not expected to occur in the vicinity of the Proposed Project in the Susquehanna River or on the Susquehanna Flats. As discussed under “Water Quality” and “Aquatic Biota,” construction and demolition of Alternative 9A or Alternative 9B would not have significant adverse effects on water quality or other habitat conditions for aquatic organisms, including sea turtles. There is no critical habitat designated for any of the sea turtles in the Proposed Project area.

For these reasons, the construction of Alternative 9A or Alternative 9B and demolition of the existing bridge would have no effect on loggerhead, Kemp’s ridley, green, or leatherback sea turtles that may occur in the Chesapeake Bay.

Freshwater Mussels

As there is a potential for freshwater mussels, some of which are state-listed as threatened or endangered, 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 construction and demolition methods utilized to reduce impacts to freshwater mussel species.

Logperch

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 Proposed 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. 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.

Northern MapTturtles

DNR-WHS may require restrictions on construction projects in order to protect northern map turtles, including, but not limited to: conducting nesting surveys during the nesting season to identify the presence/absence of nests within a project area, in-stream time-of-year restrictions, and/or removal of turtles from the work zone using trained scuba divers. northern map turtles are known to occur within the Proposed Project area and could potentially be impacted 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.

I. CONCLUSION

In summary, this report evaluates the potential effects from the Susquehanna River Rail Bridge on a variety of natural resources, including topography, geology, and soils; floodplains and wetlands; terrestrial resources; aquatic resources; Chesapeake Bay Critical Area; Coastal Zone Management; and Unique and Sensitive Areas. ***Table E-16*** summarizes the potential effects on natural resources from the Susquehanna River Rail Bridge Project. The Proposed Project would have no significant impacts to threatened, endangered, or special concern wetland and terrestrial species, hydrology, groundwater, water quality, sediment quality and contaminants, coastal zones, and unique and sensitive areas. With the incorporation of the mitigation measures described herein, the Proposed Project would not result in significant adverse impacts on floodplains, wetlands, forest resources, wildlife, aquatic biota, and critical areas.

Table E-16
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 Encroachment (acres)	100-Year	2.72	2.15
	500-Year	4.83	4.24
Preliminary FEMA Floodplain Encroachment* (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 from bridge piers and construction (e.g., includes temporary finger pier and cofferdam impacts owing to length of construction)	0.61	0.61

** Preliminary floodplain available for Harford County only*

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Attachment A

FPPA Form NRCS-CPA-106

USDA

United States Department of Agriculture

DATE: February 8, 2016

TO: Dan Reagle
Environmental Planning Division
Maryland Transit Administration
6 St. Paul Street, 9th Floor
Baltimore, MD 21202

Received
FEB 12 2016
Office of Planning

SUBJECT: Farmland Protection Policy Act
Susquehanna River Rail Bridge Project
Harford and Cecil Counties, Maryland

Dear Mr. Reagle:

The Natural Resources Conservation Service responsibility pertaining to the Farmland Protection Policy Act (FPPA) is to provide technical assistance for the Act by evaluating and completing Parts II, IV, and V of the Farmland Conversion Impact Rating Form, AD-1006. The purpose of the Act is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses.

We have determined that the Susquehanna River Rail Bridge Project, in Harford and Cecil Counties, is an activity that is not subject to provisions of the Policy Act and is therefore exempt from the Act. This is because the reconstruction of the bridge and rail system is on existing right-of-ways and these activities will not "permanently convert farmland".

We are enclosing the Rating Form NRCS-CPA-106 with "Site Exempt" written across the top of it.

If you require any additional information, please let us know.

Sincerely,

Dean Cowherd

Dean Cowherd
NRCS Assistant State Soil Scientist
443-482-2931

cc: Tim Clippinger, Forest Hill, MD
Phillip King, Dover, DE
Patricia Engler, Annapolis, MD
James Brewer, Easton, MD

Site Exempt

U.S. DEPARTMENT OF AGRICULTURE
Natural Resources Conservation Service

NRCS-CPA-106
(Rev. 1-91)

FARMLAND CONVERSION IMPACT RATING FOR CORRIDOR TYPE PROJECTS

PART I *(To be completed by Federal Agency)*	3. Date of Land Evaluation Request 1/15/16		4. Sheet 1 of 2
1. Name of Project **Susquehanna Rail Bridge Project**	5. Federal Agency Involved **Federal Rail Administration (FRA)**		
2. Type of Project **Rail Bridge Replacement**	6. County and State **Harford and Cecil Counties, Maryland**		
PART II *(To be completed by NRCS)*	1. Date Request Received by NRCS	2. Person Completing Form	
3. Does the corridor contain prime, unique statewide or local important farmland? (If no, the FPPA does not apply - Do not complete additional parts of this form). YES ☑ NO ☐		4. Acres Irrigated	Average Farm Size
5. Major Crop(s)	6. Farmable Land in Government Jurisdiction Acres: %	7. Amount of Farmland As Defined in FPPA Acres: %	
8. Name Of Land Evaluation System Used site exempt, see attached ltr.	9. Name of Local Site Assessment System	10. Date Land Evaluation Returned by NRCS 2/9/16	

	Maximum Points	Corridor A	Corridor B	Corridor C	Corridor D
PART III *(To be completed by Federal Agency)* — Alternative Corridor For Segment Alternatives 9A and 9B					
A. Total Acres To Be Converted Directly		1.99 ac.	0.22 ac.		
B. Total Acres To Be Converted Indirectly, Or To Receive Services		0	0		
C. Total Acres In Corridor		62.13 ac.	62.13 ac.		
PART IV *(To be completed by NRCS)* **Land Evaluation Information**					
A. Total Acres Prime And Unique Farmland					
B. Total Acres Statewide And Local Important Farmland					
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted					
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value					
PART V *(To be completed by NRCS) Land Evaluation Information Criterion Relative value of Farmland to Be Serviced or Converted (Scale of 0 - 100 Points)*					
PART VI *(To be completed by Federal Agency) Corridor Assessment Criteria (These criteria are explained in 7 CFR 658.5(c))*	**Maximum Points**				
1. Area in Nonurban Use	15	6	6		
2. Perimeter in Nonurban Use	10	3	3		
3. Percent Of Corridor Being Farmed	20	0	0		
4. Protection Provided By State And Local Government	20	0	0		
5. Size of Present Farm Unit Compared To Average	10	10	10		
6. Creation Of Nonfarmable Farmland	25	0	0		
7. Availablility Of Farm Support Services	5	5	5		
8. On-Farm Investments	20	10	10		
9. Effects Of Conversion On Farm Support Services	25	1	0		
10. Compatibility With Existing Agricultural Use	10	2	1		
TOTAL CORRIDOR ASSESSMENT POINTS	160	37	35	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland (From Part V)	100	0	0	0	0
Total Corridor Assessment (From Part VI above or a local site assessment)	160	37	35	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	37	35	0	0

1. Corridor Selected: TBD	2. Total Acres of Farmlands to be Converted by Project: 1.99 ac (Alt 9A)/0.22 ac (Alt 9B)	3. Date Of Selection:	4. Was A Local Site Assessment Used? YES ☐ NO ☑

5. Reason For Selection:

Signature of Person Completing this Part: Dean Cowherd

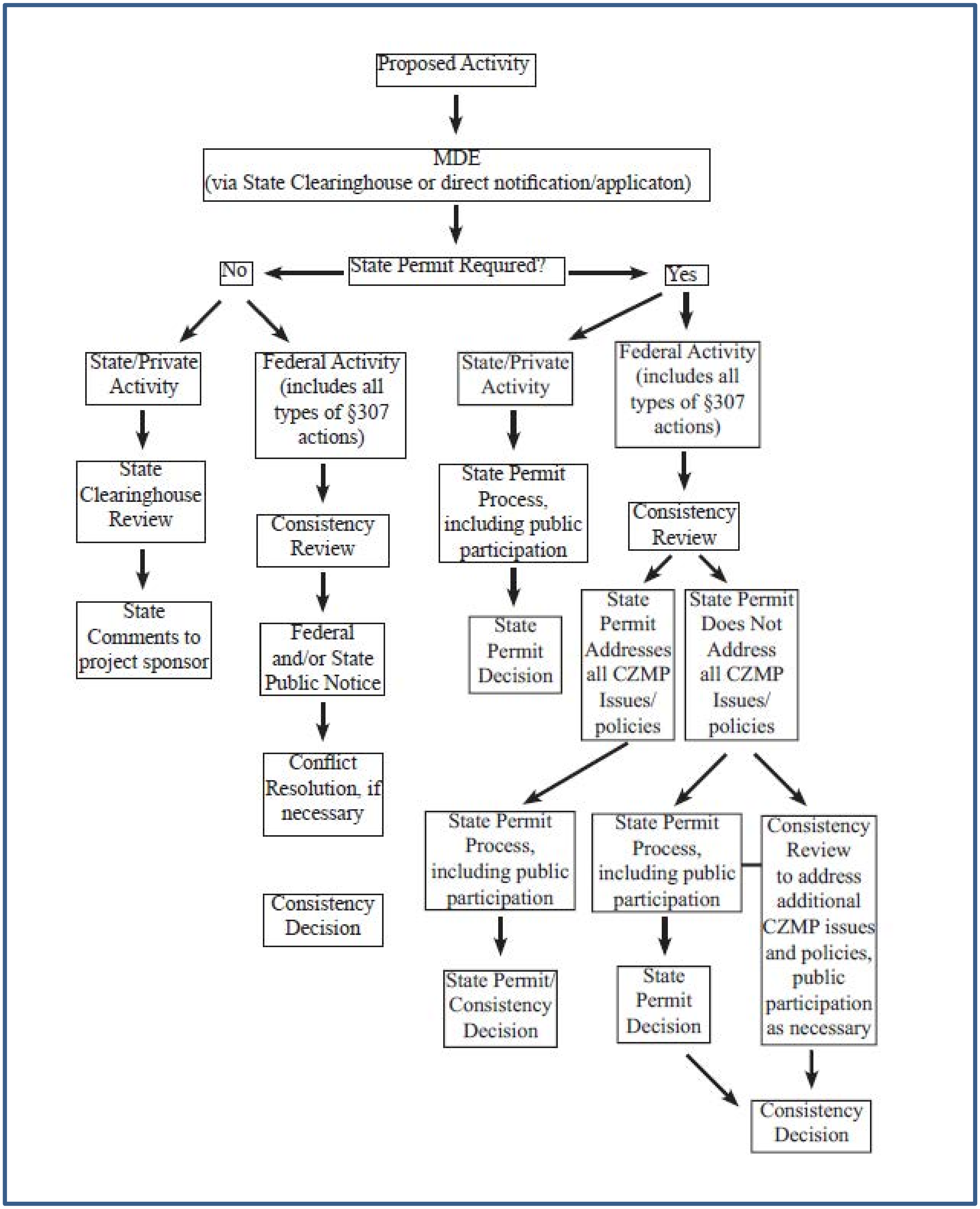
DATE 2/5/16

NOTE: Complete a form for each segment with more than one Alternate Corridor

Attachment B

Coastal Zone Management Consistency Flowchart

Attachment B: Overall Consistency Review Process



Source: Maryland Department of Environment (MDE)
A Guide to Maryland's Coastal Zone Management Program Federal Consistency Process (2004)

Attachment C

Wetland Delineation Data Forms

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehannah Amtrak City/County: Perryville, Cecil Sampling Date: 26 Oct 2015
Applicant/Owner: Amtrak State: MD Sampling Point: W15-1
Investigator(s): Emily Jellick & David Smith Section, Township, Range: ____
Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): concave Slope (%): 1
Subregion (LRR or MLRA): LRR S Lat: 39° 33' 31.28" Long: 76° 04' 13.63" Datum: ____
Soil Map Unit Name: Urban Land NWI classification: ____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:
Flags 1-48 Photo 3 looking Westerly along toe of railroad tracks.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ✓ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ✓ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ✓ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Positive α,α dipyradyl test. Rain w/in previous 36 hrs.
Dry conditions over previous month +.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W151

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
		= Total Cover	
50% of total cover:		20% of total cover:	
Sapling/Shrub Stratum (Plot size: 20' wide x 60' long)			
1. Liquidambar styraciflua	8	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	8	= Total Cover	
50% of total cover:	4	20% of total cover:	1.6
Herb Stratum (Plot size: 20' wide x 60' long)			
1. Leersia oryzoides	35	Y	OBL
2. Panicum virgatum	48	Y	FAC
3. Andropogon virginicus	3		FAC
4. Typha latifolia	5		OBL
5. Schedonorus arundinaceus	4		FAC
6. Schoenoplectus pungens	10		OBL
7.			
8.			
9.			
10.			
11.			
12.			
	105	= Total Cover	
50% of total cover:	52.5	20% of total cover:	21
Woody Vine Stratum (Plot size: 20'x60')			
1. Lonicera japonica	5	Y	FACU
2.			
3.			
4.			
5.			
	5	= Total Cover	
50% of total cover:	2.5	20% of total cover:	1

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: W151

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR3/1	95	5YR4/6	5	C	M, PL	SiCl	muck presence, spotlets
5-10	10YR3/1	100					Sl	muck presence, coarse fragments
10	Rejected by gravel							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Amtrak Susquehannah City/County: Havre De Grace Harford Sampling Date: 10/27/15

Applicant/Owner: Amtrak State: MD Sampling Point: WL17-1

Investigator(s): D. Smith, E. Jellick Section, Township, Range: ______

Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): Convex Slope (%): 1%

Subregion (LRR or MLRA): LRRS Lat: 39°32'58.35" Long: 76°05'54.12" Datum: ______

Soil Map Unit Name: Alluvial Land NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ______	Is the Sampled Area within a Wetland? Yes ✓ No ______
Hydric Soil Present?	Yes ✓ No ______	
Wetland Hydrology Present?	Yes ✓ No ______	

Remarks: PH #1 (SW)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- X Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ______	No X	Depth (inches): ______	
Water Table Present?	Yes ______	No X	Depth (inches): ______	
Saturation Present? (includes capillary fringe)	Yes ✓	No ______	Depth (inches): 0-8	Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Saturation due to confining layer. Positive αα-dipyridyl test.

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: WL/7-1

Tree Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	18	Y	OBL
2. Taxodium distichum	15	Y	OBL
3.			
4.			
5.			
6.			
7.			
8.			
	33 = Total Cover		
50% of total cover: 16.5	20% of total cover: 6.6		

Sapling/Shrub Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Herb Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Leersia oryzoides	65	Y	OBL
2. Iris versicolor	25	Y	OBL
3. Persicaria sagittata	15		OBL
4. Sagittaria latifolia	15		OBL
5. Phragmites australis	10		FACW
6. Pilea pumilla	5		FACW
7. Impatiens capensis	5		FACW
8.			
9.			
10.			
11.			
12.			
	140 = Total Cover		
50% of total cover: 70	20% of total cover: 28		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: W1 7-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	100					SiL	many fine rootlets
2-8	5Y 3/1	95	10YR 4/4	5	C	M,PL	SiCL	coarse fragments
8-12	5Y 3/1	95	10YR 4/4	5	C	M	SC	coarse fragments

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) (LRR P, T, U)
- ___ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ___ Muck Presence (A8) (LRR U)
- ___ 1 cm Muck (A9) (LRR P, T)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (MLRA 150A)
- ___ Sandy Mucky Mineral (S1) (LRR O, S)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (LRR P, S, T, U)
- ___ Polyvalue Below Surface (S8) (LRR S, T, U)
- ___ Thin Dark Surface (S9) (LRR S, T, U)
- ___ Loamy Mucky Mineral (F1) (LRR O)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- _✓_ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (LRR U)
- ___ Depleted Ochric (F11) (MLRA 151)
- ___ Iron-Manganese Masses (F12) (LRR O, P, T)
- ___ Umbric Surface (F13) (LRR P, T, U)
- ___ Delta Ochric (F17) (MLRA 151)
- ___ Reduced Vertic (F18) (MLRA 150A, 150B)
- ___ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR O)
- ___ 2 cm Muck (A10) (LRR S)
- ___ Reduced Vertic (F18) (outside MLRA 150A,B)
- ___ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes _✓_ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehanna Amtrak City/County: Havre de Grace/Harford Sampling Date: 27 Oct 2015

Applicant/Owner: Amtrak State: MD Sampling Point: WL18-1

Investigator(s): D. Smith, E. Jellick Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Swale Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): LRR S Lat: 39°32'52.60" Long: 76°06'05.87" Datum: ______

Soil Map Unit Name: Elkton silt loam, Mattapex silt loam 0-2% slopes NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No ___	Is the Sampled Area within a Wetland?	Yes ___ No ___
Hydric Soil Present?	Yes ___ No ___		
Wetland Hydrology Present?	Yes ___ No ___		

Remarks:

Photo 4 looking NE at wet ditch. Ditch 5'-8' wide originating at culvert beneath railroad.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ✓ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ___	No ✓	Depth (inches): ___	
Water Table Present?	Yes ___	No ✓	Depth (inches): ___	
Saturation Present? (includes capillary fringe)	Yes ___	No ✓	Depth (inches): ___	Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No rain in 48 hours, dry previous 2 months,

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL18-1

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	______ = Total Cover		
50% of total cover: ______	20% of total cover: ______		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	______ = Total Cover		
50% of total cover: ______	20% of total cover: ______		

Herb Stratum (Plot size: 5X100)	Absolute % Cover	Dominant Species?	Indicator Status
1. Phragmites australis	95	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	95 = Total Cover		
50% of total cover: 47.5	20% of total cover: 19		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. Vitis labrusca	15	Y	FAC
2. Lonicera japonica	20	Y	FACU
3.			
4.			
5.			
	35 = Total Cover		
50% of total cover: 17.5	20% of total cover: 7		

Remarks: (If observed, list morphological adaptations below).

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ______

SOIL

Sampling Point: WL18-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR3/1	90	7.5YR4/4	10	C	M,PL	SiCl	many rootlets, organics
6-14	10YR2/1	20	7.5YR4/6	10	C	M	C	Disturbed
	10YR5/3	70						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehanna Amtrak City/County: Havre De Grace/Harford Sampling Date: 27 Oct 2015

Applicant/Owner: Amtrak State: MD Sampling Point: WL 19-1

Investigator(s): D. Smith, E. Jellick Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Floodplain terrace Local relief (concave, convex, none): Concave Slope (%): 3

Subregion (LRR or MLRA): LRR S Lat: 39°32'50.44" Long: 76°06'08.78" Datum: ______

Soil Map Unit Name: Othello silt loam, Alluvial Land NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ______	Is the Sampled Area within a Wetland?	Yes ✓ No ______
Hydric Soil Present? Yes ✓ No ______		
Wetland Hydrology Present? Yes ✓ No ______		

Remarks:

Photo 9 looking SW at test plot. PFO1C

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ✓ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ✓ No ______ Depth (inches): 10

Saturation Present? (includes capillary fringe) Yes ✓ No ______ Depth (inches): 0-10

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No rain w/in 48 hours. Dry 2 months. Positive αα dipyridyl test.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL19-1

Tree Stratum (Plot size: 20'X80')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	65	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	65 = Total Cover		
50% of total cover: 32.5	20% of total cover: 13		

Sapling/Shrub Stratum (Plot size: 20'X80')	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	6		FAC
2. Lindera benzoin	5		FACW
3. Sambucus nigra	11	Y	FACW
4. Rubus argutus	16	Y	FAC
5. Rosa multiflora	4		FACU
6.			
7.			
8.			
	42 = Total Cover		
50% of total cover: 21	20% of total cover: 8.4		

Herb Stratum (Plot size: 20'x80')	Absolute % Cover	Dominant Species?	Indicator Status
1. Poa palustris	10		FACW
2. Leersia virginica	18	Y	FACW
3. Phragmites australis	25	Y	FACW
4. Microstegium vimineum	5		FAC
5. Lonicera japonica	12		FACU
6. Cinna arundinacea	3		FACW
7. Toxicodendron radicans	5		FAC
8.			
9.			
10.			
11.			
12.			
	78 = Total Cover		
50% of total cover: 39	20% of total cover: 15.6		

Woody Vine Stratum (Plot size: 20'x80')	Absolute % Cover	Dominant Species?	Indicator Status
1. Vitis labrusca	17	Y	FAC
2. Celastrus orbiculatus	8	Y	FACU
3. Toxicodendron radicans	5		FAC
4.			
5.			
	30 = Total Cover		
50% of total cover: 15	20% of total cover: 6		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.6 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WL 19-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR3/2	95	7.5YR4/4	5	C	PL	Sil	
1-9	10YR4/1	85	7.5YR4/6	15	C	M,PL	SicL	
9-12	10YR5/4	80	7.5YR3/4	20	C	M	cl	
12-16	10YR5/2	80	7.5YR3/4	20	C	M	C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) (LRR P, T, U)
- ___ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ___ Muck Presence (A8) (LRR U)
- ___ 1 cm Muck (A9) (LRR P, T)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (MLRA 150A)
- ___ Sandy Mucky Mineral (S1) (LRR O, S)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (LRR P, S, T, U)
- ___ Polyvalue Below Surface (S8) (LRR S, T, U)
- ___ Thin Dark Surface (S9) (LRR S, T, U)
- ___ Loamy Mucky Mineral (F1) (LRR O)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (LRR U)
- ___ Depleted Ochric (F11) (MLRA 151)
- ___ Iron-Manganese Masses (F12) (LRR O, P, T)
- ___ Umbric Surface (F13) (LRR P, T, U)
- ___ Delta Ochric (F17) (MLRA 151)
- ___ Reduced Vertic (F18) (MLRA 150A, 150B)
- ___ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR O)
- ___ 2 cm Muck (A10) (LRR S)
- ___ Reduced Vertic (F18) (outside MLRA 150A,B)
- ___ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________________

Depth (inches): ______________________

Hydric Soil Present? Yes ✓ No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehanna Amtrak City/County: Havre de Grace / Harford Sampling Date: 27 Oct 2015

Applicant/Owner: Amtrak State: MD Sampling Point: WL 19-2

Investigator(s): D. Smith, E. Jellick Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Ditch/Swale Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): LRR S Lat: 39° 32' 45.44" Long: 76° 06' 14.21" Datum: ______

Soil Map Unit Name: Mattapex silt loam, 2-5% slopes NWI classification: ______

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ___		Is the Sampled Area within a Wetland? Yes ✓ No ___
Hydric Soil Present? Yes ✓ No ___		
Wetland Hydrology Present? Yes ✓ No ___		

Remarks:

Photo 10 looking NE at PEM1C

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ✓ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______

Water Table Present? Yes ___ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No rain in 48 hours +. Dry 2 months.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL19-2

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Herb Stratum (Plot size: 15X80')	Absolute % Cover	Dominant Species?	Indicator Status
1. Echinochloa muricata	42	Y	FACW
2. Panicum dichotomiflorum	20	Y	FACW
3. Typha angustifolia	10		OBL
4. Dichanthelium scoparium	5		FACW
5. Phragmites australis	12		FACW
6. Digitaria sanguinalis	5		FACU
7.			
8.			
9.			
10.			
11.			
12.			
	94 = Total Cover		
50% of total cover: 47	20% of total cover: 18.8		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover: ____	20% of total cover: ____		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0[1]
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WL19-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR4/2	85	7.5YR3/4	15	C	M,PL	SiCl	
2-6	10YR5/4	75	7.5YR4/6	20	C	M	Sl	
			10YR4/2	5	D	M	Sl	
6-14	10YR5/6	85	7.5YR4/6	10	C	M	SC	
			10YR6/1	5	D	M	SC	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehanna Amtrak City/County: Havre de Grace/Harford Sampling Date: 27 Oct 2015

Applicant/Owner: Amtrak State: MD Sampling Point: W6-1

Investigator(s): D. Smith, E. Jellick Section, Township, Range: ____

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave Slope (%): 5

Subregion (LRR or MLRA): LRR S Lat: 39°32'44.56" Long: 76° 06' 17.19" Datum: ____

Soil Map Unit Name: Mattapex silt loam, 2-5% slopes NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No ____		Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present? Yes ✓ No ____		
Wetland Hydrology Present? Yes ✓ No ____		

Remarks:

Photo 11 looking E. Vegetated relatively permanent waterway.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ✓ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): 3	
Water Table Present?	Yes ✓	No ____	Depth (inches): 0	
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0	Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Dry previous 2 months. No rain >48 hrs.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W6-1

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ______	20% of total cover: ______		

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		
50% of total cover: ______	20% of total cover: ______		

Herb Stratum (Plot size: 10'x80')	Absolute % Cover	Dominant Species?	Indicator Status
1. Typha latifolia	20	Y	OBL
2. Echinochloa mexicana	15	Y	FACW
3. Leersia oryzoides	15	Y	OBL
4. Persicaria hydropiperoides	4		OBL
5. Cyperus strigosus	3		FACW
6. Lonicera japonica	5		FACU
7.			
8.			
9.			
10.			
11.			
12.			
	62 = Total Cover		
50% of total cover: 31	20% of total cover: 12.4		

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
50% of total cover: ______	20% of total cover: ______		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: Wb-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10 YR 3/1	85	7.5YR3/4	15	C	PL	SL	many mottles

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) (LRR P, T, U)
- ___ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ___ Muck Presence (A8) (LRR U)
- ___ 1 cm Muck (A9) (LRR P, T)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (MLRA 150A)
- ___ Sandy Mucky Mineral (S1) (LRR O, S)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (LRR P, S, T, U)
- ___ Polyvalue Below Surface (S8) (LRR S, T, U)
- ___ Thin Dark Surface (S9) (LRR S, T, U)
- ___ Loamy Mucky Mineral (F1) (LRR O)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (LRR U)
- ___ Depleted Ochric (F11) (MLRA 151)
- ___ Iron-Manganese Masses (F12) (LRR O, P, T)
- ___ Umbric Surface (F13) (LRR P, T, U)
- ___ Delta Ochric (F17) (MLRA 151)
- ___ Reduced Vertic (F18) (MLRA 150A, 150B)
- ___ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR O)
- ___ 2 cm Muck (A10) (LRR S)
- ___ Reduced Vertic (F18) (outside MLRA 150A,B)
- ___ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehannah Amtrak City/County: Perryville, Cecil Sampling Date: 26 Oct. 2015

Applicant/Owner: Amtrak State: MD Sampling Point: W9 - 1

Investigator(s): David Smith, Emily Jellick Section, Township, Range: ______

Landform (hillslope, terrace, etc.): tidal fringe Local relief (concave, convex, none): ______ Slope (%): 5%

Subregion (LRR or MLRA): LRR S Lat: 39° 33' 23.79" Long: 76° 04' 44.25" Datum: ______

Soil Map Unit Name: Butlertown silt loam, 5-10% slopes NWI classification: PEM1/SS1R

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ______
Hydric Soil Present?	Yes ✓	No ______
Wetland Hydrology Present?	Yes ✓	No ______

Is the Sampled Area within a Wetland? Yes ✓ No ______

Remarks:
class. PFO, flags 1-10 openended (2-10 are E2FO)

ph#6 (N)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ______	No ✓	Depth (inches): ______
Water Table Present?	Yes ______	No ✓	Depth (inches): ______
Saturation Present? (includes capillary fringe)	Yes ______	No ✓	Depth (inches): ______

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Rain within 36 hours

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: W9-1

Tree Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	40	Y	FAC
2. Acer saccharinum	30	Y	FAC
3. Fraxinus pennsylvanica	15		FACW
4.			
5.			
6.			
7.			
8.			
	85 = Total Cover		
50% of total cover: 42.5	20% of total cover: 17		

Sapling/Shrub Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo	28	Y	FAC
2. Acer saccharinum	3		FAC
3. Ligustrum sinense	5		FAC
4.			
5.			
6.			
7.			
8.			
	36 = Total Cover		
50% of total cover: 18	20% of total cover: 6.2		

Herb Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Phragmites australis	30	Y	FACW
2. Pilea pumila	15	Y	FACW
3. Carex intumescens	5		FACW
4. Duchesnea indica	15	Y	FACU
5. Eupatorium serotinum	5		FAC
6. Vinca minor	15	Y	UPL
7. Microstegium vimineum	5		FAC
8. Boehmeria cylindrica	5		FACW
9. Leersia virginica	5		OBL
10. Mentha spicata	7		FACW
11. Cinna arundinacea	10		FACW
12. Lonicera japonica	10		FACU
	127 = Total Cover		
50% of total cover: 63.5	20% of total cover: 25.4		

Woody Vine Stratum (Plot size: irregular)	Absolute % Cover	Dominant Species?	Indicator Status
1. Parthenocissus quinquefolia	10	Y	FACU
2. Toxicodendron radicans	5	Y	FAC
3.			
4.			
5.			
	15 = Total Cover		
50% of total cover: 7.5	20% of total cover: 3		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ______	x 1 = ______
FACW species ______	x 2 = ______
FAC species ______	x 3 = ______
FACU species ______	x 4 = ______
UPL species ______	x 5 = ______
Column Totals: ______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: W9-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1	96	7.5YR 3/4	4	C	M PL	SiL	many rootlets dense roots - muck presence
2-14	10YR 3/1	85	7.5YR 4/6	15	C	M	SL	w/organics

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Organic Bodies (A6) **(LRR P, T, U)**
___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
___ Muck Presence (A8) **(LRR U)**
___ 1 cm Muck (A9) **(LRR P, T)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Coast Prairie Redox (A16) **(MLRA 150A)**
___ Sandy Mucky Mineral (S1) **(LRR O, S)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) **(LRR P, S, T, U)**
___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
___ Thin Dark Surface (S9) **(LRR S, T, U)**
___ Loamy Mucky Mineral (F1) **(LRR O)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
✓ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) **(LRR U)**
___ Depleted Ochric (F11) **(MLRA 151)**
___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
___ Umbric Surface (F13) **(LRR P, T, U)**
___ Delta Ochric (F17) **(MLRA 151)**
___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR O)**
___ 2 cm Muck (A10) **(LRR S)**
___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ✓ No ____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Susquehanna Amtrak City/County: Perryville / Cecil Sampling Date: 26 Oct 2015
Applicant/Owner: Amtrak State: MD Sampling Point: W9-2
Investigator(s): D. Smith, E. Jellick Section, Township, Range: ______
Landform (hillslope, terrace, etc.): Tidal fringe Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR or MLRA): LRR-S Lat: 39° 33' 23.03" Long: 76° 04' 46.30" Datum: ______
Soil Map Unit Name: Water NWI classification: PEM1/SS1R
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? N Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? N (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	Is the Sampled Area within a Wetland? Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:
Photo 9 looking upriver (N). Habitat identified as PEMIN fringe.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1)
- ✓ Sediment Deposits (B2)
- ✓ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ___	No ✓	Depth (inches): ___
Water Table Present?	Yes ✓	No ___	Depth (inches): 3
Saturation Present? (includes capillary fringe)	Yes ✓	No ___	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Rain within 36 hours. Area subject to twice daily tides. Sampled at low tide.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W9-2

Tree Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: ______ 20% of total cover: ______

Sapling/Shrub Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: ______ 20% of total cover: ______

Herb Stratum (Plot size: 20x60')

	Absolute % Cover	Dominant Species?	Indicator Status
1. Pilea pumila	25	Y	FACW
2. Carex intumescens	6		FACW
3. Murdania kesak	5		OBL
4. Hibiscus moscheutos	4		OBL
5. Persicaria hydropiperoides	3		OBL
6. Ludwigia peploides	12	Y	OBL
7. Hydrocotyl umbellata	5		OBL
8. Schoenoplectus tabernaemontani	3		OBL
9. Leersia oryzoides	10		OBL
10. Typha latifolia	8		OBL
11. Ludwigia palustris	15	Y	OBL
12. Lycopus uniflorus	11	Y	OBL
	= Total Cover		

~~50% of total cover:~~ ______ ~~20% of total cover:~~ ______

~~Woody Vine Stratum (Plot size:~~ ______)

	Absolute % Cover	Dominant Species?	Indicator Status
13. Mikania scandens	8		
14. Boehmeria cylindrica	4		
15. Lythrum salicaria	4		
4.			
5.			
	123 = Total Cover		

50% of total cover: 61.5 20% of total cover: 24.6

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	______	x 1 = ______
FACW species	______	x 2 = ______
FAC species	______	x 3 = ______
FACU species	______	x 4 = ______
UPL species	______	x 5 = ______
Column Totals:	______ (A)	______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ______

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: W9-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8								Peat
8-14	10YR3/1	100						Muck

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) (LRR P, T, U)
- ___ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ___ Muck Presence (A8) (LRR U)
- ___ 1 cm Muck (A9) (LRR P, T)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (MLRA 150A)
- ___ Sandy Mucky Mineral (S1) (LRR O, S)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (LRR P, S, T, U)
- ___ Polyvalue Below Surface (S8) (LRR S, T, U)
- ___ Thin Dark Surface (S9) (LRR S, T, U)
- ___ Loamy Mucky Mineral (F1) (LRR O)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (LRR U)
- ___ Depleted Ochric (F11) (MLRA 151)
- ___ Iron-Manganese Masses (F12) (LRR O, P, T)
- ___ Umbric Surface (F13) (LRR P, T, U)
- ___ Delta Ochric (F17) (MLRA 151)
- ___ Reduced Vertic (F18) (MLRA 150A, 150B)
- ___ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR O)
- ✓ 2 cm Muck (A10) (LRR S)
- ___ Reduced Vertic (F18) (outside MLRA 150A,B)
- ___ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

Area in tidal Fringe at low tide. Peat overlying muck.

Stream Features
Field Sheet

Date: 10/26/15 Project Site: Amtrak Susquehanna WUS # : 29

Observer(s) D. Smith, E. Sellick

Stream Flow:

Perennial: ______ Intermittent ______ Ephemeral ephem

Gradient: 5 Classification: ______

Channel Characteristics:

Natural ______ Artificial (man-made) ✓ Manipulated (man-altered) ______

Explain: Flows from corrugated metal pipe

Channel Has (check all that apply):

- [x] Bed and Banks
- [ ] OHWM
  - [x] clear, natural line impressed on the bank
  - [ ] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [ ] water staining
  - [x] the presence of litter and debris
  - [x] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [ ] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ______
- [ ] Discontinuous OHWM (explain): ______

Morphology:

Avg. Channel Width 2' Depth 6" Avg. Water Depth <1"

Habitat and Pollutants:

Substrate (predominant type (s)): Sand, silt, gravel

Habitat Complexity (characterize): Low, shallow channel flowing from culvert with little habitat complexity

Bank Erosion: Severe ______ Moderate ______ Minor X

Describe: Shallow channel, vegetated banks

Silt Deposition: low

Pollutants (observation / potential sources): Runoff from road

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species ______ Fish Spawn Areas ______

Other Environmentally-Sensitive Species ______ Aquatic/Wildlife Diversity ______

Explain Findings: none observed

Riparian Zone:

Development: Mid successional Forest

Riparian vegetation: Forest ✓ Shrubs ______ Herbs ______

Dominant Species: FRPE, Acer saccharinum, ACNE, VIMI

Riparian Buffer Width: >100'

Approximate % Shading by Woody Species: 75%

Notes: Ph # 7 US, Ph#8 DS drains to tidal wetland

Mill Creek

Stream Features
Field Sheet

Date: 26 Oct. 2015 Project Site: Susquehanna Hotel WUS # : 10

Observer(s) D. Smith, E. Tellick

Stream Flow:

Perennial: ✓ Intermittent ____ Ephemeral ____

Gradient: 1-2% Classification: R3UB1

Channel Characteristics:

Natural ____ Artificial (man-made) ____ Manipulated (man-altered) ✓

Explain: Channel diverted through stone arch bridge

Channel Has (check all that apply):

- [x] Bed and Banks
- [ ] OHWM
  - [x] clear, natural line impressed on the bank
  - [ ] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [x] sediment deposition
  - [ ] water staining
  - [x] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [x] the presence of wrack line
  - [ ] sediment sorting
  - [x] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ____
- [ ] Discontinuous OHWM (explain): ____

Morphology:

Avg. Channel Width 18' Depth 2.5' Avg. Water Depth 6"

Habitat and Pollutants:

Substrate (predominant type (s)): cobble/gravel

Habitat Complexity (characterize): Numerous riffle/run complexes up and downstream of bridge, deeper pools present at bridge.

Bank Erosion: Severe ____ Moderate ____ Minor ✓

Describe: Minor bank cut on right bank below bridge

Silt Deposition: Minor

Pollutants (observation / potential sources): Runoff from railroad, adj. road

Stormwater Outfalls: None observed

Biological Habitat For (check all that apply):

Federally Listed species ____ Fish Spawn Areas ✓

Other Environmentally-Sensitive Species ____ Aquatic/Wildlife Diversity ✓

Explain Findings: Fish observed; habitat appears suitable for Diverse macroinvertebrate community.

Riparian Zone:

Development: Railroad crosses Mill Creek.

Riparian vegetation: Forest ____ Shrubs ✓ Herbs ✓

Dominant Species: Juncus effusus, Microstegium vimineum, Leersia oryzoides, Dichanthelium clandestinum, Liquidambar styraciflua, Robinia pseudoacacia, Eupatorium serotinum

Riparian Buffer Width: Right Bank - 25', Left Bank - >100'

Approximate % Shading by Woody Species: 0%

Notes: Photo 1 looking US, Photo 2 looking DS

Stream Features
Field Sheet

Date: 10/27/15 Project Site: Amtrak Susquehanna WUS # : 17

Observer(s) D. Smith, E Jellick

Lily run

Stream Flow:

Perennial: RPW Intermittent ____ Ephemeral ____

Gradient: 1% Classification: R2UB1/2

Channel Characteristics:

Natural ____ Artificial (man-made) ____ Manipulated (man-altered) ✓

Explain: Flows through culvert under railroad

Channel Has (check all that apply):

- [x] Bed and Banks
- [x] OHWM
  - [x] clear, natural line impressed on the bank
  - [x] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [ ] water staining
  - [ ] the presence of litter and debris
  - [x] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [x] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ____
- [ ] Discontinuous OHWM (explain): ____

Morphology:

Avg. Channel Width 6' Depth 2.5' Avg. Water Depth 1'

Habitat and Pollutants:

Substrate (predominant type (s)): Sand silt, gravel

Habitat Complexity (characterize): low, few undercut banks, majority of channel is standing pools/run, instream habitat - wood, leafpacks etc lacking

Bank Erosion: Severe ____ Moderate ____ Minor X

Describe: Banks well vegetated

Silt Deposition: low

Pollutants (observation / potential sources): runoff from sports fields, train tracks

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species ______ Fish Spawn Areas ______

Other Environmentally-Sensitive Species ______ Aquatic/Wildlife Diversity X

Explain Findings: Fish and S. leopard frog observed

Riparian Zone:

Development: Forest, meadow wetland

Riparian vegetation: Forest X Shrubs ______ Herbs ______

Dominant Species: PHAU, SACA spp nigra, TORA, LOTA, ACNE

Riparian Buffer Width: LB ~50' RB >100

Approximate % Shading by Woody Species: 20%

Notes: Ph # 2 - DS, PH#3 - US stream flows through culvert past maintained ball fields, narrow strip of meadow on LB, small wetland on RB

Unnamed tributary to Lily Run

Stream Features
Field Sheet

Date: 10/27/15 Project Site: Amtrak Susquehannah WUS # : 19

Observer(s) D. Smith E. Jellick

Stream Flow:
Perennial: ______ Intermittent X Ephemeral ______

Gradient: 2% Classification: R4SB3/4

Channel Characteristics:
Natural ______ Artificial (man-made) ______ Manipulated (man-altered) +

Explain: Flows through culverts, partially lined w/ concrete

Channel Has (check all that apply):

- [x] Bed and Banks
- [x] OHWM
  - [x] clear, natural line impressed on the bank
  - [x] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [ ] water staining
  - [x] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [x] the presence of wrack line
  - [ ] sediment sorting
  - [x] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ______
- [ ] Discontinuous OHWM (explain): ______

Morphology:
Avg. Channel Width 3' Depth 4' Avg. Water Depth 4"

Habitat and Pollutants:
Substrate (predominant type (s)): cobble, sand, silt, gravel

Habitat Complexity (characterize): moderate, few pools, some root wads / undercut banks and instream woody debris

Bank Erosion: Severe ______ Moderate ✓ Minor ______

Describe: steep banks with some erosion

Silt Deposition: low

Pollutants (observation / potential sources): Runoff from ball fields, railroad

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species ______ Fish Spawn Areas ______

Other Environmentally-Sensitive Species ______ Aquatic/Wildlife Diversity ______

Explain Findings: fish + S. leopard frog observed

Riparian Zone:

Development: Railroad, mid-successional forest, maintained grass

Riparian vegetation: Forest X Shrubs ______ Herbs ______

Dominant Species: LIST, ROPS, ACRU

Riparian Buffer Width: LB 50' RB 25'

Approximate % Shading by Woody Species: 90

Notes: ph #5 US ph# 6 DS upstream channel has steep 10' slope and highly eroded channel

Stream Features
Field Sheet

Date: 10/27/15 Project Site: Amtrak Susquehanna WUS #: 20 Unnamed tributary to Lily Run

Observer(s) E Jellick D Smith

Stream Flow:
Perennial: X Intermittent ____ Ephemeral ____

Gradient: 3% Classification: R2UB1

Channel Characteristics:
Natural ____ Artificial (man-made) ____ Manipulated (man-altered) X

Explain: Flows through culvert onto cobble, onto concrete and through another culvert

Channel Has (check all that apply):

- [x] Bed and Banks
- [x] OHWM
  - [ ] clear, natural line impressed on the bank
  - [x] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [x] water staining
  - [ ] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [ ] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ____
- [ ] Discontinuous OHWM (explain): ____

Morphology:
Avg. Channel Width 4' Depth 2' Avg. Water Depth 1"

Habitat and Pollutants:
Substrate (predominant type (s)): Cobble, concrete

Habitat Complexity (characterize): low - low flow, no instream cover, few rod weeds

Bank Erosion: Severe ____ Moderate X Minor ____

Describe: Several areas have eroded behind concrete lining

Silt Deposition: low

Pollutants (observation / potential sources): runoff from ball fields / railroad

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species ______ Fish Spawn Areas ______

Other Environmentally-Sensitive Species ______ Aquatic/Wildlife Diversity ______

Explain Findings: none observed

Riparian Zone:

Development: Mid successional forest

Riparian vegetation: Forest x Shrubs ______ Herbs ______

Dominant Species: ROPS, JUNI, LIST, Rubus sp, LOTA

Riparian Buffer Width: >100'

Approximate % Shading by Woody Species: 80

Notes: ph# 7 US, Ph# 8 DS

Stream Features
Field Sheet

Date: 6/27/15 Project Site: Amtrak Susquehannah WUS # : 6

Observer(s) D. Smith, E. Tellick

Stream Flow:
Perennial: ______ Intermittent X Ephemeral ______

Gradient: 1% Classification: R4SB3/5

Channel Characteristics:
Natural ______ Artificial (man-made) X Manipulated (man-altered) ______

Explain: Toe of slope channel from Railroad

Channel Has (check all that apply):

- [x] Bed and Banks
- [ ] OHWM
  - [ ] clear, natural line impressed on the bank
  - [ ] changes in character of soil
  - [ ] shelving
  - [ ] vegetation matted down, bent, or absent
  - [ ] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [ ] water staining
  - [ ] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [ ] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ______
- [ ] Discontinuous OHWM (explain): ______

Morphology:
Avg. Channel Width 4 Depth 1' Avg. Water Depth 4"

Habitat and Pollutants:
Substrate (predominant type (s)): Cobble, silt/mud

Habitat Complexity (characterize): low, straight shallow run

Bank Erosion: Severe ______ Moderate ______ Minor X

Describe: lined by cobble

Silt Deposition: low

Pollutants (observation / potential sources): runoff from railroad

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species ______ Fish Spawn Areas ______

Other Environmentally-Sensitive Species ______ Aquatic/Wildlife Diversity X

Explain Findings: Fish, frog observed

Riparian Zone:

Development: Railroad /Forest

Riparian vegetation: Forest X Shrubs ______ Herbs ______

Dominant Species: Rhus copallina, LITU, EUSE, LIST

Riparian Buffer Width: LB >100' RB - none railroad

Approximate % Shading by Woody Species: 0

Notes:

Stream Features
Field Sheet

Date: 10/27/15 Project Site: Amtrak Susquehannah WUS #: 5 Unnamed tributary to Lily Run

Observer(s) D. Smith E. Jellick

Stream Flow:

Perennial: X Intermittent ____ Ephemeral ____

Gradient: 1% Classification: R3UB1/2

Channel Characteristics:

Natural ____ Artificial (man-made) X Manipulated (man-altered) ____

Explain: Flows from culvert through underpass onto cobbles

Channel Has (check all that apply):

- [x] Bed and Banks
- [x] OHWM
  - [ ] clear, natural line impressed on the bank
  - [x] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [x] sediment deposition
  - [x] water staining
  - [ ] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [ ] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ____
- [ ] Discontinuous OHWM (explain): ____

Morphology:

Avg. Channel Width 3' Depth 1-3' Avg. Water Depth 1'

Habitat and Pollutants:

Substrate (predominant type (s)): silt, cobble, sand

Habitat Complexity (characterize): low - slow moving channel no instream habitat

Bank Erosion: Severe ____ Moderate ____ Minor X

Describe: concrete lined or cobble

Silt Deposition: low

Pollutants (observation / potential sources): Runoff from railroad, surrounding highway + junkyard

Stormwater Outfalls: none observed

Biological Habitat For (check all that apply):

Federally Listed species __________ Fish Spawn Areas __________

Other Environmentally-Sensitive Species __________ Aquatic/Wildlife Diversity __________

Explain Findings: __________

Riparian Zone:

Development: Railroad

Riparian vegetation: Forest __________ Shrubs __________ Herbs X

Dominant Species: Juncus effusus

Riparian Buffer Width: none, railroad cobble/tracks both sides scattered herbs

Approximate % Shading by Woody Species: 0

Notes: #13 US, #14 DS

Stream Features
Field Sheet

Unnamed tributary to Gashey's Creek

Date: 10/27/15 Project Site: Susquehanna Amtrak WUS # : 22

Observer(s) D. Smith, E. Jellick

Stream Flow:

Perennial: X Intermittent ______ Ephemeral ______

Gradient: 2% Classification: R4SB3

Channel Characteristics:

Natural ______ Artificial (man-made) X Manipulated (man-altered) ______

Explain: Cobble

Channel Has (check all that apply):

- [x] Bed and Banks
- [x] OHWM
  - [x] clear, natural line impressed on the bank
  - [ ] changes in character of soil
  - [ ] shelving
  - [x] vegetation matted down, bent, or absent
  - [x] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [ ] water staining
  - [ ] the presence of litter and debris
  - [ ] destruction of terrestrial vegetation
  - [ ] the presence of wrack line
  - [ ] sediment sorting
  - [ ] scour
  - [ ] multiple observed or predicted flow events
  - [ ] abrupt change in plant community
  - [ ] other (list): ______
- [ ] Discontinuous OHWM (explain): ______

Morphology:

Avg. Channel Width 3 Depth 1/2 Avg. Water Depth <1"

Habitat and Pollutants:

Substrate (predominant type (s)): cobble

Habitat Complexity (characterize): none/low - cobble bottom, straight channel

Bank Erosion: Severe ______ Moderate ______ Minor X

Describe: lined in cobble

Silt Deposition: low

Pollutants (observation / potential sources): Railroad, highway

Stormwater Outfalls: ______

Biological Habitat For (check all that apply):

Federally Listed species ____ Fish Spawn Areas ____

Other Environmentally-Sensitive Species ____ Aquatic/Wildlife Diversity ____

Explain Findings: Fish + frogs observed

Riparian Zone:

Development: ____

Riparian vegetation: Forest X Shrubs ____ Herbs ____

Dominant Species: Rhus sp. Acer rubrum, LIST

Riparian Buffer Width: RB - gravel slope, 20' to forest of 50' wide LB railroad

Approximate % Shading by Woody Species: ____

Notes: Natural canopy from ROW into forest - manipulated along toe of railroad embankment to Gashey's Creek

Attachment D

Mitigation Site Search

Susquehanna River Rail Bridge Project

Preliminary Mitigation Site Search Report

March 2016

Prepared by:

COASTAL RESOURCES INC.

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Tables

Appendices

I. INTRODUCTION

The Maryland Department of Transportation (MDOT) is currently preparing a Natural Resources Technical Report (NETR) to assess the potential effects on natural resources from the Susquehanna River Rail Bridge Project. MDOT, the project sponsor, is proposing to improve the Susquehanna River Rail Bridge between the City of Havre de Grace, Harford County, Maryland and the Town of Perryville, Cecil County, Maryland in order to provide continued rail connectivity along the Northeast Corridor (NEC). The Susquehanna River Rail Bridge is located at Milepost 60 along the NEC. The proposed project would span approximately six miles, between Milepost 63.5 south of the City of Havre de Grace and Milepost 57.3 north of the Town of Perryville. The 109-year-old bridge is a critical link along one of the U.S. Department of Transportation's (USDOT) designated high-speed rail corridors. The NEC is the busiest passenger rail line in the United States. The bridge is used by Amtrak, the Maryland Area Regional Commuter (MARC), and Norfolk Southern Railway (NS) to carry intercity, commuter, and freight trains across the Susquehanna River. If constructed, the project would result in unavoidable impacts to wetlands and waterways, despite early and on-going efforts to avoid and minimize these impacts to the extent practicable. As part of the project planning process, MDOT initiated a preliminary mitigation site search to identify potential suitable sites to compensate for potential project wetland and waterway impacts in accordance with state and federal guidance should the project be constructed. This report details the methods and results of the preliminary mitigation site search and is included as Attachment D to the NETR.

II. BACKGROUND

Section 404 of the Clean Water Act provides regulatory authority to the US Army Corps of Engineers (USACE) to issue or deny permits for the discharge of dredged or fill material into waters of the US, including special aquatic sites (e.g., wetlands, mud flats, riffle pool complexes, and vegetated shallows). Under the requirements of Section 404 and the Maryland Nontidal Wetlands Protection Act, a Joint Federal/State Permit would be required for any impacts to Waters of the U.S., including wetlands, resulting from the Susquehanna River Rail Bridge Project. As part of the permitting process, a detailed compensatory mitigation package, including final mitigation design, would need to be developed and approved by the USACE and Maryland Department of the Environment (MDE) prior to permit issuance. All mitigation would be developed in accordance with 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. When practicable measures have been taken to avoid and minimize impacts to aquatic resources, mitigation may be required in the form of establishment/creation, enhancement, or preservation to replace the loss of wetland, stream and/or other aquatic resource functions. 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.

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. Emergent wetlands are often mitigated on a 1:1 replacement basis, while forested and scrub-shrub wetlands are mitigated on a 2:1 basis. Tidal wetland compensation follows similar ratios, except emergent tidal wetlands are also replaced at a 2:1 ratio. However, these ratios can provide only a preliminary estimate of required mitigation, as functional replacement is the guiding mitigation principal, and ratios may be adjusted at the discretion of the USACE or MDE depending on the practicability and functional effectiveness of the proposed mitigation. 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, and water quality improvements, may also be used at the agencies' discretion.

The NRTR evaluates the potential effects on natural resources from two alternatives, 9A and 9B. These alternatives were selected in part because of their reduced impacts to wetlands/waterways and other natural resources, as compared to the conceptual alternatives considered, however, they would both have some direct impacts on both nontidal and tidal wetland resources and their corresponding buffers, as well as impacts to streams and impacts to the riverbed of Susquehanna River from pier installation. Additional and more specific information on the characteristics of the potentially impacted wetlands, including wetland function, is provided in Appendix E (*Natural Resources Technical Report Susquehanna River Rail Bridge Project*) of the Environmental Assessment.

Impacts to Waters of the U.S., including wetlands, from the two retained alternatives would total less than an acre of wetlands and more than 3,000 linear feet of streams. An additional 0.08 acre of submerged aquatic vegetation will also be permanently impacted. After all practicable measures have been taken to avoid and minimize impacts to aquatic resources, unavoidable impacts may 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. ***Table 1*** summarizes the wetland, stream, and SAV impacts and estimated minimum mitigation required to offset those impacts.

***Table 1* – Wetland and Stream Impacts and Estimated Minimum Required Mitigation for Each Build Alternative**

Resource	Alternative 9A			Alternative 9B		
	Impact (Ac/Lf)	Replacement Ratio[1]	Mitigation (Ac/Lf)	Impact (Ac/Lf)	Replacement Ratio[1]	Mitigation (Ac/Lf)
Nontidal Forested Wetland	0.25	2:1	0.5	0.17	2:1	0.34
Nontidal Emergent Wetland	0.58	1:1	0.58	0.54	1:1	0.54
Tidal Forested Wetland	0.05	2:1	0.1	0.05	2:1	0.1
Tidal Emergent Wetland	0.01	2:1	0.02	0.01	2:1	0.02
Intermittent and Perennial Streams	3,190	1:1	3,190	2,943	1:1	2,943
SAV	0.08	3:1	0.24	0.08	3:1	0.24

[1]Ratios and estimated acreages of wetland compensation are used for mitigation planning purposes only. Final ratios and required acreage of compensation will be negotiated with regulatory agencies during development of the Final Mitigation Plan.

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, including within a nontidal wetland in Cecil County that will not be impacted, but is a disturbed ditch wetland that may be enhanced. 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 in size, more than sufficient size to accommodate the higher enhancement ratio of at least 4:1. SAV impacts cannot realistically be replaced in-kind. Therefore, mitigation would be in the form of water quality or fish passage improvements to area streams or shoreline stabilization opportunities. Other potential onsite mitigation options will also be investigated as the project advances through later design phases. If further onsite 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.

To address the potential need for off-site mitigation, a preliminary 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. Stream impacts will occur within both watersheds, and thus, the site search encompassed both watersheds. This Preliminary Mitigation Site search serves as the first stage in the development of a Phase I Conceptual Mitigation Plan. The methods used in conducting the site search are detailed below. Phase I would be completed in later stages of the project with agency review and input, followed by development of the full Phase II mitigation plan as part of the permit application process during final design.

III. MITIGATION SITE SEARCH METHODS

The Federal Mitigation Rule prioritizes using approved mitigation banks whenever possible. Based on recent research on the Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) one private bank, the Tharpe Mitigation Bank, is located within the Swan Creek watershed. Coordination with the regulatory agencies and bank owners will be initiated in later phases of the project to determine if this bank is a viable option for mitigating the unavoidable nontidal wetland and waterway impacts from the project. Due to the uncertainty of the bank option, the project will need to seek permittee-responsible mitigation opportunities to compensate for unavoidable wetland and stream impacts.

A. WETLANDS

The wetland mitigation site search process focused on locating non-forested areas with the highest potential for wetland creation or restoration with emphasis on "in-kind" replacement within the Lower Susquehanna watershed (HUC-8 02120201).

1. Desktop Wetland Site Identification

a. Watershed Resources Registry Search

The Watershed Resources Registry (WRR) is a GIS-based targeting tool that was created by the Environmental Protection Agency (EPA) and other partners as part of a Green Highways Partnership project to integrate the Clean Water Act with multiple state programs. Potential wetland restoration sites listed in the WRR database are identified as areas that have somewhat, poorly, or very poorly drained soils, and do not consist of existing wetlands or forest. The database scores the potential wetland restoration sites using an array of ecological factors. This web-based application was used to locate potential wetland mitigation sites in the Lower Susquehanna watershed. These sites were further evaluated in a desktop GIS-based search to ensure they are free from obvious constraints such as public utilities or forest cover.

b. GIS-Based Search

In addition to the sites identified from the WRR, potential wetland mitigation sites in the Lower Susquehanna watershed were identified using aerial photographs (BING, 2012) and GIS data layers for soils (NRCS, 2014), NWI wetland data (USFWS, 2002), hydro line data (MDiMAP 2014), and FEMA 100-year floodplains (FEMA, 2013). Open land areas adjacent to mapped wetlands, streams, and floodways were prioritized due to the presence of existing sources of hydrology in those areas. Additionally, the Natural Resources Conservation Service (NRCS) mapped hydric soils and topo maps were referenced to target areas where soils and elevation are desirable for wetland creation. These sites were further investigated using aerial photography, including bird's eye views and street views, to eliminate sites with obvious constraints such as public utilities and forest cover, or sites unable to provide the minimum necessary mitigation acreage. Areas where multiple resource layers overlapped were given the highest priority and were included in the database. Sites located within forested canopy cover and areas overlapping historical preservation, forest conservation easements, and agricultural land preservation were avoided.

2. Windshield Wetland Site Assessment

Following the desktop identification of potential wetland mitigation sites, CRI completed a windshield field assessment of the sites that could be viewed from publicly accessible locations. Sites were viewed for their potential to support wetland creation or enhancement based upon current land use, land form, size, accessibility, and presence of other visible site constraints.

B. STREAMS

The stream mitigation site search process focused on locating stream segments with the highest need and potential for restoration within the Lower Susquehanna River and Swan Creek watersheds.

1. Desktop Stream Site Identification

a. Water Resources Registry Search

The WRR was used to investigate possible stream mitigation sites in the Lower Susquehanna and Swan Creek watersheds. The sites identified on the WRR were investigated during the GIS-based desktop review to ensure that they were free from obvious land use constraints.

b. GIS-Based Search

The GIS-based search involved overlaying federal, state, and regional data over aerial photography in order to locate areas suitable for stream restoration. These data ranged from point-source discharges; fish blockages; land-use and imperviousness; biological monitoring data; 303(d) impaired waters; conservation easements; and sensitive areas as designated by the county. Biological monitoring reports were also consulted to examine areas of impairment or focus. An initial search of streams lacking forested riparian buffers was conducted, to which other suitable areas were added as determined by the incorporation of federal, state, and regional data in GIS. Stream sites were considered somewhat more suitable if there were potential wetland mitigation sites nearby (via WRR or other sources), in order to create an ecological coupling of wetlands, floodplains, and streams.

2. Windshield Stream Site Assessment

Following the desktop identification of potential stream mitigation sites, CRI completed a windshield field assessment of the sites that could be viewed from publicly accessible locations. Sites were viewed for their potential to support stream restoration, in-stream habitat improvements, and fish blockage removal. Sites were eliminated based upon land use, accessibility, and the potential functional uplift likely to be achieved.

IV. MITIGATION SITE SEARCH RESULTS

A. WETLANDS

From the preliminary desk top site search efforts, 27 potential nontidal wetland mitigation sites were identified and determined to be preliminarily suitable as opportunities to mitigate unavoidable nontidal wetland impacts from the Susquehanna River Rail Bridge project (**see Appendix A – Preliminary Mitigation Site Search Map**). Details on the potential nontidal wetland mitigation sites are presented in ***Table 2***. No potential tidal wetland creation sites were found during the desktop review. The absence of potential tidal wetland creation sites results from the generally elevated topography of the landform adjacent to the tidal rivers, making the amount of necessary cut impractical. On-site mitigation for tidal wetland impacts is proposed in the form of wetland enhancement (see above), which should more than compensate for minor tidal wetland impacts resulting from the proposed rail project.

A windshield survey of the 27 potential nontidal wetland mitigation sites was conducted on March 8, 2016. Following the windshield survey, seven (7) of the 27 potential sites identified during the desktop review were determined to warrant further on-site investigations. During the windshield survey an additional site was added, bringing the total number of sites to advance for further on-site investigations to eight (8). Information about these eight sites are included in ***Table 3***. The additional site is is also included on the map in **Appendix A**. One potential off-site tidal enhancement site was also found during the windshield survey. The site is located along the Harford County shoreline just upstream of the US 40 crossing of the Susquehanna River. The site was densely vegetated with common reed, but site access may be a potential issue. This potential tidal wetland enhancement site has also been added to the map in **Appendix A.**

Table 2 **- Potential Wetland Mitigation Sites**

SITE ID	COUNTY	WATERSHED	APPROX SIZE (AC)	ON WRR* (Y/N)	HYDRIC SOILS (Y/N)	MAPPED WETLAND (Y/N)	HYDROLOGY	CURRENT LAND USE
W-1	Cecil	Lower Susquehanna	12	Yes	No	Yes	Multiple stream channels paralleling site	Open/Maintained area
W-2	Cecil	Lower Susquehanna	4	Yes	Yes	No	Stream channel adjacent to site	Agricultural field
W-3	Cecil	Lower Susquehanna	3	Yes	Yes	No	Stream flows through site	Agricultural field with narrow forested strip
W-4	Cecil	Lower Susquehanna	5	No	Yes	No	Stream channel adjacent to site; ditch extending through site	Agricultural field
W-5	Cecil	Lower Susquehanna	4	Yes	Yes	No	Stream channel adjacent to site	Agricultural field
W-6	Cecil	Lower Susquehanna	15	Yes	Yes	Yes	Stream channel flows through site	Agricultural field with narrow forested strip
W-7	Cecil	Lower Susquehanna	4	Yes	Yes	No	Stream channel adjacent to site	Agricultural field
W-8	Cecil	Lower Susquehanna	4	No	No	No	Stream channel adjacent to site; ditch extending through site	Agricultural field
W-9	Cecil	Lower Susquehanna	3	Yes	No	No	Stream channel adjacent to and flowing through site	Open/maintained area
W-10	Cecil	Lower Susquehanna	3	Yes	No	No	Multiple stream channels adjacent to site	Agricultural field & maintained area
W-11	Cecil	Lower Susquehanna	3	No	No	No	Stream channel flows through and adjacent to site, farm pond and ditches present	Agricultural field
W-12	Cecil	Lower Susquehanna	5	No	No	No	Stream channel flows through site; farm pond present	Agricultural field
W-13	Cecil	Lower Susquehanna	3	No	No	No	Stream channel flows through site; ditches extending through site	Agricultural field with a few trees
W-14	Cecil	Lower Susquehanna	3	Yes	No	No	Stream channel adjacent to site; existing wetland abutting site	Agricultural field
W-15	Cecil	Lower Susquehanna	2	Yes	Yes	No	Stream channel adjacent to the site	Agricultural field
W-16	Cecil	Lower Susquehanna	2	Yes	Yes	No	Stream channel adjacent to the site	Open/Maintained area
W-17	Harford	Lower Susquehanna	4	Yes	Yes	No	Stream channel adjacent to and flowing through site; existing wetland abutting site	Scrub-shrub area
W-18	Harford	Lower Susquehanna	3	Yes	Yes	Yes	Stream channel flows through site	Agricultural field with narrow forested strip
W-19	Harford	Lower Susquehanna	3	No	No	No	Stream channel flows through site	Agricultural field with narrow forested strip
W-20	Harford	Lower Susquehanna	3	No	No	No	Stream channel flows through site	Agricultural field with narrow forested strip
W-21	Harford	Lower Susquehanna	4	Yes	Yes	Yes	Stream channel flows through site	Open pasture with forested strip
W-22	Harford	Lower Susquehanna	7	No	No	Yes	Multiple streams channels/ditches flow through site; farm pond present	Open pasture with a narrow forested strip
W-23	Harford	Lower Susquehanna	5	Yes	No	Yes	Multiple stream channels flow through site	Open pasture with a few scattered trees
W-24	Harford	Lower Susquehanna	5	No	No	No	Stream channel adjacent to site	Agricultural field
W-25	Harford	Lower Susquehanna	4	Yes	Yes	No	Stream channel flows through site	Agricultural field
W-26	Harford	Lower Susquehanna	5	No	No	No	Pond/wetland located within site; stream channel adjacent to site	Agricultural field/maintained area
W-27	Cecil	Lower Susquehanna	5	Yes	No	Yes	Stream channel adjacent to site	Agricultural field/maintained area

* WRR: Water Resources Registry

Table 3 **- Potential Wetland Mitigation Sites Carried Forward Post Windshield Survey**

SITE ID	COUNTY	NEAREST ROAD INTERSECTION	APPROX SIZE (AC)	SOURCE	LOCATION NOTES	STATUS/COMMENTS
W-14	Cecil	Philadelphia Rd & Coudon Blvd	5	WRR	East Coudon Blvd and north of Philadelphia Rd	Low lying ag field abuts emergent marsh with thin strip of young trees (willow, sweetgum, planted leyland cypress); 3-4' cut could yield about 5 Ac wetland.
W-15	Cecil	Coudon Blvd & US 40	2	WRR	Between Coudon Blvd and Aiken St	Low lying field lies adjacent to Coudon Creek and potentially created wetland on Perryville Elementary School property. Site not accessible, but might be worth further investigation.
W-17	Harford	Post and Keewee Rds	4	WRR	Between Amtrak rail and Post Rd	Site mostly existing shrubby wetland. Small (<0.5Ac), low lying field adjacent to common reed wetland with creation potential and enhancement of common reed. Lies adjacent to project.
W-22	Harford	Webster Lapidum & Level Rds	7	CRI-Desktop	West of Webster Lapidum Rd	Site not completely visible from road, but part of a large abandoned agricultural area with many small streams/ditches draining through; some portions likely existing wetlands. Site appears relatively flat, but according to contours, has over 10 feet of elevation change. Potential stream restoration opportunities. More investigations warranted.
W-23	Harford	Webster Lapidum & Level Rds	5	WRR	West of Level Rd and north of York Dr	Part of large abandoned agricultural area on the south side of a gravel driveway from Site 22. Land form appears relatively flat, but contours suggest as much as a 20' elevation difference within the site. Existing wetland mapped adjacent to site. Potential stream restoration opportunities. More investigations warranted.
W-25	Harford	Cooley Mill & Rock Run Rds	2	WRR	North of sharp bend in Cooley Mill Rd	Relatively flat field adjacent to forested floodplain of small stream. Wet patches observed in field; portion of field mapped hydric soils. Possibly suitable to create 2 Ac wetlands.
W-27	Cecil	Conowingo Rd & Barrett Ln	1	WRR	East Conowingo Rd	Small (1 Ac.), gently sloping area mapped as hydric soil adjacent to forested floodplain along stream.
W-28	Cecil	Perrylawn Dr & Craigtown Rd	1.5	CRI-Desktop	South of the intersection of Perrylawn Dr and Craigtown Rd	Linear uplands within transmission ROW would require less than 3' of cut. Within transmission ROW so only PSS possible; may restrict access to towers. No more than 2 Ac of creation.

B. STREAMS

From the preliminary desk top site search efforts, 26 potential stream mitigation sites were identified and determined to be preliminarily suitable as opportunities to mitigate unavoidable waterway impacts from the Susquehanna River Rail Bridge Project (**see Appendix A – Preliminary Mitigation Site Search Map**). Details on the potential stream mitigation sites are presented in ***Table 3***.

A windshield survey of the 26 potential stream mitigation sites was conducted on March 8, 2016. Following the windshield survey, 17 of the 27 potential sites identified during the desktop review were determined to warrant further on-site investigations or were inaccessible without gaining land owner permission. Additionally, Site 26 (Lily Run) was extended upstream 1,714 linear feet to include the entire reach within the Havre de Grace Middle School property. Approximately 530 feet of the reach is currently piped beneath an athletic field southeast of the Amtrak right-of-way. If Alternative 9A is selected as the preferred alternative, a portion of this field will be taken for new right-of-way to allow placement of the new track. If this occurs, it may be possible to restore the piped section of stream to a natural flow regime. Information about the 17 sites carried forward are included in ***Table 4***. The extended section of Site 26 is shown in **Appendix A.**

Table 4 **- Potential Stream Mitigation Sites**

SITE ID	COUNTY	WATERSHED	APPROX. LENGTH (LF)	FISH BLOCKAGES (Y/N)	RIPARIAN ZONE	Potential Wetland Mitigation Component (Y/N)	Notes
S-1	Harford	Swan Creek	485	No	Forested	No	Confined between 2 road crossings
S-2	Harford	Lower Susquehanna River	607	Yes	Partially forested, partically maintained	No	Located approximatley 800 lf upstream of Susquehanna River confluence
S-3	Harford	Swan Creek	2,991	Yes	Forested, narrowly forested through residential area	No	Includes multiple fish blockages, includes point source discharge from mobile home park, flows through high density residential area
S-4	Harford	Swan Creek	863	No	Forested between agricultural fields	No	Surrounded by agricultural fields
S-5	Harford	Lower Susquehanna River	508	Yes	Partially forested, residential yards	No	Flows through box culvert in residential area
S-6	Cecil	Lower Susquehanna River	545	Yes	Forested	No	Flows through pipe culvert in medium density residential area
S-7	Harford	Lower Susquehanna River	555	No	Forested, northern bank abuts quarry	No	Flows to road crossing, located adjacent to quarry, approximately 350 lf upstream of the Susuquehanna River confluence
S-8	Cecil	Lower Susquehanna River	830	Yes	Forested, residential property	No	Flows through box culvert at major road crossing
S-9	Harford	Swan Creek	1,482	Yes	Forested, abuts residential properties	No	Flows to dammed impoundment, adjacent to medium density residential
S-10	Cecil	Lower Susquehanna River	474	Yes	Forested/scrub-shrub	No	Includes multiple fish blockages and a road crossing
S-11	Harford	Lower Susquehanna River	1,158	Yes	Forested	No	Rock Run Dam located mid-reach; located approximately 1,800 lf upstream of Susquehanna River confluence
S-12	Harford	Lower Susquehanna River	755	Yes	Forest/scrub-shrub	Yes (site W-22)	Dam at small impoundment, located between agricultural fields
S-13	Harford	Lower Susquehanna River	2,168	Yes	Partially forested, residential properties	No	Multiple road crossings, 2 small dams, high impervious, residential area
S-14	Harford	Swan Creek	266	Yes	Forested	No	Includes 2 small dams and flows through road crossing in residential area
S-15	Harford	Swan Creek	1,314	No	Forested	No	Flows through multiple road crossings in resential area
S-16	Harford	Lower Susquehanna River	1,774	Yes	Forested	No	Includes 2 pipeline crossings, located between agricultural fields
S-17	Harford	Lower Susquehanna River	714	No	Parially forested	No	Flows through box culvert in high density residential area
S-18	Cecil	Lower Susquehanna River	2,331	Yes	Forested	No	Includes pipeline crossing that is a potential fish blockage, flows from culvert at road crossing
S-19	Cecil	Lower Susquehanna River	464	Yes	Forested	No	Includes pipeline crossing that is a potential fish blockage, flows to road crossing in residential area
S-20	Cecil	Lower Susquehanna River	1,550	Yes	Forested	No	Located approximatley 150 lf upstream of Susquehanna River confluence, flows through residential area with adjacent ag fields
S-21	Harford	Swan Creek	1,113	No	Forested and golf course	No	Located adjacent to golf course, includes channel alterations
S-22	Harford	Swan Creek	718	No	Partially forested	No	Adjacent to retention pond in high density residential
S-23	Cecil	Lower Susquehanna River	595	No	Forested and agricultural fields	Yes (site W-2 & W-3)	Includes dirt road crossing, surrounded by ag fields
S-24	Harford	Swan Creek	1,480	No	Forested/scrub-shrub	No	Flows to road crossing, surrounded by ag fields and some residential properties
S-25	Cecil	Lower Susquehanna River	1,141	No	Residential properties and powerline ROW	No	Includes multiple road crossings in high density residential area
S-26	Harford	Lower Susquehanna River	670	No	Maintained school property	No	Stream is channelized through highly impervious area, includes road crossings

Table 5 **- Potential Stream Mitigation Sites Carried Forward Post Windshield Survey**

SITE ID	COUNTY	NEAREST ROAD INTERSECTION	APPROX. LENGTH (LF)	FISH BLOCKAGES (Y/N)	RIPARIAN ZONE	LOCATION NOTES	STATUS/COMMENTS
S-2	Harford	Superior & N Juniata Sts	607	Yes	partially forested, partially maintained	West of Superior St	No obvious blockages; some minor erosion on bends; right bank with scattered planted trees and lawn, more plantings possible, but no restoration.
S-4	Harford	Aldino & Mahan Rds	863	No	forested between agricultural fields	SE of Aldino Rd	Not accessible, but scored low for water quality by MBSS. Potential instream habitat improvements.
S-6	Cecil	Perryville Rd & Clayton St	545	Yes	forested	West of Perryville Rd & East of Lighthouse Dr	Site not visible, but potentially contains an old culverted road crossing that could be a fish blockage
S-8	Cecil	Old Haley & Jackson Station Rds	830	Yes	forested, residential property	Between Old Haley & Jackson Sta Rd	Fish blockage on upstream side of primary channel culvert at Jackson Station Rd where vertical wooden slats have been installed. Secondary channel culvert beneath Jackson Station Rd mostly filled with sediment. No other stream habitat improvements necessary.
S-9	Harford	Chapel Rd & Oak Tree Dr	1,482	Yes	forested, abuts residential properties	South of Chapel Rd & east of War Admiral Way	Impoundment not visible, but likely functions as fish blockage.
S-10	Cecil	Jacob Tome Memorial Hwy & Burlin Rd	474	Yes	forested/ scrub-shrub	SE MD 276 & SW MD 275	Not visible, as site lies within large, fenced Bainbridge Development Corp property.
S-12	Harford	Webster Lapidum & Level Rds	755	Yes	forest/ scrub-shrub	North Webster Lapidum Rd/MD 155 & east York Dr	No visible, but several small streams flow through large abandoned farm site; most of streams without forest cover.
S-13	Harford	Pulaski Hwy & Erie St	2,168	Yes	partially forested, residential properties	From CSX railroad to N Juniata St/Superior St intersection	Between Superior and Erie Sts, recent clearing of vegetation on right bank, left bank mowed lawn with large planted trees. Between Erie St and US 40 gabion baskets on right bank with minor fish blockage.
S-14	Harford	Chapel & Bryan Rds	266	Yes	forested	Upstream and downstream of Chapel Rd	Concrete apron on downstream side of Chapel Road culvert that acts as fish blockage. Large debris jam 200' farther downstream.
S-15	Harford	Hopewell & Hopkins Rds	1,314	No	forested	Upstream and downstream of Hopewell Rd	At Hopewell Road crossing, stream appears stable with forested banks. MBSS site upstream of Hopewll Road with poor habitat index, possible instream improvements.

SITE ID	COUNTY	NEAREST ROAD INTERSECTION	APPROX. LENGTH (LF)	FISH BLOCKAGES (Y/N)	RIPARIAN ZONE	LOCATION NOTES	STATUS/COMMENTS
S-18	Cecil	Frenchtown & Cokesbury Rds	2,331	Yes	forested	Frenchtown Rd to I-95	Fish blockage on downstream side of Frenchtown Rd crossing; remainder of reach not visible
S-19	Cecil	St. Marks Church Rd & Penny Ln	464	Yes	forested	Upstream of St. Marks Church Rd	Reach not fully visible from road; instream habitat improvements possible.
S-20	Cecil	Frenchtown Rd & Sumpter Dr	1,550	Yes	forested	Upstream Frenchtown Rd & west Sumpter Dr	Most of reach not visible from Frenchtown Rd; reach just upstream with high gradient and boulder substrate. Possible instream habitat improvements elsewhere within the reach.
S-22	Harford	Counterpoint & Majestic Prince Cir	718	No	partially forested	West of Counterpoint Cir	Not visible, but left bank not forested; possible planting and/or instream habitat enhancements.
S-23	Cecil	McGothlin & Granite Run Rds	595	No	forested and agricultural fields	SE McGlothlin Rd	Not visible from driveway; flows through agricultural area with thin forest buffer.
S-24	Harford	Aldino Stepney & Churchville Rds	1,480	No	forested/ scrub-shrub	Upstream Aldino Stepney Rd	Flows through old field managed for wild turkey by National Wild Turkey Federation. Stream banks 3' high with minor erosion. Most of reach not accessible.
S-26	Harford	Juniata St N & Pennington Ave	2,384	No	maintained school property	On Havre de Grace Middle School property	Portions of Lily Run through school property lacking forest cover. Other portions of reach are currently piped. If Amtrak takes school ROW for new track, could investigate opening piped sections and doing other instream habitat improvements and tree plantings.

V. CONCLUSIONS

Based on the results of the preliminary mitigation site search, a range of suitable opportunities exist within the Lower Susquehanna River and Swan Creek watersheds to compensate for potential unavoidable wetland and waterway impacts resulting from the Susquehanna River Rail Bridge Project. The preliminary site search efforts identified approximately 123 acres of preliminarily suitable wetland creation area, and over 27,000 linear feet of potential stream restoration.

A windshield survey of those sites with public access was completed in early March 2016 to determine their suitability as a wetland or stream mitigation site. Following the windshield survey, eight (8) wetland and 17 stream sites will be carried forward for more detailed on-site assessments to further evaluate suitability and technical feasibility and to refine site rankings based on more in-depth technical information. Additionally, an off-site tidal enhancement site was also identified along the Susquehanna River shoreline on the Harford County side just upstream of the US 40 Bridge.

The on-site investigations will require a property owner notificiation process to seek permissions for accessing properties. This step will occur following the 30% design/NEPA evaluation stage during future design stages of the project. At that time, coordination with government agencies and watershed groups will be initiated to potentially identify additional sites. Once on-site reviews are conducted, the highest-ranked sites would then be presented to the agencies to solicit comments and concurrence on the sites' suitability and ability to compensate for project related impacts, resulting in a Phase I Conceptual Mitigation Plan. Following agency concurrence on the Phase I plan, a Phase II mitigation plan would be developed in compliance with the Federal Mitigation Rule and State mitigation guidelines as part of the Final Design and permitting phase of the project.

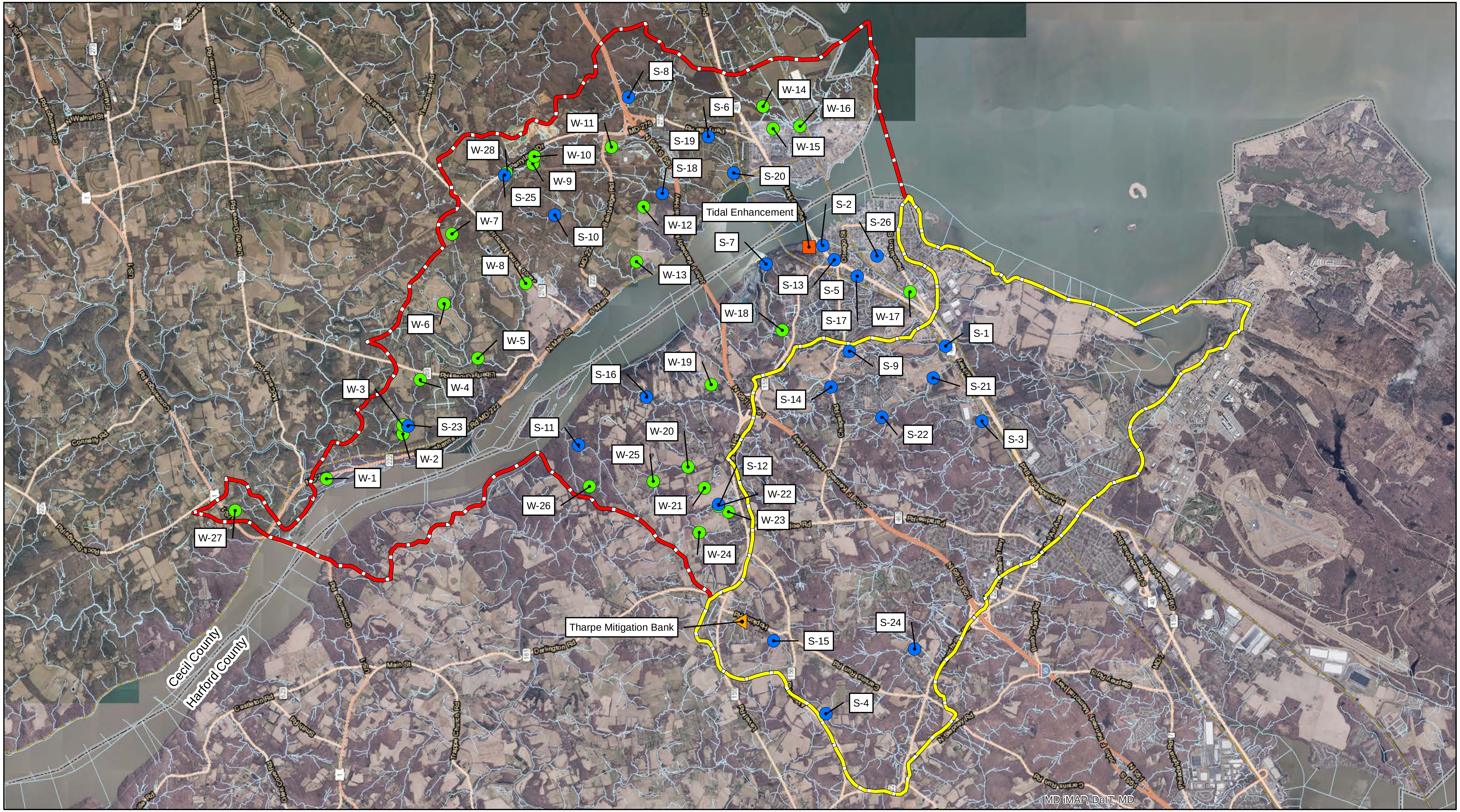
VI. REFERENCES

U.S. Department of Agriculture, Natural Resources Conservation Service. 2014. Soil Survey Geographic (SSURGO) Database for Cecil County, Maryland. Available online: http://websoilsurvey.nrcs.usda.gov

U.S. Department of Agriculture, Natural Resources Conservation Service. 2014. Soil Survey Geographic (SSURGO) Database for Harford County, Maryland. Available online: http://websoilsurvey.nrcs.usda.gov

U.S. Fish and Wildlife Service. 2002. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. http://www.fws.gov/wetlands/

APPENDIX A



Legend

Swan Creek Watershed	County Boundaries
Lower Susquehanna River Watershed	Streams
Mitigation Bank	Potential Non-Tidal Wetland Sites
Potential Stream Sites	Potential Tidal Enhancement Site

0 1.25 2.5 Miles

Susquehanna River Rail Bridge Project

Preliminary Mitigation Site Search Map

Attachment E

Correspondence

February 14, 2014

Mr. Ren Serey
Executive Director
Critical Area Commission
580 Taylor Avenue
Annapolis MD 21401

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Mr. Serey:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, which is carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Project proposes new and/or rehabilitated structures with up to four-track total capacity crossing the river. The project may also improve the navigation channel for marine users. A project location map is attached for your reference.

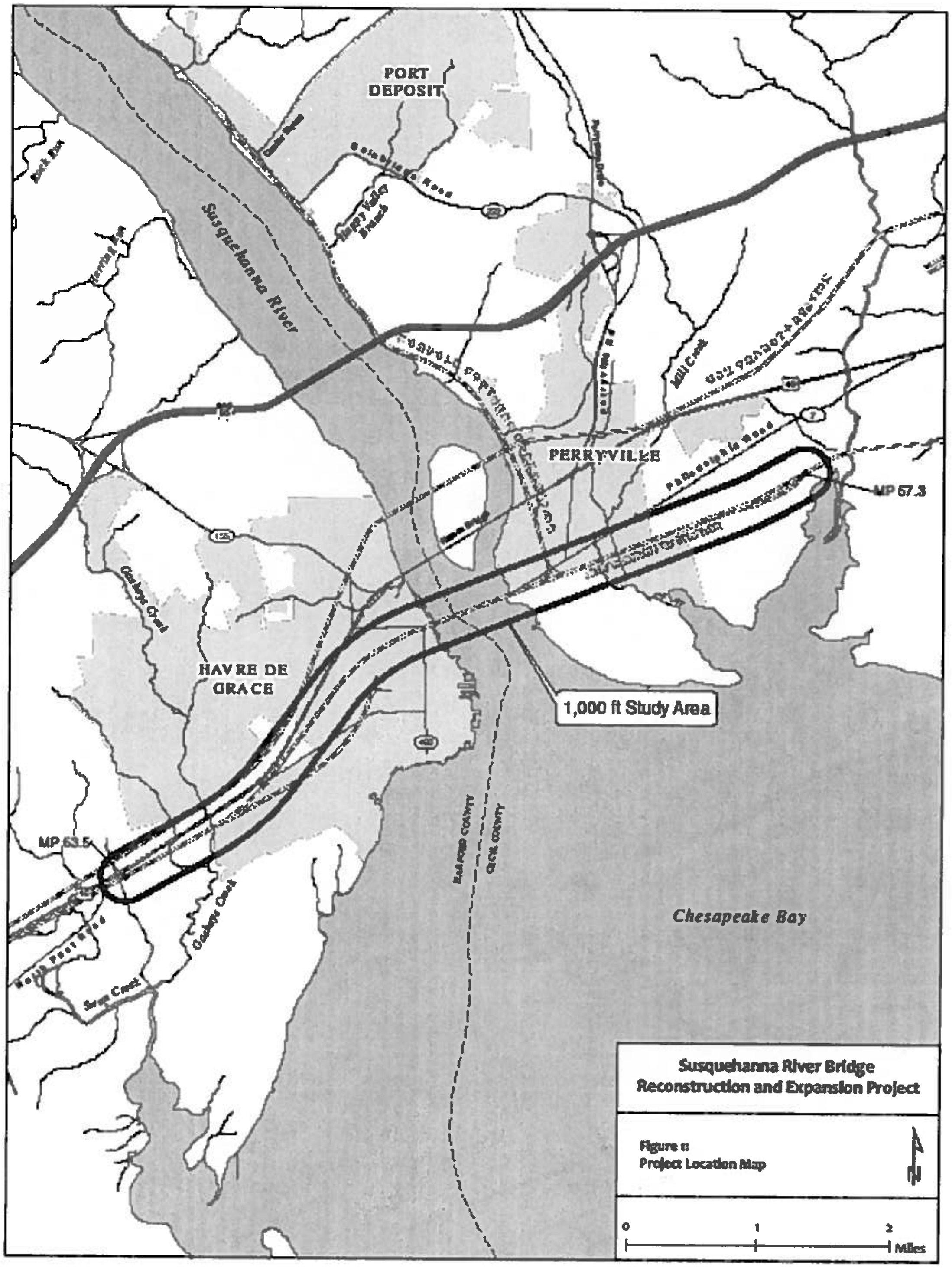
The Project team has initiated conceptual engineering and preliminary environmental studies. Agency coordination is ongoing, including plans to present current project efforts at the February 19, 2014 Interagency Review Meeting (IRM) at the Maryland State Highway Administration (SHA) Headquarters in Baltimore. A public information session is planned for early spring 2014. The project team will continue to coordinate with the Critical Area Commission as more detailed environmental and engineering studies are developed. Please feel free to share any input or Critical Area information that pertains to the proposed project. If you have any questions or need additional information, please contact me at 410-684-7063 or at hromano@mdot.state.md.us.

Sincerely,

HRomano

Harry Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Ms. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Ms. Lisa Hoerger, CAC Regulations and Mapping Coordinator, Harford County
Ms. Julie Roberts, CAC Natural Resources Planner, Cecil County
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration



PORT DEPOSIT
Susquehanna River
PERRYVILLE
HAVRE DE GRACE
MP 67.3
MP 63.5
1,000 ft Study Area
Chesapeake Bay
Mill Creek
HARFORD COUNTY
CECIL COUNTY
Susquehanna River Bridge Reconstruction and Expansion Project
Figure 1:
Project Location Map
0
1
2
Miles

Martin O'Malley
Governor
Anthony G. Brown
Lt. Governor

Margaret G. McHale
Chair
Ren Serey
Executive Director

STATE OF MARYLAND
CRITICAL AREA COMMISSION
CHESAPEAKE AND ATLANTIC COASTAL BAYS

1804 West Street, Suite 100, Annapolis, Maryland 21401
(410) 260-3460 Fax: (410) 974-5338
www.dnr.state.md.us/criticalarea/

February 18, 2014

Harry Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism
MD Department of Transportation
7201 Corporate Center Drive
Hanover, MD 21076

Re: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Mr. Romano,

Thank you for forwarding your letter via email regarding the above referenced project. The Maryland Department of Transportation (MDOT) is seeking comments on a potential bridge replacement, rehabilitation, and/or expansion. I understand that you will be coordinating with us as the project concept becomes more defined. From the map submitted and depending on the extent of the potential reconstruction, it appears that there will be impacts in the Critical Area that may be considered significant.

From this limited information, it appears that a full Critical Area Commission review may be required. Please coordinate with our office as the project becomes more defined and I will provide further information about the materials which will need to be submitted once we have a greater understanding of the impacts associated with the bridge work.

Thank you for coordinating with our office early in the process. I can be reached at 410-260-3476 with any further questions.

Sincerely,

Julie Roberts
Natural Resources Planner

February 14, 2014

Ms. Mary Colligan
National Marine Fisheries Service
Northeast Regional Office
Protected Resources Division
55 Great Republic Drive
Gloucester MA 01930

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Ms. Colligan:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Reconstruction and Expansion Project proposes new and/or rehabilitated structures carrying up to four tracks across the river. The Project may also improve the navigation channel for marine users.

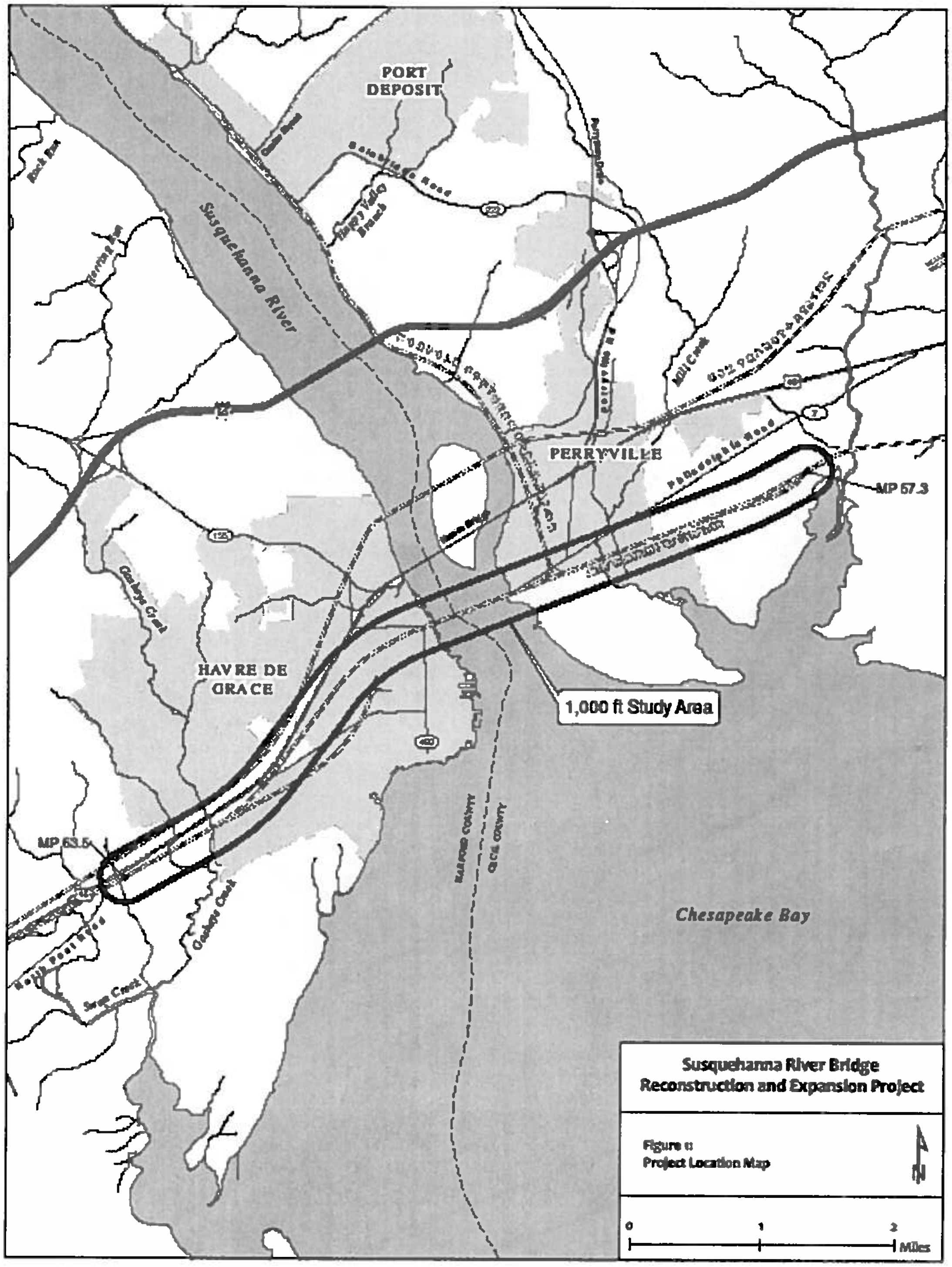
We request any information concerning federally-listed threatened or endangered species and/or any unique habitat that may occur in the study area as shown in the attached map. If you have any questions or need additional information regarding this request, please contact me at 410-684-7063 or hromano@mdot.state.md.us. You may also contact Ms. Leslie Mesnick-Uretsky at 646-388-9756 or lmesnick@akrf.com. Thank you for your assistance.

Sincerely,

H Romano

Harry J. Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Mr. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Mr. John Nichols, NMFS Chesapeake Bay Office
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration



PORT DEPOSIT
Susquehanna River
PERRYVILLE
HAVRE DE GRACE
1,000 ft Study Area
MP 57.3
MP 63.5
HARFORD COUNTY
CECIL COUNTY
Chesapeake Bay
Susquehanna River Bridge Reconstruction and Expansion Project
Project Location Map
0
1
2
Miles

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

MAR - 5 2014

Harry J. Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism
Maryland Dept of Transportation
7201 Corporate Center Drive
Hanover, MD 21076

Re: Susquehanna River Bridge Reconstruction and Expansion Project, Harford and Cecil Counties, Maryland

Dear Mr. Romano,

We received your letter on February 24, 2014 regarding the proposed expansion and reconstruction of Amtrak's Susquehanna River Bridge located in Harford and Cecil Counties, Maryland.

The following endangered species may occur within the waters (i.e., Chesapeake Bay and mouth of the Susquehanna River) of the proposed action: Shortnose sturgeon (*Acipenser brevirostrum*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) (Distinct Population Segments [DPS]: New York Bight, Chesapeake Bay, Carolina, South Atlantic), Kemp's ridley sea turtle (*Lepidochelys kempi*), green sea turtle (*Chelonia mydas*), and leatherback turtle (*Dermochelys coriacea*).

The following threatened species may occur within the waters (i.e., Chesapeake Bay and mouth of the Susquehanna River) of the proposed action: Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) (Distinct Population Segments [DPS]: Gulf of Maine), and Northwest Atlantic Ocean DPS of loggerhead sea turtle (*Caretta caretta*).

To facilitate efficient project review, we have compiled information about the presence of our listed species in the project area and in related Maryland waters that may be helpful in planning your project.

Shortnose Sturgeon
The U.S. Fish and Wildlife Service's (FWS) sturgeon reward program began in 1996. As of 2008, a total of 80 individual shortnose sturgeon had been captured, via commercial or recreational fishery, in Chesapeake Bay and its tributaries as a result of this program. Most of the shortnose sturgeon documented in the reward program have been caught in the upper Bay, from Kent Island to the mouth of the Susquehanna River and the C&D Canal, in Fishing Bay and around Hoopers Island in the middle Bay, and in the Potomac River.

Research on shortnose sturgeon indicates that this species typically spawns just below the limit of upstream passage. In unimpeded rivers systems, spawning typically occurs 200 km or more upstream. In dammed rivers, spawning often occurs at the base of the first dam. Studies indicate that spawning occurred at daily mean temperatures of 6.5-14.7°C in water depths of 1-5 meters with a peak at 1.5-1.9m. Bottom water velocity at the spawning site was a mean of 70cm/s with the greatest usage of 75-125 cm/s. The only substrate type females used was cobble/rubble (101-300 mm diameter). Substrate and flow are consistent in all areas where shortnose sturgeon spawning has been confirmed.

Several Chesapeake Bay tributaries have habitat characteristics such as hard bottom substrate and areas of high flow that may be suitable for spawning. These include the Gunpowder, James, York and Susquehanna Rivers. Adult shortnose sturgeon have been documented in the Susquehanna River in February, April and June, which is consistent with the time of year when spawning adults would be present. However, it is unknown if adequate spawning or nursery habitat occurs in the area below the Conowingo Dam, which is the first barrier to upstream passage. Telemetry data indicates that shortnose sturgeon move between the upper Chesapeake Bay and Delaware River via the C and D canal. These movements did not follow a specific pattern indicative of spawning migrations. Evidence suggests that shortnose sturgeon do not move into smaller creeks and tributaries of the large rivers connected to the Chesapeake Bay.

Although we do not have specific information on shortnose sturgeon movements in the Susquehanna, information gathered from the Potomac may be applicable. Twelve shortnose sturgeon have been captured in the Potomac River since 1996. These shortnose sturgeon were captured in the Potomac River and reported via the FWS reward program and were documented in the following locations: six at the mouth of the river one at the mouth of the Saint Mary's River; one at the mouth of Potomac Creek; one at rkm 63; one at rkm 57 (Cobb Bar); and, one at rkm 48. Additionally, one adult female was captured by U.S. Geological Service (USGS) and National Park Service (NPS) researchers within the Potomac River (at rkm 103) in September 2005.

From 2004-2008 the USGS and NPS conducted a tagging and telemetry study of shortnose sturgeon in the Potomac River (Kynard 2007). Three of the shortnose sturgeon mentioned above have been tagged with Combined Acoustic and Radio Transmitting (CART) tags. Tracking has demonstrated that the two females spent the majority of the year in a 79-km reach between river km 141–63. One female upstream in spring 2006 to a 2-km reach (river km 187–185) containing habitat determined to be suitable for spawning (Kynard et al. 2007). Remote and manual tracking showed a female arrived at the Fletchers Marina (River km 184.5) and remained within a 2-km reach (river km 187-185) for 6 days. During this time, mean daily river temperatures were 12.0–16.0°C and mean daily river discharge was 157–178 m^3/s. However, no sturgeon ELS were captured (Kynard et al. 2007).

During the years when fish were tracked, the two females spent the summer-fall in a 78-km reach (river km 63–141). Most of this area was in tidal freshwater, however, the downstream section of the range experiences tidal salinity. The fish used depths between 4.1–21.3 m, but most locations (89.2%) were in the channel. Throughout the summer and winter, fish used a wide range of water temperature (1.8–32.0°C), DO (4.8–14.6 mg/L) and salinity (0.1–5.6 ppt; Kynard et al. 2007). Substrate measured at fish locations were mud (80.7%), sand/mud (15.8%), and gravel-mud (3.5%). This area is also characterized by prolific tracts of submerged aquatic vegetation and algae blooms.

Atlantic Sturgeon
Atlantic sturgeon spawn in their natal river, with spawning migrations generally occurring during April-May in Mid-Atlantic systems. Young remain in the river/estuary until approximately age 2 and at lengths of 30-36 inches before emigrating to open ocean as subadults. After emigration from the natal river/estuary, subadults and adult Atlantic sturgeon travel within the marine environment, typically in waters between 16 to 164 feet in depth, using coastal bays, sounds, and marine waters. The distribution of Atlantic sturgeon is strongly associated with prey availability, and as a result, Atlantic sturgeon may occur where suitable forage (e.g., benthic invertebrates such as mollusks and crustaceans) and appropriate habitat conditions are present (e.g., areas of submerged aquatic vegetation (SAV). Individuals from any DPS may be found in suitable habitat areas within coastal, marine, or riverine habitat, including tidal creeks greater than 3.3 feet deep, any large or small tributaries of the Chesapeake Bay, coastal embayments where suitable habitat exists, and offshore of Maryland in marine habitat. Currently, Chesapeake Bay DPS Atlantic sturgeon are known to spawn in the James River in Virginia; historic spawning habitat is thought to exist in the Potomac River. Atlantic sturgeon have been recorded at the mouth of the Susquehanna River in recent years.

Sea Turtles
Several species of sea turtles are known to be present in the Chesapeake Bay and off the Atlantic coast of Maryland. Leatherback sea turtles (*Dermochelys coriacea*) are present off the Maryland coast but are predominantly pelagic. Loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempi*), and green sea turtles (*Chelonia mydas*) 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. Satellite tracking studies of sea turtles has found that foraging turtles mainly occurred in areas where the water depth was between approximately 16 and 49 feet. This depth was interpreted not to be as much an upper physiological depth limit for turtles, as a natural limiting depth where light and food are most suitable for foraging turtles. In Maryland waters of the Chesapeake Bay, sea turtles are most often documented in marine and estuarine waters and are not likely to be present in upper reaches of major tributaries because of salinity and prey availability requirements.

Conclusions
As listed species of sea turtles and sturgeon may occur at the mouth of the Susquehanna River and Chesapeake Bay, and thus, within the vicinity of your proposed project, any in-water work, such as excavation, blasting, pile driving, and dredging, has the potential to impact these species. As project details become finalized, a consultation, pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, may be necessary as any discretionary federal action, such as the approval or funding of a project by a federal agency, that may affect a listed species must undergo consultation pursuant to section 7 of the ESA of 1973, as amended. If the proposed project has the potential to affect listed species, and it is being approved, permitted, or funded by a Federal agency, the lead Federal agency, or their designated non-Federal representative, is

responsible for determining whether the proposed action is likely to affect the listed species. The Federal agency would submit their determination along with justification for their determination and a request for concurrence, to the attention of the ESA Section 7 Coordinator, NMFS Northeast Regional Office, Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930. After reviewing this information, NMFS would then be able to conduct a consultation under section 7 of the ESA. Should you have any questions about these comments or about the section 7 consultation process in general, please contact Jennifer Goebel at 978-281-6373 or jennifer.goebel@noaa.gov).

Essential Fish Habitat
The location of the proposed Susquehanna River Bridge Reconstruction and Expansion Project is located above the estuarine mixing zone in tidal fresh water and is not designated as essential fish habitat (EFH) for federally managed species. However, the Susquehanna River is an important migration corridor for numerous diadromous species including American shad, alewife, blueback herring, striped bass, hickory shad, gizzard shad, and American eel. Significant efforts are underway to restore the populations of several anadromous species to healthy levels. Therefore, in-water construction activities including but not limited to excavation, blasting, pile driving, and dredging may require time of year restrictions (TOYR) or other mitigative measures for these activities to help protect diadromous species migration and spawning. If you have any questions or need additional information regarding fisheries resources in the project area please contact David O'Brien, NOAA Fisheries Service, Habitat Conservation Division (david.l.o'brien@noaa.gov, 804-684-7828).

Sincerely,

Mark Murray-Brown

for

Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

EC: Goebel, O'Brien
File Code: Section 7/Nonfisheries/MD DOT/Susquehanna River Bridge_species present

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

MAY 5 2016

Dan Reagle
Environmental Planner
Maryland Transit Administration
Environmental Planning Division
6 St. Paul Street, 9th Floor, Baltimore, MD 21202

Re: Susquehanna River Rail Bridge Project
Draft Natural Resources Technical Report (NETR)

Dear Mr. Reagle:

Thank you for providing us with your Draft Natural Resources Technical Report (NETR) on April 8, 2016, and for coordinating with the resource and coordinating agencies at the Maryland Department of Transportation Interagency Review Meetings (IRM). The Maryland Department of Transportation (MDOT), project sponsor, is proposing to improve the Susquehanna River Rail Bridge between the City of Havre de Grace, Harford County, Maryland and the Town of Perryville, Cecil County, Maryland in order to provide continued rail connectivity along the Northeast Corridor (NEC).

The NETR evaluates the potential effects on natural resources from Alternative 9A and Alternative 9B. Both Alternative 9A and Alternative 9B would construct:

- a new two-track bridge accommodating train speeds of up to 90 miles per hour (mph) to the west of the existing bridge, and
- a second new two-track bridge along the existing alignment.

The second new bridge would accommodate speeds of up to 160 mph for Alternative 9A and up to 150 mph for Alternative 9B. The bridge to the west of the existing bridge would be constructed first. Once that bridge is completed, the existing bridge would be taken out of service, demolished, and replaced. A new high-speed passenger bridge would be built in the center of the right-of-way of the existing bridge alignment. This bridge would reduce the curve in Havre de Grace and allow for either 160 mph speeds for Alternative 9A or 150 mph speeds for Alternative 9B. All impact analyses and assessments included in the NETR are based on the girder approach / arch main span bridge design.

Both alternatives would impact tidal and non-tidal wetlands, streams (including 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), and the Susquehanna riverbed, including submerged aquatic vegetation (SAV). Impacts to Waters of the U.S. from the build alternatives would total less than an acre of wetlands and more than 3,000 linear feet of streams. Overall, the proposed new alignments would 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 for the construction and maintenance of the existing alignment.

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. As a result, overall wetland and stream impacts are slightly less for Alternative 9B. Alternative 9B would cross the same streams as Alternative 9A, but total stream impacts would be slightly less resulting from a narrower crossing of Lily Run and unnamed tributaries of Lily Run. Bridge pier impacts within the Susquehanna River would be the same for Alternative 9B as for Alternative 9A.

Proposed minimization and mitigation:

- To ensure that floodwater impacts due to rail construction are minimized, drainage structures would be required to maintain the current flow regime and prevent associated flooding (COMAR 26.17.04). At the proposed Lily Run crossing, 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.

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

- Demolition of the existing bridge and remnant piers would allow approximately 0.5 acre of river bottom to return to benthic habitat, thereby more than offsetting losses from the construction of the replacement bridges.

- Maryland Department of Environment (MDE) time of year restrictions listed in the NETR include closure periods:
    - For work within designated SAV areas is from April 1 through October 15.
    - In Use I Streams from March 1 through June 15 for fish spawning and migration.
    - In Use II Streams from June 1 through September 30 and December 16 through March 14 for fish spawning and migration.

- A preliminary mitigation site search was conducted in the Lower Susquehanna River and Swan Creek watersheds to address the potential need for off-site mitigation, and potential wetland and stream mitigation sites were identified. On-site investigations will require a property owner notification process to seek permissions for accessing properties. This step will occur following the 30% design/NEPA evaluation stage during future design stages of the project.

Anadromous fish

The proposed project is located above the estuarine mixing zone in tidal fresh water and is not designated as essential fish habitat (EFH) for federally managed species. However, as you describe in your NETR, semi-anadromous and anadromous species have been documented as spawning near and/or migrating through the study area, including: yellow perch (*Perca flavescens*), white perch (*Morone americana*), blueback herring (*Alosa aestivalis*), alewife (*Alosa pseudoharengus*), and American shad (*Alosa sapidissima*). We generally recommend that in-water construction activities that could impact the migration or spawning of these species be avoided from February 15 through June 15. Although the minimization efforts you describe in the NETR focus more on avoiding injury or mortality to fish in the area, e.g. from shock waves resulting from impact hammering, this time of year restriction is also recommended to minimize impacts to behavior of migrating or spawning fish. We recognize that multiple, overlapping time of year restrictions make construction timelines difficult, and we will be happy to work with you to develop a timeline of what activities would be restricted at what times of year, similar to what was done for the Woodrow Wilson Bridge, to assist in planning purposes.

The low-speed vibratory drilling method that would be used to install the 5 to 6-foot diameter piles for the replacement bridge piers would not generate impulse noise underwater. Any underwater noise produced during the installation of these piles is expected to be below both the physical and behavioral effect thresholds of 206 dB re: 1 µPa SPL peak and 150 dB re: 1 µPa sound pressure level (SPL) root mean square (RMS), respectively, established by the Fisheries Hydroacoustic Working Group. The smaller, 18 to 24 inch piles that would support the temporary finger piers would be installed by impact hammering. Following best management practices (BMP) 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. The duration of impact pile driving is expected to be less than 15 to 20 minutes per pile; less if a vibratory driver was first used to drive the pile to resistance. In addition, impact hammering would begin with a series of light taps of gradually increasing strength to avoid sudden disturbances to fish and provide them with an opportunity to move away from the site (FHWA 2003).

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). Methods such as turbidity curtains, cofferdams, and deck shielding would be implemented as necessary to contain debris. Divers with wire saws would cut bridge piers two feet below the mudline and the pier would be removed using a barge crane. 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. If blasting occurs, it would be conducted in such a manner as to minimize the potential for fish mortalities. In the event that blasting is proposed, a number of protective measures would be implemented, including using blast mats and conducting blasting within steel sheet pile cofferdams. Because demolition methods could result in increased turbidity and impact submerged aquatic vegetation (SAV) in the area and migrating and spawning anadromous fish, we would recommend time of year restrictions for these activities, as described above.

On page E-54 of the NETR, you state that "because the spacing of the new bridges' piers would be closer together than the existing bridge's piers, water velocity and scouring between the piers would potentially increase, but would be expected to be minimal and would not significantly alter the hydrological properties of the river within, upstream, or downstream of the proposed project site and would not alter the site bathymetry." It does not appear that the potential impacts to migrating anadromous fish resulting from the potential increase in water velocity were considered in the NETR. Further evaluation should be undertaken to assess the potential effects the closer piers would have on migrating anadromous fish.

Submerged Aquatic Vegetation (SAV)

Alternative 9A and Alternative 9B would each have the same number of bridge piers in the Susquehanna River. Both alternatives appear to include four bridge piers that would impact SAV habitat in slightly different amounts and locations. Based on the preliminary engineering drawings, two bridge piers for the new west bridge would fall within the mapped SAV area along the Cecil County shoreline. One pier for the new east bridge would also potentially impact a portion of the SAV bed just downstream of the existing bridge alignment. 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.

We typically recommend a compensation ratio for SAV impacts of 3:1, as you note in the NETR. You estimate that for permanent impacts to SAV from either of the two selected alternatives, replacement of at least 0.24 acre would be required. However, you state in the NETR that finger pier construction would result in temporary SAV impacts totaling approximately 0.48 acre. As we discussed at the April 20, 2016, IRM, given the length of time the finger piers would be in place (3+ years), the SAV is unlikely to recover when the finger piers are removed. As a result, these impacts should be considered permanent and you should re-calculate your total mitigation requirements to account for them.

You state in the NETR that "[s]uccessful in-kind compensation for SAV impacts has proven extremely difficult within the Chesapeake Bay area (Submerged Aquatic Vegetation Workgroup 1995), and out-of-kind compensation in the form of water quality or stream habitat improvements is typically accepted by the regulatory agencies." While we recognize the challenges involved in successful replanting of SAV, the U.S. Environmental Protection Agency has designated SAV as a special aquatic site under Section 404(b)(1) of the federal Clean Water Act, due to its important role in the marine ecosystem for nesting, spawning, nursery cover, and forage areas for fish and wildlife, and SAV is a priority habitat for NOAA. Because of the ecological value of SAV, we recommend that if impacts cannot be avoided that in-kind mitigation be undertaken unless it can be demonstrated that the planting of SAV is not practicable.

SAV and their associated epiphytes are highly productive, produce a structural matrix on which many other species depend, improve water quality and stabilize sediments. Seagrasses are among the most productive ecosystems in the world and perform a number of irreplaceable ecological functions which range from chemical cycling and physical modification of the water column and sediments to providing food and shelter for commercial, recreational, as well as economically important organisms. The replacement bridges would result in an increase in shading, and scouring and sedimentation would initially shift upon replacement of the existing bridge outside of its current alignment. Because there is successful SAV in the area now, and you will not be changing the depth or sediment type in the project area, we recommend that after removing the finger piers you:

(1) allow the sediment to settle;
(2) re-plant the area for the following growing season to restore existing conditions;
(3) mitigate for the temporal loss of SAV habitat by planting additional SAV at a 3:1 ratio, preferably in locations where SAV has been successful in the past but has disappeared or has minimal density; and
(4) monitor the entire project site for five years to determine if there are additional SAV losses resulting from the proposed project that require mitigation and to determine the success of re-planting. If SAV growth has not been documented by year three, a second round of planting may be necessary.

We appreciate the efforts you have made to avoid and minimize impacts early in the planning of your proposed project, and the efforts that you have made to coordinate with the regulatory and resource agencies at the Maryland Department of Transportation Interagency Review Meetings and at site visits. We look forward to continued coordination with you on this project as it moves forward. If you have questions or would like to discuss this further, please contact Kristy Beard at (410) 573-4542 or kristy.beard@noaa.gov.

Sincerely,

Karen M Greene

Karen Greene
Mid-Atlantic Field Offices Supervisor
Habitat Conservation Division

Cc: Golden (MDNR)
DaVia (ACOE)
Li (USFWS)
Vaccaro (NMFS PRD)

References:

Federal Highway Administration (FHWA). 2003. Woodrow Wilson Bridge Project, Shortnose Sturgeon Biological Assessment Supplement, January 2003. 19 pp.

National Oceanic and Atmospheric Administration (NOAA). 2008. Impacts to Marine Fisheries Habitat from Nonfishing Activities in the Northeastern United States. NOAA Technical Memorandum NMFS-NE-209, US Department of Commerce, NOAA, National Marine Fisheries Service, Northeast Regional Office, Gloucester, Massachusetts.

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE.
Washington, D.C. 20590

MAY 10 2016

Kim Damon-Randall, Assistant Regional Administrator
NOAA National Marine Fisheries Service
Protected Resources Division
55 Great Republic Drive
Gloucester, MA 01930-2276

Via regular mail and email to Kimberly.Damon-Randall@noaa.gov

Re: Request for Informal Consultation under Section 7 of the Endangered Species Act

Dear Ms. Damon-Randall:

The Maryland Department of Transportation (MDOT) is proposing to improve the Susquehanna River Rail Bridge between the City of Havre de Grace in Harford County, Maryland and the Town of Perryville in Cecil County, Maryland. The Federal Railroad Administration (FRA) and MDOT are preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential environmental impacts of the Susquehanna River Rail Bridge Project (the "Proposed Project"). The National Passenger Railroad Corporation (Amtrak), as bridge owner and operator, is providing conceptual and preliminary engineering designs in coordination with MDOT and FRA. The existing Susquehanna River Rail Bridge is located along Amtrak's Northeast Corridor (NEC). Two build alternatives are under consideration in the EA: Alternative 9A and Alternative 9B. Both alternatives would construct two new two-track bridges—one along the existing alignment and one along a new western alignment. Both alternatives would entail the decommissioning and removal of the existing bridge.

The FRA is transmitting a draft Natural Resources Technical Report (NETR) to initiate informal consultation under Section 7(a)(2) of the Endangered Species Act (ESA). As described in the report, the proposed action may affect, but is not likely to adversely affect shortnose sturgeon (*Acipenser brevirostrum)* or any of the Distinct Population Segments of Atlantic sturgeon (*Acipenser oxyrinchus)* that may be present in the project area. The FRA has evaluated potential impacts to sea turtles in the NETR and has determined that the proposed action will have no effect on leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle

(*Caretta caretta*), Kemp's ridley sea turtle (*Lepidochelys kempi*), or green sea turtle (*Chelonia mydas*) because these species are not expected to occur north of Baltimore and therefore would not be present in the project area. In addition, no critical habitat has been designated for sea turtles within the project area.

We request your concurrence with our determinations for these species, and hereby request informal consultation under Section 7 of the ESA. Please contact Dan Reagle, MTA Environmental Planner at 410-767-3771 or by email at DReagle1@mta.maryland.gov.

Thank you for your assistance with this project.

Sincerely,

Michael Johnsen
Acting Division Chief
Environmental and Rail Planning Division

Enclosure

Cc: Dan Reagle, Maryland Transit Administration
Jacqueline Thorne, Maryland Department of Transportation
Paul DelSignore, Amtrak
Amrita Hill, Amtrak

Maryland Department of Transportation
The Secretary's Office

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

James T. Smith, Jr.
Secretary

February 14, 2014

Ms. Lori Byrne
Environmental Review Specialist
Wildlife and Heritage Division
Department of Natural Resources
Tawes State Office Building, E-1
580 Taylor Avenue
Annapolis MD 21401

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Ms. Byrne:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Reconstruction and Expansion Project proposes new and/or rehabilitated structures carrying up to four tracks across the river. The Project may also improve the navigation channel for marine users.

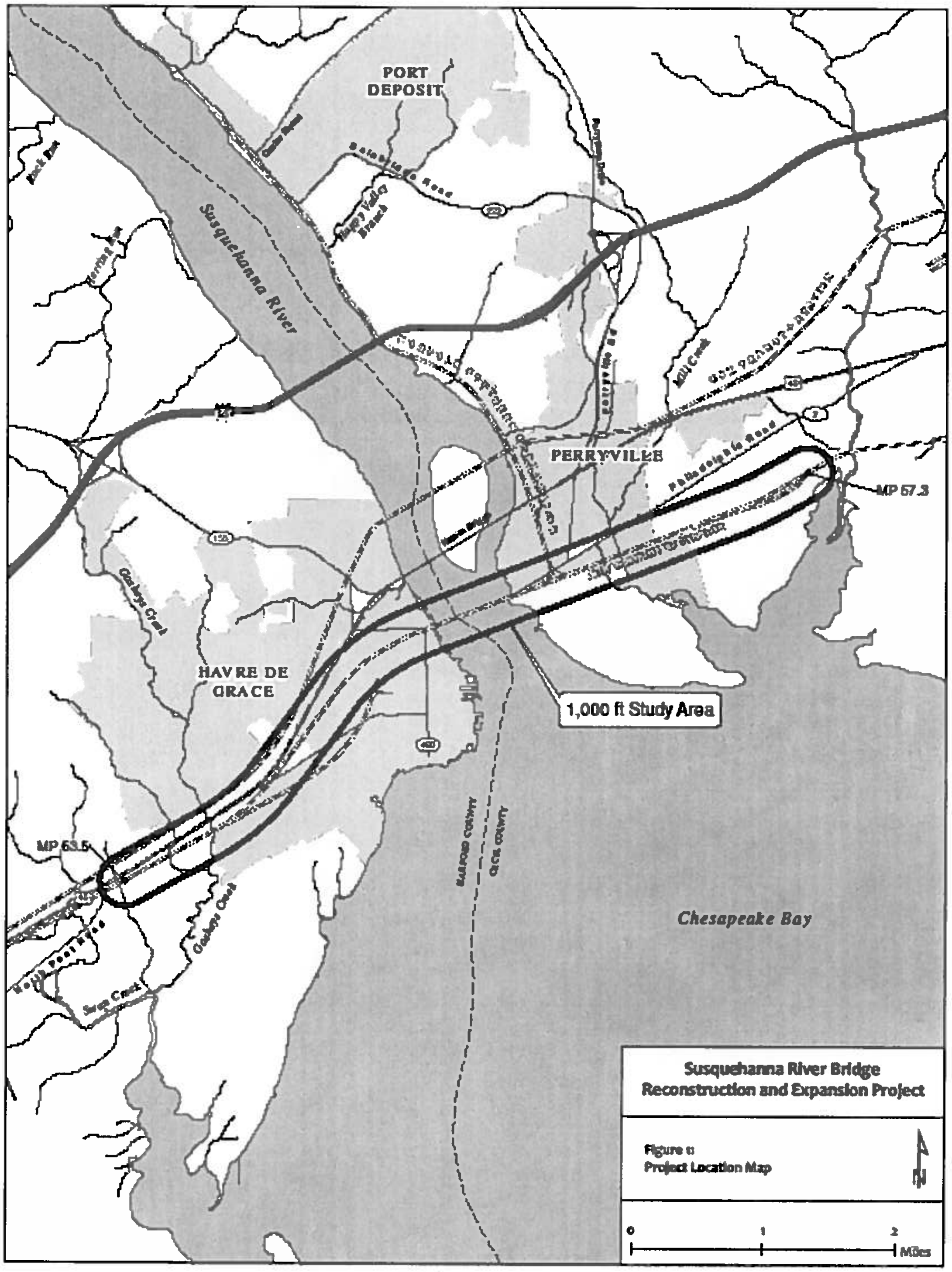
We request any information concerning state-listed threatened or endangered species and/or any unique habitat that may occur in the study area as shown in the attached map. If you have any questions or need additional information regarding this request, please contact me at 410-684-7063 or hromano@mdot.state.md.us. You may also contact Ms. Leslie Mesnick-Uretsky at 646-388-9756 or lmesnick@akrf.com. Thank you for your assistance.

Sincerely,

HRomano

Harry J. Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Mr. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration


PORT DEPOSIT
Susquehanna River
PERRYVILLE
HAVRE DE GRACE
MP 57.3
MP 63.5
1,000 ft Study Area
Chesapeake Bay
Susquehanna River Bridge
Reconstruction and Expansion Project
Figure 1:
Project Location Map
0
1
2
Miles

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

March 20, 2014

Mr. Harry J. Romano
Maryland Department of Transportation
7201 Corporate Center Drive
Hanover, MD 21076

RE: Environmental Review for Susquehanna River Bridge Reconstruction and Expansion, Amtrak Rail Bridge, Harford and Cecil Counties, Maryland.

Dear Mr. Romano:

The Wildlife and Heritage Service has determined that there are the following areas of potential concern within the boundaries of the study area as delineated:

The south side of the project route may overlap with Swan Creek which is designated in state regulations as a Nontidal Wetland of Special State Concern (NTWSSC), and is regulated by Maryland Department of the Environment as an NTWSSC, along with its 100-foot upland buffers. Your project may need review by Maryland Department of the Environment for any necessary permits associated with the Swan Creek NTWSSC.

The open waters of the Susquehanna River that are included in the study area have been identified as historic waterfowl concentration and staging areas. If there is to be any construction of water-dependent facilities please contact Larry Hindman of the Wildlife and Heritage Service at (410) 221-8838 ext. 105 for further technical assistance regarding waterfowl.

Just west of Principio Creek and south of the project route is the Furnace Bay site, which supports records of state-listed endangered Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus plaustris*). Given that these are aquatic species, we would encourage the applicant to adhere stringently to all appropriate best management practices for sediment and erosion control during all work near this site.

Our analysis of the information provided also suggests that the forested area on or adjacent to the project site contains Forest Interior Dwelling Bird habitat. Populations of many Forest Interior Dwelling Bird Species (FIDS) are declining in Maryland and throughout the eastern United States. The conservation of FIDS habitat is strongly encouraged by the Department of Natural Resources, and is mandated within the Chesapeake Bay Critical Area. The following guidelines could be incorporated to help minimize the project's impacts on FIDS and other native forest plants and wildlife:

1. Avoid placement of new roads or related construction in the forest interior. If forest loss or disturbance is absolutely unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid road placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forested habitat.

2. Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.
3. Maintain forest habitat as close as possible to the road, and maintain canopy closure where possible.
4. Maintain grass height at least 10" during the breeding season (April-August).

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2014.0271.ha/ce
Cc: D. Brinker, DNR
K. Charbonneau, CAC

September 1, 2015

Ms. Angela Willis
Maryland Transit Administration
6 St. Paul Street
Baltimore, MD 21202-1614

RE: Update to Environmental Review for Susquehanna River Bridge Reconstruction and Expansion, Amtrak Rail Bridge, Harford and Cecil Counties, Maryland.

Dear Ms. Willis:

The Wildlife and Heritage Service has determined that there are the following areas of potential concern within the boundaries of the study area as delineated:

The south side of the project route may overlap with Gasheys Run (draining to Swan Creek) which is designated in state regulations as a Nontidal Wetland of Special State Concern (NTWSSC), and is regulated by Maryland Department of the Environment as an NTWSSC, along with its 100-foot upland buffers. Your project may need review by Maryland Department of the Environment for any necessary permits associated with the Swan Creek NTWSSC.

The open waters of the Susquehanna River that are included in the study area have been identified as historic waterfowl concentration and staging areas. If there is to be any construction of water-dependent facilities please contact Larry Hindman of the Wildlife and Heritage Service at (410) 221-8838 ext. 105 for further technical assistance regarding waterfowl.

Recent data indicates that there have been observations of the state-listed endangered Northern Map Turtle (*Graptemys geographica*) in this portion of the Susquehanna River. It is possible that this species could be impacted by work associated with this bridge replacement. Map Turtles utilize both the riverine and shoreline habitats in the area. Specific protection measurements can be developed as project details become available.

Just west of Principio Creek and south of the project route is the Furnace Bay site, which supports records of state-listed endangered Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus plaustris*). Given that these are aquatic species, we would encourage the applicant to adhere stringently to all appropriate best management practices for sediment and erosion control during all work near this site.

Our analysis of the information provided also suggests that the forested area on or adjacent to the project site contains Forest Interior Dwelling Bird habitat. Populations of many Forest Interior Dwelling Bird Species (FIDS) are declining in Maryland and throughout the eastern United States. The conservation of FIDS habitat is strongly encouraged by the Department of Natural Resources, and is mandated within the Chesapeake Bay Critical Area. The following guidelines could be incorporated to help minimize the project's impacts on FIDS and other native forest plants and wildlife:

1. Avoid placement of new roads or related construction in the forest interior. If forest loss or disturbance is absolutely unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid road placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forested habitat.
2. Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.
3. Maintain forest habitat as close as possible to the road, and maintain canopy closure where possible.
4. Maintain grass height at least 10" during the breeding season (April-August).

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2015.0456.ha/ce
Cc: S. Smith, DNR
D. Brinker, DNR
G. Golden, DNR
K. Charbonneau, CAC

April 7, 2016

Ms. Lori A. Byrne
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401

Dear Ms. Byrne:

Thank you for the response letter dated September 1, 2015 that identified potential rare, threatened, and endangered (RTE) species or species of statewide importance that could occur within the study area for the Susquehanna River Rail Bridge project. The letter identified the presence of a Wetland of Special State Concern (WSSC) located within the Swan Creek drainage just south of the Amtrak right-of-way at the western end of the study area. At the eastern end of the study area, Department of Natural Resources (DNR) identified the presence of a known site within the Furnace Bay wetlands that supports a population of state-listed endangered Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus palustris*). Both plant species are found in aquatic habitats. In addition, the state-listed endangered Northern Map Turtle (*Graptemys geographica*) is documented in the project area. The presence of historic waterfowl concentration within the study area and staging areas within the Susquehanna River was also referenced in the September 2015 letter. No other state-listed species were documented by the DNR as potentially occurring within the study area.

We wish to provide the following response/clarification for each of the resources/species listed above based upon conceptual engineering

Nontidal Wetland of Special State Concern (NTWSSC)
The wetland system associated with the NTWSSC is a large palustrine forested/scrub shrub wetland that lies south and east of Williams Drive and is associated with the headwaters of unnamed tributaries to Swan Creek and Gashey's Creek. Neither of the proposed Build Alternatives (Alternative 9A and 9B) would impact this wetland system and therefore no impacts to NTWSCC would result from the project (**Attachment 1**).

Historic Waterfowl Concentration and Staging Areas
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 (**Attachment 1**). 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. 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 limits of disturbance. Although waterfowl will not be permanently impacted by either Build Alternative, they may be temporarily displaced from the active construction area. By this letter the project team is initiating coordination with Mr. Larry Hindman of the Wildlife and Heritage Service and seeking additional information.

State-listed Endangered Water Horsetail and Vetchling

Both state-listed species, the Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus plaustris*) documented in the September 2015 are located within the Furnace Bay wetlands that lie over a mile and a half east of the project limits for both Build Alternatives (**Attachment 1**). Therefore, no impacts to these species are anticipated to result from the proposed project.

State-listed Endangered Map Turtle

The state-listed endangered Northern Map Turtle (*Graptemys geographica*) is 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 Northern Map Turtle for habitat, nesting, and foraging and the turtles hibernate on the river bottom in winter.

As part of both of the Build Alternatives, operation of the replacement bridges in place of the existing bridge would not have permanent effects on water quality or other habitat characteristics that would alter the biological community present (including Northern Map Turtle) within the project area. Although permanent impacts to the Map Turtle are not anticipated, they may be temporarily displaced from active construction. As the project moves into final design and more project details become available, the project team will work with DNR to develop specific protection measures. We understand these protection measures may include, but not be limited to: conducting nesting surveys during the nesting season to identify the presence/absence of nests within a project area, in-stream time-of-year restrictions, and/or removal of turtles from the work zone using trained scuba divers.

Forest Interior Dwelling Species (FIDS)

One large, contiguous forest habitat is located within the study area and occurs southeast of the Amtrak right-of-way (ROW) at the southwestern end of the study area. The FIDS habitat occurs outside the limit of disturbance (LOD) for both Build Alternatives and no impacts to this forest are anticipated (**Attachment 1**). However, should any potential impacts to this forest become identified in the future, the following techniques, would be implemented to avoid/minimize them:

- Avoid placement of new roads or related construction in the forest interior. If forest loss or disturbance is absolutely unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid road placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forested habitat.
- Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.

- Maintain forest habitat as close as possible to the road, and maintain canopy closure where possible.
- Maintain grass height at least 10" during the breeding season (April-August)

Based on the information provided above, please inform the project team if DNR requires any additional information or if any other follow-up coordination is required at this time. If you have any questions, please contact me at 410-767-3771 or via email at DReagle1@mta.maryland.gov. We appreciate your cooperation and prompt attention to this matter.

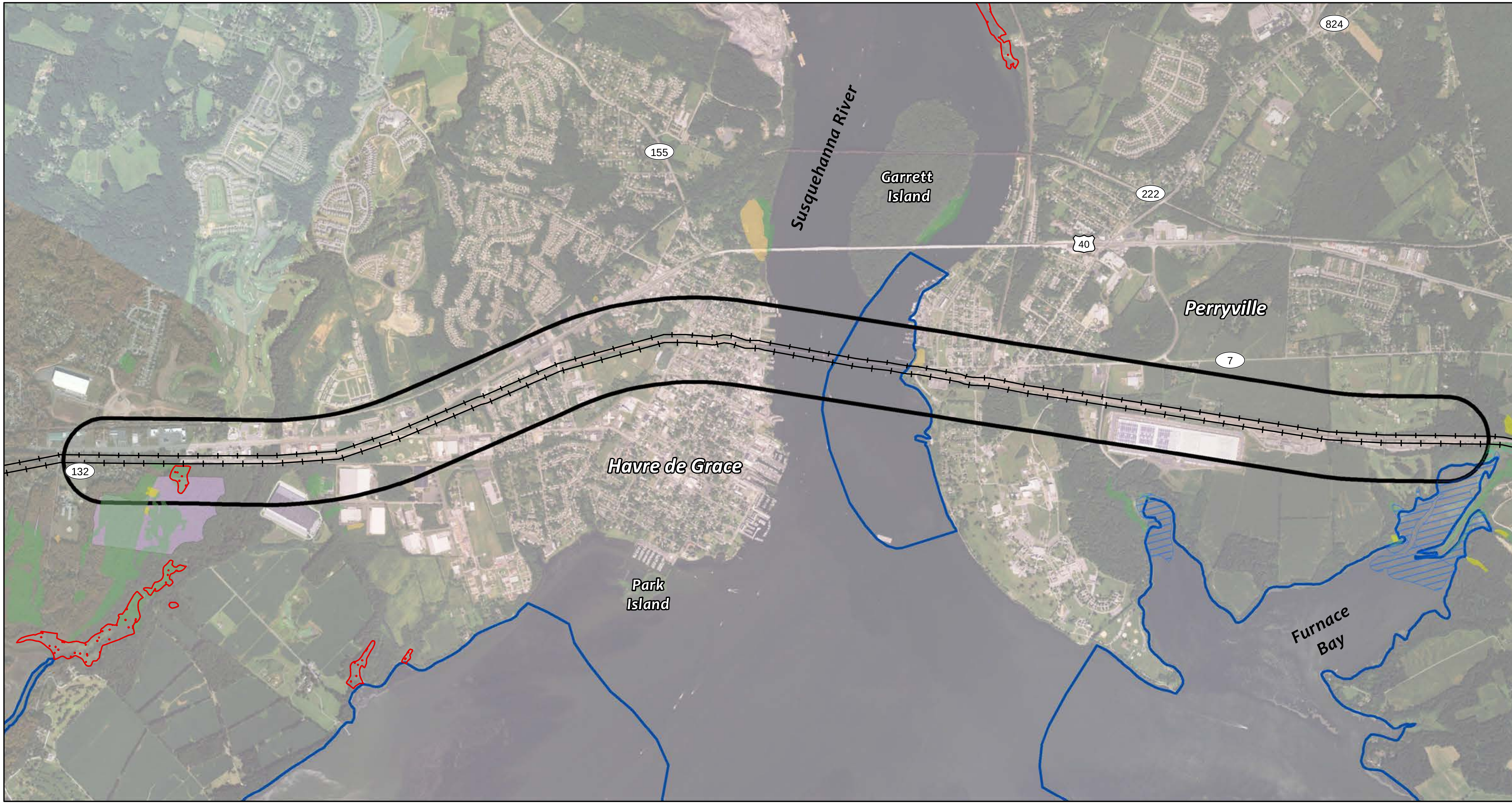
Sincerely,

Dan Reagle

Dan Reagle
Environmental Planning Division
Maryland Transit Administration
6 St. Paul Street, 9th Floor
Baltimore, MD 21202

Enclosure

cc: Ms. Amrita Hill, AMTRAK
Mr. Larry Hindman, DNR
Ms. Jacqueline Thorne, MDOT



Legend

- Esturarine Intertidal Scrub-Shrub
- Esturarine Intertidal Unconsolidated Shore
- Palustrine Emergent
- Palustrine Forested
- Palustrine Scrub-Shrub
- Wetlands of Special State Concern
- Historic Waterfowl Concentration and Staging Area
- Forest Interior Dwelling Species (FIDS)
- 1,000 ft Study Area

Data Sources

Wetlands, Waterfowl, and FIDS: Maryland Department of Natural Resources, 2015

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Attachment 1

Environmental Resources

May 9, 2016

Mr. Dan Reagle
Maryland Transit Administration
6 St. Paul Street
Baltimore, Maryland 21202-1614

RE: Follow – up to Environmental Review for Susquehanna River Bridge Reconstruction and Expansion, Amtrak Rail Bridge, Harford and Cecil Counties, Maryland.

Dear Mr. Reagle:

Thank you for providing us with the additional information regarding resources of concern mentioned in our September 1, 2015 letter for this project site.

The Gasheys Run Nontidal Wetland of Special State Concern is regulated by Maryland Department of the Environment as an NTWSSC, along with its 100-foot upland buffers. While the Wildlife and Heritage Service has no concerns for rare species in this NTWSSC at this time, you may want to check with Maryland Department of the Environment.

The open waters of the Susquehanna River that are included in the study area have been identified as historic waterfowl concentration and staging areas. We generally only have concerns for disturbance to wintering waterfowl from construction of water-dependent facilities along the shoreline and adjacent open waters. The new contact person for waterfowl is Josh Homyack of the Wildlife and Heritage Service at (410) 928-3650 or josh.homyack@maryland.gov.

Recent data indicates that there have been observations of the state-listed endangered Northern Map Turtle (*Graptemys geographica*) in this portion of the Susquehanna River. It is possible that this species could be impacted by work associated with this bridge replacement. Map Turtles utilize both the riverine and shoreline habitats in the area. Any specific protection measures should be coordinated with Scott Smith of the Wildlife and Heritage Service, as soon as details become available, at (410) 827-8612 or scott.smith@maryland.gov.

Just west of Principio Creek and south of the project route is the Furnace Bay site, which supports records of state-listed endangered Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus plaustris*). Given that these are aquatic species, we would encourage the applicant to adhere stringently to all appropriate best management practices for sediment and erosion control during all work near this site.

According to our records, this site is adjacent to the study area shown on your map, rather than over a mile away as you had suggested, making the need for best management practices all the more important.

Our analysis of the information provided also suggests that the forested area on or adjacent to the project site contains Forest Interior Dwelling Bird habitat. Populations of many Forest Interior Dwelling Bird Species (FIDS) are declining in Maryland and throughout the eastern United States. The conservation of FIDS habitat is strongly encouraged by the Department of Natural Resources, and is mandated within the Chesapeake Bay Critical Area. The following guidelines could be incorporated to help minimize the project's impacts on FIDS and other native forest plants and wildlife:

1. Avoid placement of new roads or related construction in the forest interior. If forest loss or disturbance is absolutely unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid road placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forested habitat.
2. Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.
3. Maintain forest habitat as close as possible to the road, and maintain canopy closure where possible.
4. Maintain grass height at least 10" during the breeding season (April-August).

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2016.0496.ha/ce
Cc: S. Smith, DNR
D. Brinker, DNR
G. Golden, DNR
K. Charbonneau, CAC

From:	Greg Golden -DNR-
To:	Dan Reagle
Cc:	Kristy Beard - NOAA Federal; Ray Li; Joseph.DaVia@usace.army.mil; Jon Stewart -MDE-
Subject:	MD DNR comments on Susquehanna River Rail Bridge Draft NETR document
Date:	Monday, May 09, 2016 7:28:29 PM

Dan:
I have to be rather informal in my response formatting here, for the opportunity to review the Draft document, in order to make the commenting deadline you requested. I have looked through each topic, section, and page. Obviously though, there are some sections which will require significant additional interagency review coordination and project detail development and review discussion over time, especially for the core subjects associated with wetland and waterway permitting review, including, avoidance, minimization, and compensatory mitigation topics. This would especially be true as design details, and construction and demolition methods, are further developed. I have listed several topics below where we are interested in more detailed participation, but I did not attempt to list each separate category where we will benefit and wish to participate further.

In general, the document was well put together, and included imported content and analysis, and also added value even when discussing certain topics where some agency correspondence already did occur. This is a very good start to the documentation of some very important natural resource protection issues for the project as planning continues, and is then followed by construction.

Individual comments, in very brief format:

1. Be sure to include and incorporate additional DNR Wildlife and Heritage Service (WHS) comments and guidance on State listed Rare, Threatened, and Endangered species as planning and documentation continue. We will continue to participate through the DNR Project Review Division participation as well, but direct WHS content shoudl continue to be updated in the NETR and other future documents.

2. There should be continued interagency discussion of the shade effects of the bridges, piers, and construction related piers (E-55, E-56).

3. TIme of Year restrictions for instream work. The draft document references in several places a Use I restriction of March 1 through June 15. Note that for this project, it will be extended for presence of yellow perch (and also possibly walleye) as our fisheries coordination letter stated, so please plan for a fish spawning protection restriction from February 15 through June 15, for acitivities that could suspend sediments, disturb substrate, or create sound or pressure waves. I believe this is consistent with the NMFS comment. Please DISREGARD for now the Use II restriction periods as referenced (E-57 and E-65, 6/1 to 9/30 and 12/16 to 3/14). Those appear to be an oyster restriction for the simplified older Use II designation. We will now focus in tidal Use II waters for this location on the fisheries period of Feb. 15 to June 15, and also the SAV restriction as well, and any rare species recommendations from WHS or USFWS. In most large bridge project reviews, final restriction periods are often determined by evaluating specific activities, their likelihood to suspend or disturb sediments, their likelihood to create sound or pressure waves, and overall required project timelines and applied BMPs. In other words, rather than blanket restriction periods for an entire large bridge project, they sometimes will need to be evaluated and applied activity by activity. Let's coordinate this with the agencies together, but as an

example, some minor activities might be allowable during a fish or SAV restriction, while other significant activities would not. Note also, our review interests to protect SAVs are for activities within 500 yards of documentedSAV beds, and in some cases, additional surveys might be beneficial, and requested.

4. SAV impact assessment and mitigation efforts and opportunities should be reviewed in detail within the interagency group, as there may be additional knowledge, or agency-specific criteria and policies, to share within the group.

5. Page E-62 - The State program should always be listed as State designated Scenic and Wild Rivers (word "Scenic" first for MD State program, word "Wild" first for Federal). or....(There are no) designated rivers in the State Scenic and Wild Rivers Program. State and Federal programs are completely separate. The NETR draft tends to blend the two. I know it is somewhat difficult to address both together in writing in a single section. Use the two suggestions above, or have a drafter or editor contact me for further guidance for the State references.

6. Sections on pile installation (low-speed vibratory drilling method or other): noise and vibration should be further coordinated with the resource commenting and regulatory agencies in an interagency setting. This is a complex issue that is best coordinated together as planning continues. If ever in doubt, or close to potential impact thresholds, a large tidal project is wise to have contingency plans and equipment available if any pile driving or pile work unexpectedly causes a fish kill at the work area (this did happen on Woodrow Wilson Bridge, although for activities which were later realized to be significant from the start).

7. Likewise, we would like to review matters related to collection of demolition debris in the group setting, since bottom disturbances are very possible. Woodrow Wilson Bridge had extensive coordination and collaboration on this topic.

8. Note: some demolition debris may be valuable for use in fish reef programs within the Bay - please plan to work early with the resource agencies on this possibility. Also, is the nearby set of unused piers from a past crossing still planned for demolition and removal as well?

9. Page E-67, please coordinate details and timing of any aquatic blasting with MD DNR also, through MDE or directly

10. DNR is interested to participate directly in compensatory mitigation review discussions for wetlands and waterways

Thank you for the opportunity to review and comment on the draft NETR document. If you have any questions on the comments above, please contact me at your convenience. I am not certain of the designated MDE and Corps reviewers, and have cc:ed regional managers for those two agencies, to forward as necessary.

Greg Golden
Project Review Division
Integrated Policy and Review Unit
MD Department of Natural Resources
410-260-8331
please note my new email address: greg.golden@maryland.gov

June 14, 2016

Ms. Lori A. Byrne
Environmental Review Coordinator
Wildlife and Heritage Service
Department of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401

Dear Ms. Byrne:

Thank you for the response letter dated May 9, 2016 that provided additional clarification regarding the Furnace Bay site, which supports records of the state-listed Water Horsetail (*Equisetum fluviatile*) and Vetchling (*Lathyrus palustris*). Our technical studies and associated documentation has been updated to reflect that it is not over a mile away from the study area, but still remains outside the much narrower limit of disturbance (LOD) for the project. Please see the updated mapping which shows the study area (outlined in black) and the project LOD (outlined in yellow and purple) and its distance from the Furnace Bay site (Attachment 1). It should also be noted that best management practices for sediment and erosion control will be strictly adhered to during construction throughout the entire project limits.

Also with regards to your response letter, we have undertaken the following additional actions:

1. We have noted your concerns about Forest Interior Dwelling Bird (FIDS) habitat. No FIDS habitat occurs within the project LOD, but the project will seek to minimize impacts to forest habitat and wildlife.

2. Given that the state-listed endangered Northern Map Turtle (*Graptemys geographica*) may also be impacted by work associated with the bridge replacement, as this species utilizes both the riverine and shoreline habitats within the study area, we have copied on this letter Mr. Scott Smith for additional information regarding appropriate protection measures to avoid negative effects on map turtles during construction.

3. We are also copying on this letter Mr. Josh Homyack for additional information regarding potential disturbances to wintering waterfowl along the shorelines and open waters of the Susquehanna. Waterfowl will not be permanently impacted by bridge construction, but may be temporarily displaced from the active construction area. Therefore, we are requesting additional information from Mr. Homyack regarding appropriate protection measures and other relevant information regarding waterfowl within the study area.

4. Maryland Department of the Environment has not commented on potential effects to the Gasheys Run Nontidal Wetland of Special State Concern (NTSSC), but best management practices for sediment and erosion control will be strictly adhered to during construction to minimize any indirect impacts.

If you have any questions, please contact me at 410-767-3771 or via email at DReagle1@mta.maryland.gov. We appreciate your continued coordination regarding this project.

Dan Reagle

Sincerely,

Dan Reagle
Environmental Planning Division
Maryland Transit Administration
6 St. Paul Street, 9th Floor
Baltimore, MD 21202

Attachment

cc: Mr. Greg Golden, DNR
Ms. Amrita Hill, AMTRAK
Mr. Larry Hindman, DNR
Mr. Josh Homyack, DNR
Mr. Scott Smith, DNR
Ms. Jacqueline Thorne, Maryland Department of Transportation

Legend

LOD 9A Calculation Area	Palustrine Emergent	Historic Waterfowl Concentration and Staging Area
LOD 9B Calculation Area	Palustrine Forested	Forest Interior Dwelling Species (FIDS)
Estuarine Intertidal Scrub-Shrub	Palustrine Scrub-Shrub	Streams
Estuarine Intertidal Unconsolidated Shore	Wetlands of Special State Concern	1,000 ft Study Area

Data Sources

Wetlands, Waterfowl, and FIDS: Maryland Department of Natural Resources, 2015

0 0.25 0.5 Miles

Susquehanna River Rail Bridge Project

Attachment 1

Environmental Resources

Maryland Department of Transportation
The Secretary's Office

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

James T. Smith, Jr.
Secretary

February 14, 2014

Mr. Trevor Clark
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis MD 21401

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Mr. Clark:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Reconstruction and Expansion Project proposes new and/or rehabilitated structures carrying up to four tracks across the river. The Project may also improve the navigation channel for marine users.

We request any information concerning federally-listed threatened or endangered species and/or any unique habitat that may occur in the study area as shown on the first page of the attached Natural Resources of Concern database forms. If you have any questions or need additional information regarding this request, please contact me at 410-684-7063 or hromano@mdot.state.md.us. You may also contact Ms. Leslie Mesnick-Uretsky at 646-388-9756 or lmesnick@akrf.com. Thank you for your assistance.

Sincerely,

HRomano

Harry J. Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Mr. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration

U.S. Fish and Wildlife Service

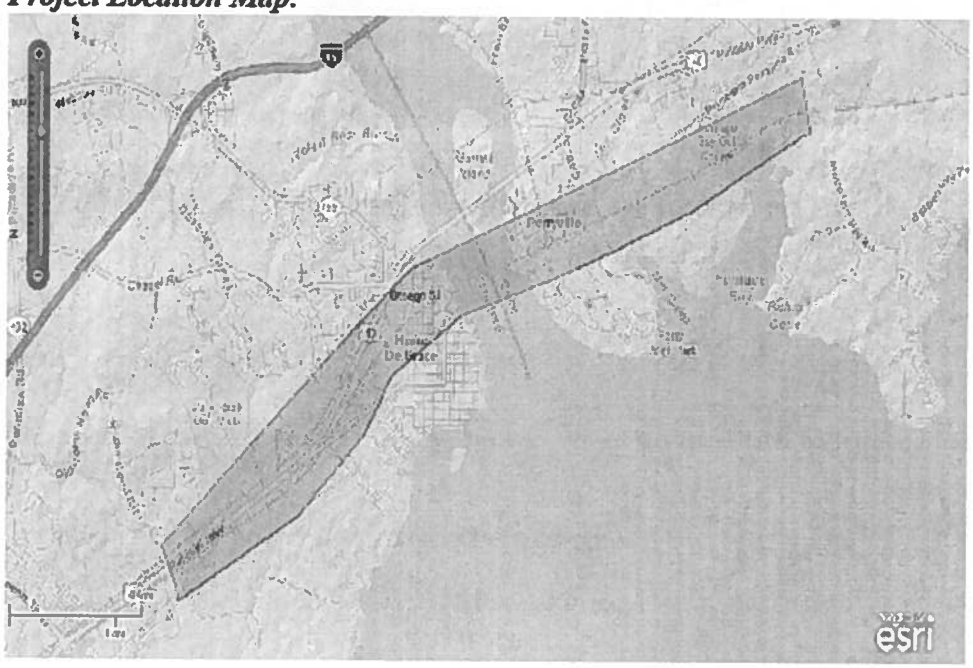
Natural Resources of Concern

This resource list is to be used for planning purposes only — it is not an official species list.

Endangered Species Act species list information for your project is available online and listed below for the following FWS Field Offices:

CHESAPEAKE BAY ECOLOGICAL SERVICES FIELD OFFICE
177 ADMIRAL COCHRANE DRIVE
ANNAPOLIS, MD 21401
(410) 573-4500

Project Location Map:



U.S. Fish and Wildlife Service

Natural Resources of Concern

Project Counties:

Cecil, MD | Harford, MD

Geographic coordinates (Open Geospatial Consortium Well-Known Text, NAD83):

MULTIPOLYGON (((-76.1412395 39.5261442, -76.1096622 39.547731, -76.0973026 39.5556726, -76.0506107 39.5691711, -76.0281231 39.5760518, -76.0265781 39.5702364, -76.0281231 39.5698394, -76.0473491 39.5618928, -76.0629703 39.557135, -76.0722316 39.5546062, -76.0881962 39.5507744, -76.1005558 39.5442818, -76.105534 39.5379342, -76.1170353 39.5293286, -76.1381496 39.520318, -76.1386646 39.5217746, -76.1412395 39.5261442)))

Project Type:

Bridge Construction / Maintenance

Endangered Species Act Species List (USFWS Endangered Species Program).

There are no listed species found within the vicinity of your project.

Critical habitats within your project area: (View all critical habitats within your project area on one map)

The following critical habitats lie fully or partially within your project area.

Fishes	Critical Habitat Type
Maryland darter (*Etheostoma sellare*) Population: Entire	Final designated critical habitat

FWS National Wildlife Refuges (USFWS National Wildlife Refuges Program).

There are no refuges found within the vicinity of your project.

FWS Migratory Birds (USFWS Migratory Bird Program).

Most species of birds, including eagles and other raptors, are protected under the Migratory Bird Treaty Act (16 U.S.C. 703). Bald eagles and golden eagles receive additional protection under the Bald and Golden Eagle Protection Act (16 U.S.C. 668). The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

Migratory bird information is not available for your project location.

NWI Wetlands (USFWS National Wetlands Inventory).

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

The following wetlands intersect your project area:

Wetland Types	NWI Classification Code	Approximate Acres
Freshwater Forested/Shrub Wetland	PFO1B	3.980198
Freshwater Forested/Shrub Wetland	PFO1A	4.402948
Freshwater Pond	PUBHx	5.296552
Freshwater Forested/Shrub Wetland	PFO1B	0.42387
Freshwater Pond	PUBHx	0.116829
Freshwater Emergent Wetland	PEM1C	3.628137
Estuarine and Marine Wetland	E2EM1N6	0.50204
Freshwater Pond	PABF	5.872225
Freshwater Pond	PUBHx	0.793017
Estuarine and Marine Wetland	E2EM1N6	0.32087
Estuarine and Marine Wetland	E2SS1P6	4.779318
Freshwater Pond	PUBHx	0.755149
Estuarine and Marine Wetland	E2SS1P6	1.046289
Freshwater Forested/Shrub Wetland	PFO1B	53.565359
Freshwater Forested/Shrub Wetland	PFO1C	9.943223

U.S. Fish and Wildlife Service

Natural Resources of Concern

Freshwater Forested/Shrub Wetland	PFO1S	5.838008
Freshwater Pond	PAB/SS1F	3.811766
Freshwater Pond	PUBVx	0.872615
Freshwater Emergent Wetland	PEM1/SS1R	2.235942
Freshwater Pond	PUBF	0.148728
Estuarine and Marine Wetland	E2EM1P6	2.015682
Freshwater Forested/Shrub Wetland	PSS1C	2.497754
Freshwater Pond	PUBHx	1.16406
Riverine	R1UBV	4.512323
Freshwater Forested/Shrub Wetland	PFO1S	5.160478
Freshwater Pond	PUBHx	0.382299
Estuarine and Marine Deepwater	E1UBL6	84038.389972
Riverine	R1UBV	2750.663558
Freshwater Pond	PUBVx	0.692103
Freshwater Forested/Shrub Wetland	PFO1B	8.081289
Freshwater Pond	PUBFx	0.029632
Freshwater Forested/Shrub Wetland	PFO1C	7.894979
Estuarine and Marine Wetland	E2EM1/SS1P6	4.45843
Estuarine and Marine Wetland	E2EM1N6	1.392153
Riverine	R2UBH	23.478455

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Ecological Services Field Office
177 ADMIRAL COCHRANE DRIVE
ANNAPOLIS, MD 21401
PHONE: (410)573-4599 FAX: (410)266-9127

Consultation Code: 05E2CB00-2016-SLI-0378 December 18, 2015
Event Code: 05E2CB00-2016-E-00367
Project Name: Susquehanna Rail Bridge Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

Preliminary Species list

Provided by:

Chesapeake Bay Ecological Services Field Office
177 ADMIRAL COCHRANE DRIVE
ANNAPOLIS, MD 21401
(410) 573-4599

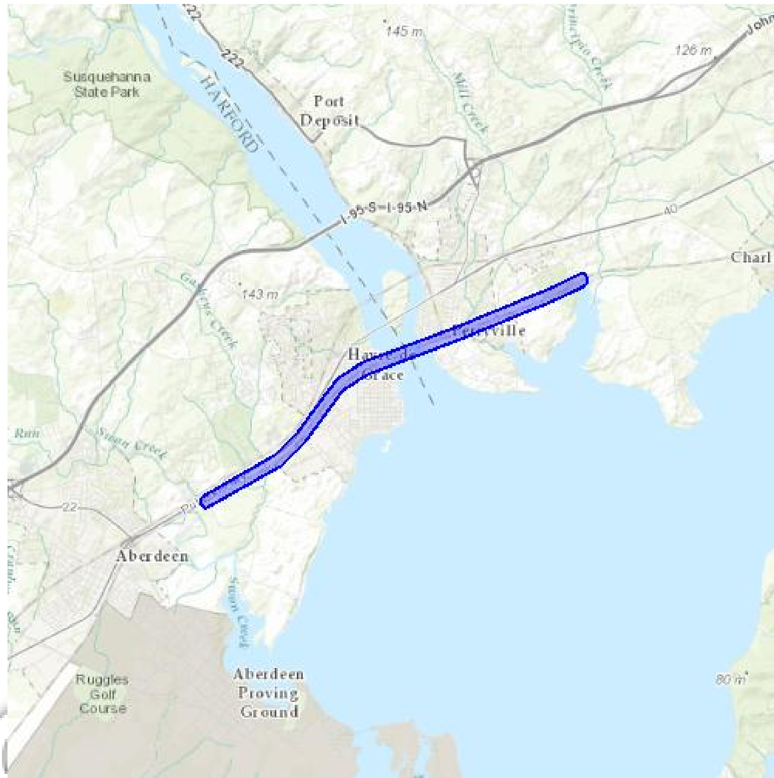
Consultation Code: 05E2CB00-2016-SLI-0378
Event Code: 05E2CB00-2016-E-00367

Project Type: TRANSPORTATION

Project Name: Susquehanna Rail Bridge Project
Project Description: The project includes replacing the 106-year old bridge with a new bridge with 4 tracks. The existing bridge is located at Milepost 60 along the Northeast Corridor (NEC). The project would span between approximately Oak Interlocking at Milepost 63.5 in the south to Prince Interlocking at Milepost 57.3 to the north. The project is funded by a grant from the Federal Railroad Administration to the Maryland Dept. of Transportation and Amtrak is the owner of the railroad corridor and bridge.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Cecil, MD | Harford, MD

Endangered Species Act Species List

There are a total of 1 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Mammals	Status	Has Critical Habitat	Condition(s)
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

January 15, 2016

Mr. Dan Reagle
STATE OF MARYLAND
Maryland Transit Administration, Office of Planning
6 St. Paul Street, 9th Floor
Baltimore, Maryland 21202

RE: "Not Likely to Adversely Affect" northern long-eared bat determination; Susquehanna Rail Bridge Project in Cecil and Harford Counties, MD

Dear Mr. Reagle:

The U.S. Fish and Wildlife Service (Service) has reviewed your project information from the Service's Information for Planning and Conservation (IPaC) online system dated December 18, 2015. The Service has evaluated the potential effects of this project to the threatened northern long-eared bat (*Myotis septentrionalis*). The comments provided below are in accordance with Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

This project is within the range of the northern long-eared bat, a federally listed threatened species. The northern long-eared bat is a temperate, insectivorous migratory bat that hibernates in mines and caves in the winter and summers in wooded areas. Since the forest clearing for this proposed project is minimal, and there are no current records of northern long-eared bats in the project vicinity, this project as proposed is "not likely to adversely affect" the northern long-eared bat, therefore, there are no time of year restrictions on forest clearing.

Except for occasional transient individuals, no other Federal proposed or listed endangered or threatened species under our jurisdiction are known to exist within the project impact area. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

We appreciate the opportunity to provide information relevant to threatened and endangered fish and wildlife resources. This Endangered Species Act determination does not exempt this project from obtaining all permits and approvals that may be required by other State or Federal agencies.

If you have any questions or concerns regarding this letter, please contact Trevor Clark of my Endangered Species staff at (410) 573-4527 or by email at Trevor_Clark@fws.gov.

Sincerely,

G. La Rouche

Genevieve LaRouche
Supervisor

Maryland Department of Transportation
The Secretary's Office

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

James T. Smith, Jr.
Secretary

February 14, 2014

Mr. Tony Redman
Integrated Policy Review Unit
Department of Natural Resources
Tawes State Office Building, C-3
580 Taylor Avenue
Annapolis MD 21401

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Mr. Redman:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Reconstruction and Expansion Project proposes new and/or rehabilitated structures carrying up to four tracks across the river. The Project may also improve the navigation channel for marine users.

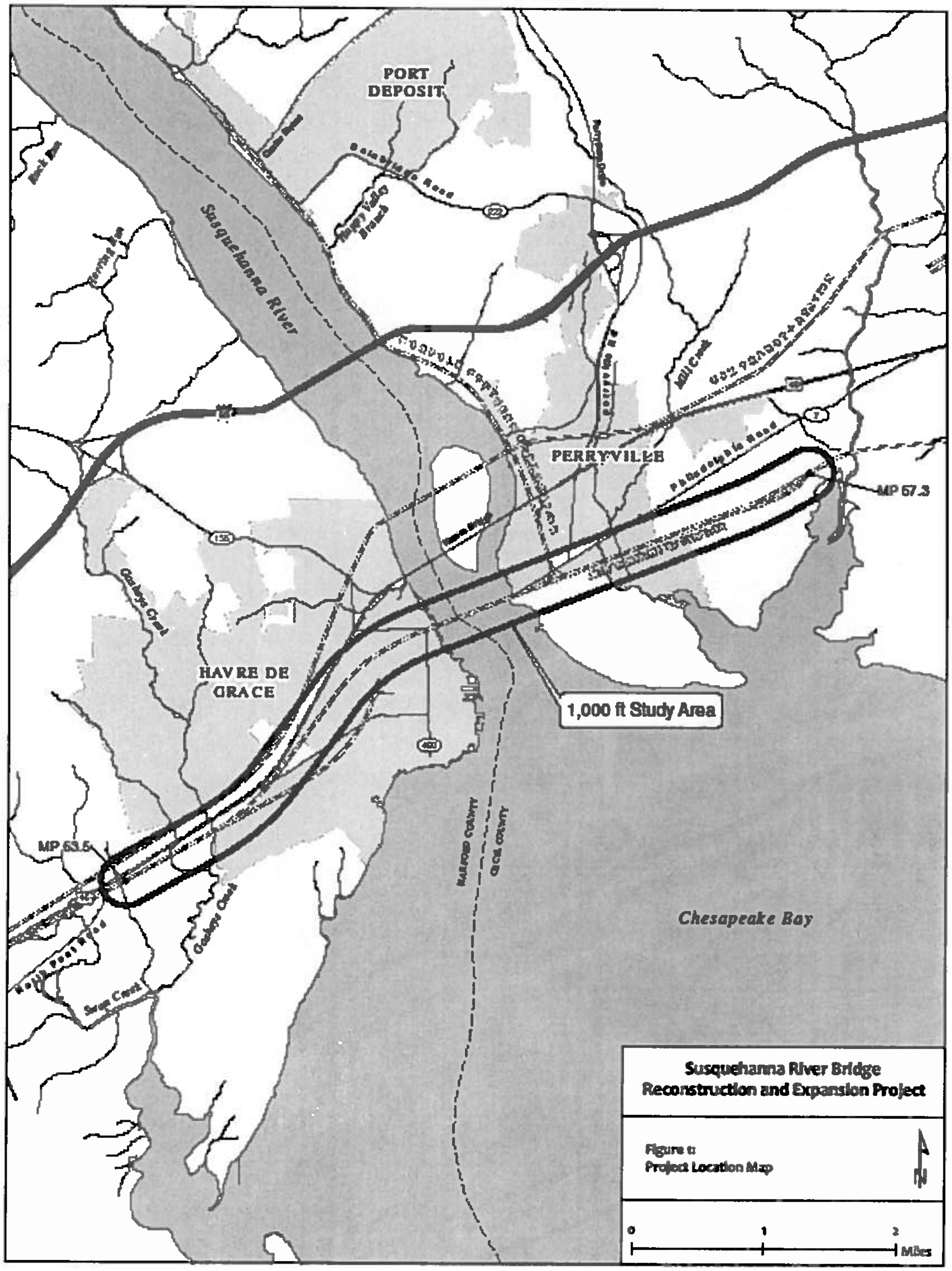
We request any information concerning state-listed threatened or endangered species and/or any unique habitat that may occur in the study area as shown in the attached map. If you have any questions or need additional information regarding this request, please contact me at 410-684-7063 or hromano@mdot.state.md.us. You may also contact Ms. Leslie Mesnick-Uretsky at 646-388-9756 or lmesnick@akrf.com. Thank you for your assistance.

Sincerely,

HRomano

Harry J. Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Mr. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration


PORT DEPOSIT
Susquehanna River
PERRYVILLE
HAVRE DE GRACE
1,000 ft Study Area
MP 67.3
MP 63.5
Chesapeake Bay
Philadelphia Road
Susquehanna River Bridge Reconstruction and Expansion Project
Figure 1:
Project Location Map
0
1
2
Miles

14-MIS-162

October 22, 2014

Harry Romano
Maryland Department of Transportation
7201 Corporate Center Drive
Hanover, MD 21076

Subject: Fisheries Information for the Proposed Susquehanna River Bridge Reconstruction and Expansion Project, in Harford and Cecil Counties, Maryland.

Dear Mr. Romano:

The above referenced project has been reviewed to determine fisheries species and aquatic resources in the vicinity of the proposed project. The proposed activities include the Susquehanna River Bridge Reconstruction and Expansion Project, in Harford and Cecil Counties, Maryland. Note that Maryland Department of Natural Resources is actively involved in the review and interagency coordination on this project, and that this response is only for the fisheries information coordination, and contains no other project analysis or comments.

Gasheys Creek and Mill Creek (Bush River Basin) and tributaries near the site are classified as Use I streams (Water Contact Recreation, and Protection of Aquatic Life). Susquehanna River (Lower Susquehanna River Basin) mainstem and tidal tributary reaches near the site 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).

Yellow perch, white perch, herring species, and shad species have been documented spawning near and/or migrating through the project study area. Where the presence of yellow perch has been documented along with these other anadromous fish species, generally no instream work is permitted in Use I streams during the period of February 15 through June 15, inclusive, during any year. Instream work in Use II waters that would suspend sediments in the water column, move sediments along the bottom, or create disturbances from sound or pressure waves should also not occur during the same period, February 15 through June 15, inclusive, of any year.

Principio Creek (Elk River Basin) and tributaries near the site are classified as Use III streams (Natural Trout Waters). Generally, no instream work is permitted in Use III streams during the period of October 1 through April 30, inclusive, during any year. Several very small tributaries to the Susquehanna River on the Cecil County side have been documented to support wild trout, either consistently, or occasionally. Survey work is ongoing in this region. Two new Use III stream designations in this area include Happy Valley Branch and all tributaries above US 222 in Cecil County, and an unnamed tributary to Susquehanna River crossing Frenchtown Road in

Cecil County (our attached map does not yet show these two new designations). As the bridge study proceeds, we will coordinate further on these small trout tributaries, based on determinations of potential impact areas for the project. If small tributaries may be impacted for approach work or infrastructure related to the bridge, additional coordination will be necessary for evaluating potential trout presence in the tributaries in this vicinity, and for setting Best Management Practices including instream work time of year restrictions.

The site is also near Submerged Aquatic Vegetation (SAV) beds in the Susquehanna River; no instream work that would suspend sediments in the water column or significantly disturb the bottom should occur from April 15 through October 15, inclusive, during any year, within 500 yards of documented SAV beds. Exact locations of current, recent, and historic SAV beds can be further coordinated during the project review. Field work will eventually be required to survey and map SAV beds in and near the work area.

Some of the streams near the site are listed as Tier II High Quality Waters, and may require additional restrictions or Best Management Practices. Please refer to the attached map for the location of Tier II streams and Use Classifications.

The smaller streams in the study area support many resident fish species documented by our Maryland Biological Stream Survey. MBSS data can be accessed via the MDDNR web page at http://www.dnr.state.md.us/map_template/streamhealth/index.html, allowing access to resource surveys in neighboring tributaries.

The Susquehanna River mainstem supports populations of several gamefish species, including striped bass, catfish species, walleye, and black bass. These species and other gamefish in the area spawn during the spring season referenced above for anadromous fish species, and should also be protected by the referenced corresponding instream work restriction period. Fishing activities for these species can occur year around.

Other important fisheries resources in this area include American eel presence, and potential presence of sturgeon (shortnose and Atlantic). American eels migrate upstream through this region to smaller streams where they grow to adult stages. Some eels may reside within the project study area long term. Their spawning runs then take them back through this area as they migrate downstream as adults to a specific region of the Atlantic Ocean to spawn. Special attention has been given to American eel management in recent years, due to their ecological and economic importance, and their declining numbers. The two sturgeon species are protected species, and have specific management requirements and efforts by National Marine Fisheries Service and US Fish and Wildlife Service, and cooperation with MD DNR. Further coordination with these three agencies will be required for these sturgeon species for this project.

Freshwater mussels are a category of aquatic species with growing focus, management effort, and protection methods. Some freshwater mussels are State listed as threatened or endangered. Our Wildlife and Heritage Service is the State lead for State listed freshwater mussel species. Since new field data is constantly being developed on freshwater mussels, and there is potential for these species to be found within the project area, further coordination will be necessary on potential mussel presence and Best Management Practices for protection as the project study continues.

As the above information demonstrates, this is a region and area very rich and diverse in fisheries and aquatic resources. This letter serves as an overall view for these resources, and MD DNR will remain available for further coordination on project and resource specifics as the study continues.

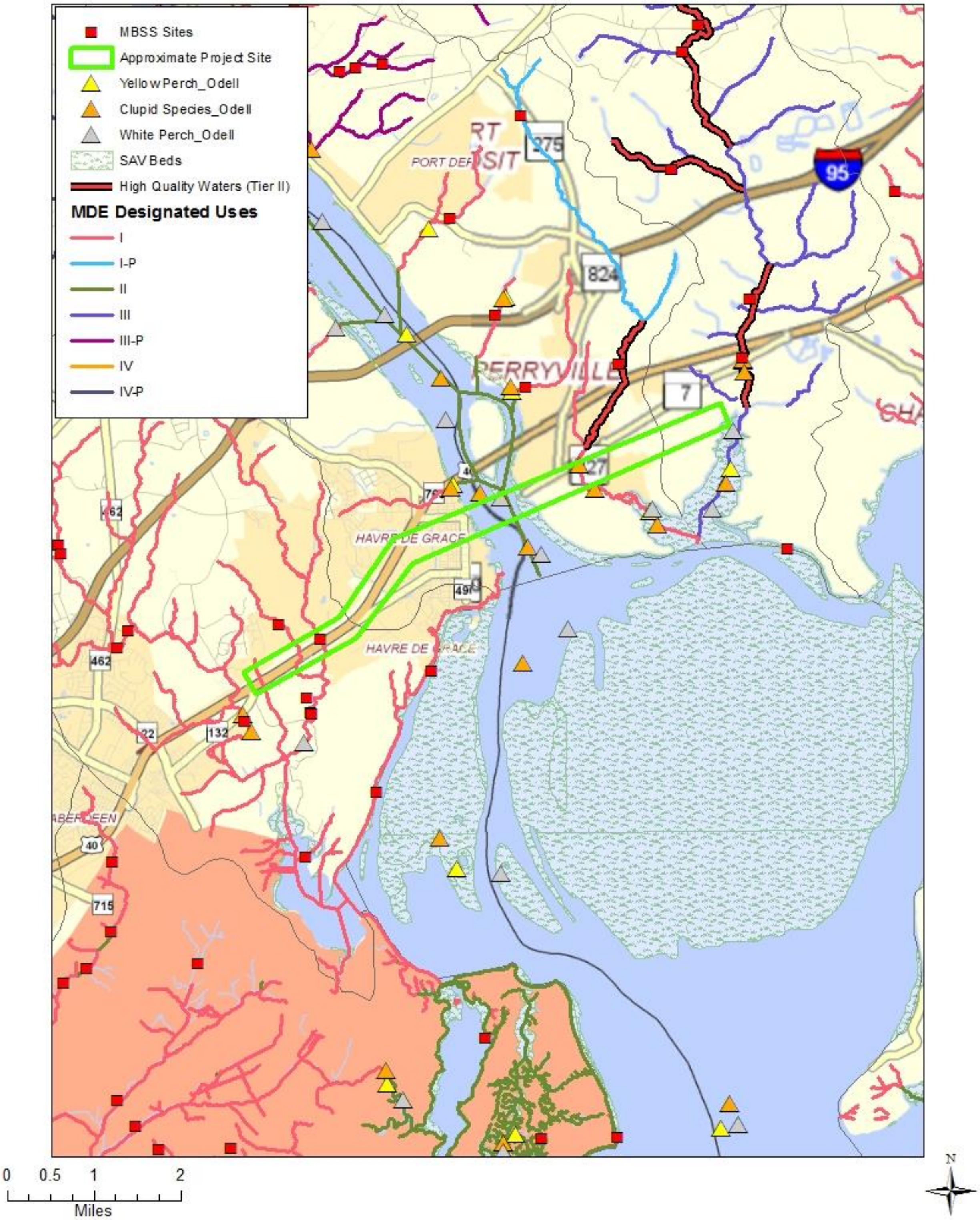
If you have further questions, please contact me at your convenience at 410-260-8331, or greg.golden@maryland.gov

Sincerely,

Gregory J Golden

Greg Golden
Project Review Division
Integrated Policy and Review Unit

cc: Lori Byrne, WHS, DNR



MBSS Sites
Approximate Project Site
Yellow Perch_Odell
Clupid Species_Odell
White Perch_Odell
SAV Beds
High Quality Waters (Tier II)
MDE Designated Uses
I
I-P
II
III
III-P
IV
IV-P
PORT DEP
PERRYVILLE
HAVRE DE GRACE
ABERDEEN
95
275
824
7
40
462
22
132
715
0
0.5
1
2
Miles
N

Maryland Department of Transportation
The Secretary's Office

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

James T. Smith, Jr.
Secretary

February 14, 2014

Mr. Bob Rosenbush
Maryland Department of Planning
Clearinghouse and Plan Review Unit
301 W Preston Street
Baltimore MD 21201

RE: Susquehanna River Bridge Reconstruction and Expansion Project
Harford and Cecil Counties, Maryland

Dear Mr. Rosenbush:

The Maryland Department of Transportation (MDOT) has received a grant from the Federal Railroad Administration (FRA) to support Preliminary Engineering and Environmental Documentation to expand and reconstruct Amtrak's Susquehanna River Bridge, which carries passenger and freight rail traffic on two electrified tracks along an integral part of the Northeast Corridor (NEC). Due to the bridge's age, condition, and increases in rail traffic, it is expected that rehabilitation, replacement, and/or expansion will be necessary. The Susquehanna River Bridge Project proposes new and/or rehabilitated structures with up to four-track total capacity crossing the river. The project may also improve the navigation channel for marine users. A project location map is attached for your reference.

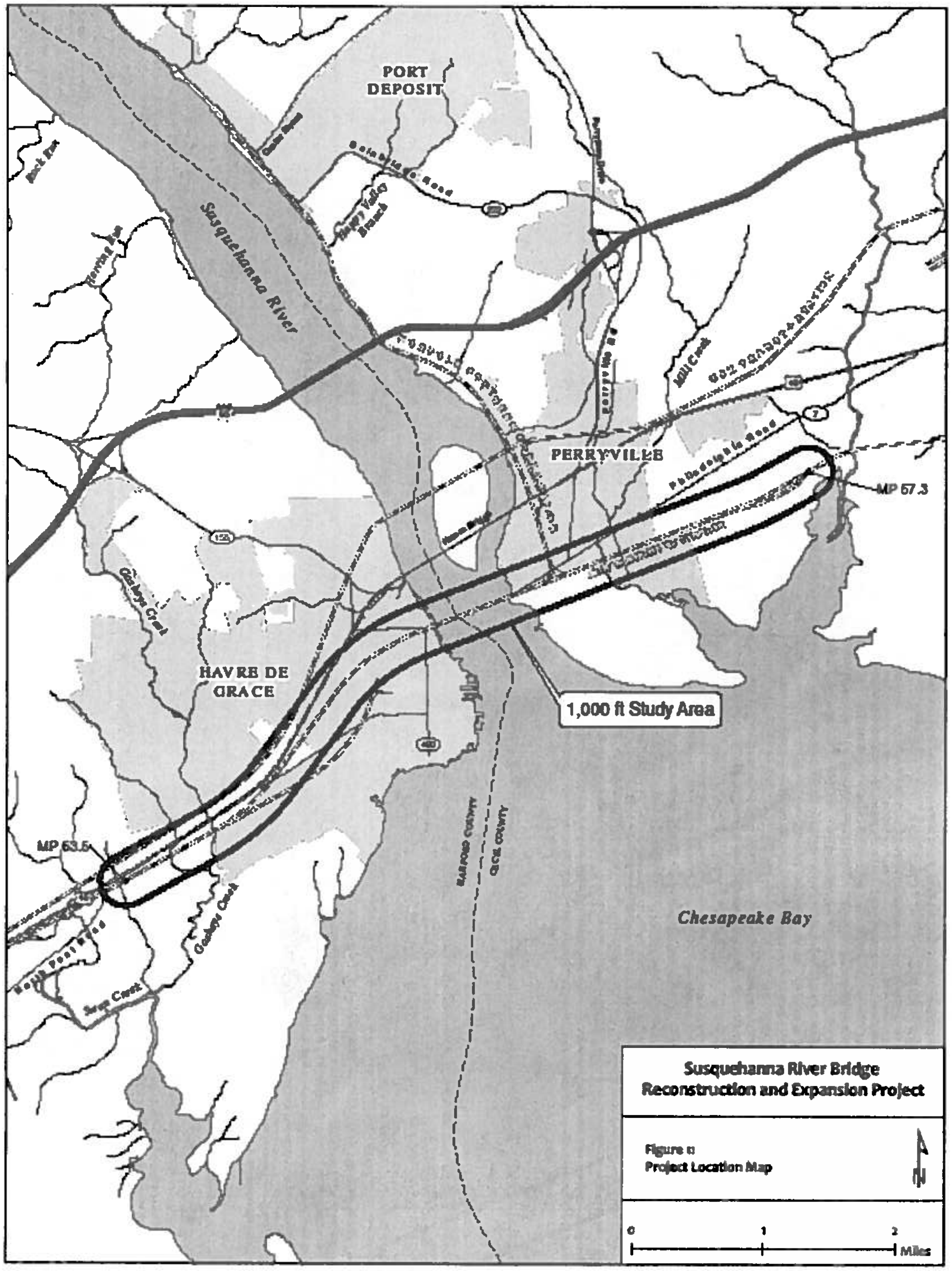
The Project team has initiated conceptual engineering and preliminary environmental studies. Agency coordination is ongoing, including plans to present current project efforts at the February 19, 2014 Interagency Review Meeting (IRM) at the Maryland State Highway Administration (SHA) Headquarters in Baltimore. A public information session is planned for early spring 2014. With the Project in the preliminary planning phase, we request that the Clearinghouse distribute this letter to member agencies for initial comment. If you require additional information, please contact me at 410-684-7063 or hromano@mdot.state.md.us. Thank you for your assistance.

Sincerely,

HRomano

Harry Romano
Rail Program and Policy Manager
Office of Freight and Multimodalism

cc: Mr. Adam Denton, Federal Railroad Administration
Ms. Michelle Fishburne, Federal Railroad Administration
Ms. Amrita Hill, Amtrak
Mr. Craig Rolwood, Amtrak
Ms. Angela Willis, Maryland Transit Administration


PORT DEPOSIT
Susquehanna River
PERRYVILLE
HAVRE DE GRACE
MP 57.3
MP 63.5
1,000 ft Study Area
Chesapeake Bay
Susquehanna River Bridge
Reconstruction and Expansion Project
Figure
Project Location Map
0
1
2
Miles

U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

November 28, 2016

NOAA's National Marine Fisheries Service
Protected Resources Division
55 Great Republic Drive
Gloucester, MA 01930

Attn: Mrs. Kimberly Damon-Randall

Re: Request for Informal Consultation under Section 7 of the Endangered Species Act (ESA) for the Susquehanna River Rail Bridge Project

Dear Mrs. Kimberly Damon-Randall,

This letter is to request informal consultation under Section 7(a)(2) of the Endangered Species Act (ESA) for the activities proposed to construct the Susquehanna River Rail Bridge Project (an earlier, brief letter request was submitted on May 10, 2016). The Federal Railroad Administration (FRA), as part of the project team with Maryland Department of Transportation (MDOT) and Amtrak, has determined that the proposed activity may affect, but is not likely to adversely affect, listed species under jurisdiction of the NMFS, as defined in the 1973 Endangered Species Act (ESA). Additionally, we have determined the project is not likely to adversely affect critical habitat – existing or proposed. We request NMFS concurrence with these determinations.

The Project Team is transmitting a Natural Resources Technical Report (NETR) for your review and to initiate informal consultation. Detailed project activities and supporting analysis are provided in the referenced electronic copy of the NETR. A summary is provided below.

Proposed Project

The Maryland Department of Transportation (MDOT) is proposing to replace the Susquehanna River Rail Bridge between the City of Havre de Grace in Harford County, Maryland and the Town of Perryville in Cecil County, Maryland.

FRA and MDOT are preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential environmental impacts of the Susquehanna River Rail Bridge Project (the "Proposed Project"). FRA is funding preliminary engineering and NEPA analysis for the project. The National Passenger Railroad Corporation (Amtrak), as bridge owner and operator, is providing conceptual and preliminary engineering designs in coordination with MDOT and FRA.

Currently, the Proposed Project is not funded for construction. Should the Proposed Project receive future federal funding for construction, the intent is that FRA or another lead federal agency could rely on the environmental analysis that has been conducted at this preliminary engineering stage, i.e., that the future construction project would be "NEPA ready."

The existing Susquehanna River Rail Bridge is located along Amtrak's Northeast Corridor (NEC). The Preferred Build Alternative 9A would construct two new bridges with two tracks each—one along the existing alignment and one along a new western alignment. The bridge to the west of the existing alignment would allow speeds of up to 90 miles per hour (mph). The new bridge along the existing alignment would allow speeds of up to 160 mph. The Preferred Alternative would entail the decommissioning and removal of the existing bridge as well as the removal of remnant piers from an earlier bridge structure slightly downstream.

The existing bridge is 110 years old, has functionally-obsolete and aging infrastructure, speed and capacity constraints, operational inflexibility, maintenance difficulties, and presents conflicts with maritime uses.

Based on the work that needs to be completed prior to the contractor procurement, the Proposed Project schedule assumes that contracted construction would commence in 2019, subject to project funding. The schedule for the Proposed Project would include in-water restrictions, and other limitations likely to be required by permits. Anticipated stream closure periods prohibit in-stream work from February 15 through June 15 for protection of fish spawning or migration in tidal Use II streams and April 1 through October 15 within designated SAV areas. With these potential schedule limitations, the FRA and MDOT anticipate that construction work for the project could be completed over five-years.

Construction would require in-water work with the potential to re-suspend bottom sediment, resulting in minimal, temporary, and localized effects on water quality of the Susquehanna River in the vicinity of the Proposed Project site. These activities include the following:

<u>Construction of temporary finger piers</u>. Finger piers would be used to connect to access roads for optimum movement of equipment, as well as to avoid the need for dredging. These temporary piers would remain for the majority of the construction period (3 to 5 years). Construction of the proposed temporary finger piers would eliminate the need for dredging that would otherwise be required for construction barges to access the Proposed Project site, and would thereby avoid the more substantial disturbance to river sediments that would be caused by dredging. Finger piers would likely be supported by up to 180 small (18 to 24 inches) steel pipe piles. Following best management practices (BMPs) 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 using a vibratory driver to advance the piles to resistance. Piles would be impact driven to their final elevation. The project team anticipates duration of impact pile driving at less than 5 to 10 minutes per pile. Crews would install an average of 6 piles each day. At this rate there would be an average daily duration of 1 hour of

impact pile driving and not likely more than 2 hours per day. To minimize underwater noise levels, a wooden cushion block would be used, which would provide approximately 11 to 24 dB of noise attenuation. In addition, impact hammering would begin with a series of light taps of gradually increasing power, 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 prior to exposure to injurious noise levels (FHWA 2003).

Construction of west and east replacement bridge piers. The new girder approach / arch main span bridge would have a total of 37 in-water piers (with a pier diameter of 5.67 feet for all piers except piers 13 and 14 at 6.67 feet). 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. The construction approach used for each pier pairing would depend on the location of the pier in relation to water depth. In deeper waters, drilled caissons (concrete-filled steel pipe piles) would be used for the pier construction and in shallower waters cofferdams would be utilized. Pile drilling results in minimal river bottom disturbance relative to other large-diameter pile installation methods. No dredging, sheet pile cells, or cofferdams would be required with the exception of the deep-water piers (Piers 3 and 4) that would potentially require a cofferdam during construction.

Demolition of the existing bridge and remnant piers. There are currently 16 in-water piers supporting the existing bridge and 13 remnant piers just downstream of the existing bridge that were left in place following demolition of the 1866 Philadelphia, Wilmington & Baltimore Railroad (PW&B) bridge. During demolition, the existing bridge would be dismantled by removing parts of the superstructure by barge or crane. The existing piers would be removed with an excavator and their support piles would either be cut two feet below the mud line with a wire saw or demolished by blasting inside a temporary cofferdam. Use of turbidity curtains and floating booms during the bridge removal activities would minimize the potential for resuspended sediment to result in significant adverse impacts to water or sediment quality.

Description of the Action Area

The Susquehanna River Rail Bridge is located along the Chesapeake Bay near the mouth of the Susquehanna River, at river Milepost 1. The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50CFR§402.02). For this project, an area, 1,000-feet upstream and 1,000 feet downstream of the current rail right-of-way, was evaluated for potential impacts to forests and wetlands. The project team identified 22 waters of the U.S. within this area. The majority of the identified systems included nontidal forested wetlands within the floodplain of lower and upper perennial streams that drain to the Chesapeake Bay, Susquehanna River, or Furnace Bay. 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, which drain directly to streams or forested wetlands along the streams. Two identified forested wetlands and one emergent wetland appeared to be hydrologically isolated. Two systems were identified as tidal emergent or forested wetlands, one along the Susquehanna River and the other along the perimeter of Furnace Bay. Other habitat in the action area is described in detail in the NETR.

The study area for aquatic resources in the Susquehanna River was the larger area of 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 (see Figure E-6 in the NETR). The aquatic resources study area also included 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.

NMFS Listed Species (and Critical Habitat) in the Action Area

The shortnose sturgeon (Acipenser brevirostrum) and Atlantic sturgeon (Acipenser oxyrinchus), were identified by NMFS as endangered species that may occur within the action 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 action 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 species that also occurs along the Atlantic coast of North America in estuaries and large rivers, including the Susquehanna (Chesapeake Bay). On February 6, 2012, certain Distinct Population Segments were designated as federally endangered. Atlantic sturgeon from the Chesapeake Bay and New York Bight Distinct Population Segment may occur in the action area. 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 action area, and are most likely to occur between April and June, they are not found in exceptionally high abundance (USFWS 2007 Atlantic sturgeon reward program). Atlantic sturgeon may occur in the action 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) and there is no hard-bottom spawning habitat present within the action area; therefore, Atlantic sturgeon eggs, larvae, and early juveniles are not expected to occur in the action area. On June 3, 2016, NMFS proposed a rule to designate critical habitat for three listed distinct population segments (DPSs) of Atlantic sturgeon found in U.S. waters (Gulf of Maine, New York Bight, and Chesapeake Bay DPSs) under GARFO jurisdiction (81 FR 35701). The proposed action occurs within the proposed Susquehanna River area.

Effects Determination

The work planned for the Susquehanna River Rail Bridge is within the known and expected range of shortnose sturgeon and Atlantic sturgeon. Both species are susceptible to the anticipated effects (i.e., increased turbidity, habitat modification, and vessel interactions). Construction or operation of the replacement bridges would not be expected to result in significant changes to water quality or other aquatic habitat parameters that would affect aquatic organisms. As described in detail in the attached NETR, the proposed action may affect, but is not likely to adversely affect shortnose sturgeon (*Acipenser brevirostrum*) or any of the Distinct Population Segments of Atlantic sturgeon (*Acipenser oxyrinchus*) that may be present in the action area. The table contained in this letter summarizes the total potential effects on natural resources from the Susquehanna River Rail Bridge Project.

Turbidity and Water Quality

Bottom disturbance during the construction of the in-water elements would have the potential to result in temporary sediment resuspension, and in turn, increased turbidity. However, any such effects would be highly localized and temporary, and would be expected to dissipate quickly, such that no significant or long-lasting changes in turbidity or other water quality parameters would occur. As the total suspended solids (TSS) will not reach levels that are toxic to benthic communities, the proposed action is extremely unlikely to result in reductions in the quality or quantity of sturgeon prey currently available. TSS is most likely to affect sturgeon if a plume creates a barrier in the waterway, and/or triggers an alteration of normal behaviors. However, because of turbidity curtains, sturgeon will not be exposed to elevated levels of resuspended sediment. Based on this, and the best available information, we conclude that when added to the baseline conditions, the effects of suspended sediment will be too small to be meaningfully measured or detected, and are therefore insignificant. The project will have no effect on salinity. No impacts to dissolved oxygen or temperature are anticipated.

Habitat Modification

The action area consists of soft substrate that may support benthic prey organisms. Sturgeon could opportunistically forage in the action area based on current conditions. The only activities that will impact soft substrate are pile installation. The estimated acreage of habitat loss due to the pile footprints of the bridge piers is <0.1 acres. The area of permanent habitat loss is therefore equivalent to <0.1% of the available soft-sediment benthic habitat in the action area and an even smaller percentage of the total soft-sediment benthic habitat in the Susquehanna River. Given the small size of the bridge piers and the extremely small loss of soft-bottom benthic habitat, effects of habitat modification will be too small to be meaningfully measured or detected, and are therefore insignificant.

The proposed action will not affect the habitat in a way that impedes the movements of spawning adults or juveniles; this is because it will not alter the depth of the action area in a way that makes the area inaccessible or will result in the placement of physical barriers to passage. While the project will result in additional structures in the water, neither the existing bridge piers, nor the replacement piers to be constructed, are likely to impede the movements of juvenile or adult sturgeon, as fish monitored with acoustic tags in the action area were unaffected and the new piers are designed to minimize surface area.

Acoustic Impacts

The installation and removal of steel piles using impact and vibratory hammers will produce sound pressure waves and therefore may affect aquatic species, including sturgeon. Underwater sound pressure waves can injure or kill fish (Reyff 2003; Abbott and Bing-Sawyer 2002; Longmuir and Lively 2001; Stephenson et al. 2010; Stotz and Colby 2001). Effects to fish can range from temporary startle resulting in avoidance of an area to death due to injury of internal organs, such as swim bladders. The type of hammer (i.e., vibratory hammer vs. impact hammer), size of the organism (smaller individuals are more susceptible to effects), and distance from the sound source (i.e., sound dissipates over distance, so noise levels are greater closer to the source) all contribute to the likelihood of effects to the individual.

During unattenuated impact pile driving of steel pipe piles for temporary finger piers, underwater noise levels associated with the potential onset of physiological injury to fish (i.e., 206 dB re: 1μPa SPL_{peak}) would extend up to 50 feet from the pile[1]. The use of a wooden cushion block during impact pile driving would provide approximately 11 to 26 dB of noise attenuation, which would reduce the extent of the ensonified (sound-filled) area to within less than 33 feet of the pile. Given the small extent of the 206 dB SPL_{peak} noise isopleth, injurious effects to sturgeon in the action area are extremely unlikely and therefore discountable. The potential impacts of underwater noise would be further minimized if the impact pile driving was conducted between July and December, when sturgeon are less likely to occur in the action area.

Underwater noise levels associated with the potential onset of behavioral effects to fish (i.e., 150 dB re: 1μPa SPL_{rms}) would extend across the river during unattenuated impact pile driving of piles and approximately 1,800 feet (i.e., 50% of the river width within the action area) if a wooden cushion block was used to attenuate noise levels. These noise levels would only occur over a period of 1 to 2 hours per day. If an average of 6 piles were driven per day and 3 days of impact pile driving occurred each week, then impact pile driving would be completed within 2.5 months. The most likely response of sturgeon to the underwater sound produced during pile driving for the finger piers would

[1] Noise isopleth estimates were made using the GARFO Acoustics Tool for analyzing the effects of pile driving on ESA-listed species in the Greater Atlantic Region.

Potential Effects on Natural Resources from the Susquehanna River Rail Bridge Project			
Resource Type	**Resource Category**	**Alternative 9A**	**Alternative 9B**
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 from bridge piers and construction (e.g., includes temporary finger pier and cofferdam impacts owing to length of construction)	0.61	0.61

Critical Habitat

A proposed rule regarding the designation of critical habitat for the Chesapeake Bay Distinct Population Segment (DPS) of the Atlantic sturgeon was published in the Federal Register on June 3, 2016. The proposed critical habitat includes the entirety of the action area. Once critical habitat is proposed, the requirement to conference is in place. Conference is required when a proposed action is likely to result in the destruction or adverse modification of proposed critical habitat. We have determined that conference is not necessary; here, we consider the impacts of the proposed action on critical habitat proposed for designation for the Chesapeake Bay DPS.

The critical habitat designation is for habitats that support successful Atlantic sturgeon reproduction and recruitment. In order to determine if the project may affect critical habitat, we consider whether it would impact the habitat in a way that would affect its ability to support reproduction and recruitment. Specifically, we consider the effects of the project on the physical and biological features of the proposed critical habitat. The be temporary avoidance of the area (AKRF and Popper 2012a,b). Behavioral avoidance by sturgeon would be temporary and limited to 1 to 2 hours during impact pile driving on any given day. Because the extent of the 150 dB SPL_{rms} isopleth is greater than the extent of the 187 dB re: $1\mu Pa^2 \cdot s$ cSEL isopleth (i.e., the potential onset of physiological injury due to prolonged sound exposure), sturgeon would avoid the ensonified area and would not likely be exposed to noise levels exceeding the 187 dB cSEL threshold.

Should sturgeon move into the action area where the 150 dBRMS isopleth extends, as described above, it is reasonable to assume that a sturgeon, upon detecting underwater noise levels of 150 dBRMS, will modify its behavior such that it redirects its course of movement away from the ensonified area and therefore, away from the project site. If any movements away from the ensonified area do occur, it is extremely unlikely that these movements will affect essential sturgeon behaviors (e.g., spawning, foraging, resting, and migration), as the area is not a spawning or overwintering area, and the Susquehanna River is sufficiently large enough to allow sturgeon to avoid the ensonified area while continuing to forage and migrate. Given the small distance a sturgeon would need to move to avoid the disturbance levels of noise, any effects will not be able to be meaningfully measured or detected. Therefore, the effects of noise on sturgeon are insignificant.

Increased Vessel Traffic

The proposed project may result in a temporary increase in vessel traffic in the action area; however, at this time, the exact number of project vessels operating within the action area at any given time and the precise number of operating hours for those vessels are not known. At a minimum, the project will utilize work barges, delivery barges, and crew vessels (with personnel lifts). The drafts of these vessels are not likely to exceed 6 to 8 feet in most cases. Water depths within most of the action area range from 20 to 50 feet at mean lower low water. Therefore, the vessel clearance above the river bottom would be at least 12 feet. The factors relevant to determining the risk to listed species from vessel strikes vary, but may be related to the size and speed of the vessels, navigational clearance (i.e., depth of water and draft of the vessel) in the area where the vessel is operating, and the behavior of fish in the area (foraging, migrating, etc.). 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 and below 15 feet from the water's surface for Atlantic sturgeon (Balazik et al. 2012), vessel interaction with sturgeon is extremely unlikely and, therefore, discountable.

essential features identified in the proposed rule are:

- suitable hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand range) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- transitional salinity zones of 0.5-30 parts per thousand inclusive of waters with a gradual downstream gradient and soft substrate (e.g., sand, mud) downstream of spawning sites for juvenile foraging and physiological development;
- water depth of up to 27 meters absent physical barriers to passage (e.g., locks, dams, reservoirs, gear, etc.) between the river mouth and spawning sites for unimpeded movements of spawning adults as well as seasonal and physiological-dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary, and;
- water with the temperature, salinity, and oxygen values that, combined, provide for dissolved oxygen values that support successful reproduction and recruitment (e.g., 6 mg/L for juvenile rearing habitat) and are within the temperature range that supports the habitat function (e.g., 13 to 26° C for spawning habitat and no more than 30° C for juvenile rearing habitat).

The first feature (hard bottom habitat with salinity less than 0.05 ppt) is not present in the action area.

The remaining three features are present in the action area. The only activity remaining as part of the proposed action that will impact soft substrate is pile installation. The estimated acreage of habitat loss due to the pile footprints of the bridge piers is <0.1 acres. The area of permanent habitat loss therefore is equivalent to <0.1% of the available soft-sediment benthic habitat in the action area and an even smaller percentage of the total soft-sediment benthic habitat in the Susquehanna River. Given the small size of the bridge piers and the extremely small loss of soft-bottom benthic habitat, effects will be insignificant.

The proposed action will not affect the habitat in a way that impedes the movements of spawning adults or juveniles; this is because it will not alter the depth of the action area in a way that makes the area inaccessible or result in the placement of physical barriers to passage. While the project will result in additional structures in the water, neither the existing bridge piers, nor the replacement piers to be constructed, would impede the movements of juvenile or adult sturgeon, as fish monitored with acoustic tags in the action area were unaffected and the new piers are designed to minimize surface area.

The project will have no effect on salinity. No impacts to dissolved oxygen or temperature are anticipated. Effects to water quality are extremely unlikely to occur and are, therefore, discountable.

In sum, it is not expected that the temporary loss of a minimal amount of soft substrate that could be used for juvenile foraging would result in a direct or indirect alteration of the proposed critical habitat that appreciably diminishes the value of the critical habitat for the conservation of Atlantic sturgeon. Therefore, we do not anticipate the destruction or adverse modification of the proposed critical habitat and conference with NMFS is not necessary.

Conclusion

Overall, we have determined that the Susquehanna River Rail Bridge Project may affect, but is not likely to adversely affect, any listed species, or pending critical habitat, under NMFS' jurisdiction. We request your concurrence with our determinations for these species, and hereby request informal consultation under Section 7 of the ESA. Please contact me, FRA Environmental Protection Specialist, at (202) 493-0844 or by email at Brandon.Bratcher@dot.gov.

Thank you for your assistance with this project.

Sincerely,

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Literature Cited

All references are included in the referenced electronic copy of the NETR.

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